

2015-2025

MMM – City Wide Integrated Public Transport Plan



Annexure S - OO



INTEGRATED
PUBLIC
TRANSPORT
NETWORK

Content

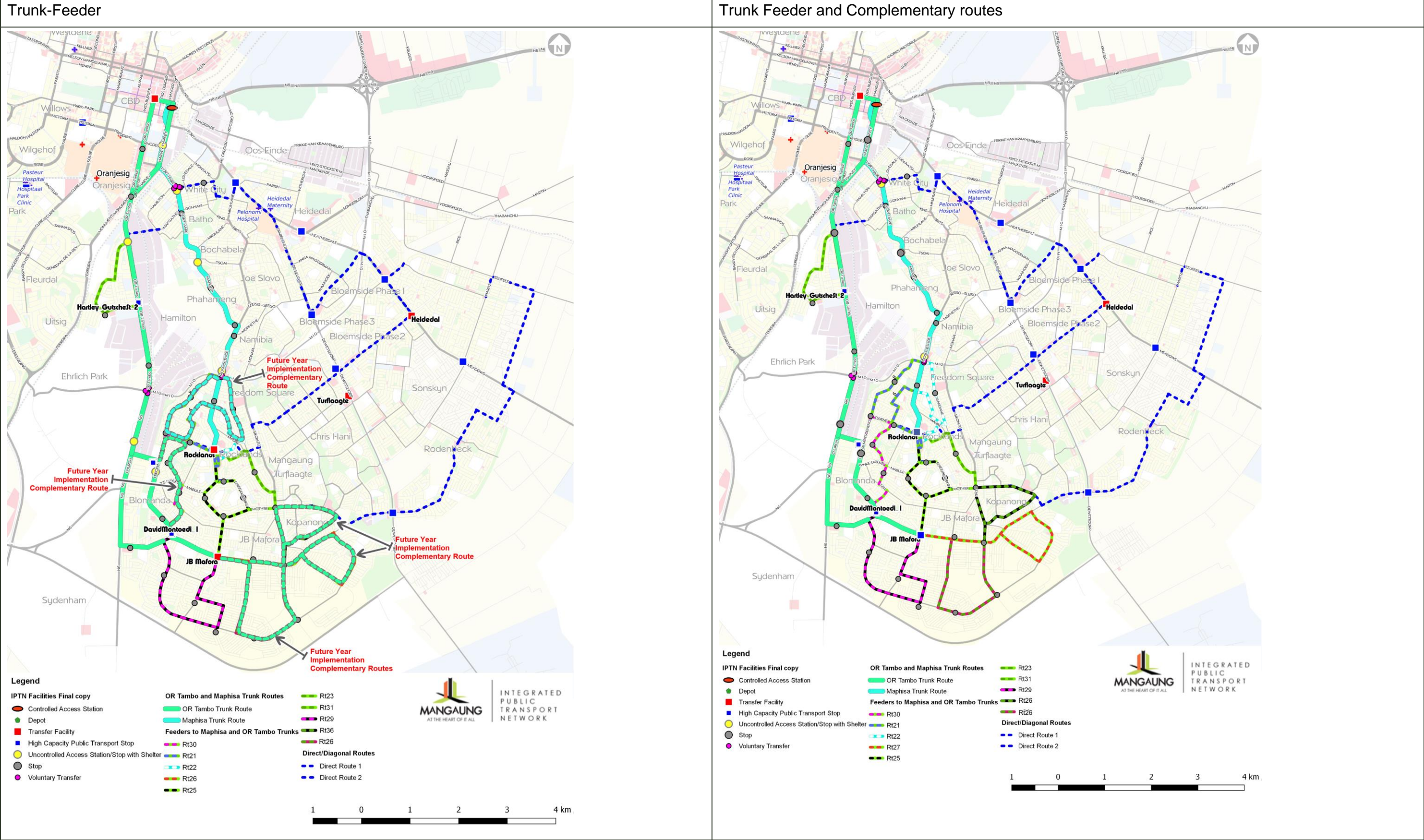
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S Annexure S: First Order Mode Selection

Daily Pax	Distance(km)*	Peak Hour	First Order Mode selection	Peak Hour	First Order Mode selection	Peak Hour	First Order Mode selection	Peak Hour	First Order Mode selection	Veh Volume Peak Direction Peak Hour (Private and Heavy Exclude PT)	Lanes	Veh Volume Peak Direction Peak Hour (Private and Heavy Exclude PT) 2025	Veh Volume Peak Direction Peak Hour (Private and Heavy Exclude PT) 2036
Dr Belcher	14 km	2836		3726		3429		3429		900	2	1054	1311
Dr Belcehr Meadows	11 km	1946		2557		2353		2353		900	2	1054	1311
Dr Belcher Direct routes	10-16 km	778		1023		941		941		150	1	176	219
Maphisa	11 km	1869		1931		1989		2314		800	2	937	1165
OR Tambo	14 km	2033		2033		2164		2517		1200	2	1406	1748
CBD (Zastron/Nelson Mandela, Harvey, Hanger Street)	6 -18 km	857		1352		1390		1393		1500	2	1757	2185
Botshabelo	55 km	2998		3105		3312		3551		250	1	293	364
Thaba Nchu	68 km	1196		3924		3352		3388		300	1	351	437

T Annexure T: Route Design Options Per Functional Public Transport Corridor Route Design Options per Functional Public Transport Sub-Corridor

T.1 Maphisa_OR Tambo Route Design- Maps

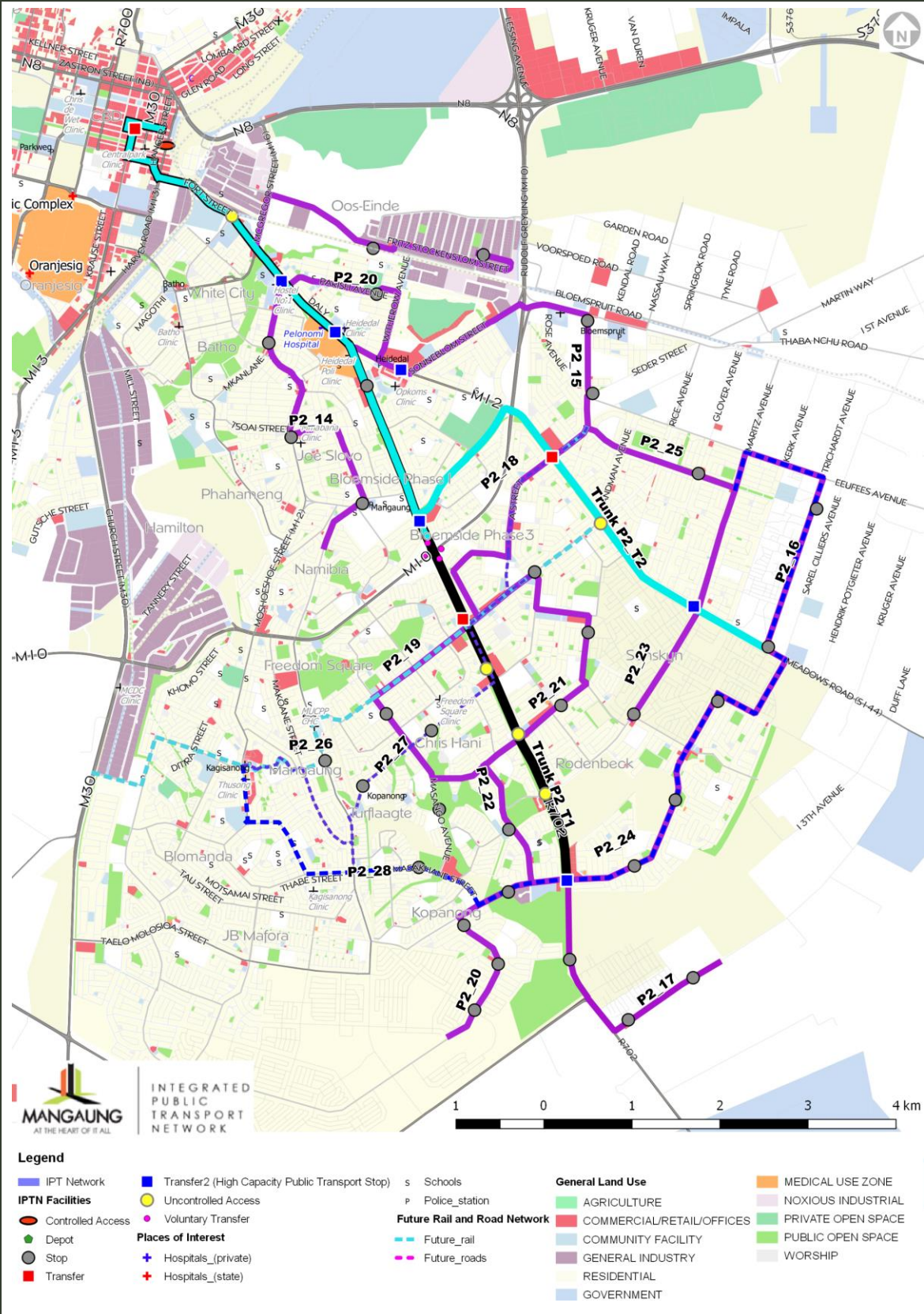


T.2 Maphisa_OR Tambo Route Design- Tables

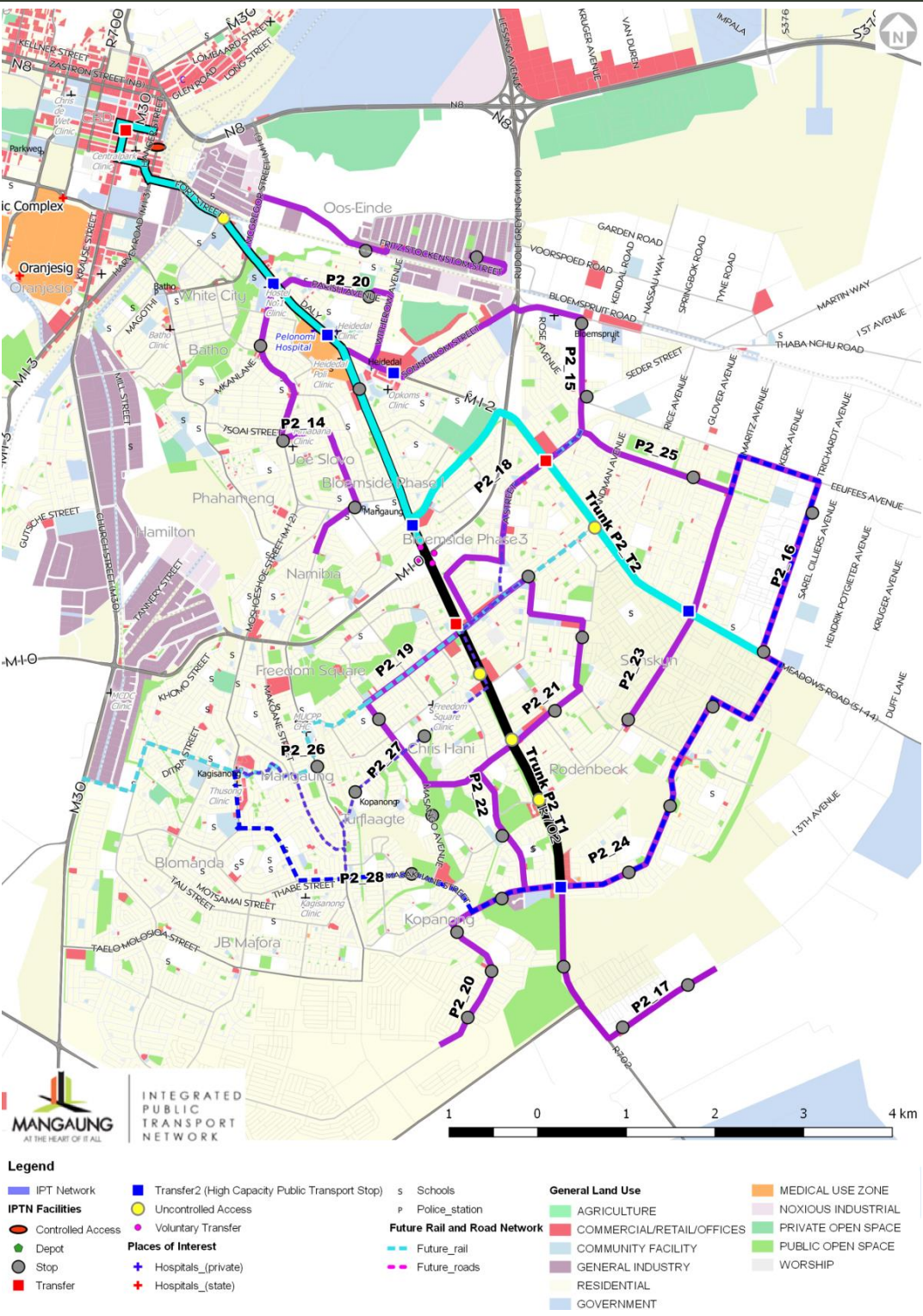
Route Number	Route Length	2020/21	21/22	23/24	
Maphisa T1	8	Trunk	Trunk	Trunk	8
Rt 21	3	Feeder	Complementary	Complementary	12.3
Rt 22	2.5	Feeder	Complementary	Complementary	12.5
Rt 23	2.2	Feeder	Feeder	Feeder	2.2
Rt 25	2.7	Feeder	Feeder	Feeder	2.7
OR Tambo Trunk	14	Trunk	Trunk	Trunk	14
Rt26	3	Feeder	Complementary	Complementary	17
Rt27	3	Feeder	Complementary	Complementary	17.4
Rt30	2.4	Feeder	Complementary	Complementary	16.4
Rt31	2	Feeder	Complementary	Complementary	10.5
Direct Route 1	8	Direct/Diagonal	Direct/Diagonal	Direct/Diagonal	8
Direct Route 2	11.6	Direct/Diagonal	Direct Route Diagonal	Direct Route Diagonal	11.6

T.3 Dr Belcher - Route Design Maps

Trunk-Feeder



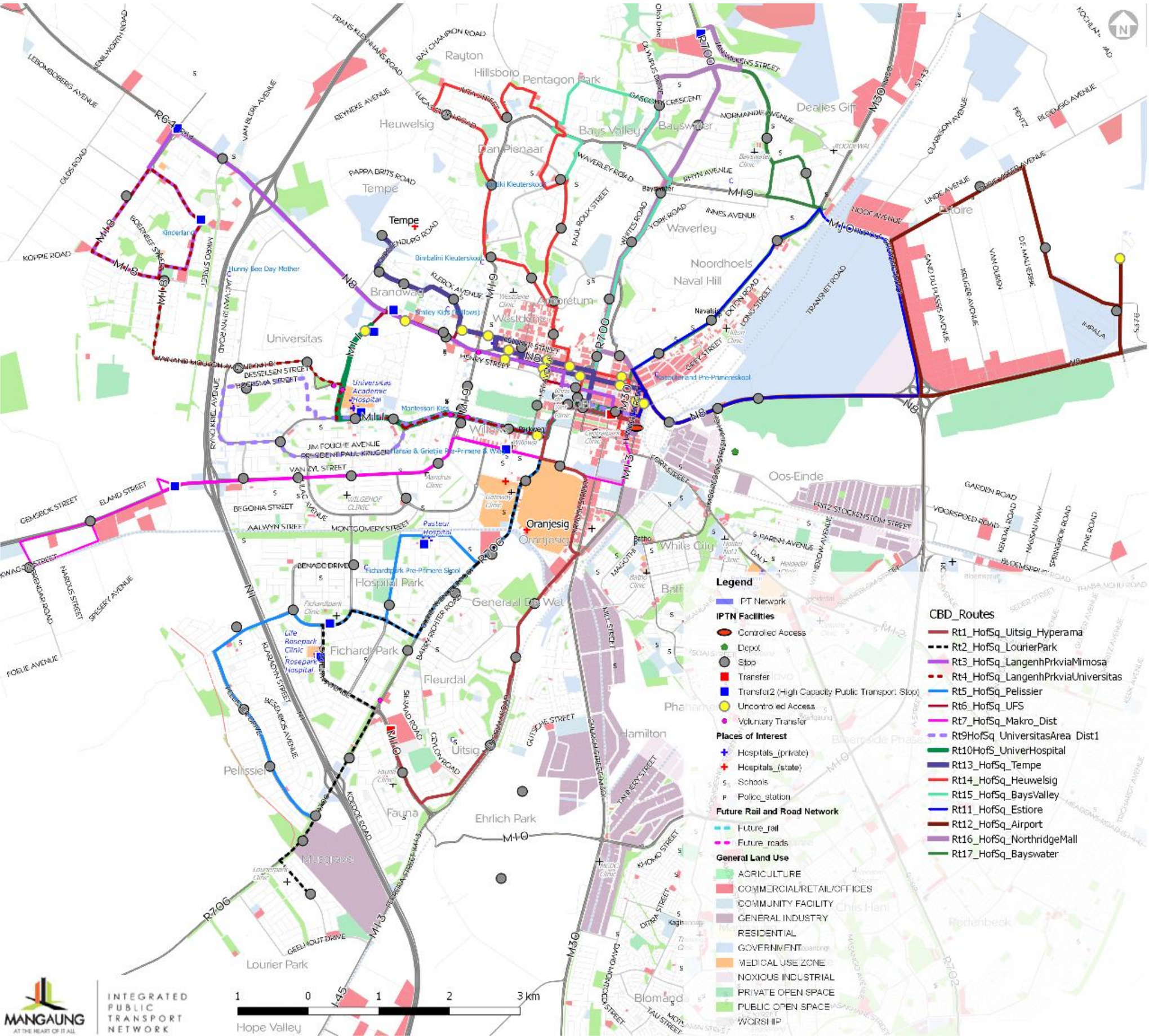
Trunk Feeder and Complementary routes



T.4 Dr Belcher - Route Design Tables

	Length One Direction (km)	2024/25	2026/27	2027/28	2028/29	Length One Directio n (km)
P2_T1	10.9	Trunk			Trunk	10.9
P2_T2	14.4	Trunk			Trunk	14.4
P2_14	5.1	Feeder	Complementar y	Complementa ry	Complementary	9.2
P2_15	4.3	Feeder			Feeder	4.3
P2_16	5.8	Feeder			Feeder	5.8
P2_17	6.8	Feeder	Feeder	Complementa ry	Complementary	9.7
P2_18	3.7	Feeder			Feeder	3.7
P2_19	3.5	Feeder	Feeder	Complementa ry	Complementary	11.5
P2_20	2.2	Feeder			Feeder	2.2
P2_21	3.9	Feeder	Feeder	Complementa ry	Complementary	13.6
P2_22	5.6	Feeder			Feeder	5.6
P2_23	5.6	Feeder			Feeder	5.6
P2_24	1.4	Feeder			Feeder	2.3
P2_25	2.1	Feeder	Feeder	Feeder	Complementary	2.1
P2_26	3.7	Direct Route			Direct Route	13.0
P2_27	9.9	Direct Route			Direct Route	9.9
P2_28	8.8	Direct Route			Direct Route	8.8

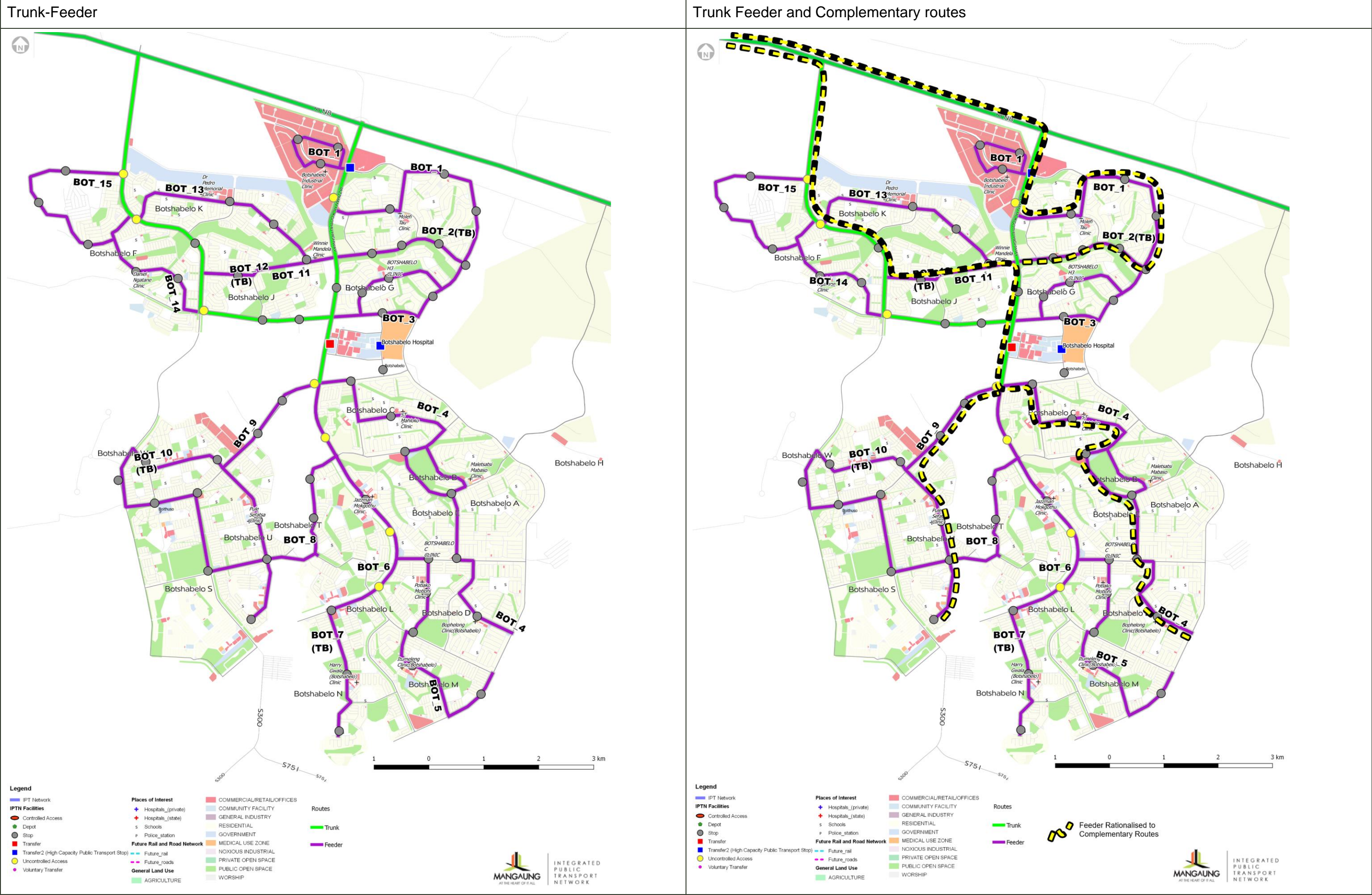
T.5 CBD - Route Design Maps



T.6 CBD - Route Design Tables

Route No.	Route Description	Distance One-way	2019/20	2025/26	2026/27
Rt1	Hoffman Square to Uitsig and Hyperama	9			✓
Rt10	Hoffman Square to Universitas Hospital	7		✓	
Rt11	Hoffman Square to Estiore	7			✓
Rt12	Hoffman Square to Airport	7			✓
Rt13	Hoffman Square to Tempe	7	✓		
Rt14	Hoffman Square to Heuwelsig	8		✓	
Rt15	Hoffman Square to Bays Valley	7		✓	
Rt16	Hoffman Square to Northridge Mall	7		✓	
Rt17	Hoffman Square to Bayswater	8		✓	
Rt2	Hoffman Square to Lourier Park	10			
Rt3	Hoffman Square to Langenhoven Park via Mimosa	12		✓	
Rt4	Hoffman Square to Langenhoven Park via Universitas	12		✓	
Rt5	Hoffman Square to Pellissier	12			✓
Rt6	Hoffman Square to UFS	5	✓		
Rt7	Hoffman Square to Makro	11		✓	
Rt9	Hoffman Square to Universitas Area	7		✓	

T.7 Botshabelo - Route Design Maps



T.8 Botshabelo - Route Design Tables

Route Number		2028/29	2031/32	2032/33	2033/34	2034/35	2035/36
BOT_1	5.5	Feeder	Comp			Comp	54.9
BOT_2	5.5	Feeder				Feeder	5.5
BOT_3	6.6	Feeder				Feeder	6.6
BOT_4	9.5	Feeder		Comp		Comp	58.9
BOT_5	10.1	Feeder				Feeder	10.1
BOT_6	8.9	Feeder				Feeder	8.9
BOT_7	8.9	Feeder				Feeder	8.9
BOT_8	6.8	Feeder				Feeder	6.8
BOT_9	10.5	Feeder			Comp	Comp	59.9
BOT_10	10.5	Feeder				Feeder	10.5
BOT_11	6.3	Feeder				Feeder	6.3
BOT_12	6.3	Feeder				Feeder	6.3
BOT_13	5.0	Feeder				Feeder	5.0
BOT_14	4.5	Feeder				Feeder	4.5
BOT_15	4.5	Feeder				Feeder	4.5
BOT_25	49.5	Trunk- Bloemfontein				Trunk	49.5
BOT_24	20.3	Trunk – Thaba Nchu				Trunk	20.3

T.10 Thaba Nchu - Route Design Tables

Route Number	One-way Direction	2030/31	2031/32	2032/33	2033/34	
TB_1	68.0	Trunk	Trunk	Trunk	Trunk	68.0
TB_2	20.0	Complementary to Botshabelo Blue Rank	Complementary to Botshabelo Blue Rank	Complementary to Botshabelo Blue Rank	Complementary to Botshabelo	20.0
TB_3	9.5	Feeders	Feeders	Feeders	Feeders	9.5
TB_4	10.9	Feeders	Complementary	Complementary	Complementary	10.9
TB_5	11.3	Feeders	Complementary	Complementary	Complementary	11.3
TB_6	7.7	Feeders	Feeders	Feeders	Feeders	7.7
TB_7	7.0	Feeders	Feeders	Complementary	Complementary	73.4
TB_8	7.0	Feeders	Feeders	Feeders	Feeders	7.0

U Annexure U: Vehicle Specifications

V Annexure V: Private and Heavy vehicle volumes 2017

Corridor	Route	Route Type	Route Design						One Door Channel						Two Door						One Door Channel						Two Door						One Door		Two Door		Alighting time (s/p)	Bay availability			Bay Allocation 2036
			Capacity			Service Freq(min)			Smart card			Pre Payment			Smart card			Pre Payment			Smart card			Pre Payment			Smart card	Pre Payment	Smart card	Pre Payment											
			2017	2025	2036	2017	2025	2036	2017	2025	2036	2017	2025	2036	2017	2025	2036	2017	2025	2036	2017	2025	2036	2017	2025	2036	2017	2025	2036	2017	2025	2036									
			Dwell Time per vehicle (minutes)																		Number of Bays required																		Boarding time per pax (s)		
Dr Belcher	Namibia to CBD	Complementary	80	120	120	3	5	5		5	5	8	2	6	6	5	8	8	4	6	6	2	1	2	1	1	1	2	1	2	1	3.5	2.5	3.5	2.5	2.5	-2	-3	-1.3	2_4	
Dr Belcher	Freedom Square	Complementary	80	120	80	6	9	6		5	5	5	2	6	4	5	8	5	4	6	4	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	1	1	1.8	2_3		
Dr Belcher	Heidedal	Complementary	80	80	80	11	10	11		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	5	5	6.5	2_3		
Dr Belcher	Phase 2	Complementary	80	80	80	10	10	10		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	5	4	5.8	2_3		
Dr Belcher	Meadows	Trunk	80	120	120	6	9	9		5	5	8	2	6	6	5	8	8	4	6	6	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	1	1	2.9	2_1		
Dr Belcher	Dr Belcher	Trunk	120	120	120	5	5	5		8	8	8	5	6	6	8	8	8	6	6	6	2	1	2	1	2	1	2	1	2	1	3.5	2.5	3.5	2.5	2.5	-3	-3	-1.0	2_2	
Dr Belcher	Turflaagte	Complementary	80	80	80	7	7	7		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	2	1	2.8	1_2		
Maphisa/Moshoesh oe	Dr Rantlai Stadium	Complementary	80	80	80	24	23	20		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	19	17	15.6	1_2		
Maphisa/Moshoesh oe	Dr Rantlai Stadium Makoena St	Complementary	80	80	80	22	21	18		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	17	15	13.8	1_2		
Maphisa/Moshoesh oe	Maphisa/Moshoesho e	Trunk	80	80	80	3	3	3		5	5	5	2	4	4	5	5	5	4	4	4	2	1	2	1	2	1	2	2	2	3.5	2.5	3.5	2.5	2.5	-2	-2	-1.4	1_1		
OR Tambo	OR Tambo	Trunk	80	80	80	5	5	4		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	0	-1	0.1	11_1		
OR Tambo	Ipopeng	Complementary	80	80	80	12	11	9		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	6	6	5.4	11_2		
OR Tambo	Bloemanda	Complementary	80	80	80	20	19	16		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	14	13	12.0	11_2		

X Annexure X: CBD Traffic Impact Study – IPTN

Y Annexure Y: Road Infrastructure Maintenance and Upgrades

Area	Upgrade/Maintenance	No. of Lanes (m2)	
		2	4
Botshabelo	Construction of Roads	83,721	
	Resurfacing/rehab road sections (High Priority)	513,464	51,409
CBD	Construction of Roads	19,369	
	Future Links	40,617	
	Resurfacing/rehab road sections (Low Priority)	181,373	1,377,209
	Resurfacing/rehab road sections (High Priority)		40,696
Dr Belcher	Construction of Roads	109,977	
	Provincial Road		76,590
	Stormwater_Low water bridge	1,647	
	Resurfacing/rehab road sections (Low Priority)	178,793	141,601
	Resurfacing/rehab road sections (High Priority)	92,655	64,512
Maphisa	Construction of Roads	37,193	
	Resurfacing/rehab road sections (Low Priority)	106,995	25,910
	Resurfacing/rehab road sections (High Priority)		195,036
OR Tambo	Provincial Road		45,770
	Resurfacing/rehab road sections (Low Priority)	101,965	54,102
	Resurfacing/rehab road sections (High Priority)		73,306
Ring Road (M10)	Resurfacing/rehab road sections (Low Priority)		193,402
SANRAL	SANRAL		977,821
	Resurfacing/rehab road sections (Low Priority)	21,920	9,761
Thaba Nchu	Construction of Roads	55,043	
	Construction of Roads_Alt	6,128	
	Resurfacing/rehab road sections (High Priority)	355,223	67,003
Vista Park (Future Link)	Future Links	30,907	

Z Annexure Z: Waiting Areas Guidelines Per Number of Passengers in the peak 15-minutes of the peak hour

	Los C and D						
	Passengers Per station Per 15 minutes	50	100	150	200	300	400
	Passengers per station Per hour	200	400	600	800	1200	1600
LOS C	m²(0.7) per passenger	35 m²	70 m²	105 m²	140 m²	210 m²	280 m²
LOS D	m²(0.3) per passenger	15 m²	30 m²	45 m²	60 m²	90 m²	120 m²
	Waiting Area Dimensions						
	Waiting area Width	5 m	5 m	5 m	5 m	5 m	5 m
LOS C	Length m²(0.7)	7 m	14 m	21 m	28 m	42 m	56 m
LOS D	Length m²(0.3)	3 m	6 m	9 m	12 m	18 m	24 m

LOS	LOS A and B						
LOS A	m²(1.2) per passenger	60 m²	120 m²	180 m²	240 m²	360 m²	480 m²
LOS B	m²(0.9) per passenger	45 m²	90 m²	135 m²	180 m²	270 m²	360 m²
	Waiting Area Dimensions						
	Waiting area Width	5 m	5 m	5 m	5 m	5 m	5 m
LOS A	Length m²(1.2)	12 m	24 m	36 m	48 m	72 m	96 m
LOS B	Length m²(0.9)	9 m	18 m	27 m	36 m	54 m	72 m

	Los C and D						
	Passengers Per station Per 15 minutes	50	100	150	200	300	400
	Passengers per station Per hour	200	400	600	800	1200	1600
LOS C	m²(0.7) per passenger	35 m²	70 m²	105 m²	140 m²	210 m²	280 m²
LOS D	m²(0.3) per passenger	15 m²	30 m²	45 m²	60 m²	90 m²	120 m²
	Waiting Area Dimensions						
	Waiting area Width	3 m	3 m	3 m	3 m	3 m	3 m
LOS C	Length m²(0.7)	12 m	23 m	35 m	47 m	70 m	93 m
LOS D	Length m²(0.3)	5 m	10 m	15 m	20 m	30 m	40 m

LOS A	m²(1.2)	60 m²	120 m²	180 m²	240 m²	360 m²	480 m²
LOS B	m²(0.9)	45 m²	90 m²	135 m²	180 m²	270 m²	360 m²
	Waiting Area Dimensions						
	Waiting area Width	3 m	3 m	3 m	3 m	3 m	3 m
LOS A	Length m²(1.2)	20 m	40 m	60 m	80 m	120 m	160 m
LOS B	Length m²(0.9)	15 m	30 m	45 m	60 m	90 m	120 m

AA Annexure AA: Station Incremental Implementation Strategy

BB Annexure BB: Hoffman Square – Capacity Calculation

Corridor	Route	Route Type	Route Design							One Door Channel						Two Door						One Door Channel						Two Door						One Door		Two Door		Alighting time (s/p)	Bay availability				Bay Allocation 2036
			Capacity			Service Freq(min)				Smart card			Pre Payment			Smart card			Pre Payment			Smart card			Pre Payment			Smart card			Pre Payment			Smart card	Pre Payment	Smart card	Pre Payment						
			2017	2025	2036	2017	2025	2036		2017	2025	2036	2017	2025	2036	2017	2025	2036	2017	2025	2036	2017	2025	2036	2017	2025	2036	2017	2025	2036	2017	2025	2036	2017	2025	2036							
			Dwell Time per vehicle (minutes)							Number of Bays required												Boarding time per pax (s)																					
Dr Belcher	Namibia to CBD	Complementary	80	120	120	3	5	5		5	5	8	2	6	6	5	8	8	4	6	6	2	1	2	1	1	1	2	1	2	1	2	1	3.5	2.5	3.5	2.5	2.5	-2	-3	-1.3	2_4	
Dr Belcher	Freedom Square	Complementary	80	120	80	6	9	6		5	5	5	2	6	4	5	8	5	4	6	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	1	1	1.8	2_3		
Dr Belcher	Heidedal	Complementary	80	80	80	11	10	11		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	5	5	6.5	2_3		
Dr Belcher	Phase 2	Complementary	80	80	80	10	10	10		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	5	4	5.8	2_3		
Dr Belcher	Meadows	Trunk	80	120	120	6	9	9		5	5	8	2	6	6	5	8	8	4	6	6	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	1	1	2.9	2_1		
Dr Belcher	Dr Belcher	Trunk	120	120	120	5	5	5		8	8	8	5	6	6	8	8	8	6	6	6	2	1	2	1	2	1	2	1	2	1	2	1	3.5	2.5	3.5	2.5	2.5	-3	-3	-1.0	2_2	
Dr Belcher	Turflaagte	Complementary	80	80	80	7	7	7		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	2	1	2.8	1_2		
Maphisa/Moshoeshoe	Dr Rantlai Stadium	Complementary	80	80	80	24	23	20		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	19	17	15.6	1_2		
Maphisa/Moshoeshoe	Dr Rantlai Stadium Makoena St	Complementary	80	80	80	22	21	18		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	17	15	13.8	1_2		
Maphisa/Moshoeshoe	Maphisa/Moshoeshoe	Trunk	80	80	80	3	3	3		5	5	5	2	4	4	5	5	5	4	4	4	2	1	2	1	2	1	2	1	2	2	2	3.5	2.5	3.5	2.5	2.5	-2	-2	-1.4	1_1		
OR Tambo	OR Tambo	Trunk	80	80	80	5	5	4		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	0	-1	0.1	11_1		
OR Tambo	Ipopeng	Complementary	80	80	80	12	11	9		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	6	6	5.4	11_2		
OR Tambo	Bloemanda	Complementary	80	80	80	20	19	16		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	14	13	12.0	11_2		
OR Tambo	VTEF college	Complementary	80	80	80	12	11	9		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	6	6	5.4	11_2		
OR Tambo	Elrich Park	Complementary	80	22	22	19	5	4		5	5	1	2	1	1	5	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	14	3	3.1	11_2		
Thaba Nchu	Thaba Nchu to Bloemfontein	Trunk	120	120	120	16	13	10		8	8	8	5	6	6	8	8	8	6	6	6	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	8	5	4.3	7_1		
Botshabelo	Botshabelo H	Complementary	80	22	120	9	13	12		5	5	8	2	1	6	5	1	8	4	1	6	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	4	11	5.8	6_3		
Botshabelo	Botshabelo C	Complementary	80	80	120	7	10	9		5	5	8	2	4	6	5	5	8	4	4	6	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	2	4	3.1	6_2		
Botshabelo	Botshabelo R,U,S	Complementary	80	120	80	9	8	8		5	5	5	2	6	4	5	8	5	4	6	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	4	0	3.7	6_2		
Botshabelo	Blue Rank	Trunk	120	120	120	7	6	6		8	8	8	5	6	6	8	8	8	6	6	6	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	-1	-2	0.0	6_1		
Botshabelo	Botshabelo K,F	Trunk	80	120	80	8	11	7		5	5	5	2	6	4	5	8	5	4	6	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	3	3	2.7	6_2		
CBD Distribution	Rt1_HofSq_Uitsig_Hyperama	CBD Distribution	120	120	120	4	4	4		8	8	8	5	6	6	8	8	8	6	6	6	2	1	2	2	2	2	2	2	2	2	2	3.5	2.5	3.5	2.5	2.5	-4	-4	-2.0	5_1		
CBD Distribution	Rt10HofS_UniverHospital	CBD Distribution	80	80	80	4	4	4		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	-1	-1	-0.1	5_2		
CBD Distribution	Rt11_HofSq_Estioere	CBD Distribution	22	22	22	11	11	11		1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	10	10	10.1	5_3		
CBD Distribution	Rt12_HofSq_Airport	CBD Distribution	22	22	22	4	4	4		1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	3	3	3.2	5_3		
CBD Distribution	Rt13_HofSq_Tempe	CBD Distribution	80	80	80	5	5	5		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	0	0	1.0	5_4		
CBD Distribution	Rt14_HofSq_Heuvelsig	CBD Distribution	80	80	80	5	5	5		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	-1	-1	0.8	5_5		
CBD Distribution	Rt15_HofSq_BaysValley	CBD Distribution	22	22	22	4	4	4		1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	3	3	3.2	5_6		
CBD Distribution	Rt16_HofSq_Northridge Mall	CBD Distribution	80	80	80	5	5	5		5	5	5	2	4	4	5	5	5	4	4	4	1	1	1	1	1	1	1	1	1	1	1	3.5	2.5	3.5	2.5	2.5	0	0	0.9	5_6		
CBD Distribution	Rt17_HofSq_Bayswater	CBD Distribution	120	120	120	5	5	5		8																																	

CC Annexure CC: NMT Infrastructure Projects Parameters

Corridor	Route Number	Route Length	Operationalisation Stage	Length (km)	Cost/m2	Width(m)	Sides	Total Estimated Cost
Maphisa	Maphisa T1	8	Trunk	5.6	R 500	2.5	2	R14.00M
Maphisa	Rt 21	3	Feeder	3	R 500	1.6	1	R2.40M
Maphisa	Rt 22	2.5	Feeder	2.5	R 500	1.6	1	R2.00M
Maphisa	Rt 23	2.2	Feeder	2.2	R 500	1.6	1	R1.76M
Maphisa	Rt 25	2.7	Feeder	2.7	R 500	1.6	1	R2.16M
Maphisa	OR Tambo Trunk	14	Trunk	9.8	R 500	3.5	2	R34.30M
Maphisa	Rt26	3	Feeder	3	R 500	1.6	1	R2.40M
Maphisa	Rt27	3	Feeder	3	R 500	1.6	1	R2.40M
Maphisa	Rt30	2.4	Feeder	2.4	R 500	1.6	1	R1.92M
Maphisa	Rt31	2	Feeder	2	R 500	1.6	1	R1.60M
Maphisa	Direct Route 1	8	Direct/Diagonal	0	R 500	0	1	R0.00M
Maphisa	Direct Route 2	11.6	Direct/Diagonal	0	R 500	0	1	R0.00M
Phase 2	P2_T1	10.9	Trunk	7.63	R 500	3	2	R22.89M
Phase 2	P2_T2	14.4	Trunk	5.76	R 500	3	2	R17.28M
Phase 2	<i>P2_14</i>	5.1	<i>Feeder</i>	5.1	R 500	1.6	1	R4.08M
Phase 2	P2_15	4.3	Feeder	4.3	R 500	1.6	1	R3.44M
Phase 2	P2_16	5.8	Feeder	5.8	R 500	1.6	1	R4.64M
Phase 2	<i>P2_17</i>	6.8	<i>Feeder</i>	6.8	R 500	1.6	1	R5.44M
Phase 2	P2_18	3.7	Feeder	3.7	R 500	1.6	1	R2.96M
Phase 2	<i>P2_19</i>	3.5	<i>Feeder</i>	3.5	R 500	1.6	1	R2.80M
Phase 2	P2_20	2.2	Feeder	2.2	R 500	1.6	1	R1.76M
Phase 2	<i>P2_21</i>	3.9	<i>Feeder</i>	3.9	R 500	1.6	1	R3.12M
Phase 2	P2_22	5.6	Feeder	5.6	R 500	1.6	1	R4.48M
Phase 2	P2_23	5.6	Feeder	5.6	R 500	1.6	1	R4.48M
Phase 2	P2_24	1.4	Feeder	1.4	R 500	1.6	1	R1.12M
Phase 2	<i>P2_25</i>	2.1	<i>Feeder</i>	2.1	R 500	1.6	1	R1.68M
Phase 2	P2_26	3.7	Direct Route	0	R 500	0	1	R0.00M
Phase 2	P2_27	9.9	Direct Route	0	R 500	0	1	R0.00M
Phase 2	P2_28	8.8	Direct Route	0	R 500	0	1	R0.00M
CBD	Rt1	9	Half	4.5	R 500	2	1	R4.50M
CBD	Rt10	7	Full	5.6	R 500	3	1	R8.40M
CBD	Rt11	7	Full	7	R 500	2	1	R7.00M
CBD	Rt12	7	None	0	R 500	0	1	R0.00M
CBD	Rt13	7	Full	3.5	R 500	3	1	R5.25M
CBD	Rt14	8	None	0	R 500	0	1	R0.00M
CBD	Rt15	7	None	0	R 500	0	1	R0.00M
CBD	Rt16	7	None	0	R 500	0	1	R0.00M
CBD	Rt17	8	None	0	R 500	0	1	R0.00M
CBD	Rt2	10	Half	5	R 500	2	1	R5.00M
CBD	Rt3	12	Half	6	R 500	2	1	R6.00M
CBD	Rt4	12	Half	6	R 500	2	1	R6.00M
CBD	Rt5	12	Half	6	R 500	2	1	R6.00M
CBD	Rt6	5	Full	5	R 500	3	1	R7.50M
CBD	Rt7	11	Half	5.5	R 500	2	1	R5.50M
CBD	Rt9	7	Full	7	R 500	2	1	R7.00M

Corridor	Route Number	Route Length	Operationalisation Stage	Length (km)	Cost/m2	Width(m)	Sides	TotalEstimated Cost
Botshabelo	BOT_1	5.5	Feeder	5.5	R 500	1.6	1	R4.40M
Botshabelo	BOT_2	5.5	Feeder	5.5	R 500	1.6	1	R4.40M
Botshabelo	BOT_3	6.6	Feeder	6.6	R 500	1.6	1	R5.28M
Botshabelo	BOT_4	9.5	Feeder	9.5	R 500	1.6	1	R7.60M
Botshabelo	BOT_5	10.1	Feeder	10.1	R 500	1.6	1	R8.08M
Botshabelo	BOT_6	8.9	Feeder	8.9	R 500	1.6	1	R7.12M
Botshabelo	BOT_7	8.9	Feeder	8.9	R 500	1.6	1	R7.12M
Botshabelo	BOT_8	6.8	Feeder	6.8	R 500	1.6	1	R5.44M
Botshabelo	BOT_9	10.5	Feeder	10.5	R 500	1.6	1	R8.40M
Botshabelo	BOT_10	10.5	Feeder	10.5	R 500	1.6	1	R8.40M
Botshabelo	BOT_11	6.3	Feeder	6.3	R 500	1.6	1	R5.04M
Botshabelo	BOT_12	6.3	Feeder	6.3	R 500	1.6	1	R5.04M
Botshabelo	BOT_13	5	Feeder	5	R 500	1.6	1	R4.00M
Botshabelo	BOT_14	4.5	Feeder	4.5	R 500	1.6	1	R3.60M
Botshabelo	BOT_15	4.5	Feeder	4.5	R 500	1.6	1	R3.60M
Botshabelo	BOT_25	49.5	Trunk- Bloemfontein	7.425	R 500	3	2	R22.28M
Botshabelo	BOT_24	20.3	Trunk – Thaba Nchu	0	R 500	3	1	R0.00M
Thaba Nchu	TB_1	68	Trunk	3.4	R 500	3	2	R10.20M
Thaba Nchu	TB_2	20	Complementary to Botshabelo Blue Rank	6	R 500	3	1	R9.00M
Thaba Nchu	TB_3	9.5	Feeders	9.5	R 500	1.6	1	R7.60M
Thaba Nchu	TB_4	10.9	Feeders	10.9	R 500	1.6	1	R8.72M
Thaba Nchu	TB_5	11.3	Feeders	11.3	R 500	1.6	1	R9.04M
Thaba Nchu	TB_6	7.7	Feeders	7.7	R 500	1.6	1	R6.16M
Thaba Nchu	TB_7	7	Feeders	7	R 500	1.6	1	R5.60M
Thaba Nchu	TB_8	7	Feeders	7	R 500	1.6	1	R5.60M

Maphisa/Moshoeshoe Corridor

OR Tambo

Infrastructure						
Facilities			OR Tambo	Upgrade		
	Depot	R260.00M				R0.00M
	Sleeping Grounds	R0.75M				R0.00M
	Stops	R0.16M	28			R4.55M
	Controlled Access Stations	R6.50M	1	1	R6.50M	R6.50M
	Uncontrolled Access Stations	R0.50M	2	8	R4.00M	R1.00M
	Transfers	R15.00M	0			R0.00M
	Transfers High Capacity	R0.50M	6			R3.00M
	Transfers Low Capacity	R0.25M	4	4	R1.00M	R1.00M
	Control Centre	R0.71M				R0.00M
	Customer Care				R31.50M	R0.00M

Roadways	Maphisa		R16.05M			R43.00M		R16.05M	
Number of sections Road Section Length Road Section Width Cost per m2	Additional Lane		Resurfacing/rehab road sections Partof scheduled Maintenance)	Resurfacing/rehab section(Prioritise Rehab and Maintenance)	Resurfacing/rehab section(Provincial)	Intersection Upgrades			
	R	-	R	78,033,525	R	36,652,840	R		22,885,232
	R	-	R	54,623,467	R	-	R		-
NMT Infrastructure/km	Trunk		Internal	Complementary	Distribution				
Number	0		1	1	1				
Length (m)	10000		5000	8500	6000				
Width	2		1.5	1.5	1.7				
Unit Cost	R	500	R	500	R	500			
Cost	R	10,000,000	R	3,750,000	R	6,375,000	R	5,100,000	
Total Cost	R	-	R	3,750,000	R	6,375,000	R	5,100,000	
							R20.00M	R15.23M	

EEAnnexure EE: Facility Sizing per Design Year

		2017	Waiting area Length required (m)		2025	Length required (m)		2036	Length required (m)			2036 (4 times pax per station) Waiting Area Length required (m)			
Area	Gis ID	Pax per station per 15 minutes	@3m width	@5m width	Pax per station per 15 minutes	@3m width	@5m width	Pax per station per 15 minutes	@3m width	@5m width	Type of route	Pax per station per 15 minutes	@3m width	@5m width	Nr stops per route
Phase 2	P2_14	30	12	7	40	12	7	40	12	7	Complementary	80	23	14	3
Phase 2	P2_15	40	12	7	40	12	7	40	12	7	Feeder	90	23	14	3
Phase 2	P2_16	20	12	7	20	12	7	20	12	7	Feeder	40	12	7	3
Phase 2	P2_17	70	23	14	70	23	14	70	23	14	Complementary	110	47	28	3
Phase 2	P2_18	20	12	7	20	12	7	20	12	7	Feeder	60	23	14	3
Phase 2	P2_19	40	12	7	40	12	7	40	12	7	Complementary	120	47	28	3
Phase 2	P2_20	20	12	7	20	12	7	20	12	7	Feeder	80	23	14	2
Phase 2	P2_21	40	12	7	40	12	7	40	12	7	Complementary	120	47	28	3
Phase 2	P2_22	30	12	7	30	12	7	30	12	7	Feeder	50	12	7	3
Phase 2	P2_29	40	12	7	37	12	7	36	12	7	Feeder	52	23	14	2
Phase 2	P2_T1	20	12	7	37	12	7	36	12	7	Trunk	66	23	14	10
Phase 2	P2_T2	110	47	28	18	12	7	18	12	7	Trunk	100	23	14	3
Phase 2	P2_23	40	12	7	110	47	28	110	47	28	Feeder	230	70	45	2
Phase 2	P2_24	30	12	7	50	12	7	50	12	7	Feeder	90	23	14	2
Phase 2	P2_25	80	23	14	30	12	7	30	12	7	Complementary	170	47	28	2
Phase 2	P2_26	30	12	7	80	23	14	80	23	14	Direct Route	40	12	7	3
Phase 2	P2_27	30	12	7	30	12	7	30	12	7	Direct Route	40	12	7	3
Phase 2	P2_28	30	12	7	30	12	7	30	12	7	Direct Route	30	12	7	3
Phase 1 _Maphisa	Maphisa_F1	10	12	7	30	12	7	30	12	7	Feeder	40	12	7	4
Phase 1 _Maphisa	Maphisa_F2	10	12	7	10	12	7	20	12	7	Feeder	30	12	7	4
Phase 1 _Maphisa	Maphisa F3	10	12	7	20	12	7	20	12	7	Feeder	30	12	7	4
Phase 1 _Maphisa	Rt21	20	12	7	10	12	7	20	12	7	Complementary	20	12	7	4
Phase 1 _Maphisa	Rt22	20	12	7	20	12	7	20	12	7	Complementary	20	12	7	4
Phase 1 _Maphisa	Rt23	30	12	7	20	12	7	20	12	7	Feeder	40	12	7	4
Phase 1 _Maphisa	Rt25	20	12	7	30	12	7	30	12	7	Feeder	100	23	14	4
OR Tambo	OR_27	10	12	7	30	12	7	30	12	7	Feeder	26	12	7	4
Phase 1 _Maphisa	Maphisa_T1	60	23	14	7	12	7	8	12	7	Trunk	110	47	28	6
Phase 1 _Maphisa	Maphisa D1	10	12	7	30	12	7	40	12	7	Direct Route Diagonal	10	12	7	4
Phase 1 _Maphisa	Maphisa D2	10	12	7	10	12	7	10	12	7	Direct Route Diagonal	20	12	7	4
OR Tambo	OR_24	40	12	7	20	12	7	30	12	7	Trunk	80	23	14	6
OR Tambo	OR_25	30	12	7	40	12	7	50	12	7	Complementary	40	12	7	4
OR Tambo	OR_23	20	12	7	30	12	7	30	12	7	Complementary	30	12	7	4
OR Tambo	OR_26	30	12	7	20	12	7	20	12	7	Complementary	40	12	7	4
OR Tambo	OR_19	20	12	7	30	12	7	30	12	7	Complementary	30	12	7	4
Thaba Nchu	TB_1	20	12	7	20	12	7	20	12	7	Trunk	10	12	7	8
Thaba Nchu	TB_2	10	12	7	20	12	7	20	12	7	Complementary	10	12	7	5
Thaba Nchu	TB_3	10	12	7	10	12	7	10	12	7	Feeders	20	12	7	5
Thaba Nchu	TB_4	30	12	7	10	12	7	10	12	7	Feeders	80	23	14	5
Thaba Nchu	TB_5	50	12	7	40	12	7	50	12	7	Feeders	140	47	28	5
Thaba Nchu	TB_6	20	12	7	60	23	14	80	23	14	Feeders	60	23	14	5
Thaba Nchu	TB_7	50	12	7	20	12	7	30	12	7	Complementary	20	12	7	4
Thaba Nchu	TB_8	10	12	7	60	23	14	70	23	14	Feeders	50	12	7	4
Thaba Nchu	TB_T	10	12	7	0	0	0	0	0	0	Feeders	60	23	14	4
Botshabelo	BOT_1	30	12	7	10	12	7	10	12	7	Complementary	20	12	7	4
Botshabelo	BOT_2	10	12	7	40	12	7	40	12	7	Feeder	20	12	7	4
Botshabelo	BOT_3	10	12	7	10	12	7	10	12	7	Feeder	20	12	7	4
Botshabelo	BOT_4	40	12	7	10	12	7	10	12	7	Complementary	20	12	7	4
Botshabelo	BOT_5	10	12	7	50	12	7	50	12	7	Feeder	20	12	7	4
Botshabelo	BOT_6	20	12	7	10	12	7	10	12	7	Feeder	40	12	7	4
Botshabelo	BOT_7	10	12	7	20	12	7	30	12	7	Feeder	20	12	7	4
Botshabelo	BOT_8	10	12	7	10	12	7	10	12	7	Feeder	20	12	7	4
Botshabelo	BOT_9	30	12	7	10	12	7	10	12	7	Complementary	10	12	7	4
Botshabelo	BOT_10	20	12	7	40	12	7	40	12	7	Feeder	30	12	7	4
Botshabelo	BOT_11	10	12	7	20	12	7	20	12	7	Feeder	20	12	7	4
Botshabelo	BOT_12	10	12	7	10	12	7	10	12	7	Feeder	30	12	7	3
Botshabelo	BOT_13	10	12	7	20	12	7	20	12	7	Feeder	10	12	7	3
Botshabelo	BOT_14	20	12	7	10	12	7	10	12	7	Feeder	30	12	7	3
Botshabelo	BOT_15	10	12	7	20	12	7	20	12	7	Feeder	20	12	7	3
Botshabelo	BOT_24	40	12	7	10	12	7	10	12	7	Trunk	30	12	7	7
Botshabelo	BOT_25	20	12	7	40	12	7	40	12	7	Trunk	40	12	7	7
Circular Routes	P2_P4 via M10	10	12	7	20	12	7	30	12	7	Direct Route	10	12	7	4
Circular Routes	P1_RocklandsTranToHyperama Via N8	10	12	7	30	12	7	30	12	7	Direct Route	10	12	7	4
Circular Routes	Lemo Mall to Northridge Mall	10	12	7	10	12	7	10	12	7	Direct Route	10	12	7	4
CBD	Rt1_HofSq_Uitsig_Hyperama	30	12	7	9	30	12	7	50	12	Distribution Route	7	180	47	28
CBD	Rt10HofS_UniverHospital	50	12	7	4	50	12	7	60	23	Distribution Route	14	140	47	28
CBD	Rt11_HofSq_Estioere	10	12	7	7	10	12	7	10	12	Distribution Route	7	20	12	7

CBD	Rt12_HofSq_Airport	10	12	7	7	10	12	7	10	12	Distribution Route	7	40	12	7
CBD	Rt13_HofSq_Tempe	40	12	7	4	40	12	7	50	12	Distribution Route	7	150	47	28
CBD	Rt14_HofSq_Heuwelsig	20	12	7	7	20	12	7	30	12	Distribution Route	7	100	23	14
CBD	Rt15_HofSq_BaysValley	10	12	7	6	10	12	7	10	12	Distribution Route	7	40	12	7
CBD	Rt16_HofSq_NorthridgeMall	20	12	7	7	20	12	7	30	12	Distribution Route	7	100	23	14
CBD	Rt17_HofSq_Bayswater	30	12	7	8	30	12	7	40	12	Distribution Route	7	150	47	28
CBD	Rt2_HofSq_LourierPark	40	12	7	7	40	12	7	50	12	Distribution Route	7	120	47	28
CBD	Rt3_HofSq_LangenhPrkviaMimosa	20	12	7	5	20	12	7	30	12	Distribution Route	7	50	12	7
CBD	Rt4_HofSq_LangenhPrkviaUniversitas	30	12	7	5	30	12	7	40	12	Distribution Route	7	60	23	14
CBD	Rt5_HofSq_Pelissier	10	12	7	7	10	12	7	10	12	Distribution Route	7	30	12	7
CBD	Rt6_HofSq_UFS	80	23	14	5	80	23	14	100	23	Distribution Route	14	360	70	45
CBD	Rt7_HofSq_Makro_Dist	30	12	7	6	30	12	7	40	12	Distribution Route	7	80	23	14
CBD	Rt9HofSq_UniversitasArea_Dist003	10	12	7	7	10	12	7	10	12	Distribution Route	7	40	12	7

FF Annexure FF: Route Details per Design Year Trunk, Feeder and Complementary Routes (31_Excel File)

2017 – Full Implementation Stage

Area	Gis ID	Route Type	0.76	Speed	N8 Speed	Capacity	Freq(min)	Fleet	60min trips	Distance One dir (km)	Travel TimeOne Direction (min)
Phase 2	P2_14	Complementary	1357	19.0	0.0	80	3.2	16	19	9.2	29
Phase 2	P2_15	Feeder	372	19.0	0.0	22	3.2	7	19	4.3	14
Phase 2	P2_16	Feeder	217	19.0	0.0	22	5.5	6	11	5.8	18
Phase 2	P2_17	Complementary	723	19.0	0.0	80	6.0	9	10	9.7	31
Phase 2	P2_18	Feeder	190	19.0	0.0	22	6.2	3	10	3.7	12
Phase 2	P2_19	Complementary	401	19.0	0.0	80	10.8	6	6	11.5	36
Phase 2	P2_20	Feeder	151	19.0	0.0	22	7.8	2	8	2.2	7
Phase 2	P2_21	Complementary	433	19.0	0.0	80	10.0	8	6	13.6	43
Phase 2	P2_22	Feeder	273	19.0	0.0	22	4.3	7	14	5.6	18
Phase 2	P2_29	Feeder	284	19.0	0.0	22	4.2	7	14	5.6	18
Phase 2	P2_T1	Trunk	709	19.0	0.0	80	6.1	10	10	10.9	34
Phase 2	P2_T2	Trunk	1273	19.0	0.0	120	5.1	16	12	14.4	45
Phase 2	P2_23	Feeder	314	19.0	0.0	22	3.8	3	16	2.3	7
Phase 2	P2_24	Feeder	179	19.0	0.0	22	6.6	2	9	2.1	7
Phase 2	P2_25	Complementary	619	19.0	0.0	80	7.0	10	9	13.0	41
Phase 2	P2_26	Direct Route	316	19.0	0.0	22	3.8	15	16	9.9	31
Phase 2	P2_27	Direct Route	316	19.0	0.0	22	3.8	13	16	8.8	28
Phase 2	P2_28	Direct Route	316	19.0	0.0	22	3.8	19	16	12.7	40
Phase 1_Maphisa	Maphisa_F1	Feeder	137	19.0	0.0	22	8.7	2	7	3.0	9
Phase 1_Maphisa	Maphisa_F2	Feeder	152	19.0	0.0	22	7.8	2	8	3.5	11
Phase 1_Maphisa	Maphisa_F3	Feeder	144	19.0	0.0	22	8.2	2	7	3.5	11
Phase 1_Maphisa	Rt21	Complementary	178	19.0	0.0	80	24.3	3	2	12.3	39
Phase 1_Maphisa	Rt22	Complementary	196	19.0	0.0	80	22.0	3	3	12.5	39
Phase 1_Maphisa	Rt23	Feeder	339	19.0	0.0	22	3.5	3	17	2.2	7
Phase 1_Maphisa	Rt25	Feeder	311	19.0	0.0	22	3.8	4	16	2.7	9
OR Tambo	OR_27	Feeder	99	19.0	0.0	22	12.0	1	5	3.0	9
Phase 1_Maphisa	Maphisa_T1	Trunk	1349	19.0	0.0	80	3.2	13.8	19	8.0	25
Phase 1_Maphisa	Maphisa D1	Direct Route Diagonal	25	19.0	0.0	22	47.2	1	1	11.6	37
Phase 1_Maphisa	Maphisa D2	Direct Route Diagonal	120	19.0	0.0	22	9.9	6	6	11.6	37
OR Tambo	OR_24	Trunk	844	20.0	0.0	80	5.1	14	12	14.0	42
OR Tambo	OR_25	Complementary	373	20.0	0.0	80	11.6	6	5	17.0	39
OR Tambo	OR_23	Complementary	218	20.0	0.0	80	19.8	3	3	17.4	39
OR Tambo	OR_26	Complementary	371	20.0	0.0	80	11.7	6	5	16.4	39
OR Tambo	OR_19	Complementary	228	19.0	19.0	80	18.9	3	3	10.5	33
Thaba Nchu	TB_1	Trunk	401	25.0	85.0	120	16.2	4	4	68.0	37
Thaba Nchu	TB_2	Complementary	122	25.0	85.0	80	35.3	4	2	20.0	74
Thaba Nchu	TB_3	Feeders	75	25.0	85.0	22	15.8	8	4	9.5	75
Thaba Nchu	TB_4	Complementary	543	25.0	85.0	80	7.9	15	8	10.9	67
Thaba Nchu	TB_5	Complementary	954	25.0	85.0	120	6.8	18	9	11.3	71
Thaba Nchu	TB_6	Feeders	278	19.0	85.0	80	15.5	5	4	7.7	44
Thaba Nchu	TB_7	Complementary	673	19.0	85.0	120	9.6	12	6	73.4	64
Thaba Nchu	TB_8	Feeders	138	19.0	85.0	80	31.3	3	2	7.0	61
Thaba Nchu	TB_T	Feeders	141	25.0	85.0	80	30.7	3	2	4.0	48
Botshabelo	BOT_1	Complementary	464	25.0	85.0	80	9.3	9	6	54.9	48
Botshabelo	BOT_2	Feeder	84	25.0	85.0	22	14.1	3	4	5.5	27
Botshabelo	BOT_3	Feeder	97	25.0	85.0	22	12.3	7	5	6.6	51
Botshabelo	BOT_4	Complementary	598	25.0	85.0	80	7.2	14	8	58.9	58
Botshabelo	BOT_5	Feeder	104	25.0	85.0	22	11.4	9	5	10.1	59
Botshabelo	BOT_6	Feeder	280	25.0	85.0	22	4.2	23	14	8.9	56
Botshabelo	BOT_7	Feeder	93	25.0	85.0	22	12.7	5	5	8.9	36
Botshabelo	BOT_8	Feeder	100	25.0	85.0	22	11.9	8	5	6.8	51
Botshabelo	BOT_9	Complementary	474	25.0	85.0	80	9.1	12	7	59.9	60
Botshabelo	BOT_10	Feeder	177	25.0	85.0	22	6.7	10	9	10.5	39
Botshabelo	BOT_11	Feeder	83	25.0	85.0	22	14.4	6	4	6.3	50
Botshabelo	BOT_12	Feeder	117	25.0	85.0	22	10.2	5	6	6.3	29
Botshabelo	BOT_13	Feeder	56	25.0	85.0	22	21.2	4	3	5.0	47
Botshabelo	BOT_14	Feeder	195	25.0	85.0	22	6.1	13	10	4.5	46
Botshabelo	BOT_15	Feeder	76	25.0	85.0	22	15.6	3	4	4.5	25
Botshabelo	BOT_24	Trunk	914	25.0	85.0	120	7.1	9	8	49.5	35
Botshabelo	BOT_25	Trunk	548	25.0	85.0	80	7.9	3	8	20.3	14
Circular Routes	P2_P4 via M10		76	19.0	85.0	22	15.6	4	4	12.0	38
Circular Routes	P1_RocklandsTranToHyperama Via N8		76	19.0	85.0	22	15.6	4	4	20.0	39
Circular Routes	Lemo Mall to NorthridgeMall		76	19.0	85.0	22	15.6	3	4	14.0	27

2025 Full Implementation Stage

Area	Gis ID	Riute Type	0.70	Speed	N8 Speed	Capacity	Freq(min)	Fleet	60min trips	Distance One dir	Travel One Direction	Round Trips
Phase 2	P2_14	Complementary	1397	19.0	0.0	120	4.6	11	13	9.2	29	51
Phase 2	P2_15	Feeder	382	19.0	0.0	22	3.1	8	19	4.3	14	24
Phase 2	P2_16	Feeder	224	19.0	0.0	22	5.3	6	11	5.8	18	32
Phase 2	P2_17	Complementary	744	19.0	0.0	120	8.7	6	7	9.7	31	53
Phase 2	P2_18	Feeder	196	19.0	0.0	22	6.1	3	10	3.7	12	21
Phase 2	P2_19	Complementary	413	19.0	0.0	80	10.5	6	6	11.5	36	64
Phase 2	P2_20	Feeder	156	19.0	0.0	22	7.6	2	8	2.2	7	12
Phase 2	P2_21	Complementary	445	19.0	0.0	80	9.7	8	6	13.6	43	75
Phase 2	P2_22	Feeder	281	19.0	0.0	22	4.2	7	14	5.6	18	31
Phase 2	P2_29	Feeder	293	19.0	0.0	22	4.1	8	15	5.6	18	31
Phase 2	P2_T1	Trunk	730	19.0	0.0	120	8.9	7	7	10.9	34	60
Phase 2	P2_T2	Trunk	1310	19.0	0.0	120	4.9	16	12	14.4	45	80
Phase 2	P2_23	Feeder	323	19.0	0.0	22	3.7	3	16	2.3	7	13
Phase 2	P2_24	Feeder	184	19.0	0.0	22	6.4	2	9	2.1	7	12
Phase 2	P2_25	Complementary	637	19.0	0.0	80	6.8	11	9	13.0	41	72
Phase 2	P2_26	Direct Route	326	19.0	0.0	80	13.3	4	5	9.9	31	55
Phase 2	P2_27	Direct Route	326	19.0	0.0	80	13.3	4	5	8.8	28	48
Phase 2	P2_28	Direct Route	326	19.0	0.0	80	13.3	5	5	12.7	40	70
Phase 1_Maphisa	Maphisa_F1	Feeder	146	19.0	0.0	22	8.2	2	7	3.0	9	17
Phase 1_Maphisa	Maphisa_F2	Feeder	162	19.0	0.0	22	7.3	3	8	3.5	11	19
Phase 1_Maphisa	Maphisa F3	Feeder	154	19.0	0.0	22	7.7	3	8	3.5	11	19
Phase 1_Maphisa	Rt21	Complementary	189	19.0	0.0	80	22.8	3	2.63	12.3	39	68
Phase 1_Maphisa	Rt22	Complementary	209	19.0	0.0	80	20.7	3	3	12.5	39	69
Phase 1_Maphisa	Rt23	Feeder	361	19.0	0.0	22	3.3	4	18	2.2	7	12
Phase 1_Maphisa	Rt25	Feeder	331	19.0	0.0	22	3.6	4	17	2.7	9	15
OR Tambo	OR_27	Feeder	105	19.0	0.0	22	11.3	1.5	5	3.0	9	17
Phase 1_Maphisa	Maphisa_T1	Trunk	1436	19.0	0.0	120	4.5	10	13	8.0	25	44
Phase 1_Maphisa	Maphisa D1	Direct Route Diagonal	27	19.0	0.0	22	44.4	1	1	11.6	37	64
Phase 1_Maphisa	Maphisa D2	Direct Route Diagonal	128	19.0	0.0	80	33.7	2	2	11.6	37	64
OR Tambo	OR_24	Trunk	898	20.0	0.0	120	7.2	10	8	14.0	42	74
OR Tambo	OR_25	Complementary	397	20.0	0.0	80	10.9	6	6	17.0	39	68
OR Tambo	OR_23	Complementary	232	20.0	0.0	80	18.6	4	3	17.4	39	68
OR Tambo	OR_26	Complementary	395	20.0	0.0	80	10.9	6	5	16.4	39	68
OR Tambo	OR_19	Complementary	243	19.0	19.0	22	4.9	14	12	10.5	39	69
Thaba Nchu	TB_1	Trunk	499	25.0	85.0	120	13.0	5	5	68.0	37	65
Thaba Nchu	TB_2	Complementary	152	25.0	85.0	22	7.8	17	8	20.0	74	130
Thaba Nchu	TB_3	Feeders	94	25.0	85.0	22	12.7	10	5	9.5	75	132
Thaba Nchu	TB_4	Complementary	676	25.0	85.0	80	6.4	18	9	79.2	67	117
Thaba Nchu	TB_5	Complementary	1187	25.0	85.0	120	5.5	23	11	79.6	71	124
Thaba Nchu	TB_6	Feeders	346	19.0	85.0	22	3.4	22	17	7.7	44	77
Thaba Nchu	TB_7	Complementary	837	19.0	85.0	120	7.7	15	8	77.3	64	113
Thaba Nchu	TB_8	Feeders	172	19.0	85.0	22	6.9	15	9	5.1	61	106
Thaba Nchu	TB_9	Feeders	175	25.0	85.0	22	6.8	12	9	4.0	48	84
Botshabelo	BOT_1	Complementary	513	25.0	85.0	120	12.6	7	5	54.9	48	84
Botshabelo	BOT_2	Feeder	93	25.0	85.0	22	12.8	4	5	5.5	27	48
Botshabelo	BOT_3	Feeder	107	25.0	85.0	22	11.1	8	5	6.6	51	89
Botshabelo	BOT_4	Complementary	661	25.0	85.0	120	9.8	10	6	58.9	58	101
Botshabelo	BOT_5	Feeder	115	25.0	85.0	22	10.3	10	6	10.1	59	104
Botshabelo	BOT_6	Feeder	309	25.0	85.0	22	3.8	26	16	8.9	56	98
Botshabelo	BOT_7	Feeder	103	25.0	85.0	22	11.5	5	5	8.9	36	62
Botshabelo	BOT_8	Feeder	110	25.0	85.0	22	10.8	8	6	6.8	51	90
Botshabelo	BOT_9	Complementary	524	25.0	85.0	80	8.2	13	7	59.9	60	105
Botshabelo	BOT_10	Feeder	195	25.0	85.0	22	6.1	11	10	10.5	39	69
Botshabelo	BOT_11	Feeder	91	25.0	85.0	22	13.0	7	5	6.3	50	87
Botshabelo	BOT_12	Feeder	129	25.0	85.0	22	9.2	6	7	6.3	29	51
Botshabelo	BOT_13	Feeder	62	25.0	85.0	22	19.2	4	3	5.0	47	82
Botshabelo	BOT_14	Feeder	215	25.0	85.0	22	5.5	14	11	4.5	46	80
Botshabelo	BOT_15	Feeder	84	25.0	85.0	22	14.1	3	4	4.5	25	44
Botshabelo	BOT_24	Trunk	1009	25.0	85.0	120	6.4	10	9	49.5	35	61
Botshabelo	BOT_25	Complementary	605	25.0	85.0	120	10.7	2	6	20.3	14	25

2036 – Full Implementation Stage

Area	Gis ID	Riute Type	0.70	Speed	N8 Speed	Capacity	Freq(min)	Fleet	60min trips	Distance One dir	Travel One Direction	Round Trips
Phase 2	P2_14	Complementary	1388	19.0	0.0	120	4.7	11	13	9.2	29	51
Phase 2	P2_15	Feeder	380	19.0	0.0	22	3.1	8	19	4.3	14	24
Phase 2	P2_16	Feeder	222	19.0	0.0	22	5.3	6	11	5.8	18	32
Phase 2	P2_17	Complementary	740	19.0	0.0	120	8.8	6	7	9.7	31	53
Phase 2	P2_18	Feeder	195	19.0	0.0	22	6.1	3	10	3.7	12	21
Phase 2	P2_19	Complementary	410	19.0	0.0	80	10.5	6	6	11.5	36	64
Phase 2	P2_20	Feeder	155	19.0	0.0	22	7.7	2	8	2.2	7	12
Phase 2	P2_21	Complementary	443	19.0	0.0	80	9.8	8	6	13.6	43	75
Phase 2	P2_22	Feeder	280	19.0	0.0	22	4.2	7	14	5.6	18	31
Phase 2	P2_29	Feeder	291	19.0	0.0	22	4.1	8	15	5.6	18	31
Phase 2	P2_T1	Trunk	725	19.0	0.0	120	8.9	7	7	10.9	34	60
Phase 2	P2_T2	Trunk	1302	19.0	0.0	120	5.0	16	12	14.4	45	80
Phase 2	P2_23	Feeder	321	19.0	0.0	22	3.7	3	16	2.3	7	13
Phase 2	P2_24	Feeder	183	19.0	0.0	22	6.5	2	9	2.1	7	12
Phase 2	P2_25	Complementary	633	19.0	0.0	80	6.8	11	9	13.0	41	72
Phase 2	P2_26	Direct Route	324	19.0	0.0	80	13.3	4	4	9.9	31	55
Phase 2	P2_27	Direct Route	324	19.0	0.0	80	13.3	4	4	8.8	28	48
Phase 2	P2_28	Direct Route	324	19.0	0.0	80	13.3	5	4	12.7	40	70
Phase 1 _Maphisa	Maphisa_F1	Feeder	169	19.0	0.0	22	7.0	2	9	3.0	9	17
Phase 1 _Maphisa	Maphisa_F2	Feeder	188	19.0	0.0	22	6.3	3	10	3.5	11	19
Phase 1 _Maphisa	Maphisa F3	Feeder	179	19.0	0.0	22	6.6	3	9	3.5	11	19
Phase 1 _Maphisa	Rt21	Complementary	220	19.0	0.0	80	19.6	3	3.06	12.3	39	68
Phase 1 _Maphisa	Rt22	Complementary	243	19.0	0.0	80	17.8	4	3	12.5	39	69
Phase 1 _Maphisa	Rt23	Feeder	420	19.0	0.0	22	2.8	4	21	2.2	7	12
Phase 1 _Maphisa	Rt25	Feeder	385	19.0	0.0	22	3.1	5	19	2.7	9	15
OR Tambo	OR_27	Feeder	123	19.0	0.0	22	9.7	1.7	6	3.0	9	17
Phase 1 _Maphisa	Maphisa_T1	Trunk	1670	19.0	0.0	120	3.9	11	15	8.0	25	44
Phase 1 _Maphisa	Maphisa D1	Direct Route Diagonal	31	19.0	0.0	22	38.2	2	2	11.6	37	64
Phase 1 _Maphisa	Maphisa D2	Direct Route Diagonal	149	19.0	0.0	80	29.0	2	2	11.6	37	64
OR Tambo	OR_24	Trunk	1044	20.0	0.0	120	6.2	12	10	14.0	42	74
OR Tambo	OR_25	Complementary	461	20.0	0.0	80	9.4	7	6	17.0	39	68
OR Tambo	OR_23	Complementary	270	20.0	0.0	80	16.0	4	4	17.4	39	68
OR Tambo	OR_26	Complementary	459	20.0	0.0	80	9.4	7	6	16.4	39	68
OR Tambo	OR_19	Complementary	282	19.0	19.0	22	4.2	16	14	10.5	39	69
Thaba Nchu	TB_1	Trunk	631	25.0	85.0	120	10.3	6	6	68.0	37	65
Thaba Nchu	TB_2	Complementary	193	25.0	85.0	22	6.2	21	10	20.0	74	130
Thaba Nchu	TB_3	Feeders	119	25.0	85.0	22	10.0	13	6	9.5	75	132
Thaba Nchu	TB_4	Feeders	856	25.0	85.0	80	5.0	23	12	79.2	67	117
Thaba Nchu	TB_5	Feeders	1504	25.0	85.0	120	4.3	29	14	79.6	71	124
Thaba Nchu	TB_6	Feeders	438	19.0	85.0	80	9.9	8	6	7.7	44	77
Thaba Nchu	TB_7	Feeders	1060	19.0	85.0	120	6.1	18	10	77.3	64	113
Thaba Nchu	TB_8	Feeders	217	19.0	85.0	22	5.5	19	11	5.1	61	106
Thaba Nchu	TB_T	Feeders	222	25.0	85.0	22	5.4	19	11	4.0	58	101
Botshabelo	BOT_1	Complementary	550	25.0	85.0	120	11.8	7	5	54.9	48	84
Botshabelo	BOT_2	Feeder	99	25.0	85.0	22	11.9	4	5	5.5	27	48
Botshabelo	BOT_3	Feeder	115	25.0	85.0	22	10.4	9	6	6.6	51	89
Botshabelo	BOT_4	Complementary	709	25.0	85.0	120	9.1	11	7	58.9	58	101
Botshabelo	BOT_5	Feeder	124	25.0	85.0	22	9.6	11	6	10.1	59	104
Botshabelo	BOT_6	Feeder	331	25.0	85.0	80	13.0	8	5	8.9	56	98
Botshabelo	BOT_7	Feeder	111	25.0	85.0	22	10.7	6	6	8.9	36	62
Botshabelo	BOT_8	Feeder	118	25.0	85.0	22	10.1	9	6	6.8	51	90
Botshabelo	BOT_9	Complementary	562	25.0	85.0	80	7.7	14	8	59.9	60	105
Botshabelo	BOT_10	Feeder	210	25.0	85.0	80	20.6	3	3	10.5	39	69
Botshabelo	BOT_11	Feeder	98	25.0	85.0	22	12.1	7	5	6.3	50	87
Botshabelo	BOT_12	Feeder	138	25.0	85.0	22	8.6	6	7	6.3	29	51
Botshabelo	BOT_13	Feeder	66	25.0	85.0	22	17.9	5	3	5.0	47	82
Botshabelo	BOT_14	Feeder	231	25.0	85.0	80	18.7	4	3	4.5	46	80
Botshabelo	BOT_15	Feeder	90	25.0	85.0	22	13.1	3	5	4.5	25	44
Botshabelo	BOT_24	Trunk	1082	25.0	85.0	120	6.0	10	10	49.5	35	61
Botshabelo	BOT_25	Trunk	649	25.0	85.0	120	10.0	3	6	20.3	14	25
Circular Routes	P2_P4 via M10		86	19.0	85.0	22	13.8	5	4	12.0	38	66
Circular Routes	P1_RocklandsTranToHyperama Via N8		86	19.0	85.0	22	13.8	5	4	20.0	39	68
Circular Routes	Lemo Mall to NorthridgeMall		86	19.0	85.0	22	13.8	3	4	14.0	27	47

2017 – Feeder Trunk

Area	Gis ID	Riute Type	0.76	Speed	N8 Speed	Capacity	Freq(min)	Fleet	60min trips	Distance One dir	Travel One Direction	
Phase 2	P2_14	Feeder	1357	19.0	0.0	22	0.9	32	69	5.1	16	28
Phase 2	P2_15	Feeder	372	19.0	0.0	22	3.2	7	19	4.3	14	24
Phase 2	P2_16	Feeder	217	19.0	0.0	22	5.5	6	11	5.8	18	32
Phase 2	P2_17	Feeder	723	19.0	0.0	80	6.0	5	10	5.7	18	32
Phase 2	P2_18	Feeder	190	19.0	0.0	22	6.2	3	10	3.7	12	21
Phase 2	P2_19	Feeder	401	19.0	0.0	80	10.8	2	6	3.5	11	20
Phase 2	P2_20	Feeder	151	19.0	0.0	22	7.8	2	8	2.2	7	12
Phase 2	P2_21	Feeder	433	19.0	0.0	22	2.7	8	22	3.9	12	22
Phase 2	P2_22	Feeder	273	19.0	0.0	22	4.3	7	14	5.6	18	31
Phase 2	P2_29	Feeder	284	19.0	0.0	22	4.2	7	14	5.6	18	31
Phase 2	P2_T1	Trunk	3624	19.0	0.0	120	1.8	34	34	10.9	34	60
Phase 2	P2_T2	Trunk	1892	19.0	0.0	120	3.4	23	18	14.4	45	80
Phase 2	P2_23	Feeder	314	19.0	0.0	22	3.8	3	16	2.3	7	13
Phase 2	P2_24	Feeder	179	19.0	0.0	22	6.6	2	9	2.1	7	12
Phase 2	P2_25	Feeder	619	19.0	0.0	22	1.9	11	31	3.7	12	21
Phase 2	P2_26	Direct Route	316	19.0	0.0	22	3.8	15	16	9.9	31	55
Phase 2	P2_27	Direct Route	316	19.0	0.0	22	3.8	13	16	8.8	28	48
Phase 2	P2_28	Direct Route	316	19.0	0.0	22	3.8	19	16	12.7	40	70
Phase 1_Maphisa	Maphisa_F1	Feeder	137	19.0	0.0	22	8.7	2	7	3.0	9	17
Phase 1_Maphisa	Maphisa_F2	Feeder	152	19.0	0.0	22	7.8	2	8	3.5	11	19
Phase 1_Maphisa	Maphisa F3	Feeder	144	19.0	0.0	22	8.2	2	7	3.5	11	19
Phase 1_Maphisa	Rt21	Feeder	178	19.0	0.0	22	6.7	2	9	3.0	9	17
Phase 1_Maphisa	Rt22	Feeder	196	19.0	0.0	22	6.1	2	10	2.5	8	14
Phase 1_Maphisa	Rt23	Feeder	339	19.0	0.0	22	3.5	3	17	2.2	7	12
Phase 1_Maphisa	Rt25	Feeder	311	19.0	0.0	22	3.8	4	16	2.7	9	15
OR Tambo	OR_27	Feeder	99	19.0	0.0	22	12.0	1	5	3.0	9	17
Phase 1_Maphisa	Maphisa_T1	Trunk	1724	19.0	0.0	80	2.5	17.6	24	8.0	25	44
Phase 1_Maphisa	Maphisa D1	Direct Route Diagonal	25	19.0	0.0	22	47.2	1	1	11.6	37	64
Phase 1_Maphisa	Maphisa D2	Direct Route Diagonal	120	19.0	0.0	80	35.9	2	2	11.6	37	64
OR Tambo	OR_24	Trunk	2033	20.0	0.0	80	2.1	35	28	14.0	42	74
OR Tambo	OR_25	Feeder	373	20.0	0.0	22	3.2	21	19	3.0	39	68
OR Tambo	OR_23	Feeder	218	20.0	0.0	22	5.5	13	11	3.4	39	68
OR Tambo	OR_26	Feeder	371	20.0	0.0	22	3.2	21	19	2.4	39	68
OR Tambo	OR_19	Feeder	228	19.0	19.0	22	5.2	11	12	2.0	33	58
Thaba Nchu	TB_1	Trunk	3030	25.0	85.0	120	2.1	30	28	68.0	37	65
Thaba Nchu	TB_2	Feeder	138	25.0	85.0	80	31.4	4	2	20.0	74	130
Thaba Nchu	TB_3	Feeders	85	25.0	85.0	22	14.0	9	4	9.5	75	132
Thaba Nchu	TB_4	Feeders	611	25.0	85.0	80	7.1	16	8	10.9	67	117
Thaba Nchu	TB_5	Feeders	1073	25.0	85.0	80	4.0	31	15	11.3	71	124
Thaba Nchu	TB_6	Feeders	313	19.0	85.0	80	13.8	6	4	7.7	44	77
Thaba Nchu	TB_7	Feeders	757	19.0	85.0	80	5.7	20	11	7.0	64	113
Thaba Nchu	TB_8	Feeders	155	19.0	85.0	80	27.9	4	2	7.0	61	106
Thaba Nchu	TB_T	Feeders	158	25.0	85.0	80	27.3	3	2	4.0	48	84
Botshabelo	BOT_1	Feeder	464	25.0	85.0	80	9.3	9	6	5.5	48	84
Botshabelo	BOT_2	Feeder	84	25.0	85.0	22	14.1	3	4	5.5	27	48
Botshabelo	BOT_3	Feeder	97	25.0	85.0	22	12.3	7	5	6.6	51	89
Botshabelo	BOT_4	Feeder	598	25.0	85.0	80	7.2	14	8	9.5	58	101
Botshabelo	BOT_5	Feeder	104	25.0	85.0	22	11.4	9	5	10.1	59	104
Botshabelo	BOT_6	Feeder	280	25.0	85.0	22	4.2	23	14	8.9	56	98
Botshabelo	BOT_7	Feeder	93	25.0	85.0	22	12.7	5	5	8.9	36	62
Botshabelo	BOT_8	Feeder	100	25.0	85.0	22	11.9	8	5	6.8	51	90
Botshabelo	BOT_9	Feeder	474	25.0	85.0	80	9.1	12	7	10.5	60	105
Botshabelo	BOT_10	Feeder	177	25.0	85.0	22	6.7	10	9	10.5	39	69
Botshabelo	BOT_11	Feeder	83	25.0	85.0	22	14.4	6	4	6.3	50	87
Botshabelo	BOT_12	Feeder	117	25.0	85.0	22	10.2	5	6	6.3	29	51
Botshabelo	BOT_13	Feeder	56	25.0	85.0	22	21.2	5	3	10.4	60	105
Botshabelo	BOT_14	Feeder	195	25.0	85.0	22	6.1	16	10	8.5	55	97
Botshabelo	BOT_15	Feeder	76	25.0	85.0	22	15.6	4	4	8.5	35	61
Botshabelo	BOT_24	Trunk	2450	25.0	85.0	120	2.6	23	23	49.5	35	61
Botshabelo	BOT_25	Trunk	548	25.0	85.0	80	7.9	3	8	20.3	14	25
Circular Routes	P2_P4 via M10		76	19.0	85.0	22	15.6	4	4	12.0	38	66
Circular Routes	P1_RocklandsTranToHyperama Via N8		76	19.0	85.0	22	15.6	4	4	20.0	39	68
Circular Routes	Lemo Mall to NorthridgeMall		76	19.0	85.0	22	15.6	3	4	14.0	27	47

2025 – Feeder Trunk

Area	Gis ID	Riute Type	0.70	Speed	N8 Speed	Capacity	Freq(min)	Fleet	60min trips	Distance One dir	Travel One Direction	Round Trips
Phase 2	P2_14	Feeder	1397	19.0	0.0	22	0.9	33	71	5.1	16	28
Phase 2	P2_15	Feeder	382	19.0	0.0	22	3.1	8	19	4.3	14	24
Phase 2	P2_16	Feeder	224	19.0	0.0	22	5.3	6	11	5.8	18	32
Phase 2	P2_17	Feeder	744	19.0	0.0	80	5.8	5	10	5.7	18	32
Phase 2	P2_18	Feeder	196	19.0	0.0	22	6.1	3	10	3.7	12	21
Phase 2	P2_19	Feeder	413	19.0	0.0	80	10.5	2	6	3.5	11	20
Phase 2	P2_20	Feeder	156	19.0	0.0	22	7.6	2	8	2.2	7	12
Phase 2	P2_21	Feeder	445	19.0	0.0	22	2.7	8	22	3.9	12	22
Phase 2	P2_22	Feeder	281	19.0	0.0	22	4.2	7	14	5.6	18	31
Phase 2	P2_29	Feeder	293	19.0	0.0	22	4.1	8	15	5.6	18	31
Phase 2	P2_T1	Trunk	3730	19.0	0.0	120	1.7	35	35	10.9	34	60
Phase 2	P2_T2	Trunk	1947	19.0	0.0	120	3.3	24	18	14.4	45	80
Phase 2	P2_23	Feeder	323	19.0	0.0	22	3.7	3	16	2.3	7	13
Phase 2	P2_24	Feeder	184	19.0	0.0	22	6.4	2	9	2.1	7	12
Phase 2	P2_25	Feeder	637	19.0	0.0	22	1.9	11	32	3.7	12	21
Phase 2	P2_26	Direct Route	326	19.0	0.0	22	3.6	15	16	9.9	31	55
Phase 2	P2_27	Direct Route	326	19.0	0.0	22	3.6	13	16	8.8	28	48
Phase 2	P2_28	Direct Route	326	19.0	0.0	22	3.6	19	16	12.7	40	70
Phase 1_Maphisa	Maphisa_F1	Feeder	146	19.0	0.0	22	8.2	2	7	3.0	9	17
Phase 1_Maphisa	Maphisa_F2	Feeder	162	19.0	0.0	22	7.3	3	8	3.5	11	19
Phase 1_Maphisa	Maphisa F3	Feeder	154	19.0	0.0	22	7.7	3	8	3.5	11	19
Phase 1_Maphisa	Rt21	Feeder	189	19.0	0.0	22	6.3	3	10	3.0	9	17
Phase 1_Maphisa	Rt22	Feeder	209	19.0	0.0	22	5.7	2	11	2.5	8	14
Phase 1_Maphisa	Rt23	Feeder	361	19.0	0.0	22	3.3	4	18	2.2	7	12
Phase 1_Maphisa	Rt25	Feeder	331	19.0	0.0	22	3.6	4	17	2.7	9	15
OR Tambo	OR_27	Feeder	105	19.0	0.0	22	11.3	1.5	5	3.0	9	17
Phase 1_Maphisa	Maphisa_T1	Trunk	1834	19.0	0.0	80	2.4	19	25	8.0	25	44
Phase 1_Maphisa	Maphisa D1	Direct Route Diagonal	27	19.0	0.0	22	44.4	1	1	11.6	37	64
Phase 1_Maphisa	Maphisa D2	Direct Route Diagonal	128	19.0	0.0	80	33.7	2	2	11.6	37	64
OR Tambo	OR_24	Trunk	2164	20.0	0.0	80	2.0	37	30	14.0	42	74
OR Tambo	OR_25	Feeder	397	20.0	0.0	80	10.9	6	6	3.0	39	68
OR Tambo	OR_23	Feeder	232	20.0	0.0	80	18.6	4	3	3.4	39	68
OR Tambo	OR_26	Feeder	395	20.0	0.0	80	10.9	6	5	2.4	39	68
OR Tambo	OR_19	Feeder	243	19.0	19.0	22	4.9	14	12	10.5	39	69
Thaba Nchu	TB_1	Trunk	3196	25.0	85.0	120	2.0	32	30	68.0	37	65
Thaba Nchu	TB_2	Complementary	145	25.0	85.0	80	29.8	4	2	20.0	74	130
Thaba Nchu	TB_3	Feeders	89	25.0	85.0	22	13.3	10	5	9.5	75	132
Thaba Nchu	TB_4	Feeders	645	25.0	85.0	80	6.7	17	9	10.9	67	117
Thaba Nchu	TB_5	Feeders	1132	25.0	85.0	120	5.7	22	10	11.3	71	124
Thaba Nchu	TB_6	Feeders	330	19.0	85.0	80	13.1	6	5	7.7	44	77
Thaba Nchu	TB_7	Feeders	798	19.0	85.0	80	5.4	21	11	9.3	64	113
Thaba Nchu	TB_8	Feeders	164	19.0	85.0	80	26.4	4	2	5.1	61	106
Thaba Nchu	TB_T	Feeders	167	25.0	85.0	80	25.9	3	2	4.0	48	84
Botshabelo	BOT_1	Feeder	513	25.0	85.0	120	12.6	7	5	5.5	48	84
Botshabelo	BOT_2	Feeder	93	25.0	85.0	22	12.8	4	5	5.5	27	48
Botshabelo	BOT_3	Feeder	107	25.0	85.0	22	11.1	8	5	6.6	51	89
Botshabelo	BOT_4	Feeder	661	25.0	85.0	120	9.8	10	6	9.5	58	101
Botshabelo	BOT_5	Feeder	115	25.0	85.0	22	10.3	10	6	10.1	59	104
Botshabelo	BOT_6	Feeder	309	25.0	85.0	22	3.8	26	16	8.9	56	98
Botshabelo	BOT_7	Feeder	103	25.0	85.0	22	11.5	5	5	8.9	36	62
Botshabelo	BOT_8	Feeder	110	25.0	85.0	22	10.8	8	6	6.8	51	90
Botshabelo	BOT_9	Feeder	524	25.0	85.0	80	8.2	13	7	10.5	60	105
Botshabelo	BOT_10	Feeder	195	25.0	85.0	22	6.1	11	10	10.5	39	69
Botshabelo	BOT_11	Feeder	91	25.0	85.0	22	13.0	7	5	6.3	50	87
Botshabelo	BOT_12	Feeder	129	25.0	85.0	22	9.2	6	7	6.3	29	51
Botshabelo	BOT_13	Feeder	62	25.0	85.0	22	19.2	5	3	10.4	60	105
Botshabelo	BOT_14	Feeder	215	25.0	85.0	22	5.5	18	11	8.5	55	97
Botshabelo	BOT_15	Feeder	84	25.0	85.0	22	14.1	4	4	8.5	35	61
Botshabelo	BOT_24	Trunk	2707	25.0	85.0	120	2.4	26	25	49.5	35	61
Botshabelo	BOT_25	Trunk	605	25.0	85.0	80	7.1	4	8	20.3	14	25
Circular Routes	P2_P4 via M10		84	19.0	85.0	22	14.1	5	4	12.0	38	66
Circular Routes	P1_RocklandsTranToHyperama Via N8		84	19.0	85.0	22	14.1	5	4	20.0	39	68
Circular Routes	Lemo Mall to NorthridgeMall		84	19.0	85.0	22	14.1	3	4	14.0	27	47

2036 – Feeder Trunk

Area	Gis ID	Riute Type	0.70	Speed	N8 Speed	Capacity	Freq(min)	Fleet	60min trips	Distance One dir	Travel One Direction	Round Trips
Phase 2	P2_14	Feeder	1388	19.0	0.0	22	0.9	33	70	5.1	16	28
Phase 2	P2_15	Feeder	380	19.0	0.0	22	3.1	8	19	4.3	14	24
Phase 2	P2_16	Feeder	222	19.0	0.0	22	5.3	6	11	5.8	18	32
Phase 2	P2_17	Feeder	740	19.0	0.0	80	5.8	5	10	5.7	18	32
Phase 2	P2_18	Feeder	195	19.0	0.0	22	6.1	3	10	3.7	12	21
Phase 2	P2_19	Feeder	410	19.0	0.0	80	10.5	2	6	3.5	11	20
Phase 2	P2_20	Feeder	155	19.0	0.0	22	7.7	2	8	2.2	7	12
Phase 2	P2_21	Feeder	443	19.0	0.0	22	2.7	8	22	3.9	12	22
Phase 2	P2_22	Feeder	280	19.0	0.0	22	4.2	7	14	5.6	18	31
Phase 2	P2_29	Feeder	291	19.0	0.0	22	4.1	8	15	5.6	18	31
Phase 2	P2_T1	Trunk	3707	19.0	0.0	120	1.7	34	34	10.9	34	60
Phase 2	P2_T2	Trunk	1935	19.0	0.0	120	3.3	24	18	14.4	45	80
Phase 2	P2_23	Feeder	321	19.0	0.0	22	3.7	3	16	2.3	7	13
Phase 2	P2_24	Feeder	183	19.0	0.0	22	6.5	2	9	2.1	7	12
Phase 2	P2_25	Feeder	633	19.0	0.0	22	1.9	11	32	3.7	12	21
Phase 2	P2_26	Direct Route	324	19.0	0.0	22	3.7	15	16	9.9	31	55
Phase 2	P2_27	Direct Route	324	19.0	0.0	22	3.7	13	16	8.8	28	48
Phase 2	P2_28	Direct Route	324	19.0	0.0	22	3.7	19	16	12.7	40	70
Phase 1_Maphisa	Maphisa_F1	Feeder	169	19.0	0.0	22	7.0	2	9	3.0	9	17
Phase 1_Maphisa	Maphisa_F2	Feeder	188	19.0	0.0	22	6.3	3	10	3.5	11	19
Phase 1_Maphisa	Maphisa F3	Feeder	179	19.0	0.0	22	6.6	3	9	3.5	11	19
Phase 1_Maphisa	Rt21	Feeder	220	19.0	0.0	22	5.4	3	11	3.0	9	17
Phase 1_Maphisa	Rt22	Feeder	243	19.0	0.0	22	4.9	3	12	2.5	8	14
Phase 1_Maphisa	Rt23	Feeder	420	19.0	0.0	22	2.8	4	21	2.2	7	12
Phase 1_Maphisa	Rt25	Feeder	385	19.0	0.0	22	3.1	5	19	2.7	9	15
OR Tambo	OR_27	Feeder	123	19.0	0.0	22	9.7	1.7	6	3.0	9	17
Phase 1_Maphisa	Maphisa_T1	Trunk	2134	19.0	0.0	80	2.0	22	30	8.0	25	44
Phase 1_Maphisa	Maphisa D1	Direct Route Diagonal	31	19.0	0.0	22	38.2	2	2	11.6	37	64
Phase 1_Maphisa	Maphisa D2	Direct Route Diagonal	149	19.0	0.0	80	29.0	2	2	11.6	37	64
OR Tambo	OR_24	Trunk	2517	20.0	0.0	80	1.7	43	35	14.0	42	74
OR Tambo	OR_25	Feeder	461	20.0	0.0	80	9.4	7	6	3.0	39	68
OR Tambo	OR_23	Feeder	270	20.0	0.0	80	16.0	4	4	3.4	39	68
OR Tambo	OR_26	Feeder	459	20.0	0.0	80	9.4	7	6	2.4	39	68
OR Tambo	OR_19	Feeder	282	19.0	19.0	22	4.2	16	14	10.5	39	69
Thaba Nchu	TB_1	Trunk	3702	25.0	85.0	120	1.8	37	34	68.0	37	65
Thaba Nchu	TB_2	Complementary	168	25.0	85.0	80	25.7	5	2	20.0	74	130
Thaba Nchu	TB_3	Feeders	103	25.0	85.0	22	11.5	11	5	9.5	75	132
Thaba Nchu	TB_4	Feeders	747	25.0	85.0	80	5.8	20	10	10.9	67	117
Thaba Nchu	TB_5	Feeders	1312	25.0	85.0	120	4.9	25	12	11.3	71	124
Thaba Nchu	TB_6	Feeders	382	19.0	85.0	80	11.3	7	5	7.7	44	77
Thaba Nchu	TB_7	Feeders	925	19.0	85.0	120	7.0	16	9	77.3	64	113
Thaba Nchu	TB_8	Feeders	189	19.0	85.0	80	22.8	5	3	5.1	61	106
Thaba Nchu	TB_T	Feeders	194	25.0	85.0	80	22.3	5	3	4.0	58	101
Botshabelo	BOT_1	Feeder	550	25.0	85.0	120	11.8	7	5	5.5	48	84
Botshabelo	BOT_2	Feeder	99	25.0	85.0	22	11.9	4	5	5.5	27	48
Botshabelo	BOT_3	Feeder	115	25.0	85.0	22	10.4	9	6	6.6	51	89
Botshabelo	BOT_4	Feeder	709	25.0	85.0	120	9.1	11	7	9.5	58	101
Botshabelo	BOT_5	Feeder	124	25.0	85.0	22	9.6	11	6	10.1	59	104
Botshabelo	BOT_6	Feeder	331	25.0	85.0	22	3.6	27	17	8.9	56	98
Botshabelo	BOT_7	Feeder	111	25.0	85.0	22	10.7	6	6	8.9	36	62
Botshabelo	BOT_8	Feeder	118	25.0	85.0	22	10.1	9	6	6.8	51	90
Botshabelo	BOT_9	Feeder	562	25.0	85.0	80	7.7	14	8	10.5	60	105
Botshabelo	BOT_10	Feeder	210	25.0	85.0	22	5.7	12	11	10.5	39	69
Botshabelo	BOT_11	Feeder	98	25.0	85.0	22	12.1	7	5	6.3	50	87
Botshabelo	BOT_12	Feeder	138	25.0	85.0	22	8.6	6	7	6.3	29	51
Botshabelo	BOT_13	Feeder	66	25.0	85.0	22	17.9	6	3	10.4	60	105
Botshabelo	BOT_14	Feeder	231	25.0	85.0	22	5.2	19	12	8.5	55	97
Botshabelo	BOT_15	Feeder	90	25.0	85.0	22	13.1	5	5	8.5	35	61
Botshabelo	BOT_24	Trunk	2902	25.0	85.0	120	2.2	27	27	49.5	35	61
Botshabelo	BOT_25	Trunk	649	25.0	85.0	80	6.7	4	9	20.3	14	25
Circular Routes	P2_P4 via M10		86	19.0	85.0	22	13.8	5	4	12.0	38	66
Circular Routes	P1_RocklandsTranToHyperama Via N8		86	19.0	85.0	22	13.8	5	4	20.0	39	68
Circular Routes	Lemo Mall to NorthridgeMall		86	19.0	85.0	22	13.8	3	4	14.0	27	47

GG Annexure GG: Detail Operational Cost and Revenue Calculation Per Route



HH Annexure HH Subsidised Bus Service Summary Information

HH.1 Summarised per Corridor

Row Labels	IPTN Phase	Wed Trips	Wed Pax	Fri Pax	Sat trips	Sat Pax	Sun Trips	Sun Pax
1001	Phase 1 a and b	150	6454	5520	35	1701	7	144
1003	Phase 1 c	90	3446	3169	21	233	4	13
1004	Phase 1c Northern Suburbs	136	4878	4837	29	451	0	0
2000	Phase 2	176	8966	8008	4	42	5	14
3000	Phase 3	70	3442	3645	18	572	4	98
4003	Phase 4 Hyperama	135	4863	5029	50	865	14	225
4004	Phase 5 Airport/Transwerk	8	651	493	1	1	0	0
6000	Phase 6_Makro	51	1542	1481	14	319	8	81
8001	Phase 7_Botshabelo	466	29216	28658	239	11206	167	6846
8002	Phase 8_Thaba Nchu	181	11629	11699	72	3392	76	2998
9001	Not Affected North	85	2461	2568	45	1156	30	994
9002	Not Affected East	68	4452	4369	19	465	8	221
Grand Total		1616	82000	79476	547	20403	323	11634

HH.2 Detail Per Route – Trip Frequency

RouteNo	Unique	Contract Route No	Direction	From	To	Day	Total Trips	Time Slots																							
								After 14:00 Before 14:00	04:00 AM - 05:00 AM	05:00 AM - 06:00 AM	06:00 AM - 07:00 AM	07:00 AM - 08:00 AM	08:00 AM - 09:00 AM	09:00 AM - 10:00 AM	10:00 AM - 11:00 AM	11:00 AM - 12:00 PM	12:00 PM - 01:00 PM	01:00 PM - 02:00 PM	02:00 PM - 03:00 PM	03:00 PM - 04:00 PM	04:00 PM - 05:00 PM	05:00 PM - 06:00 PM	06:00 PM - 07:00 PM	07:00 PM - 08:00 PM	08:00 PM - 09:00 PM	09:00 PM - 10:00 PM	10:00 PM - 11:00 PM	11:00 PM - 12:00 PM			
0001.1	0001	Forward	A1	Central Park	Mon-Fri	12	10	2	3	4	3	0	0		1	2	1	3	2	1											
0001.4	0001	Return	Central Park	A1	Mon-Fri	13	0	13	0	0	0	0	0																		
0002.5	0002	Forward	A4	Central Park	Mon-Fri	10	8	2	1	4	3	0	0		1		3	1	2	1											
0002.6	0002	Return	Central Park	A4	Mon-Fri	13	0	13	0	0	0	0	0																		
0003.7	0003	Forward	C2	Central Park	Mon-Fri	7	5	2	0	4	1	0	0				3	1	1												
0003.8	0003	Return	Central Park	C2	Mon-Fri	7	0	7	0	0	0	0	0																		
0004.10	0004	Forward	D1	Central Park	Mon-Fri	5	5	0	1	2	2	0	0			1	1	1	2												
0004.11	0004	Return	Central Park	D1	Mon-Fri	7	0	7	0	0	0	0	0																		
0005.12	0005	Forward	J1	Kortpad	Mon-Fri	2	1	1	0	1	0	0	0				1														
0005.14	0005	Forward	J1	Hoffman Square	Mon-Fri	1	0	1	0	0	0	0	0																		
0005.15	0005	Forward	J1	Central Park	Mon-Fri	11	8	3	2	3	3	0	0			2	1	2	2	1											
0005.16	0005	Return	Central Park	J1	Mon-Fri	12	1	11	0	1	0	0	0				1														
0006.17	0006	Return	Kortpad	J3	Mon-Fri	4	0	4	0	0	0	0	0																		
0006.18	0006	Forward	J3	Central Park	Mon-Fri	14	14	0	3	6	5	0	0		1	2	4	2	5												
0006.19	0006	Forward	J3	Kortpad	Mon-Fri	3	0	3	0	0	0	0	0																		

RouteNoUnique	Contract Route No	Direction	From	To	Day	Total Trips	After 14:00 Before 14:00			04:00 AM - 05:00 AM	05:00 AM - 06:00 AM	06:00 AM - 07:00 AM	07:00 AM - 08:00 AM	08:00 AM - 09:00 AM	09:30 AM - 03:59 AM	04:00 AM - 04:29 AM	04:30 AM - 05:00 AM	05:00 AM - 05:29 AM	05:30 AM - 5:59 AM	06:00 AM - 06:29 AM	06:30 AM - 06:59 AM	07:00 AM - 07:29 AM	07:30 AM - 07:59 AM	08:00 AM - 08:29 AM	08:30 AM - 08:59 AM	09:00 AM - 09:29 AM	09:30 AM - 09:59 AM	10:00 AM - 10:29 PM	10:30 PM - 10:59 PM	11:00 PM - 11:29 PM	11:30 PM - 12:00 PM
0006.20	0006	Return	Central Park	J3	Mon-Fri	12	1	11	0	1	0	0	0						1												
0007.22	0007	Forward	K6	Central Park	Mon-Fri	14	11	3	2	5	4	0	0			2	2	3	2	2											
0007.23	0007	Return	Central Park	K6	Mon-Fri	18	1	17	0	1	0	0	0					1													
0008.25	0008	Forward	M1	Central Park	Mon-Fri	11	9	2	4	3	2	0	0			1	3	1	2	2											
0008.26	0008	Forward	M1	Kortpad	Mon-Fri	1	0	1	0	0	0	0	0																		
0008.27	0008	Return	Central Park	M1	Mon-Fri	11	0	11	0	0	0	0	0																		
0009.28	0009	Forward	N1	Kortpad	Mon-Fri	2	0	2	0	0	0	0	0																		
0009.29	0009	Forward	N1	Central Park	Mon-Fri	14	9	5	2	3	4	0	0			2	1	2	3	1											
0009.30	0009	Return	Central Park	N1	Mon-Fri	16	2	14	0	1	1	0	0					1		1											
0010.31	0010	Forward	S1	Central Park	Mon-Fri	3	3	0	1	2	0	0	0			1	1	1													
0010.32	0010	Return	Central Park	S1	Mon-Fri	2	0	2	0	0	0	0	0																		
0011.33	0011	Return	Fairways	S1	Mon-Fri	1	1	0	0	0	0	0	1																		
0011.34	0011	Return	Fairways	T1	Mon-Fri	1	0	1	0	0	0	0	0																		
0011.35	0011	Return	Kortpad	T1	Mon-Fri	2	0	2	0	0	0	0	0																		
0011.36	0011	Forward	T1	Fairways	Mon-Fri	1	1	0	0	0	0	1	0																		
0011.37	0011	Forward	S1	Fairways	Mon-Fri	1	1	0	0	0	0	0	1																		
0011.38	0011	Forward	T1	Central Park	Mon-Fri	6	5	1	0	3	2	0	0				2	1	2												
0011.39	0011	Return	Central Park	T1	Mon-Fri	7	1	6	0	0	1	0	0							1											
0012.40	0012	Return	Fairways	U7	Mon-Fri	1	1	0	0	0	0	0	0																		
0012.41	0012	Return	Kortpad	U7	Mon-Fri	1	0	1	0	0	0	0	0																		
0012.43	0012	Forward	U7	Central Park	Mon-Fri	12	10	2	2	5	3	0	0			1	1	2	3	2	1										
0012.44	0012	Forward	U7	Fairways	Mon-Fri	1	1	0	0	0	0	0	0																		
0012.45	0012	Return	Central Park	U7	Mon-Fri	14	0	14	0	0	0	0	0																		
0013.46	0013	Return	Fairways	W4	Mon-Fri	1	0	1	0	0	0	0	0																		
0013.47	0013	Forward	W4	Central Park	Mon-Fri	14	11	3	1	6	4	0	0			1		5	1	2	2										
0013.48	0013	Return	Central Park	W4	Mon-Fri	10	0	10	0	0	0	0	0																		
0015.50	0015	Forward	M4	Kortpad	Mon-Fri	1	0	1	0	0	0	0	0																		
0015.51	0015	Forward	M4	Fairways	Mon-Fri	1	1	0	0	0	0	1	0																		
0016.52	0016	Forward	Belgie	Bloemdustria	Mon-Fri	1	0	1	0	0	0	0	0																		
0016.53	0016	Return	Bloemdustria	W4	Mon-Fri	1	0	1	0	0	0	0	0																		
0016.54	0016	Return	Central Park	Belgie	Mon-Fri	1	0	1	0	0	0	0	0																		
0016.55	0016	Return	Kortpad	N1	Mon-Fri	1	0	1	0	0	0	0	0																		

MMM – City Wide Integrated Public Transport Plan

RouteNoUnique	Contract Route No	Direction	From	To	Day	Total Trips	After 14:00 Before 14:00			04:00 AM - 05:00 AM	05:00 AM - 06:00 AM	06:00 AM - 07:00 AM	07:00 AM - 08:00 AM	08:00 AM - 09:00 AM	09:00 AM - 10:00 AM	10:00 AM - 11:00 AM	11:00 AM - 12:00 PM	12:00 PM - 01:00 PM	01:00 PM - 02:00 PM	02:00 PM - 03:00 PM	03:00 PM - 04:00 PM	04:00 PM - 05:00 PM	05:00 PM - 06:00 PM	06:00 PM - 07:00 PM	07:00 PM - 08:00 PM	08:00 PM - 09:00 PM	09:00 PM - 10:00 PM	10:00 PM - 11:00 PM	11:00 PM - 12:00 PM
0036.99	0036	Forward	E3	Central Park	Mon-Fri	2	2	0	0	2	0	0	0	0	1	1													
0040.101	0040	Forward	Bainsvlei	Hoffman Square	Mon-Fri	3	3	0	0	0	1	2	0			1	2												
0040.102	0040	Forward	Bainsvlei 2	Central Park	Mon-Fri	1	0	1	0	0	0	0	0									1							
0040.103	0040	Return	Hoffman Square	Bainsvlei	Mon-Fri	2	0	2	0	0	0	0	0									2							
0040.104	0040	Forward	Bainsvlei	Central Park	Mon-Fri	1	0	1	0	0	0	0	0								1								
0040.105	0040	Forward	Bainsvlei	Central Park	Mon-Fri	8	3	5	0	0	1	1	1								2	2		1					
0040.106	0040	Return	Central Park	Bainsvlei	Mon-Fri	7	6	1	0	0	2	4	0								1								
0041.107	0041	Return	Bayswater	Hoffman Square	Mon-Fri	12	12	0	0	0	2	5	5																
0041.108	0041	Forward	Hoffman Square	Bayswater	Mon-Fri	11	2	9	0	0	0	0	0						2	1	1	1	2	3		1			
0041.109	0041	Forward	Central Park	Bayswater	Mon-Fri	16	15	1	0	0	6	7	2									1							
0041.110	0041	Return	Bayswater	Central Park	Mon-Fri	12	1	11	0	0	0	0	0						1	1	1	1	1	2	3	1	1		
0042.111	0042	Return	Brandwag	Hoffman Square	Mon-Fri	7	7	0	0	0	2	3	2																
0042.112	0042	Forward	Central Park	Mimosa Mall	Mon-Fri	1	0	1	0	0	0	0	0										1						
0042.113	0042	Forward	Hoffman Square	Brandwag	Mon-Fri	5	0	5	0	0	0	0	0							1	1	1	1	1					
0042.114	0042	Return	Mimosa Mall	Central Park	Mon-Fri	1	0	1	0	0	0	0	0											1					
0042.115	0042	Return	Zoo	Central Park	Mon-Fri	1	0	1	0	0	0	0	0									1							
0042.116	0042	Forward	Central Park	Brandwag	Mon-Fri	8	8	0	0	0	2	5	1																
0042.117	0042	Return	Brandwag	Central Park	Mon-Fri	5	0	5	0	0	0	0	0							1	1	1		1	1				
0043.118	0043	Forward	Station View	Central Park	Mon-Fri	1	1	0	0	0	1	0	0																
0044.119	0044	Return	Dan Pienaar	Hoffman Square	Mon-Fri	10	10	0	0	0	3	4	3																
0044.120	0044	Forward	Hoffman Square	Dan Pienaar	Mon-Fri	11	1	10	0	0	0	0	0						1	1	1	2	2	2	1	1			
0044.121	0044	Forward	Central Park	Dan Pienaar	Mon-Fri	12	12	0	0	0	5	6	1																
0044.122	0044	Return	Dan Pienaar	Central Park	Mon-Fri	11	0	11	0	0	0	0	0							1	1	1	2	2	2	1	1		
0046.123	0046	Return	Fauna	Hoffman Square	Mon-Fri	5	5	0	0	0	1	1	2						1										
0046.124	0046	Forward	Central Park	Fauna	Mon-Fri	4	4	0	0	0	1	2	1																
0046.125	0046	Return	Fauna	Central Park	Mon-Fri	4	1	3	0	0	1	0	0								1		1	1					
0046.579	0046	Forward	Hoffman Square	Fauna	Mon-Fri	4	1	3	0	0	0	0	0							1		1	1						
0047.126	0047	Return	Fichardt Park	Hoffman Square	Mon-Fri	7	7	0	0	0	1	5	1																
0047.127	0047	Forward	Hoffman Square	Fichardt Park	Mon-Fri	6	0	6	0	0	0	0	0							1	1	1		1	1	1			
0047.128	0047	Forward	Central Park	Fichardt Park	Mon-Fri	11	10	1	0	1	4	4	1																
0047.129	0047	Return	Fichardt Park	Central Park	Mon-Fri	8	1	7	0	0	1	0	0							1		1	1	1	1	1	1		
0048.130	0048	Return	Bergman Square	Central Park	Mon-Fri	6	3	3	0	2	1	0	0									1	1						

RouteNoUnique	Contract Route No	Direction	From	To	Day	Total Trips	After 14:00 Before 14:00			04:00 AM - 05:00 AM	05:00 AM - 06:00 AM	06:00 AM - 07:00 AM	07:00 AM - 08:00 AM	08:00 AM - 09:00 AM	09:00 AM - 10:00 AM	10:00 AM - 11:00 AM	11:00 AM - 12:00 PM	12:00 PM - 01:00 PM	01:00 PM - 02:00 PM	02:00 PM - 03:00 PM	03:00 PM - 04:00 PM	04:00 PM - 05:00 PM	05:00 PM - 06:00 PM	06:00 PM - 07:00 PM	07:00 PM - 08:00 PM	08:00 PM - 09:00 PM	09:00 PM - 10:00 PM	10:00 PM - 11:00 PM	11:00 PM - 12:00 PM
0048.131	0048	Forward	Central Park	Bergman Square	Mon-Fri	6	1	5	0	0	1	0	0							1	1		1	1					
0048.132	0048	Return	Central Park	Khayalitsha	Mon-Fri	7	3	4	0	0	3	0	0							1		1		1					
0048.133	0048	Forward	Khayalitsha	Central Park	Mon-Fri	6	5	1	0	2	3	0	0							1									
0048.134	0048	Forward	Freedom Square	Central Park	Mon-Fri	9	5	4	1	2	2	0	0		1						1	1		1	1				
0048.135	0048	Return	Central Park	Freedom Square	Mon-Fri	11	4	7	0	1	2	1	0							1	1	1	1	1					
0050.138	0050	Forward	Hoffman Square	Langenhovenpark	Mon-Fri	2	2	0	0	0	0	0	0				1			1									
0050.139	0050	Return	Langenhovenpark	Hoffman Square	Mon-Fri	2	2	0	0	0	0	0	0				1			1									
0051.140	0051	Forward	Central Park	Hamilton	Mon-Fri	11	7	4	0	0	4	3	0								1	1		1					
0051.141	0051	Return	Hamilton	Central Park	Mon-Fri	1	0	1	0	0	0	0	0									1							
0051.142	0051	Return	Hamilton	Central Park	Mon-Fri	9	4	5	0	0	1	3	0								1	2		1		1			
0052.143	0052	Forward	Central Park	Lillyvale	Mon-Fri	3	1	2	0	0	0	1	0							1	1								
0052.144	0052	Return	Heuwelsig	Hoffman Square	Mon-Fri	7	7	0	0	0	2	4	1																
0052.145	0052	Forward	Hoffman Square	Heuwelsig	Mon-Fri	5	1	4	0	0	0	0	0						1	1	1	2							
0052.146	0052	Forward	Hoffman Square	Woodland Hills	Mon-Fri	2	0	2	0	0	0	0	0						1			1							
0052.147	0052	Return	Lillyvale	Hoffman Square	Mon-Fri	1	1	0	0	0	0	0	1																
0052.148	0052	Return	Lillyvale	Central Park	Mon-Fri	3	0	3	0	0	0	0	0								1	1		1					
0052.150	0052	Forward	Central Park	Heuwelsig	Mon-Fri	7	7	0	0	0	3	3	1																
0052.151	0052	Return	Heuwelsig	Central Park	Mon-Fri	5	0	5	0	0	0	0	0						1		1	1	2						
0053.152	0053	Forward	Hoffman Square	Hospitaalpark	Mon-Fri	4	0	4	0	0	0	0	0							1		1	1		1				
0053.153	0053	Return	Hospitaalpark	Hoffman Square	Mon-Fri	4	4	0	0	0	1	2	1																
0053.154	0053	Forward	Central Park	Hospitaalpark	Mon-Fri	4	4	0	0	0	1	2	1																
0053.155	0053	Return	Hospitaalpark	Central Park	Mon-Fri	4	0	4	0	0	0	0	0							1		1		1	1				
0054.157	0054	Forward	Hoffman Square	Langenhovenpark	Mon-Fri	13	2	11	0	0	0	0	0						1	1	2	2	1	2	3	1			
0054.158	0054	Return	Langenhovenpark	Hoffman Square	Mon-Fri	16	16	0	0	0	5	6	5																
0054.159	0054	Forward	Central Park	Langenhovenpark	Mon-Fri	18	17	1	0	1	8	6	2											1					
0054.160	0054	Return	Langenhovenpark	Central Park	Mon-Fri	19	1	18	0	0	0	0	0						1	1	1	2	2	4	1	4	2		1
0055.161	0055	Forward	Central Park	Lourierpark	Mon-Fri	1	1	0	0	0	1	0	0																
0055.162	0055	Forward	Fichardt Park	Lourierpark	Mon-Fri	1	1	0	0	1	0	0	0																
0055.163	0055	Forward	Hoffman Square	Lourierpark	Mon-Fri	1	0	1	0	0	0	0	0										1						
0055.164	0055	Return	Hyperama	Central Park	Mon-Fri	2	0	2	0	0	0	0	0											1		1			
0055.165	0055	Return	Lourierpark	Hoffman Square	Mon-Fri	1	0	1	0	0	0	0	0										1						
0055.166	0055	Return	Lourierpark	Central Park	Mon-Fri	2	1	1	0	0	1	0	0											1					

Route	No	Unique	Contract Route No	Direction	From	To	Day	Total Trips	Before 14:00	After 14:00	04:00 AM - 05:00 AM	05:00 AM - 06:00 AM	06:00 AM - 07:00 AM	07:00 AM - 08:00 AM	08:00 AM - 09:00 AM	09:30 AM - 10:30 AM	10:30 AM - 11:30 AM	11:30 AM - 12:00 PM	12:00 PM - 12:29 PM	12:30 PM - 12:59 PM	01:00 PM - 01:29 PM	01:30 PM - 01:59 PM	02:00 PM - 02:29 PM	02:30 PM - 02:59 PM	03:00 PM - 03:29 PM	03:30 PM - 03:59 PM	04:00 PM - 04:29 PM	04:30 PM - 04:59 PM	05:00 PM - 05:29 PM	05:30 PM - 05:59 PM	06:00 PM - 06:29 PM	06:30 PM - 06:59 PM	07:00 PM - 07:29 PM	07:30 PM - 07:59 PM	08:00 PM - 08:29 PM	08:30 PM - 08:59 PM	09:00 PM - 09:29 PM	09:30 PM - 09:59 PM	10:00 PM - 10:29 PM	10:30 PM - 10:59 PM	11:00 PM - 11:29 PM	11:30 PM - 12:00 PM						
0055.167	0055	Return	Lourierpark	Central Park	Mon-Fri	1	1	0	0	0	1	0	0	0				1																														
0056.169	0056	Return	Parkeraad	Central Park	Mon-Fri	1	0	1	0	0	0	0	0	0												1																						
0057.170	0057	Return	Central Park	Namibië	Mon-Fri	3	1	2	0	1	0	0	0	0			1									1		1																				
0057.171	0057	Forward	Namibië	Central Park	Mon-Fri	3	1	2	0	1	0	0	0	0			1									1		1																				
0058.172	0058	Forward	Hoffman Square	Noordhoek	Mon-Fri	7	1	6	0	0	0	0	0	0							1		1	1	2		1	1																				
0058.173	0058	Return	Noordhoek	Hoffman Square	Mon-Fri	8	8	0	0	0	3	3	2				1	2	1	2	1	1																										
0058.174	0058	Forward	Central Park	Noordhoek	Mon-Fri	8	8	0	0	0	4	3	1				2	2	2	1	1																											
0058.175	0058	Return	Noordhoek	Central Park	Mon-Fri	8	0	8	0	0	0	0	0	0								2	1	1	1		2		1																			
0059.176	0059	Return	Bidvest	Central Park	Mon-Fri	1	0	1	0	0	0	0	0	0																																		
0059.177	0059	Forward	Central Park	Ooseinde	Mon-Fri	3	3	0	0	0	1	2	0					1	1	1																												
0059.178	0059	Return	Ooseinde	Central Park	Mon-Fri	2	0	2	0	0	0	0	0	0														1	1																			
005A.179	005A	Forward	J1	Central Park	Mon-Fri	2	2	0	2	0	0	0	0	0		1	1																															
005A.180	005A	Return	Central Park	J1	Mon-Fri	2	0	2	0	0	0	0	0	0																																		
005B.181	005B	Return	Central Park	G1	Mon-Fri	1	1	0	0	0	1	0	0	0					1																													
005B.182	005B	Forward	G1	Central Park	Mon-Fri	1	0	1	0	0	0	0	0	0												1																						
005B.184	005B	Return	Central Park	G2	Mon-Fri	1	1	0	0	0	1	0	0	0					1																													
0061.185	0061	Return	Central Park	Motsabi	Mon-Fri	2	0	2	0	0	0	0	0	0																	1				1													
0061.186	0061	Forward	Motsabi	Central Park	Mon-Fri	3	2	1	0	2	0	0	0	0				2																														
0061.187	0061	Forward	Phase 2	Central Park	Mon-Fri	9	3	6	1	1	1	0	0	0			1		1							1			2	2	1																	
0061.188	0061	Return	Central Park	Phase 2	Mon-Fri	9	2	7	0	1	1	0	0	0			1		1							1		1	1	1	1	1		1														
0062.189	0062	Forward	Hoffman Square	Pellissier	Mon-Fri	8	1	7	0	0	0	0	0	0							1	1	1	1	2	1		1																				
0062.190	0062	Return	Pellissier	Hoffman Square	Mon-Fri	7	7	0	0	0	1	5	1					1	2	3	1																											
0062.191	0062	Forward	Central Park	Pellissier	Mon-Fri	6	6	0	0	0	2	3	1					1	1	2	1	1																										
0062.192	0062	Return	Pellissier	Central Park	Mon-Fri	8	0	8	0	0	0	0	0	0									1	1	1	1	2	1		1																		
0063.193	0063	Forward	Phelindaba	Central Park	Mon-Fri	11	3	8	1	1	1	0	0			1		1								1	2		3		2																	
0063.194	0063	Return	Central Park	Phelindaba	Mon-Fri	14	6	8	0	1	5	0	0				1		5							2		1	1	1	2		1															
0064.195	0064	Forward	Rocklands	Central Park	Mon-Fri	6	2	4	0	1	1	0	0				1		1										1	1	1	1	1		1													
0064.196	0064	Return	Central Park	Rocklands	Mon-Fri	7	1	6	0	0	0	1	0							1						1		1	1	1	1		1															
0065.197	0065	Forward	Phase 4	Central Park	Mon-Fri	14	6	8	1	3	2	0	0			1		3		2					1		1		1	2	2		1															
0065.198	0065	Return	Central Park	Phase 4	Mon-Fri	12	3	9	0	1	2	0	0				1	2								1	1	1	2	1	2		1															
0066.199	0066	Forward	Turflaagte	Central Park	Mon-Fri	8	3	5	1	0	2	0	0			1		1	1							1			1	2	1																	
0066.200	0066	Return	Central Park	Turflaagte	Mon-Fri	10	3	7	0	2	1	0	0				2	1							1		1	1	1	2		1																

MMM – City Wide Integrated Public Transport Plan

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MMM – City Wide Integrated Public Transport Plan Annexure 42 | Page

RouteNoUnique	Contract Route No	Direction	From	To	Day	Total Trips	After 14:00 Before 14:00		04:00 AM - 05:00 AM	05:00 AM - 06:00 AM	06:00 AM - 07:00 AM	07:00 AM - 08:00 AM	08:00 AM - 09:00 AM	09:30 AM - 03:59 AM	04:00 AM - 04:29 AM	04:30 AM - 05:00 AM	05:00 AM - 05:29 AM	05:30 AM - 5:59 AM	06:00 AM - 06:29 AM	06:30 AM - 06:59 AM	07:00 AM - 07:29 AM	07:30 AM - 07:59 AM	08:00 AM - 08:29 AM	08:30 AM - 08:59 AM	09:00 AM - 09:29 AM	09:30 AM - 09:59 AM	10:00 PM - 10:29 PM	10:30 PM - 10:59 PM	11:00 PM - 11:29 PM	11:30 PM - 12:00 PM
0112.322	0112	Forward	Brandfort	Thaba Nchu	Mon-Fri	1	0	1	0	0	0	0																		
0112.323	0112	Return	Thaba Nchu	Brandfort	Mon-Fri	1	1	0	0	0	0	0	1						1											
0115.326	0115	Forward	Spitskop	Thaba Nchu	Mon-Fri	2	1	1	0	0	0	0	1																	
0115.327	0115	Return	Thaba Nchu	Spitskop	Mon-Fri	2	2	0	0	0	0	1	0						1											
0116.329	0116	Forward	Thaba Nchu	Windmill Casino	Mon-Fri	1	0	1	0	0	0	0	0												1					
0116.330	0116	Return	Windmill Casino	Central Park	Mon-Fri	1	0	1	0	0	0	0	0														1			
0117.332	0117	Return	Protea Hotel	Zone 1	Mon-Fri	3	1	2	0	0	1	0	0					1												1
0117.333	0117	Forward	Zone 1	Protea Hotel	Mon-Fri	3	2	1	0	1	0	0	0				1											1		
0119.339	0119	Forward	Sediba	Thaba Nchu	Mon-Fri	3	1	2	0	0	0	0	1						1											
0119.340	0119	Forward	Tala	Thaba Nchu	Mon-Fri	1	0	1	0	0	0	0	0											1						
0119.341	0119	Return	Thaba Nchu	Sediba	Mon-Fri	2	1	1	0	0	0	0	0																	
0120.343	0120	Forward	Rooibult	Morago	Mon-Fri	1	1	0	0	0	1	0	0						1											
0120.345	0120	Forward	Rooibult	Thaba Nchu	Mon-Fri	2	2	0	0	1	0	1	0				1													
0120.346	0120	Return	Thaba Nchu	Rooibult	Mon-Fri	3	1	2	0	0	1	0	0						1											
0120.566	0120	Forward	Morago	Sediba	Mon-Fri	1	1	0	0	0	0	1	0						1											
0122.347	0122	Forward	Feloane	Thaba Nchu	Mon-Fri	1	1	0	0	0	1	0	0					1												
0122.348	0122	Return	Thaba Nchu	Feloane	Mon-Fri	1	0	1	0	0	0	0	0																	
0123.349	0123	Forward	Morago	Thaba Nchu	Mon-Fri	1	1	0	0	1	0	0	0				1													
0123.350	0123	Return	Thaba Nchu	Morago	Mon-Fri	1	0	1	0	0	0	0	0																	
0124.353	0124	Return	Thaba Nchu	Sediti	Mon-Fri	2	2	0	0	0	2	0	0					2												
0125.354	0125	Return	Fairways	Zone 1	Mon-Fri	4	2	2	0	0	0	1	1																	
0125.356	0125	Forward	Zone 1	Fairways	Mon-Fri	2	2	0	0	0	2	0	0						2											
0125.357	0125	Forward	Zone 1	Thaba Nchu	Mon-Fri	1	0	1	0	0	0	0	0																	
0126.358	0126	Forward	Central Park	Erlichpark	Mon-Fri	1	1	0	0	0	0	1	0																	
0126.359	0126	Return	Erlichpark	Central Park	Mon-Fri	1	0	1	0	0	0	0	0																	
0126.360	0126	Return	Erlichpark	Hoffman Square	Mon-Fri	2	2	0	0	0	1	1	0						1											
0126.361	0126	Forward	Hoffman Square	Erlichpark	Mon-Fri	1	0	1	0	0	0	0	0																	
0127.363	0127	Forward	Phelindaba	Universitas Hospital	Mon-Fri	1	1	0	0	0	1	0	0						1											
0128.364	0128	Return	Universitas Hospital	Phelindaba	Mon-Fri	2	2	0	0	1	1	0	0				1		1											
0128.365	0128	Forward	Phelindaba	Universitas Hospital	Mon-Fri	1	1	0	1	0	0	0	0				1													
0130.368	0130	Forward	Central Park	Pelonomi	Mon-Fri	1	0	1	0	0	0	0	0																	
0130.369	0130	Forward	Central Park	National Hospital	Mon-Fri	1	0	1	0	0	0	0	0																	

RouteNoUnique	Contract Route No	Direction	From	To	Day	Total Trips	After 14:00 Before 14:00		04:00 AM - 05:00 AM	05:00 AM - 06:00 AM	06:00 AM - 07:00 AM	07:00 AM - 08:00 AM	08:00 AM - 09:00 AM	09:00 AM - 10:00 AM	10:00 AM - 11:00 AM	11:00 AM - 12:00 PM	12:00 PM - 01:00 PM	01:00 PM - 02:00 PM	02:00 PM - 03:00 PM	03:00 PM - 04:00 PM	04:00 PM - 05:00 PM	05:00 PM - 06:00 PM	06:00 PM - 07:00 PM	07:00 PM - 08:00 PM	08:00 PM - 09:00 PM	09:00 PM - 10:00 PM	10:00 PM - 11:00 PM	11:00 PM - 12:00 PM
0130.370	0130	Forward	Pelonomi	National Hospital	Mon-Fri	1	0	1	0	0	0	0	0									1						
0130.371	0130	Return	Pelonomi	Central Park	Mon-Fri	1	0	1	0	0	0	0	0									1						
0130.372	0130	Forward	Pelonomi	Universitas Hospital	Mon-Fri	1	1	0	0	0	1	0	0															
0131.374	0131	Return	Universitas Hospital	Central Park	Mon-Fri	3	1	2	0	0	0	1	0									1	1					
0131.375	0131	Forward	Phelindaba	National Hospital	Mon-Fri	1	1	0	0	1	0	0	0		1													
0132.376	0132	Return	National Hospital	Rocklands	Mon-Fri	1	0	1	0	0	0	0	0							1								
0134.378	0134	Return	UOVS	Phelindaba	Mon-Fri	2	0	2	0	0	0	0	0							1	1							
0135.379	0135	Return	UOVS	Phase 2	Mon-Fri	1	0	1	0	0	0	0	0							1								
0137.382	0137	Forward	National Hospital	Universitas Hospital	Mon-Fri	1	0	1	0	0	0	0	0									1						
0138.387	0138	Return	Central Park	Phase 3	Mon-Fri	5	3	2	0	1	2	0	0		1	1	1					2						
0138.388	0138	Forward	Phase 3	Central Park	Mon-Fri	4	3	1	0	2	1	0	0		2	1					1							
0141.389	0141	Forward	Ipopeng	Central Park	Mon-Fri	3	1	2	0	1	0	0	0		1							2						
0141.390	0141	Return	Central Park	Ipopeng	Mon-Fri	2	0	2	0	0	0	0	0								1	1						
0142.391	0142	Forward	Mafora	Central Park	Mon-Fri	5	2	3	0	1	1	0	0		1	1				1	1	1						
0142.392	0142	Return	Central Park	Mafora	Mon-Fri	5	1	4	0	0	1	0	0		1				1	1	1	1						
0143.395	0143	Forward	Phase 7	Central Park	Mon-Fri	4	2	2	0	1	1	0	0		1	1					1	1						
0143.396	0143	Return	Central Park	Phase 7	Mon-Fri	3	1	2	0	0	1	0	0			1				1	1							
0146.399	0146	Return	Woodland Hills	Hoffman Square	Mon-Fri	4	4	0	0	0	0	3	1															
0146.400	0146	Forward	Central Park	Woodland Hills	Mon-Fri	6	5	1	0	0	4	1	0		1	3	1				1							
0146.401	0146	Return	Woodland Hills	Central Park	Mon-Fri	5	0	5	0	0	0	0	0						1	1		2	1					
0150.568	0150	Return	Industrial Botshabelo	Thaba Nchu	Mon-Fri	2	0	2	0	0	0	0	0								1	1						
0151.403	0151	Forward	Botshabelo Hospital	Central Park	Mon-Fri	1	0	1	0	0	0	0	0						1									
0151.404	0151	Return	Central Park	Botshabelo Hospital	Mon-Fri	1	1	0	0	0	1	0	0		1													
0153.405	0153	Forward	Bloemside	Central Park	Mon-Fri	1	1	0	0	0	1	0	0		1													
0153.406	0153	Return	Central Park	Bloemside	Mon-Fri	1	1	0	0	1	0	0	0		1													
0153.407	0153	Return	Central Park	Bloemanda	Mon-Fri	1	1	0	0	1	0	0	0		1													
0155.408	0155	Forward	Central Park	Tempe	Mon-Fri	1	0	1	0	0	0	0	0						1									
0155.409	0155	Forward	Phase 4	Tempe	Mon-Fri	1	1	0	0	1	0	0	0		1													
0155.410	0155	Return	Tempe	Phase 4	Mon-Fri	1	0	1	0	0	0	0	0						1									
0157.413	0157	Return	Tempe	Rocklands	Mon-Fri	1	0	1	0	0	0	0	0						1									
0157.414	0157	Forward	Rocklands	Tempe	Mon-Fri	1	1	0	0	1	0	0	0		1													
0163.415	0163	Forward	Central Park	Verkeerdevlei	Mon-Fri	1	0	1	0	0	0	0	0									1						

RouteNoUnique	Contract Route No	Direction	From	To	Day	Total Trips	After 14:00																Before 14:00	Total Trips											
							04:00 AM - 05:00 AM	05:00 AM - 06:00 AM	06:00 AM - 07:00 AM	07:00 AM - 08:00 AM	08:00 AM - 09:00 AM	09:30 AM - 10:29 AM	10:30 AM - 11:29 AM	11:30 AM - 12:29 PM	12:30 PM - 12:59 PM	01:00 PM - 01:29 PM	01:30 PM - 01:59 PM	02:00 PM - 02:29 PM	02:30 PM - 02:59 PM	03:00 PM - 03:29 PM	03:30 PM - 03:59 PM	04:00 PM - 04:29 PM			04:30 PM - 04:59 PM	05:00 PM - 05:29 PM	05:30 PM - 05:59 PM	06:00 PM - 06:29 PM	06:30 PM - 06:59 PM	07:00 PM - 07:29 PM	07:30 PM - 07:59 PM	08:00 PM - 08:29 PM	08:30 PM - 08:59 PM	09:00 PM - 09:29 PM	09:30 PM - 09:59 PM
022A.429	022A	Return	Kortpad	N1	Mon-Fri	1	0	1	0	0	0	0	0																						1
022A.430	022A	Return	Kortpad	M4	Mon-Fri	2	0	2	0	0	0	0	0																						1
027B.435	027B	Forward	N1	TNC Industrial	Mon-Fri	1	1	0	0	1	0	0	0					1																	
027B.436	027B	Forward	Thaba Nchu	M4	Mon-Fri	1	0	1	0	0	0	0	0																						
027B.438	027B	Forward	TNC Industrial	Botshabelo Hospital	Mon-Fri	1	0	1	0	0	0	0	0																						
027B.439	027B	Forward	M4	Thaba Nchu	Mon-Fri	1	1	0	0	1	0	0	0					1																	
031A.440	031A	Return	Hospitals	CR Swart	Mon-Fri	1	0	1	0	0	0	0	0																						
031A.441	031A	Return	Hospitals	N4	Mon-Fri	1	0	1	0	0	0	0	0																						
046A.443	046A	Return	Generaal De Wet	Central Park	Mon-Fri	8	1	7	0	0	0	0	0																						
046A.444	046A	Return	Generaal De Wet	Hoffman Square	Mon-Fri	3	3	0	0	0	1	2	0																						
046A.445	046A	Forward	Hoffman Square	Generaal De Wet	Mon-Fri	6	1	5	0	0	0	0	0																						
046A.446	046A	Forward	Central Park	Generaal De Wet	Mon-Fri	4	3	1	0	0	1	2	0																						
046C.449	046C	Return	Generaal De Wet	Central Park	Mon-Fri	3	1	2	0	0	0	0	0																						
046C.450	046C	Forward	Hoffman Square	Fauna	Mon-Fri	3	1	2	0	0	0	0	0																						
051A.453	051A	Forward	Central Park	Hamilton	Mon-Fri	1	1	0	0	0	1	0	0																						
051A.454	051A	Return	Hamilton	Central Park	Mon-Fri	1	0	1	0	0	0	0	0																						
051A.455	051A	Return	Hamilton Nampak	Central Park	Mon-Fri	3	0	3	0	0	0	0	0																						
051B.456	051B	Forward	Central Park	Hamilton	Mon-Fri	1	1	0	0	0	0	1	0																						
051B.457	051B	Return	Hamilton PAO	Central Park	Mon-Fri	1	0	1	0	0	0	0	0																						
093A.459	093A	Forward	Zone 1	Central Park	Mon-Fri	1	1	0	1	0	0	0	0																						
093A.460	093A	Return	Central Park	Zone 1	Mon-Fri	3	2	1	0	0	0	0	0																						
093A.462	093A	Return	Thaba Nchu	Zone 1	Mon-Fri	1	0	1	0	0	0	0	0																						
093B.463	093B	Forward	Zone 1	Central Park	Mon-Fri	17	8	9	0	0	0	1	1																						
093B.464	093B	Return	Central Park	Zone 1	Mon-Fri	17	11	6	0	1	2	2	1																						
093C.466	093C	Return	Central Park	Zone 1	Mon-Fri	11	0	11	0	0	0	0	0																						
093D.467	093D	Return	Central Park	CR Swart	Mon-Fri	1	0	1	0	0	0	0	0																						
093D.469	093D	Forward	Zone 1	Hospitals	Mon-Fri	2	1	1	1	0	0	0	0																						
093D.471	093D	Return	CR Swart	Zone 1	Mon-Fri	1	0	1	0	0	0	0	0																						
094A.472	094A	Forward	Unit 1	Central Park	Mon-Fri	3	3	0	0	2	1	0	0																						
094A.473	094A	Return	Central Park	Unit 1	Mon-Fri	1	0	1	0	0	0	0	0																						
094B.474	094B	Forward	Zone 5	Central Park	Mon-Fri	2	2	0	0	1	1	0	0																						
094B.475	094B	Return	Central Park	Zone 5	Mon-Fri	1	0	1	0	0	0	0	0																						

RouteNoUnique	Contract Route No	Direction	From	To	Day	Total Trips	After 14:00																Before 14:00															
							04:00 AM - 05:00 AM				05:00 AM - 06:00 AM				06:00 AM - 07:00 AM				07:00 AM - 08:00 AM				08:00 AM - 09:00 AM				09:00 AM - 10:00 AM				10:00 AM - 11:00 AM				11:00 AM - 12:00 PM			
							1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
094C.476	094C	Forward	Sakanyoka	Central Park	Mon-Fri	1	1	0	0	0	1	0	0																									
094D.477	094D	Forward	Makurung	Central Park	Mon-Fri	1	1	0	0	1	0	0	0																									
094D.478	094D	Return	Central Park	Makurung	Mon-Fri	1	0	1	0	0	0	0	0																									
097A.480	097A	Forward	Moroka School	Central Park	Mon-Fri	3	3	0	0	2	1	0	0																									
097B.482	097B	Return	Central Park	Mokwena	Mon-Fri	1	1	0	0	0	0	0	0																									
098A.484	098A	Return	Bloemspruit	Zone 1	Mon-Fri	1	0	1	0	0	0	0	0																									
098B.487	098B	Forward	Thaba Nchu	Tempe	Mon-Fri	1	1	0	0	1	0	0	0																									
098B.488	098B	Return	Tempe	Thaba Nchu	Mon-Fri	1	0	1	0	0	0	0	0																									
098C.489	098C	Forward	Zone 1	Tempe	Mon-Fri	1	1	0	0	1	0	0	0																									
098D.491	098D	Forward	Zone 1	Air Force Base	Mon-Fri	1	1	0	0	1	0	0	0																									
100A.492	100A	Forward	Moroto	Central Park	Mon-Fri	1	1	0	0	0	0	0	0		1																							
100A.493	100A	Return	Central Park	Moroto	Mon-Fri	1	0	1	0	0	0	0	0																									
103A.496	103A	Forward	Tala	Central Park	Mon-Fri	1	1	0	1	0	0	0	0			1																						
103A.497	103A	Return	Central Park	Tala	Mon-Fri	1	0	1	0	0	0	0	0																									
103B.498	103B	Forward	Tala	Houtnek	Mon-Fri	1	0	1	0	0	0	0	0																									
103B.499	103B	Forward	Houtnek	Tala	Mon-Fri	2	0	2	0	0	0	0	0																									
106A.503	106A	Return	Thaba Nchu	Kommissiedrift	Mon-Fri	1	0	1	0	0	0	0	0																									
107A.504	107A	Forward	Mariasdal	Thaba Nchu	Mon-Fri	1	0	1	0	0	0	0	0																									
107A.505	107A	Return	Thaba Nchu	Mariasdal	Mon-Fri	2	1	1	0	0	1	0	0																									
107B.506	107B	Forward	Mariasdal	Thaba Nchu	Mon-Fri	1	1	0	0	0	0	0	0																									
107B.507	107B	Return	Thaba Nchu	Mariasdal	Mon-Fri	1	1	0	0	0	0	0	0																									
107C.510	107C	Return	Thaba Nchu	Mariasdal	Mon-Fri	1	0	1	0	0	0	0	0																									
107D.511	107D	Forward	Mariasdal	Thaba Nchu	Mon-Fri	1	1	0	0	0	0	1	0																									
107F.513	107F	Forward	Sediti	Thaba Nchu	Mon-Fri	1	0	1	0	0	0	0	0																									
108A.514	108A	Forward	Merino	Thaba Nchu	Mon-Fri	1	1	0	0	1	0	0	0																									
108A.515	108A	Return	Thaba Nchu	Merino	Mon-Fri	1	0	1	0	0	0	0	0																									
108B.516	108B	Forward	Tiger River	Thaba Nchu	Mon-Fri	1	1	0	0	0	1	0	0																									
109A.517	109A	Forward	Rooifontein	Thaba Nchu	Mon-Fri	1	1	0	0	1	0	0	0																									
110A.518	110A	Forward	Springfontein	Thaba Nchu	Mon-Fri	2	1	1	0	0	0	1	0																									
110A.519	110A	Return	Thaba Nchu	Springfontein	Mon-Fri	1	1	0	0	0	0	0	0																									
111A.520	111A	Forward	Woodbridge	Thaba Nchu	Mon-Fri	3	2	1	0	1	0	0	1																									
111A.521	111A	Return	Thaba Nchu	Woodbridge	Mon-Fri	1	0	1	0	0	0	0	0																									

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HH.1 Detail Per Route – Passengers per hour

[illegible]

RouteNoUnique	Contract Route No	Direction	From	To	Day (Wed)	Total Pass Wed	Before 14:00	After 14:00	03:00 AM - 05:59 AM	06:00 AM - 07:59 PM	08:00 PM - 12:00 PM	07:00 AM - 08:00 AM	08:00 AM - 09:00 AM	03:30 AM - 03:59 AM	04:00 AM - 04:29 AM	04:30 AM - 05:00 AM	05:00 AM - 05:29 AM	05:30 AM - 5:59 AM	06:00 AM - 06:29 AM	06:30 AM - 06:59 AM	07:00 AM - 07:29 AM	07:30 AM - 07:59 AM	08:00 PM - 08:29 PM	08:30 PM - 08:59 PM	09:00 PM - 09:29 PM	09:30 PM - 09:59 PM	10:00 PM - 10:29 PM	10:30 PM - 10:59 PM	11:00 PM - 11:29 PM	11:30 PM - 12:00 PM	
0012.44	0012	Forward	U7	Fairways	10-Feb-16	17	17	0	0	17	0	0	0																		
0012.45	0012	Return	Central Park	U7	10-Feb-16	1196	0	1196	0	1078	118	0	0																		
0013.47	0013	Forward	W4	Central Park	10-Feb-16	1043	967	76	562	481	0	0	0		73		359	130	225	180											
0013.48	0013	Return	Central Park	W4	10-Feb-16	875	0	875	0	875	0	0	0																		
0015.50	0015	Forward	M4	Kortpad	10-Feb-16	10	0	10	0	10	0	0	0																		
0015.51	0015	Forward	M4	Fairways	10-Feb-16	0	0	0	0	0	0	0	0																		
0016.52	0016	Forward	Belgie	Bloemdustria	10-Feb-16	51	0	51	0	51	0	0	0																		
0016.53	0016	Return	Bloemdustria	W4	10-Feb-16	18	0	18	0	18	0	0	0																		
0016.54	0016	Return	Central Park	Belgie	10-Feb-16	0	0	0	0	0	0	0	0																		
0016.55	0016	Return	Kortpad	N1	10-Feb-16	0	0	0	0	0	0	0	0																		
0021.60	0021	Forward	Thaba Nchu	Fairways	10-Feb-16	220	83	137	0	220	0	0	0																		
0021.61	0021	Forward	Thaba Nchu	N1	10-Feb-16	50	0	50	0	50	0	0	0																		
0022.65	0022	Forward	F3	Thaba Nchu	10-Feb-16	23	0	23	0	23	0	0	0																		
0023.66	0023	Return	Fairways	K6	10-Feb-16	78	45	33	0	78	0	9	12																		
0023.67	0023	Return	Fairways	F3	10-Feb-16	92	41	51	0	92	0	0	29																		
0023.68	0023	Forward	K6	Fairways	10-Feb-16	109	92	17	0	109	0	49	20																		
0023.69	0023	Forward	F3	Fairways	10-Feb-16	39	30	9	0	39	0	0	15																		
0024.71	0024	Return	Fairways	M4	10-Feb-16	221	133	88	0	221	0	35	68																		
0024.74	0024	Return	Kortpad	M4	10-Feb-16	0	0	0	0	0	0	0	0																		
0024.75	0024	Forward	M4	Fairways	10-Feb-16	123	75	48	0	123	0	38	14																		
0024.76	0024	Forward	A4	Fairways	10-Feb-16	1	0	1	0	1	0	0	0																		
0025.78	0025	Forward	N1	Fairways	10-Feb-16	96	65	31	0	96	0	48	8																		
0026.80	0026	Return	Central Park Botshabelo Hospital	Fairways	10-Feb-16	1472	991	481	0	1472	0	322	111																		
0026.81	0026	Forward	Botshabelo Hospital	Central Park	10-Feb-16	0	0	0	0	0	0	0	0																		
0026.82	0026	Forward	G2	Kortpad	10-Feb-16	0	0	0	0	0	0	0	0																		
0026.83	0026	Return	Kortpad	G2	10-Feb-16	0	0	0	0	0	0	0	0																		
0027.84	0027	Return	Fairways	Thaba Nchu	10-Feb-16	244	171	73	0	244	0	171	0																		
0027.85	0027	Forward	Thaba Nchu	Fairways	10-Feb-16	26	0	26	0	26	0	0	0																		
0028.86	0028	Forward	N6	Central Park	10-Feb-16	253	253	0	188	65	0	0	0		68		26	94		65											
0028.87	0028	Return	Central Park	N6	10-Feb-16	291	0	291	0	240	51	0	0																		
0029.88	0029	Forward	H2	Central Park	10-Feb-16	282	282	0	63	219	0	0	0				63		219												
0029.89	0029	Return	Central Park	H2	10-Feb-16	161	0	161	0	161	0	0	0																		
0030.91	0030	Forward	Fairways	Central Park	10-Feb-16	1871	1029	842	0	1871	0	196	136																		
0030.92	0030	Return	Central Park	Kortpad	10-Feb-16	56	0	56	0	56	0	0	0																		
0031.93	0031	Forward	Kortpad	Hospitals	10-Feb-16	26	0	26	0	26	0	0	0																		
0031.94	0031	Forward	Kortpad	Hospitals	10-Feb-16	1	1	0	1	0	0	0	0				1														
0033.96	0033	Forward	K6	Transwerke	10-Feb-16	35	35	0	35	0	0	0	0				35														
0033.97	0033	Return	Transwerke	K6	10-Feb-16	39	0	39	0	39	0	0	0																		
0034.98	0034	Forward	C1	Central Park	10-Feb-16	118	118	0	0	118	0	0	0					57	61												

RouteUnique	Contract Route No	Direction	From	To	Day (Wed)	Total Pass Wed	Before 14:00	After 14:00	03:00 AM - 05:59 AM	06:00 AM - 07:59 PM	08:00 PM - 12:00 PM	07:00 AM - 08:00 AM	08:00 AM - 09:00 AM	03:30 AM - 03:59 AM	04:00 AM - 04:29 AM	04:30 AM - 05:00 AM	05:00 AM - 05:29 AM	05:30 AM - 5:59 AM	06:00 AM - 06:29 AM	06:30 AM - 06:59 AM	07:00 AM - 07:29 AM	07:30 AM - 07:59 AM	08:00 PM - 08:29 PM	08:30 PM - 08:59 PM	09:00 PM - 09:29 PM	09:30 PM - 09:59 PM	10:00 PM - 10:29 PM	10:30 PM - 10:59 PM	11:00 PM - 11:29 PM	11:30 PM - 12:00 PM						
0036.99	0036	Forward	E3	Central Park	10-Feb-16	178	178	0	178	0	0	0	0				72	106																		
0040.101	0040	Forward	Bainsvlei	Hoffman Square	10-Feb-16	3	3	0	0	3	0	2	0							1		2														
0040.102	0040	Forward	Bainsvlei 2	Central Park	10-Feb-16	72	0	72	0	72	0	0	0																	72						
0040.103	0040	Return	Hoffman Square	Bainsvlei	10-Feb-16	0	0	0	0	0	0	0	0																0	0						
0040.104	0040	Forward	Bainsvlei	Central Park	10-Feb-16	67	0	67	0	67	0	0	0																67							
0040.105	0040	Forward	Bainsvlei	Central Park	10-Feb-16	385	4	381	0	385	0	4	0							0	4		0						170	156	55					
0040.106	0040	Return	Central Park	Bainsvlei	10-Feb-16	698	698	0	0	698	0	325	0							373	243	82							0							
0041.107	0041	Return	Bayswater	Hoffman Square	10-Feb-16	24	24	0	0	24	0	17	0							7	8	9	0													
0041.108	0041	Forward	Hoffman Square	Bayswater	10-Feb-16	143	0	143	0	143	0	0	0															2	3	2	110	12	4	10		
0041.109	0041	Forward	Central Park	Bayswater	10-Feb-16	1198	1198	0	0	1198	0	482	106							217	393	234	248	106						0						
0041.110	0041	Return	Bayswater	Central Park	10-Feb-16	845	0	845	0	845	0	0	0															65		85	111	125	206	129	124	
0042.111	0042	Return	Brandwag	Hoffman Square	10-Feb-16	28	28	0	0	28	0	14	0							14	13	1	0													
0042.112	0042	Forward	Central Park	Mimosa Mall	10-Feb-16	0	0	0	0	0	0	0	0																	0						
0042.113	0042	Forward	Hoffman Square	Brandwag	10-Feb-16	14	0	14	0	14	0	0	0															1	2	0	2	9				
0042.114	0042	Return	Mimosa Mall	Central Park	10-Feb-16	60	0	60	0	60	0	0	0																		60					
0042.115	0042	Return	Zoo	Central Park	10-Feb-16	63	0	63	0	63	0	0	0																	63						
0042.116	0042	Forward	Central Park	Brandwag	10-Feb-16	469	469	0	0	469	0	363	18							88	216	147	18													
0042.117	0042	Return	Brandwag	Central Park	10-Feb-16	364	0	364	0	364	0	0	0															52	88	51	78	95				
0044.119	0044	Return	Dan Pienaar	Hoffman Square	10-Feb-16	24	24	0	0	24	0	7	2							15	5	2	2	0												
0044.120	0044	Forward	Hoffman Square	Dan Pienaar	10-Feb-16	19	0	19	0	19	0	0	0															3	1	0	1	2	0	12		
0044.121	0044	Forward	Central Park	Dan Pienaar	10-Feb-16	1106	1106	0	0	1106	0	497	43							313	253	312	185	43												
0044.122	0044	Return	Dan Pienaar	Central Park	10-Feb-16	753	0	753	0	753	0	0	0															112	99	77	213	139	79	34		
0046.123	0046	Return	Fauna	Hoffman Square	10-Feb-16	116	80	36	0	116	0	13	12							55		13	6	6						36						
0046.124	0046	Forward	Central Park	Fauna	10-Feb-16	251	251	0	0	251	0	173	29							49		112	61	29												
0046.125	0046	Return	Fauna	Central Park	10-Feb-16	169	0	169	0	169	0	0	0							0									69	56	44					
0046.579	0046	Forward	Hoffman Square	Fauna	10-Feb-16	69	0	69	0	69	0	0	0																8		28	15	18			
0047.126	0047	Return	Fichardt Park	Hoffman Square	10-Feb-16	36	36	0	0	36	0	20	0							16		8	12	0												
0047.127	0047	Forward	Hoffman Square	Fichardt Park	10-Feb-16	30	0	30	0	30	0	0	0															3	1	1		12	13			
0047.128	0047	Forward	Central Park	Fichardt Park	10-Feb-16	728	725	3	40	688	0	266	3						40	149	267	167	99	3							3					
0047.129	0047	Return	Fichardt Park	Central Park	10-Feb-16	504	2	502	0	504	0	0	0							2									82	104	82	124	46	64		
0048.130	0048	Return	Bergman Square	Central Park	10-Feb-16	355	352	3	244	111	0	0	0						244		108									0	0		3			
0048.131	0048	Forward	Central Park	Bergman Square	10-Feb-16	296	3	293	0	296	0	0	0								3									57	70		6	107	53	
0048.134	0048	Forward	Freedom Square	Central Park	10-Feb-16	507	445	62	290	217	0	0	0			52		238		155										41	14		5	2		
0050.138	0050	Forward	Hoffman Square	Langenhovenpark	10-Feb-16	67	26	41	0	67	0	0	0																26		41					
0051.141	0051	Return	Hamilton	Central Park	10-Feb-16	104	0	104	0	104	0	0	0																		29	75				
0051.142	0051	Return	Hamilton	Central Park	10-Feb-16	192	15	177	0	192	0	15	0								0	15									16	99		32		30
0052.143	0052	Forward	Central Park	Lillyvale	10-Feb-16	65	65	0	0	65	0	65	0									65								0	0					
0052.144	0052	Return	Heuwelsig	Hoffman Square	10-Feb-16	7	7	0	0	7	0	1	0							6	1	0		0												
0052.145	0052	Forward	Hoffman Square	Heuwelsig	10-Feb-16	5	0	5	0	5	0	0	0															3		0	0	2				

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RouteNoUnique	Contract Route No	Direction	From	To	Day (Wed)	Total Pass Wed	Before 14:00	After 14:00	03:00 AM - 05:59 AM	06:00 AM - 07:59 PM	08:00 PM - 12:00 PM	07:00 AM - 08:00 AM	08:00 AM - 09:00 AM	03:30 AM - 03:59 AM	04:00 AM - 04:29 AM	04:30 AM - 05:00 AM	05:00 AM - 05:29 AM	05:30 AM - 5:59 AM	06:00 AM - 06:29 AM	06:30 AM - 06:59 AM	07:00 AM - 07:29 AM	07:30 AM - 07:59 AM	08:00 AM - 08:29 AM	08:30 PM - 08:59 PM	09:00 PM - 09:29 PM	09:30 PM - 09:59 PM	10:00 PM - 10:29 PM	10:30 PM - 10:59 PM	11:00 PM - 11:29 PM	11:30 PM - 12:00 PM	
0062.191	0062	Forward	Central Park	Pellissier	10-Feb-16	499	499	0	0	499	0	310	63						126	163	147	63									
0062.192	0062	Return	Pellissier	Central Park	10-Feb-16	616	0	616	0	616	0	0	0																		
0063.193	0063	Forward	Phelindaba	Central Park	10-Feb-16	402	324	78	211	191	0	43	0			57	154		70	43											
0063.194	0063	Return	Central Park	Phelindaba	10-Feb-16	588	102	486	0	588	0	0	0				0	55	47	0											
0064.195	0064	Forward	Rocklands	Central Park	10-Feb-16	260	228	32	119	141	0	0	0				119		109												
0064.196	0064	Return	Central Park	Rocklands	10-Feb-16	393	43	350	0	393	0	43	0						0	43											
0065.197	0065	Forward	Phase 4	Central Park	10-Feb-16	357	339	18	240	117	0	0	0			35	205		99												
0065.198	0065	Return	Central Park	Phase 4	10-Feb-16	905	138	767	138	767	0	0	0				138	0		0											
0066.199	0066	Forward	Turflaagte	Central Park	10-Feb-16	254	237	17	67	187	0	0	0			67		94	76												
0066.200	0066	Return	Central Park	Turflaagte	10-Feb-16	615	2	613	1	614	0	0	0				1		1												
0067.201	0067	Forward	Hoffman Square	Universitas	10-Feb-16	34	0	34	0	34	0	0	0																		
0067.202	0067	Return	Universitas	Hoffman Square	10-Feb-16	9	9	0	0	9	0	7	0					2	4	3											
0067.203	0067	Forward	Central Park	Universitas	10-Feb-16	690	690	0	32	658	0	245	87				32	130	196	136	109	87									
0067.204	0067	Return	Universitas	Central Park	10-Feb-16	686	0	686	0	686	0	0	0																		
0068.205	0068	Forward	Hoffman Square	Universitas West	10-Feb-16	0	0	0	0	0	0	0	0																		
0068.206	0068	Return	Universitas West	Hoffman Square	10-Feb-16	3	3	0	0	3	0	2	1						1	1	1										
0068.207	0068	Forward	Central Park	Universitas West	10-Feb-16	353	353	0	0	353	0	177	68						108	90	87	68									
0068.208	0068	Return	Universitas West	Central Park	10-Feb-16	299	0	299	0	299	0	0	0																		
0069.209	0069	Forward	Central Park	Vogue Warehouse	10-Feb-16	43	43	0	0	43	0	43	0							43											
0069.211	0069	Return	Vogue Warehouse	Central Park	10-Feb-16	72	0	72	0	72	0	0	0																		
0070.212	0070	Forward	Hoffman Square	Kwaggafontein	10-Feb-16	21	0	21	0	21	0	0	0																		
0070.213	0070	Forward	Hoffman Square	Wilgehof	10-Feb-16	50	0	50	0	50	0	0	0																		
0070.214	0070	Return	Makro	Central Park	10-Feb-16	0	0	0	0	0	0	0	0							0	0										
0070.215	0070	Return	Wilgehof	Hoffman Square	10-Feb-16	37	13	24	0	37	0	11	2						5	6	2										
0070.217	0070	Forward	Central Park	Makro	10-Feb-16	115	115	0	0	115	0	62	53							62	53										
0070.218	0070	Forward	Central Park	Wilgehof	10-Feb-16	224	224	0	0	224	0	199	25							123	76	25									
0070.220	0070	Return	Wilgehof	Central Park	10-Feb-16	211	0	211	0	211	0	0	0																		
0071.221	0071	Forward	Central Park	UOVS	10-Feb-16	82	82	0	0	82	0	82	0							82											
0071.222	0071	Return	UOVS	Central Park	10-Feb-16	228	0	228	0	228	0	0	0																		
0072.223	0072	Forward	Peter Swart	Central Park	10-Feb-16	442	431	11	271	171	0	0	0				271		160												
0072.224	0072	Forward	Phelindaba	Fichardt Park	10-Feb-16	84	84	0	0	84	0	0	0					84													
0072.225	0072	Return	Central Park	Peter Swart	10-Feb-16	276	6	270	0	276	0	2	0					0	4	2											
0074.226	0074	Forward	Phelindaba	Dan Pienaar	10-Feb-16	56	56	0	0	56	0	0	0					56													
0075.227	0075	Forward	Phelindaba	Langenhovenpark	10-Feb-16	69	69	0	0	69	0	0	0					69													
0076.228	0076	Forward	Phelindaba	Pellissier	10-Feb-16	50	50	0	0	50	0	0	0					50													
0077.229	0077	Forward	Phelindaba	Universitas	10-Feb-16	56	56	0	0	56	0	0	0					56													
0079.231	0079	Forward	Phelindaba	Wilgehof	10-Feb-16	45	45	0	0	45	0	0	0					45													
0080.232	0080	Forward	Bloemside	Central Park	10-Feb-16	11	0	11	0	11	0	0	0																		

Route\Unique	Contract Route No	Direction	From	To	Day (Wed)	Total Pass Wed	Before 14:00	After 14:00	03:00 AM - 05:59 AM	06:00 AM - 07:59 PM	08:00 PM - 12:00 PM	07:00 AM - 08:00 AM	08:00 AM - 09:00 AM	03:30 AM - 03:59 AM	04:00 AM - 04:29 AM	04:30 AM - 05:00 AM	05:00 AM - 05:29 AM	05:30 AM - 5:59 AM	06:00 AM - 06:29 AM	06:30 AM - 06:59 AM	07:00 AM - 07:29 AM	07:30 AM - 07:59 AM	08:00 PM - 08:29 PM	08:30 PM - 08:59 PM	09:00 PM - 09:29 PM	09:30 PM - 09:59 PM	10:00 PM - 10:29 PM	10:30 PM - 10:59 PM	11:00 PM - 11:29 PM	11:30 PM - 12:00 PM	
0080.233	0080	Forward	Central Park	Vista	10-Feb-16	113	113	0	0	113	0	0	105					8			105										
0080.235	0080	Return	Central Park	Kagisanong	10-Feb-16	169	169	0	0	169	0	169	0								169										
0080.236	0080	Return	Hoffman Square	Bloemside	10-Feb-16	16	0	16	0	16	0	0	0																		
0080.237	0080	Forward	Pholoho Tswellang	Central Park	10-Feb-16	6	0	6	0	6	0	0	0																		
0080.239	0080	Return	Vista	Mafora	10-Feb-16	0	0	0	0	0	0	0	0					0													
0080.240	0080	Return	Vista	Central Park	10-Feb-16	0	0	0	0	0	0	0	0																		
0081.241	0081	Forward	Central Park	Kellys View	10-Feb-16	33	33	0	0	33	0	33	0																		
0081.242	0081	Return	Kellys View	Central Park	10-Feb-16	26	1	25	0	26	0	1	0																		
0081.243	0081	Return	Kwaggafontein	Hoffman Square	10-Feb-16	1	1	0	0	1	0	1	0																		
0081.244	0081	Forward	Central Park	Kwaggafontein	10-Feb-16	307	300	7	96	211	0	204	0					96													
0081.245	0081	Return	Kwaggafontein	Central Park	10-Feb-16	517	44	473	0	457	60	0	0						44												
0083.246	0083	Forward	Central Park	Hillsideview	10-Feb-16	45	0	45	0	45	0	0	0																		
0083.247	0083	Return	Hillsideview	Hoffman Square	10-Feb-16	195	0	195	0	195	0	0	0																		
0083.248	0083	Return	Hillsideview	Central Park	10-Feb-16	74	0	74	0	0	74	0	0																		
0083.249	0083	Forward	Phomolong Gate	Central Park	10-Feb-16	15	0	15	0	15	0	0	0																		
0084.250	0084	Forward	Phelindaba	Bayswater	10-Feb-16	39	39	0	0	39	0	0	0						39												
0085.251	0085	Forward	Phase 6	Central Park	10-Feb-16	1058	1049	9	522	536	0	0	0					28		494		527									
0085.252	0085	Return	Central Park	Phase 6	10-Feb-16	762	18	744	3	759	0	0	0					3	0	9	6										
0086.253	0086	Return	Central Park	Mandela View	10-Feb-16	29	4	25	0	29	0	0	0																		
0086.254	0086	Forward	Mandela View	Central Park	10-Feb-16	29	29	0	0	29	0	0	0																		
0086.255	0086	Forward	Mandela View	Bloemdustria	10-Feb-16	0	0	0	0	0	0	0	0																		
0086.256	0086	Return	Bloemdustria	Zone 1	10-Feb-16	6	0	6	0	6	0	0	0																		
008A.257	008A	Forward	M4	Central Park	10-Feb-16	207	0	207	0	207	0	0	0																		
008A.258	008A	Return	Central Park	M4	10-Feb-16	530	54	476	0	174	356	0	0						54												
0090.260	0090	Return	Transwerke	Zone 1	10-Feb-16	31	0	31	0	31	0	0	0																		
0092.263	0092	Return	Albert Cross	Mokwena	10-Feb-16	10	0	10	0	5	5	0	0																		
0093.266	0093	Forward	Zone 1	Central Park	10-Feb-16	815	794	21	530	285	0	0	0																		
0093.267	0093	Return	Central Park	Zone 1	10-Feb-16	69	0	69	0	69	0	0	0																		
0094.268	0094	Forward	Zone 2	Central Park	10-Feb-16	546	546	0	393	153	0	0	0																		
0095.269	0095	Forward	Zone 3	Central Park	10-Feb-16	630	577	53	372	258	0	0	0																		
0095.272	0095	Forward	Zone 4	Central Park	10-Feb-16	64	64	0	0	64	0	0	0																		
0095.273	0095	Return	Central Park	Zone 3_4	10-Feb-16	1354	0	1354	0	1228	126	0	0																		
0096.275	0096	Forward	Garapulana	Central Park	10-Feb-16	59	59	0	59	0	0	0	0						59												
0096.276	0096	Return	Central Park	Garapulana	10-Feb-16	43	0	43	0	43	0	0	0																		
0097.279	0097	Forward	Mokwena	Central Park	10-Feb-16	93	93	0	93	0	0	0	0						93												
0097.280	0097	Forward	Mokwena	Central Park	10-Feb-16	408	380	28	137	271	0	0	0																		
0097.281	0097	Return	Central Park	Mokwena	10-Feb-16	1148	33	1115	0	1148	0	0	0																		
0098.283	0098	Forward	Selosesha	Central Park	10-Feb-16	566	417	149	115	451	0	64	66					115		113		64		66							
0098.284	0098	Forward	Station View	Central Park	10-Feb-16	64	64	0	0	64	0	0	0						64												

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0098.285	0098	Return	Central Park	Selosesha	10-Feb-16	43	0	43	0	43	0	0	0																		
0099.286	0099	Forward	Brandfort	Central Park	10-Feb-16	127	127	0	127	0	0	0	0		127																
0099.287	0099	Return	Central Park	Brandfort	10-Feb-16	122	0	122	0	122	0	0	0																		
0101.290	0101	Forward	Paradys	Central Park	10-Feb-16	39	39	0	39	0	0	0	0		39																
0101.291	0101	Return	Central Park	Paradys	10-Feb-16	60	0	60	0	60	0	0	0																		
0102.292	0102	Forward	Rooifontein	Central Park	10-Feb-16	157	157	0	157	0	0	0	0		85	72															
0102.293	0102	Return	Central Park	Rooifontein	10-Feb-16	37	0	37	0	37	0	0	0																		
0105.302	0105	Forward	Thaba Nchu	TNC Industrial	10-Feb-16	6	6	0	0	6	0	0	0					6													
0105.303	0105	Forward	Bofulo	Thaba Nchu	10-Feb-16	27	27	0	27	0	0	0	0			27															
0105.304	0105	Return	Thaba Nchu	Bofulo	10-Feb-16	41	0	41	0	41	0	0	0																		
0106.305	0106	Forward	Kommissiedrift	Thaba Nchu	10-Feb-16	4	4	0	4	0	0	0	0					4													
0107.307	0107	Forward	Mariasdal	Thaba Nchu	10-Feb-16	40	40	0	40	0	0	0	0		40																
0107.308	0107	Return	Thaba Nchu	Mariasdal	10-Feb-16	77	24	53	0	77	0	0	0					24													
0108.312	0108	Return	Thaba Nchu	Merino	10-Feb-16	10	0	10	0	10	0	0	0																		
0109.313	0109	Return	Thaba Nchu	Rooifontein	10-Feb-16	9	0	9	0	9	0	0	0																		
0110.314	0110	Forward	Klipfontein	Thaba Nchu	10-Feb-16	50	50	0	50	0	0	0	0			50															
0110.316	0110	Return	Thaba Nchu	Springfontein	10-Feb-16	74	12	62	0	74	0	0	0					12													
0111.317	0111	Return	Gladstone	Thaba Nchu	10-Feb-16	0	0	0	0	0	0	0	0																		
0111.318	0111	Forward	Thaba Nchu	Gladstone	10-Feb-16	17	0	17	0	17	0	0	0																		
0111.319	0111	Forward	Woodbridge	Thaba Nchu	10-Feb-16	58	58	0	58	0	0	0	0		3			55													
0111.321	0111	Return	Thaba Nchu	Woodbridge	10-Feb-16	160	20	140	0	160	0	0	0					0	20												
0112.322	0112	Forward	Brandfort	Thaba Nchu	10-Feb-16	54	0	54	0	54	0	0	0																		
0112.323	0112	Return	Thaba Nchu	Brandfort	10-Feb-16	60	60	0	0	60	0	0	60						60												
0115.326	0115	Forward	Spitskop	Thaba Nchu	10-Feb-16	44	24	20	0	44	0	0	24							24											
0115.327	0115	Return	Thaba Nchu	Spitskop	10-Feb-16	41	28	13	0	41	0	28	0								28										
0116.329	0116	Forward	Thaba Nchu	Windmill Casino	10-Feb-16	2	0	2	0	0	2	0	0																		
0116.330	0116	Return	Windmill Casino	Central Park	10-Feb-16	15	0	15	0	0	15	0	0																		
0117.332	0117	Return	Protea Hotel	Zone 1	10-Feb-16	110	89	21	0	89	21	0	0					89													
0117.333	0117	Forward	Zone 1	Protea Hotel	10-Feb-16	38	34	4	34	0	4	0	0				34														
0119.339	0119	Forward	Sediba	Thaba Nchu	10-Feb-16	125	67	58	0	125	0	67	0								67										
0119.341	0119	Return	Thaba Nchu	Sediba	10-Feb-16	47	0	47	0	47	0	0	0																		
0120.345	0120	Forward	Rooibult	Thaba Nchu	10-Feb-16	61	61	0	14	47	0	47	0				14														
0120.346	0120	Return	Thaba Nchu	Rooibult	10-Feb-16	88	41	47	0	88	0	0	0							41											
0122.347	0122	Forward	Feloane	Thaba Nchu	10-Feb-16	33	33	0	0	33	0	0	0					33													
0122.348	0122	Return	Thaba Nchu	Feloane	10-Feb-16	38	0	38	0	38	0	0	0																		
0123.349	0123	Forward	Morago	Thaba Nchu	10-Feb-16	35	35	0	35	0	0	0	0				35														
0123.350	0123	Return	Thaba Nchu	Morago	10-Feb-16	34	0	34	0	34	0	0	0																		
0124.353	0124	Return	Thaba Nchu	Sediti	10-Feb-16	52	52	0	0	52	0	0	0					52													
0125.354	0125	Return	Fairways	Zone 1	10-Feb-16	285	156	129	0	285	0	92	64																		

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0125.356	0125	Forward	Zone 1	Fairways	10-Feb-16	166	166	0	0	166	0	0	0							166											
0126.358	0126	Forward	Central Park	Erlichpark	10-Feb-16	0	0	0	0	0	0	0	0							0											
0126.359	0126	Return	Erlichpark	Central Park	10-Feb-16	0	0	0	0	0	0	0	0														0				
0126.360	0126	Return	Erlichpark	Hoffman Square	10-Feb-16	12	12	0	0	12	0	4	0							8	4										
0126.361	0126	Forward	Hoffman Square	Erlichpark	10-Feb-16	23	0	23	0	23	0	0	0															23			
0127.363	0127	Forward	Phelindaba	Universitas Hospital	10-Feb-16	112	112	0	0	112	0	0	0							112											
0128.364	0128	Return	Universitas Hospital	Phelindaba	10-Feb-16	0	0	0	0	0	0	0	0				0		0												
0128.365	0128	Forward	Phelindaba	Universitas Hospital	10-Feb-16	4	4	0	4	0	0	0	0			4															
0130.368	0130	Forward	Central Park	Pelonomi	10-Feb-16	0	0	0	0	0	0	0	0																		
0130.369	0130	Forward	Central Park	National Hospital	10-Feb-16	0	0	0	0	0	0	0	0															0			
0130.370	0130	Forward	Pelonomi	National Hospital	10-Feb-16	0	0	0	0	0	0	0	0																0		
0130.371	0130	Return	Pelonomi	Central Park	10-Feb-16	2	0	2	0	2	0	0	0																	2	
0130.372	0130	Forward	Pelonomi	Universitas Hospital	10-Feb-16	11	11	0	0	11	0	0	0							11											
0131.374	0131	Return	Universitas Hospital	Central Park	10-Feb-16	50	0	50	0	50	0	0	0							0										26	24
0131.375	0131	Forward	Phelindaba	National Hospital	10-Feb-16	22	22	0	22	0	0	0	0				22														
0132.376	0132	Return	National Hospital	Rocklands	10-Feb-16	17	0	17	0	17	0	0	0																17		
0134.378	0134	Return	UOVS	Phelindaba	10-Feb-16	77	0	77	0	77	0	0	0																47	30	
0135.379	0135	Return	UOVS	Phase 2	10-Feb-16	34	0	34	0	34	0	0	0																34		
0137.382	0137	Forward	National Hospital	Universitas Hospital	10-Feb-16	0	0	0	0	0	0	0	0																	0	
0138.387	0138	Return	Central Park	Phase 3	10-Feb-16	118	2	116	0	118	0	0	0				0		2	0										116	
0138.388	0138	Forward	Phase 3	Central Park	10-Feb-16	352	345	7	193	159	0	0	0				193		152											7	
0141.390	0141	Return	Central Park	Ipopeng	10-Feb-16	114	0	114	0	114	0	0	0																65	49	
0142.391	0142	Forward	Mafora	Central Park	10-Feb-16	458	389	69	142	316	0	0	0				142		247										21	7	41
0142.392	0142	Return	Central Park	Mafora	10-Feb-16	291	0	291	0	291	0	0	0				0											75	71	67	78
0143.395	0143	Forward	Phase 7	Central Park	10-Feb-16	212	210	2	135	77	0	0	0				135		75										1	1	
0143.396	0143	Return	Central Park	Phase 7	10-Feb-16	130	4	126	0	130	0	0	0						4										69	57	
0144.398	0144	Forward	Ipopeng	Central Park	10-Feb-16	103	98	5	98	5	0	0	0				98													5	
0146.399	0146	Return	Woodland Hills	Hoffman Square	10-Feb-16	2	2	0	0	2	0	2	0							2	0	0									
0146.400	0146	Forward	Central Park	Woodland Hills	10-Feb-16	533	533	0	0	533	0	45	0						161	327		45							0		
0146.401	0146	Return	Woodland Hills	Central Park	10-Feb-16	477	0	477	0	477	0	0	0													48	120	166	143		
0151.403	0151	Forward	Botshabelo Hospital	Central Park	10-Feb-16	59	0	59	0	59	0	0	0															59			
0151.404	0151	Return	Central Park	Botshabelo Hospital	10-Feb-16	77	77	0	0	77	0	0	0						77												
0153.405	0153	Forward	Bloemside	Central Park	10-Feb-16	58	58	0	0	58	0	0	0						58												
0153.406	0153	Return	Central Park	Bloemside	10-Feb-16	0	0	0	0	0	0	0	0					0													
0153.407	0153	Return	Central Park	Bloemanda	10-Feb-16	28	28	0	28	0	0	0	0					28													
0155.408	0155	Forward	Central Park	Tempe	10-Feb-16	4	4	0	0	4	0	0	0							4							0	0			
0155.409	0155	Forward	Phase 4	Tempe	10-Feb-16	42	42	0	42	0	0	0	0					42													

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0155.410	0155	Return	Tempe	Phase 4	10-Feb-16	24	0	24	0	24	0	0	0																			24																
0157.413	0157	Return	Tempe	Rocklands	10-Feb-16	21	0	21	0	21	0	0	0																			21																
0157.414	0157	Forward	Rocklands	Tempe	10-Feb-16	44	44	0	44	0	0	0	0				44																															
0204.424	0204	Return	Central Park	Freedom Square	10-Feb-16	458	3	455	1	457	0	0	0				1	0	2	0												71	55	57	75	70	69		58									
0205.425	0205	Return	Central Park	Khayalitsha	10-Feb-16	405	1	404	0	405	0	0	0					1														55		97		144		108										
0207.427	0207	Forward	Khayalitsha	Central Park	10-Feb-16	533	531	2	270	263	0	0	0				270	98	163													2																
022A.429	022A	Return	Kortpad	N1	10-Feb-16	1	0	1	0	0	1	0	0																									1										
022A.430	022A	Return	Kortpad	M4	10-Feb-16	0	0	0	0	0	0	0	0																									0										
027B.435	027B	Forward	N1	TNC Industrial	10-Feb-16	61	61	0	61	0	0	0	0				61																															
027B.436	027B	Forward	Thaba Nchu	M4	10-Feb-16	66	0	66	0	66	0	0	0																						66													
027B.438	027B	Forward	TNC Industrial	Botshabelo Hospital	10-Feb-16	0	0	0	0	0	0	0	0																					0														
027B.439	027B	Forward	M4	Thaba Nchu	10-Feb-16	51	51	0	51	0	0	0	0				51																															
031A.440	031A	Return	Hospitals	CR Swart	10-Feb-16	3	0	3	0	3	0	0	0																				3															
031A.441	031A	Return	Hospitals	N4	10-Feb-16	22	0	22	0	22	0	0	0																					22														
046A.443	046A	Return	Generaal De Wet	Central Park	10-Feb-16	371	0	371	0	352	19	0	0																				45		39	81		81		57	49			19				
046A.444	046A	Return	Generaal De Wet	Hoffman Square	10-Feb-16	16	16	0	0	16	0	8	0					8	8																													
046A.445	046A	Forward	Hoffman Square	Generaal De Wet	10-Feb-16	41	0	41	0	41	0	0	0																				4			11		6		10	10							
046A.446	046A	Forward	Central Park	Generaal De Wet	10-Feb-16	181	181	0	0	181	0	80	0					101	80																					0								
046C.450	046C	Forward	Hoffman Square	Fauna	10-Feb-16	62	0	62	0	62	0	0	0																				1		26				35									
046C.452	046C	Return	DeWet / Fauna	Central Park	10-Feb-16	103	0	103	0	103	0	0	0																					24		45				34								
051A.455	051A	Return	Hamilton Nampak	Central Park	10-Feb-16	193	0	193	0	193	0	0	0																								28	54	111									
051B.456	051B	Forward	Central Park	Hamilton	10-Feb-16	753	753	0	0	753	0	332	0					332	89	213	119																0	0		0		0						
051B.457	051B	Return	Hamilton PAO	Central Park	10-Feb-16	37	0	37	0	37	0	0	0																								37											
093A.459	093A	Forward	Zone 1	Central Park	10-Feb-16	70	70	0	70	0	0	0	0				70																															
093A.460	093A	Return	Central Park	Zone 1	10-Feb-16	208	0	208	0	208	0	0	0																					55	96						57							
093A.462	093A	Return	Thaba Nchu	Zone 1	10-Feb-16	38	0	38	0	38	0	0	0																									38										
093B.463	093B	Forward	Zone 1	Central Park	10-Feb-16	1256	429	827	0	1256	0	157	84								111	46	84		52		67		69		56		109		130	98		176	83	129		15	13		18			
093B.464	093B	Return	Central Park	Zone 1	10-Feb-16	1109	696	413	114	802	193	185	55					114	60	126	112	73	55		57		49		50		50	26								62			82	76		60		57
093C.466	093C	Return	Central Park	Zone 1	10-Feb-16	1135	0	1135	0	1135	0	0	0																								86	74	140	230	230	117	192	66				
093D.467	093D	Return	Central Park	CR Swart	10-Feb-16	0	0	0	0	0	0	0	0																								0											
093D.469	093D	Forward	Zone 1	Hospitals	10-Feb-16	82	57	25	57	25	0	0	0				57																							25								
093D.471	093D	Return	CR Swart	Zone 1	10-Feb-16	35	0	35	0	35	0	0	0																									35										
094A.472	094A	Forward	Unit 1	Central Park	10-Feb-16	254	254	0	171	83	0	0	0					171		83																												
094A.473	094A	Return	Central Park	Unit 1	10-Feb-16	59	0	59	0	59	0	0	0																										59									
094B.474	094B	Forward	Zone 5	Central Park	10-Feb-16	153	153	0	60	93	0	0	0				60		93																													
094B.475	094B	Return	Central Park	Zone 5	10-Feb-16	67	0	67	0	67	0	0	0																											67								
094C.476	094C	Forward	Sakanyoka	Central Park	10-Feb-16	51	51	0	0	51	0	0	0					51																														
094D.477	094D	Forward	Makurung	Central Park	10-Feb-16	72	72	0	72	0	0	0	0					72																														

MMM – City Wide Integrated Public Transport Plan

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124B.538	124B	Return	Thaba Nchu	Morago	10-Feb-16	29	29	0	0	29	0	0	0																		
129A.540	129A	Forward	Bloemanda	UOVS	10-Feb-16	54	54	0	54	0	0	0	0				54														
35A4.541	35A4	Forward	W4	Tempe	10-Feb-16	28	28	0	28	0	0	0	0				28														
35A7.542	35A7	Forward	A5	Tempe	10-Feb-16	47	47	0	47	0	0	0	0				47														
35D1.543	35D1	Forward	D1	Tempe	10-Feb-16	49	49	0	49	0	0	0	0				49														
35G1.545	35G1	Forward	N1	Tempe	10-Feb-16	46	46	0	46	0	0	0	0				46														
35G1.547	35G1	Return	Tempe	N1	10-Feb-16	50	0	50	0	50	0	0	0																		
35K6.548	35K6	Forward	K6	Tempe	10-Feb-16	67	67	0	67	0	0	0	0				67														
35K6.549	35K6	Return	Tempe	K6	10-Feb-16	30	0	30	0	30	0	0	0																		
9303.550	9303	Return	Central Park	Soutpan	10-Feb-16	130	0	130	0	130	0	0	0																		
9303.551	9303	Forward	Soutpan	Central Park	10-Feb-16	156	156	0	75	81	0	0	0				75	81													
NN.1.552	NN.1	Return	Fairways	N1	10-Feb-16	120	88	32	0	120	0	39	22							39	22										
NN.5.557	NN.5	Return	Tempe	Freedom Square	10-Feb-16	0	0	0	0	0	0	0	0					0													
NN.6.558	NN.6	Return	Transwerke	Central Park	10-Feb-16	0	0	0	0	0	0	0	0					0													
NN.9.561	NN.9	Forward	J3	M4	10-Feb-16	0	0	0	0	0	0	0	0																		
NT001	NT001	Forward	ACC School	Bochabela	10-Feb-16	0	0	0	0	0	0	0	0																		
NT002	NT002	Forward	ACC School	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																		
NT003	NT003	Forward	ACC School	Workshop	10-Feb-16	0	0	0	0	0	0	0	0																		
NT004	NT004	Forward	Batho	ACC School	10-Feb-16	0	0	0	0	0	0	0	0																		
NT005	NT005	Forward	Bayswater	Phelindaba	10-Feb-16	0	0	0	0	0	0	0	0					0													
NT006	NT006	Forward	Bergman Square	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																		
NT007	NT007	Forward	BFN High School	Bloemanda	10-Feb-16	0	0	0	0	0	0	0	0																		
NT008	NT008	Forward	BFN High School	Heidedal	10-Feb-16	0	0	0	0	0	0	0	0																		
NT009	NT009	Forward	BFN High School	Noordhoek	10-Feb-16	0	0	0	0	0	0	0	0																		
NT010	NT010	Forward	BFN High School	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																		
NT011	NT011	Forward	BFN High School	Workshop	10-Feb-16	0	0	0	0	0	0	0	0																		
NT012	NT012	Forward	Bloemanda	BFN High School	10-Feb-16	0	0	0	0	0	0	0	0					0													
NT013	NT013	Forward	Bloemanda	Central Park	10-Feb-16	0	0	0	0	0	0	0	0																		
NT014	NT014	Forward	Bloemanda	Kruitberg School	10-Feb-16	0	0	0	0	0	0	0	0																		
NT015	NT015	Forward	Bloemanda	Roseview School	10-Feb-16	0	0	0	0	0	0	0	0																		
NT016	NT016	Forward	Bloemanda	Wilgehof School	10-Feb-16	0	0	0	0	0	0	0	0																		
NT017	NT017	Forward	Bloemside	Hoffman Square	10-Feb-16	0	0	0	0	0	0	0	0																		
NT018	NT018	Forward	Bloemside	Koot Niemand	10-Feb-16	0	0	0	0	0	0	0	0																		
NT019	NT019	Forward	Bloemside	Roseview School	10-Feb-16	0	0	0	0	0	0	0	0																		
NT020	NT020	Forward	Bloemspruit	Bloemside	10-Feb-16	0	0	0	0	0	0	0	0					0													
NT021	NT021	Forward	Bochabela	ACC School	10-Feb-16	0	0	0	0	0	0	0	0																		
NT022	NT022	Forward	Bochabela	Central Park	10-Feb-16	0	0	0	0	0	0	0	0																		
NT023	NT023	Forward	Bochabela	Joe Solomon School	10-Feb-16	0	0	0	0	0	0	0	0																		
NT024	NT024	Forward	Bochabela	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																		

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NT025	NT025	Forward	Bochabela	Wilgehof School	10-Feb-16	0	0	0	0	0	0	0	0							0										
NT026	NT026	Forward	BP Garage Boch	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																	
NT027	NT027	Forward	Brebner High	Grassland	10-Feb-16	0	0	0	0	0	0	0	0																	
NT028	NT028	Forward	Brebner High	Phase 2	10-Feb-16	0	0	0	0	0	0	0	0																	
NT029	NT029	Forward	Brebner High	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																	
NT030	NT030	Forward	Brebner High	Vista	10-Feb-16	0	0	0	0	0	0	0	0																	
NT031	NT031	Forward	Brebner High	Workshop	10-Feb-16	0	0	0	0	0	0	0	0																	
NT032	NT032	Forward	Central Park	Bloemanda	10-Feb-16	0	0	0	0	0	0	0	0						0		0									
NT033	NT033	Forward	Central Park	Bloemspruit	10-Feb-16	0	0	0	0	0	0	0	0																	
NT034	NT034	Forward	Central Park	Bochabela	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT035	NT035	Forward	Central Park	Heidedal	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT036	NT036	Forward	Central Park	Joe Solomon School	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT037	NT037	Forward	Central Park	Kenworth Spar	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT038	NT038	Forward	Central Park	Opkoms	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT039	NT039	Forward	Central Park	Phase 2	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT040	NT040	Forward	Central Park	Phase 5	10-Feb-16	0	0	0	0	0	0	0	0							0	0									
NT041	NT041	Forward	Central Park	St Bernard School	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT042	NT042	Forward	Central Park	Transwerke	10-Feb-16	0	0	0	0	0	0	0	0																	
NT043	NT043	Forward	CR Swart	Bloemanda	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT044	NT044	Forward	Dan Pienaar	Batho	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT045	NT045	Forward	Erlichpark	Brebner High	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT046	NT046	Forward	Fichardtpark	Workshop	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT047	NT047	Forward	Freedom Square	Koot Niemand	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT048	NT048	Forward	Freedom Square	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																	
NT049	NT049	Forward	Freedom Square	Roseview School	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT050	NT050	Forward	Grassland	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																	
NT051	NT051	Forward	Hamilton	Bloemanda	10-Feb-16	0	0	0	0	0	0	0	0							0										
NT052	NT052	Forward	Hamilton	Workshop	10-Feb-16	0	0	0	0	0	0	0	0									0								
NT053	NT053	Forward	Heidedal	BFN High School	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT054	NT054	Forward	Heidedal	Central Park	10-Feb-16	0	0	0	0	0	0	0	0																	
NT055	NT055	Forward	Heidedal	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0									0								
NT056	NT056	Forward	Heidedal	Woodland Hills	10-Feb-16	0	0	0	0	0	0	0	0																	
NT057	NT057	Forward	Hoffmansquare	Bloemside	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT058	NT058	Forward	Hoffmansquare	Bochabela	10-Feb-16	0	0	0	0	0	0	0	0							0	0									
NT059	NT059	Forward	Hoffmansquare	Heidedal	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT060	NT060	Forward	Hoffmansquare	Phase 4	10-Feb-16	0	0	0	0	0	0	0	0								0									
NT061	NT061	Forward	Hoffmansquare	Phelindaba	10-Feb-16	0	0	0	0	0	0	0	0							0	0									
NT062	NT062	Forward	Hospitals	Bloemanda	10-Feb-16	0	0	0	0	0	0	0	0							0										
NT063	NT063	Forward	Hospitals	Phase 4	10-Feb-16	0	0	0	0	0	0	0	0							0										

RouteNo	Unique	Contract Route No	Direction	From	To	Day (Wed)	Total Pass Wed	Before 14:00	After 14:00	03:00 AM - 05:59 AM	06:00 AM - 07:59 PM	08:00 PM - 12:00 PM	07:00 AM - 08:00 AM	08:00 AM - 09:00 AM	03:30 AM - 03:59 AM	04:00 AM - 04:29 AM	04:30 AM - 05:00 AM	05:00 AM - 05:29 AM	05:30 AM - 5:59 AM	06:00 AM - 06:29 AM	06:30 AM - 06:59 AM	07:00 AM - 07:29 AM	07:30 AM - 07:59 AM	08:00 AM - 08:29 AM	08:30 PM - 08:59 PM	09:00 PM - 09:29 PM	09:30 PM - 09:59 PM	10:00 PM - 10:29 PM	10:30 PM - 10:59 PM	11:00 PM - 11:29 PM	11:30 PM - 12:00 PM	
NT064		NT064	Forward	Joe Solomon School	Bochabela	10-Feb-16	0	0	0	0	0	0	0	0																		
NT065		NT065	Forward	Joe Solomon School	BP Garage Boch	10-Feb-16	0	0	0	0	0	0	0	0																		
NT066		NT066	Forward	Joe Solomon School	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																		
NT067		NT067	Forward	Kagisanong	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																		
NT068		NT068	Forward	Khayalitsha	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																		
NT069		NT069	Forward	Khayalitsha	Vista	10-Feb-16	0	0	0	0	0	0	0	0																		
NT070		NT070	Forward	Koot Niemand	Heidedal	10-Feb-16	0	0	0	0	0	0	0	0																		
NT071		NT071	Forward	Koot Niemand	Phase 5	10-Feb-16	0	0	0	0	0	0	0	0																		
NT072		NT072	Forward	Koot Niemand	Phase 6	10-Feb-16	0	0	0	0	0	0	0	0																		
NT073		NT073	Forward	Koot Niemand	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																		
NT074		NT074	Forward	Kruitberg School	Bochabela	10-Feb-16	0	0	0	0	0	0	0	0																		
NT075		NT075	Forward	Kruitberg School	Peter Swart	10-Feb-16	0	0	0	0	0	0	0	0																		
NT076		NT076	Forward	Kruitberg School	Phase 4	10-Feb-16	0	0	0	0	0	0	0	0																		
NT077		NT077	Forward	Kruitberg School	Phelindaba	10-Feb-16	0	0	0	0	0	0	0	0																		
NT078		NT078	Forward	Kruitberg School	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																		
NT079		NT079	Forward	Langenhovenpark	UOVS	10-Feb-16	0	0	0	0	0	0	0	0																		
NT080		NT080	Forward	Lillyvale	Hoffman Square	10-Feb-16	0	0	0	0	0	0	0	0																		
NT082		NT082	Forward	Mafora	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																		
NT083		NT083	Forward	Mangaung	Hoffman Square	10-Feb-16	0	0	0	0	0	0	0	0																		
NT084		NT084	Forward	Motsabi	Hyperama	10-Feb-16	0	0	0	0	0	0	0	0																		
NT085		NT085	Forward	National Hospital	Rocklands	10-Feb-16	0	0	0	0	0	0	0	0																		
NT086		NT086	Forward	Noordhoek	BFN High School	10-Feb-16	0	0	0	0	0	0	0	0																		
NT087		NT087	Forward	Noordhoek	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																		
NT088		NT088	Forward	Olympia School	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																		
NT089		NT089	Forward	Ooseinde	Grassland	10-Feb-16	0	0	0	0	0	0	0	0																		
NT090		NT090	Forward	Ooseinde	Heidedal	10-Feb-16	0	0	0	0	0	0	0	0																		
NT091		NT091	Forward	Ooseinde	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																		
NT092		NT092	Forward	Opkoms	Koot Niemand	10-Feb-16	0	0	0	0	0	0	0	0																		
NT093		NT093	Forward	Opkoms	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																		
NT094		NT094	Forward	Opkoms	Wilgehof School	10-Feb-16	0	0	0	0	0	0	0	0																		
NT095		NT095	Forward	Peter Swart	Koot Niemand	10-Feb-16	0	0	0	0	0	0	0	0																		
NT096		NT096	Forward	Peter Swart	Kruitberg School	10-Feb-16	0	0	0	0	0	0	0	0																		
NT097		NT097	Forward	Peter Swart	Phom Dep	10-Feb-16	0	0	0	0	0	0	0	0																		
NT098		NT098	Forward	Peter Swart	Roseview School	10-Feb-16	0	0	0	0	0	0	0	0																		
NT099		NT099	Forward	Phase 2	Hoffman Square	10-Feb-16	0	0	0	0	0	0	0	0																		
NT100		NT100	Forward	Phase 2	UOVS	10-Feb-16	0	0	0	0	0	0	0	0																		
NT101		NT101	Forward	Phase 4	Koot Niemand	10-Feb-16	0	0	0	0	0	0	0	0																		
NT102		NT102	Forward	Phase 4	Kruitberg School	10-Feb-16	0	0	0	0	0	0	0	0																		

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							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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II Annexure II: Phase 1 Business Plan

KK Annexure KK: Universal Access Strategy and Action Plan

LL Annexure LL: Marketing Communications

JJ Annexure JJ: Environmental Strategy and Action Plan



SUSTAINABILITY FRAMEWORK FOR THE INTEGRATED TRANSPORT
NETWORK PROJECT, MANGAUNG METROPOLITAN MUNICIPALITY,
BLOEMFONTEIN, FREE STATE PROVINCE

Client Reference: Contract No.: C447

GladAfrica Reference: Project Number 127

Project Name: Intergrated Public Transport Network (IPTN)

Report Heading: **Sustainability Framework for the Integrated Transport Network Project, Mangaung Metropolitan Municipality, Bloemfontein, Free State Province**

Compiled by: Hlengiwe Thusi

Signature:

Date: 22 June 2016

Cert.Sci.Nat

Reviewed by: Ariel Oosthuizen

Signature:

Date: 30 June 2016

MA, UJ

Released by: Andrew Woghiren

Signature:

Date: 01 July 2016

Pr.Sci.Nat

Received and accepted by a duly authorised representative of the client

Client representative name: Athenkosi Godlongwa

Signature: _____ Date: _____

Client representative name: Steve Rapulungoane

Signature: *P.P. Rapulungoane* Date: 31/08/2016

Report Status

Draft		Revision Number	2	Final	✓
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1. INTRODUCTION

Mangaung Metropolitan Municipality (MMM) has decided to implement a Bus Rapid Transit system commonly referred to as an Integrated Public Transport System (IPTN), as part of the National Public Transport Strategy and Action Plan released in 2007 by the National Department of Transport. The strategy proposes the implementation of Integrated Rapid Public Transport Networks (IRPTN) in 12 (now 13) South African cities, with Bus Rapid Transit (BRT) forming the backbone service in the majority of these cities. Currently the cities which have successfully implemented this system are Cape Town (MyCiTi), Johannesburg (Rea Vaya) and Pretoria (A re Yeng).

A team of experts has been appointed to assist with the planning, design, and implementation of the MMM IPTN project. GA Environment (Pty) Ltd is responsible for the Environment and Sustainability work stream in the project.

2. PURPOSE

The implementation of the MMM IPTN project is a major development, which must essentially be a sustainable transportation system. The purpose of the sustainability assessment is to evaluate and optimise the MMM IPTN project as a whole in relation to the principles of sustainable development. This assessment will make it possible to identify imbalances and deficiencies between the realms of the environment, society and the economy in and around MMM and thus to outline areas which may be optimised, thus resulting in a long term sustainable IPTN.

3. BACKGROUND

3.1 Background to the Project

In South Africa, the BRT networks that have been implemented successfully are Johannesburg (Rea Vaya), Cape Town (MyCiTi) and Tshwane (A re Yeng). Other BRT systems have been planned for Rustenburg, Port Elizabeth and George. These first examples have identified challenges and risks that could have been optimised or better managed in order to ensure the successful implementation of the entire BRT system. Some of these challenges and risks can be grouped as follows:

- Integration of the existing minibus taxi transport service into the proposed MMM IPTN;
- Integration of the existing bus transport service into the proposed MMM IPTN;
- Integration of the existing rail transport service into the proposed MMM IPTN;
- Identification of the fit-for-need BRT system for the City of Mangaung's IPTN;

- Thorough need for an assessment of the network facility and movement patterns and constraints in order to ensure facilities are not abandoned, resulting in wasteful expenditure; and
- Alignment of the National Department of Transport (DoT) IPTN strategy with the BRT system which seeks to: *“to implement a continuous upgrading from the current basic commuter service to an upgraded modal service and (where possible) to an integrated rapid public transport network”*. This is referred to as the *“Accelerated Modal Upgrading”* (Cobus Oosthuizen, 2015).

4. SUSTAINABILITY FRAMEWORK

4.1 Vision and Mission for the Environment and Sustainability Work Stream

The vision and mission was developed by GA Environment following the workshop with MMM’s Environment team on 27 May 2016. It encapsulates the ideas that the team deemed to be crucial.

Vision

To underpin the planning, design and implementation of the IPTN in order to create a public transportation network founded on environmental sustainability, affordability and universal access for the improvement of the living standard of all Mangaung’s inhabitants.

Mission

Mangaung Metropolitan Municipality is committed to ensuring that the IPTN bears the hallmark of integrated environmental sustainability, by focusing on reducing emissions, minimizing the carbon footprint of the entire network, and enhancing green elements throughout the system, to make Mangaung a more habitable city. Educating and empowering of all inhabitants is crucial, as this would contribute towards keeping the network safe, affordable and accessible to all.

4.2 Framework Adopted to Facilitate the Vision and Mission

The Sustainability Framework articulates MMM’s strategic commitment to sustainable development and is an integral part of building a sustainable transport system. Through this document, MMM aims to put into practice its commitment to the environment and sustainability. These commitments will be aligned with MMM’s Climate Change Strategy, policies and Environmental Management Plans (EIMP & EMF, etc.). Translating these commitments into successful outcomes depends on the joint efforts of MMM and its stakeholders (internal and external). Consistent with these commitments, MMM should adopt the guiding principles described in Section 6 of this document, including its

responsibility to conduct environmental and social Due Diligence for the proposed IPTN as described in Section 7.

The Sustainability Framework will make use of the approach taken from the Cape Town Comprehensive Integrated Transport Plan 2013 – 2018. This approach utilises the Avoid-Shift-Improve (A-S-I) concept seen below in **Figure 1** (*The A-S-I approach was adopted at the joint workshop on 27 May 2016 as the approach of choice for the Mangaung IPTN.*)

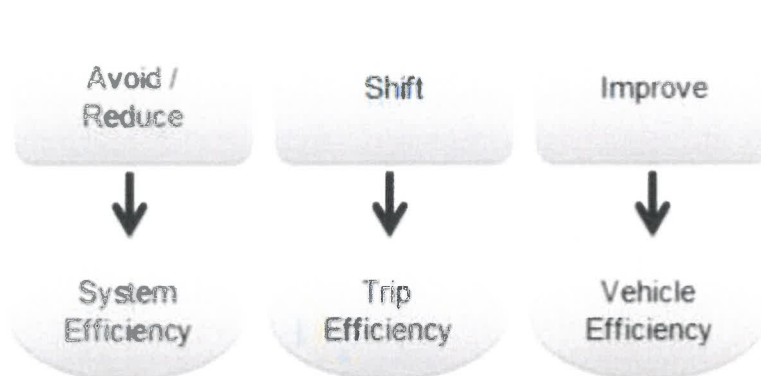


Figure 1: Avoid-Shift-Improve (A-S-I) concept

“Avoid” refers to the efficiency of the urban system: A compact multi-functional City with an integrated transport system will play a key role in avoiding or reducing the need and desire to travel. Integrated land-use planning: Measures such as the Travel Demand Management (TDM) and Transit Orientated Development (TOD) Strategies can reduce the need to travel as well as the trip length.

“Shift” refers to a modal shift from energy intensive modes such as private vehicles towards more sustainable modes such as NMT and public transport. Again, the TDM strategy plays a key role in achieving this. Although public transport also generates emissions, lower specific energy consumption per passenger-km and higher occupancy levels imply that the associated CO₂ emissions per passenger-km are lower compared to vehicles (especially SOV¹).

“Improve” refers to vehicle and fuel efficiency as well as the optimisation of transport infrastructure. The aim is to improve the energy efficiency of transport modes and related vehicle technology. The potential of alternative energy use is also acknowledged as an area to be explored.

MMM can either make use of this framework document together with a Sustainable Transport Strategy, which will be established. This Strategy will consist of specific policies, strategies and plans, such as:

¹ SOV – refers to Single Occupancy Vehicles

- The Greening Strategy for MMM IPTN;
- Travel SMART;
- Climate Change Adaptation Plan of Action (CAPA) for MMM;
- A Strategy addressing social issues relating to transport; and
- Policies and position papers on fuels and vehicle technology.

The actions proposed in the strategy intend to benefit the MMM's environment as well as the people who live and work in the City. A robust action plan will be developed to assist with the implementation of this sustainability framework. The action plan will provide support to set the framework for future action to alleviate environmental, social and economic challenges, raise awareness with the local population on these challenges and establish MMM's commitment to work in partnership with the wider community to achieve a more sustainable city.

5. CONCEPT STATEMENT

Mangaung Metropolitan Municipality's IPTN Sustainability Framework should significantly improve the IPTNs transport system by integrating well-understood and structured sustainability measures (with targets and objectives) across the entire project life-cycle (from conceptual, detailed design, infrastructure construction through to operation). This Framework establishes sustainability principles for MMM as well as its Agents and Consultants. It should enable MMM to anticipate and manage emerging environmental, social and economic issues with a view to making the IPTN sustainable (Figure 2).

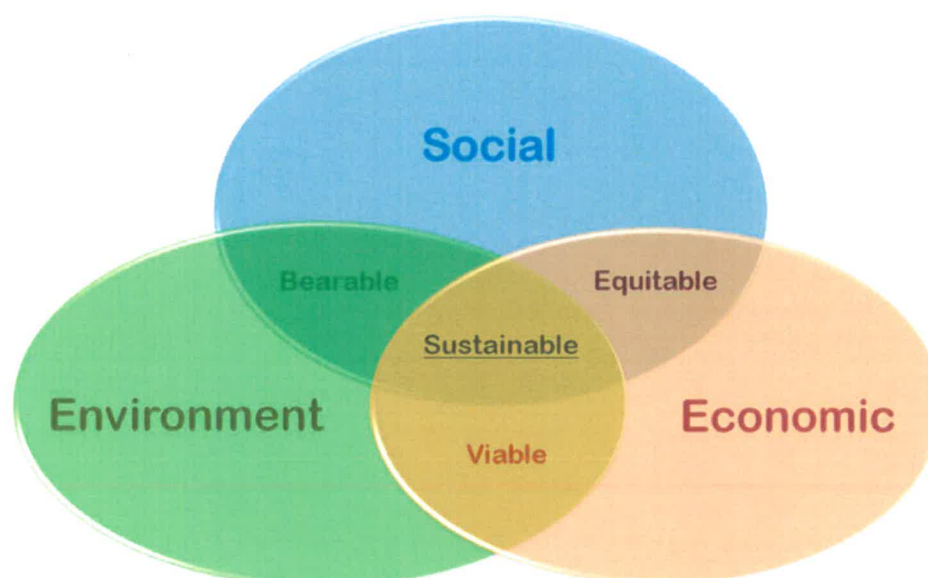


Figure 2: Sustainability (Source: ESES Framework, UNEP)

6. GUIDING PRINCIPLES FOR SUSTAINABILITY OF THE IPTN

The following are proposed as the guiding principles:

- 1) Mangaung Metropolitan Municipality will apply a science- and technology-based precautionary approach to the IPTN project from design through to implementation and operation. The City also recognizes the natural environment, its life-supporting function and the potential for adverse social and economic impacts resulting from the mismanagement or neglect of these facets.
- 2) For this reason, environmental impacts will be assessed and evaluated before the decision is made to condone/accept the impact as unavoidable.
- 3) Mangaung Metropolitan Municipality's Sustainability Framework will consider its community as the primary beneficiaries, and ultimate owners of the IPTN project. Therefore, stakeholder communication will be given priority throughout the project: from its conception, through to project preparation, design and construction and implementation. Stakeholder communication will continue to be a priority during the operational phase in order to maintain close contact with the needs of the community.

6.1 Key Performance Indicators

A set of indicators were noted or implied in the literature studied from Mangaung's Environmental Department. To these, some indicators were added as needed. The consensus indicated that the following were the indicators that the Environment and Sustainability work stream would focus on (in order of priority):

Priority 1

- Energy Use and Efficiency;
- Universal Accessibility/Affordability;
- Transport Management; and
- Community Participation.

The project team should not lose sight of other important indicators, such as:

Priority 2

- Water and Wastewater Management;
- Waste Management;
- Emissions;

- Resource Management; and
- Local Procurement and Supply Chain Sustainability.

7. APPROACH AND METHODOLOGY

The proposed IPTN will potentially impact on the social fabric of the affected communities. There is thus a need to analyse the social issues/concerns as a component of the environmental impacts of the project. The work to be carried out has been grouped into four recognisable areas, comprising four main aspects:

- Environmental Compliance;
- Sustainability Analysis;
- Socio-economic Analysis; and
- Resource Utilisation.

7.1 Environmental Compliance

This component will address all the legal requirements of the IPTN that must be authorised in terms of the National Environmental Management Act, 1998 and the EIA Regulations 2014. Also included in this aspect are all environmental requirements that stem from the National Water Act, 1998 and any other pertinent legislation, such as the National Heritage Resources Act, 1999.

7.2 Socio-economic Analysis

The socio-economic component of the IPTN aims to examine the social and economic benefits of the project by weighing these benefits against the potential negative impacts such as, costs, disruption of the social fabric, relocations, expropriations, and inconvenience to the public.

7.3 Resource Utilisation

The focus of this task will be on the efficient use of natural resources throughout the planning, design and construction and operation of the IPTN. Issues such as fuel type and source, renewable energy, consumption of natural resources for the BRT infrastructure (e.g. fuel, water, energy use at bus depot and station operations), will be considered and evaluated in this component.

The workshop on 27 May 2016 identified the following as resource constraints:

- Availability of land and land scarcity;
- Electricity; and
- Water.

7.4 Sustainability Analysis

A sustainable transport system is one that is accessible, safe, environmentally-friendly and affordable (ECMT, 2004). This component is considered as a major deliverable for the project, given that the very essence of an IPTN is to ensure sustainable transportation across the City. The analysis will ensure that the environment, social and economic considerations are factored into all concepts, designs and infrastructure implemented for the IPTN. The following aspects will be the priorities of the project:

- Structure (green building, building materials and cost);
- Resource utilization (water usage); and
- Energy usage and efficiency (emissions).

8. GOVERNANCE

Objectives

- Promote and implement effective partnerships in all spheres of the transport industry, the community and with other stakeholders; and
- Promote public education and awareness on the City's sustainable development and its future plans, i.e. the implementation of the IPTN project.

The Mangaung community should be made aware of the nature, causes and consequences (benefits) of the proposed IPTN project on a global scale and how their local environment is affected. More importantly, the community should understand its role in assisting with the successful implementation of this project. The Environment and Sustainability work stream proposes an engagement or communication plan with relevant stakeholders. Detailed neighbourhood liaison plans will be included in the action plan.

The draft Sustainability Framework was developed and circulated to MMM. Engagement with MMM in the form of a workshop (on 27 May 2016 in Bloemfontein) was held to allow adequate time for the draft framework to be assessed and adopted for the project. The intention of the workshop was to:

- Create a background for the Environment and Sustainability work stream to ensure that both the team from GA Environment and MMM understands the scope of the Environment and Sustainability work stream and have the same frame of reference; and
- Workshop the draft Sustainability Framework and obtain MMM inputs that will allow GA Environment to commence with its work with the full understanding and expectations of the scope of work going forward.

9. WAY FORWARD

The Environment and Sustainability work stream has identified a number of actions to achieve a sustainable implementation of the IPTN project. However the following are identified as priority actions required to synergise the implementation of the IPTN. These actions will provide the impetus to integrate and cascade sustainable solutions in the project. These will be defined in the action plan to be implemented for the IPTN project. These are:

- Energy Use and Efficiency;
Energy efficient bus stations, depots, etc.
- Universal Accessibility/Affordability;
An integrated transport system for MMM
- Transport Management;
CNG (Compressed Natural Gas) Fuel Alternative
- Water and Wastewater Management;
Develop and maintain efficient and secure water management system
- Waste Management;
Waste Reduction, Reuse and Recycling
- Community Participation;
Raise awareness, educate and involve the community
- Emissions;
Innovation for adaptation and mitigation efforts
- Resource Management; and
Promote labour intensive workforce infrastructure in order to employ more personnel
- Local Procurement and Supply Chain Sustainability.
Efforts to promote local business and local economic development

10. CONCLUSION

The dire need for integration between the economy, social aspects and the environment is no longer debated. The only question still to be answered is how to achieve sustainability within each project or institution. With the IPTN, MMM has the ideal opportunity to achieve sustainability and put into practice the environmental - and social-related policies and strategies that have been or are being developed. In other words, the IPTN is the chance to make sustainability work within MMM.

This sustainability framework is both the point of departure and guide for each step of the IPTN. It affects the planning and development, implementation, and operation of the IPTN in MMM. Therefore, the responsibility of the Environment and Sustainability work stream is significant, and goes to the core of the entire project. It is therefore recommended that this Sustainability Framework is adopted by the Political Leadership of the City.

11. REFERENCES

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SUSTAINABILITY ACTION PLAN FOR THE INTEGRATED TRANSPORT
NETWORK PROJECT, MANGAUNG METROPOLITAN MUNICIPALITY,
BLOEMFONTEIN, FREE STATE PROVINCE



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EXECUTIVE SUMMARY

According to the first principle stated in Chapter two of the National Environmental Management Act (Act 107 of 1998, NEMA), environmental management must place people and their needs foremost and serve their physical, psychological, developmental, cultural and social interests equitably. In keeping with this principle and other sustainability imperatives, a number of South African cities have developed Integrated Public Transportation Networks (IPTN). The reason is that such systems relieve commuters' reliance on private transportation, which in turn, reduces greenhouse gas (GHG) emissions, which ultimately limit the impact of the city on the environment. Mangaung Metropolitan Municipality (MMM) has decided to implement an IPTN and to ensure that the system is as sustainable as possible.

In May 2016, a Sustainability Framework was developed for the IPTN. This framework was workshopped with the relevant MMM officials on 27 May 2016 and subsequently adopted by the Municipality. The Sustainability Framework outlined the principles that would ensure that the development of the IPTN is socially, environmentally and economically sustainable, and is in line with Municipal policies at the time of compilation. This Sustainability Action Plan (SAP) was developed to give effect to the sustainability priorities that were identified and reflected in the Sustainability Framework.

The purpose of the Sustainability Action Plan (SAP) is to evaluate and optimise the implementation of the MMM IPTN project as a whole in relation to the principles of sustainable development. The implementation of the SAP will make it possible to identify imbalances and deficiencies between the interlinked realms of the **environment**, **society** and the **economy** and outline aspects which may be optimised resulting in a long-term sustainable IPTN.

During the workshop held in May 2016 for the Sustainability Framework, municipal officials identified a number of sustainability priorities for the MMM IPTN. These priorities must now be further developed into a workable plan, so that implementation, monitoring and reporting can be carried out with the aim to reduce and minimise impacts that will result from the IPTN project.

The SAP comprises this Action Plan which is based on the IPTN Sustainability Framework. The SAP assessed both the Priority I and Priority II sustainability aspects as identified in the Sustainability Framework. The environmental aspects that have been identified as priorities listed below and further described in **Tables 1 to 8**:

- **Priority I:**
 - Energy Use Efficiency
 - Transportation
 - Universal Access
 - Community Participation
- **Priority II:**
 - Water
 - Carbon Emissions
 - Local Procurement and Supply Chain Management
 - Waste Management

Table 1: Electricity Use Efficiency

ASPECT / ACTION AREA: ELECTRICITY USE EFFICIENCY		
Justification: South Africa is currently experiencing a serious shortage of electricity, and government has put in place programmes for the generation of more electricity in the country. It is therefore the city's intention to roll out steps to minimise electricity use and the IPTN's dependence on fossil fuels can be reduced. The IPTN project is one way the city is able to show efforts and actions towards energy saving in its operations.		
Objectives: <ul style="list-style-type: none"> Reduce consumption of fossil-fuel based electricity, integrate the use and development of renewable energy into the IPTN Bus operations. 		
Indicators: <ul style="list-style-type: none"> Measure electricity usage for all bus stations, depots, IPTN head offices, ablution facilities and intermodal facilities. 		
Potential Impact	Potential Impact	
	1	Inefficient use of electricity will increase the levels of greenhouse gases in the atmosphere when more energy is produced to meet the demand.
	2	The increased use of electricity will increase the electricity bill for the IPTN operations.
Target <ul style="list-style-type: none"> Establish volumes of IPTN electricity used after go-live. Reduce energy usage by 5% annually over a period of six years. 		
Mitigation Measures Proposed <ul style="list-style-type: none"> Implement Compact Fluorescent Lights (CFL). Implement Light Emitting Diode (LED). Implement Solar Street Lighting. 		

Table 2: Transport Management

ASPECT: TRANSPORT MANAGEMENT		
Justification: Transport contributes to the economy of the country. Transport is also a contributing factor to local economic development. The dominant public transport mode in the MMM region is the minibus-taxi. MMM does not have a community bus service. There is a privately-owned commuter bus service (Interstate Bus Lines). The IPTN will be MMM's first bus service.		
Objectives: <ul style="list-style-type: none"> Promote a low-cost IPTN. Make the IPTN the preferred choice of transport system for the community. 		
Indicators: <ul style="list-style-type: none"> Accessibility of the buses to the general public. Affordability of the buses to the general public. Use of non-motorised transport and other transport systems to access the buses. 		
Potential Impact	Potential Impact	
	1	An inefficient transport system results in the community being unable to get to work, school, hospital, etc.
	2	Increase the number of commuters using the IPTN.
Target <ul style="list-style-type: none"> Establish the effective use of the IPTN in the first month. Transform 50% of the current transport system to a scheduled reliable service. 		
Mitigation Measures Proposed <ul style="list-style-type: none"> Promote the use of non-motorised transport to access station. Educate and raise awareness on the IPTN. Develop synergy with the Waaihoek transport system. 		

Table 3: Community Participation

ASPECT / ACTION AREA: COMMUNITY PARTICIPATION		
Justification: In any service with customers, customer care is crucial for two primary reasons: <ul style="list-style-type: none"> Firstly, when customers feel that they are not placed at the centre of an operation, the tendency is not to make use of the service – which is exactly the opposite of what is required. The platform should be used to obtain positive feedback on which factors would make a greater number of customers become patrons of the system. Secondly, customers often come with novel solutions and challenges that could not have been anticipated otherwise. 		
Objectives: <ul style="list-style-type: none"> Ensure that of 25% of IPTN customers participate through the established communication channels by FY5. Ensure that at least 90% of those customers who do participate have their issues resolved to the customer's satisfaction. 		
Indicators: <ul style="list-style-type: none"> Measure the number of participants (through all the commenting avenues) against the number of users of the IPTN system in MMM. Measure the level to which the participating customers are satisfied with the service provided after they complained, made queries, or suggestions. 		
Potential Impact	Potential Impact	
	1	A loss of customers due to complaints and queries that are not dealt with to the customer's satisfaction. Slow uptake or increase in patronage of the system.
	2	When customers do not receive feedback on suggestions, they feel alienated and they feel that the system does not value and care about them.
Mitigation Measures Proposed <ul style="list-style-type: none"> Customer Contact Centre. Dissemination of information through public channels and social media. Obtaining information via surveys, follow-up calls and interviews. 		
Target No lost commuters due to unresolved customer complaints. All suggestions are evaluated and feedback provided to the customer.		

Table 4: Universal Access and Affordability

ASPECT / ACTION AREA: UNIVERSAL ACCESS AND AFFORDABILITY		
Justification: Universal Access is a Work Stream on its own, while affordability is part of the work of the Business and Finance Work Stream. These Work Streams are part and parcel of the planning of the entire IPTN at present. For this reason, only additional actions (that will only take place once the IPTN goes live) will be mentioned.		
Objective(s): <ul style="list-style-type: none"> Ensure that sufficient information on Universal Access know to the system is made available, especially for those who need it most (elderly, disabled, etc.) and how to use it. Ensure that those with special needs have the opportunity to provide input for the continual improvement of the system. Ensure that the IPTN remains affordable and is accessible to a broad spectrum of the local community. 		
Indicator(s): Records of: <ul style="list-style-type: none"> The number of Universal Access campaigns held. The number of Universal Access customers who provided input via the Community Participation avenues (customer care centre and surveys). Surveys that include information regarding the affordability of the system. 		
Potential Impact	Potential Impact	
	1	Universal Access customers (physically disabled, blind, deaf, the elderly, children, persons with large parcels or small children, etc.) do not necessarily know how to make use of the system.
Target Universal Access customers are aware of the IPTN and know how to use it.		

	2	Universal Access customers do not have the opportunity to provide their input into the continual improvement of the system.	Universal Access customers have opportunities to provide their input and they know where to get assistance / complain if they need to.
	3	The IPTN is not an affordable system and customers do not use the service due to the system being too expensive.	An IPTN that is affordable to all potential customers over time.
Mitigation Measures Proposed			
<ul style="list-style-type: none"> Public Campaigns. Formalising Universal Access travel. Surveys and interviews that (amongst others) focus on Universal Access costumers and affordability. 			

Table 5: Water Management

ASPECT / ACTION AREA: WATER MANAGEMENT			
Justification: Water is becoming a scarce resource globally and it is often regarded as a critical resource for South Africa as a whole. Increased or decreased rainfall conditions will affect the amount of water available for domestic and other non-domestic uses. Bloemfontein is situated in an area that generally receives low rainfall area and is one of the cities that experience severe conditions in dry seasons.			
Objective(s): <ul style="list-style-type: none"> Reduce water consumption for the IPTN Bus operations. Increase water efficiency at bus depots, control centre and stations. 			
Indicator(s): Records of: <ul style="list-style-type: none"> Measure water usage for all bus stations and depots. Measure the water usage for all landscapes along the bus routes and at the bus depots. Measure water usage the IPTN head offices. Measure water usage at ablution facilities. Measure water usage at the intermodal facility. 			
Potential Impact	Potential Impact		Target
	1	Inefficient use of water will add to the burden on the availability of potable (drinking) water from reservoirs. It will also increase the water bill for the IPTN.	<ul style="list-style-type: none"> Establish current volumes of water used. Reduce water usage by 20% in the first year of operations.
Mitigation Measures Proposed			
<ul style="list-style-type: none"> Implement water-efficient washing bays (eco-wash). Implement water harvesting and re-use tanks. Water landscaping in the afternoon when it is cooler. Ensure that taps and ablution facilities do not leak (employ a full-time plumber to monitor and maintain). 			

Table 6: Waste Management

ASPECT / ACTION AREA: WASTE MANAGEMENT			
Justification: Improper management of waste has emerged as an important threat to the environment and public health. As a result, there is a need to find ways to mitigate the potential impacts that result from improper waste management.			
Objective(s): <ul style="list-style-type: none"> Reduce the amount of waste by 20% by 2020 			
Indicator(s): Records of: <ul style="list-style-type: none"> Waste management savings per annum. 			
Potential Impact	Potential Impact		Target
	1	Potential land pollution (tyres and bus batteries).	Eliminate from go-live date.
	2	The amount of general solid waste to landfill.	Reduce the amount of waste to landfill by 10% by 2020.

Mitigation Measures Proposed		
<ul style="list-style-type: none"> Return spent batteries to the manufacturer. Recycle the old tyres. Recycle paper. 		

Table 7: Carbon Emissions

ASPECT / ACTION AREA: CARBON EMISSIONS			
Justification: Climate change has emerged as an important threat to economic development, the environment and public health. As a result, there is a need to find ways to mitigate the impact of climate change that is linked to carbon emissions.			
Objective(s): <ul style="list-style-type: none"> Reduce the amount of carbon emissions by 24% by 2020. 			
Indicator(s): Records of: <ul style="list-style-type: none"> Audited records of carbon emissions per annum. Audited savings on carbon tax. 			
Potential Impact	Potential Impact		Target
	1	Potential deterioration of the air quality due to increased carbon emissions.	Reduce the amount of carbon emissions by 24% by 2020
Mitigation Measures Proposed <ul style="list-style-type: none"> Investigate the best source of propulsion fuel for the buses 			

Table 8: Local Procurement and Supply Chain Management

ASPECT / ACTION AREA: LOCAL PROCUREMENT AND SUPPLY CHAIN MANAGEMENT			
Justification: Local procurement and supply chain management are already addressed within MMM's structures. As a responsible organ of state, it is imperative that MMM focuses on ensuring that (as far as practicable) local companies and individuals get to benefit from the employment and services that the IPTN project will generate. Likewise, it is important to ensure that Broad-Based Black Economic Empowerment (B-BBEE) remains in firm focus. Finally, procuring the most sustainable what???? is crucial. Note that supply chain management also encompasses recycling, etc. of old products.			
Objective(s): <ul style="list-style-type: none"> Ensure the appointment of local individuals and companies during planning, execution and operation – according to the MMM procurement policies. Ensure that MMM's B-BBEE quotas are adhered to. Focus on procuring the most sustainable solution possible. Investigate the possibility of reuse, recycling, etc. 			
Indicator(s): Records of: <ul style="list-style-type: none"> Advertise opportunities for individuals and companies locally, before advertising nationally. Compliance with MMM's B-BBEE quotas. Include sections regarding sustainability in tenders / bids and allocate points towards the sustainable execution of contracts (e.g. using more sustainable products during construction, etc.). Investigate the potential reuse, repurposing, and recycling of used products (e.g. tyres). 			
Potential Impact	Potential Impact		Target
	1	Individuals and companies from inside the metropolitan area will not be given preference for providing products and services.	Comply with and improve on current targets for local procurement.
	2	Companies with a good B-BBEE standing and previously disadvantaged individuals will not benefit from the employment equity legislation.	Comply with and improve on current targets for B-BBEE.

	3	Service and product providers will not be encouraged to look for the most sustainable option if this does not form part of tender requirements and MMM will not reap the benefits of having the most practicable sustainable option.	There is a sustainability component to all tenders /bids from MMM. There will be points allocated to the sustainability aspect so that being more sustainable will influence the decision as to which service / product provider will be appointed.
	4	More solid waste will be generated (resulting from used products) and MMM will forfeit the potential cost savings of reducing, reusing, repurposing or recycling products and materials.	Actively look for opportunities to reduce, reuse, repurpose, and recycle products and material that MMM cannot use for its original purpose anymore.
Mitigation Measures Proposed			
<ul style="list-style-type: none"> • The MMM procurement department should regularly review their strategies for ensuring local procurement for IPTN appointments. • The MMM procurement department should regularly review their strategies for ensuring attracting the right B-BBEE companies and previously disadvantaged individuals for IPTN appointments. • Ensure that all MMM bids and tenders that has to do with the IPTN have a specific section on ensuring sustainability. This section must be linked to the adjudication points that a company receives, otherwise the incentive will not be strong enough for a company to look for sustainable alternatives. • The MMM supply chain management department should task departments with investigating how they may reduce the use of products, reuse, repurpose or recycle where ever possible even before the IPTN commences. 			

The IPTN for MMM is a massive undertaking with many activities that work together to ensure the proper operation of the system. The sustainability aspects are cross-cutting and the staff working on sustainability issues will have to work closely with all other departments to ensure that they not only maintain the IPTN as a sustainable operation but also continually improve on the sustainability of the entire system.

The Head of the IPTN Department within MMM will have to rely on a number of managers / staff members outside of his/her department to assist with the implementation, monitoring and improvement of sustainability in the system. This makes it imperative to establish a sustainability coordination committee that should meet at regular intervals to discuss matters pertaining to implementation, monitoring and continual improvement. *For this reason, the relevant person(s) should have a suitable position to avoid conflicts in terms of seniority / hierarchy within the organisation.*

As a minimum requirement, the sustainability team will have to take certain measurements, compile reports, liaise with employees, etc. This function requires a person with a lower level within the overall IPTN hierarchy. It is therefore recommended that the responsibility is shared between a more senior and a middle-level employee within the IPTN Department of MMM – possibly called a **Sustainability Officer** and a **Sustainability Manager**.

The implementation of the sustainability aspects will ensure that the IPTN adheres to sustainable development principles i.e. climate change mitigation and adaptation, as well as awareness raising on the effects of transportation. The commitment outlined in the mission of the Sustainability Framework would therefore become achievable. MMM would thus become a leader by implementing an IPTN that takes sustainable development seriously. MMM is encouraged to finalise and adopt its Climate Change Strategy, ensuring that it is approved by Council, as this would support the proposals made in this Action Plan. The Municipality must be seen as acting with political will to implement climate change responses within its operations and have the supporting policies that have been approved by the leadership of MMM.

Of utmost importance is the assurance that financial provision is made in each financial year in order to implement these sustainable measures in the IPTN. Workshops were held with the relevant and affected project Work Streams, i.e. Infrastructure, Systems Planning, Universal Access, Marketing and Finance, but the financial aspects will only be thoroughly developed in the following phase. It is crucial that the actions outlined and costs budgeted are duly implemented prior to- and post the Go-Live date of July 2019. This implementation phase is thus considered the most importance stage in the work of the Environment and Sustainability Work Stream.

ABBREVIATIONS AND ACRONYMS

BRT	Bus Rapid Transport
CCBA	Community and Biodiversity Alliance
CCBS	Community and Biodiversity Standard
CCS	Climate Change Strategy
CC&S	Carbon Capture and Sequestration
CDM	Clean Development Mechanism
CDP	Carbon Disclosure Project
CFD	Computational Fluid Dynamics
CFL	Compact Fluorescent Lights
CDM	Clean Development Mechanism
CNG	Compressed Natural Gas
CO ₂	Carbon dioxide
CSP	Concentrating Solar Power
CSR	Corporate Social Responsibility
DEA	Department of Environmental Affairs
DESTEA	Department of Economic Development, Small Businesses, Tourism and Environmental Affairs
DoE	Department of Energy
EET	Emission Estimation Technique
EMF	Environmental Management Framework
GBCSA	Green Building Council of South Africa
GHG	Greenhouse gas
GRI	Global Reporting Initiative
GS	Gold Standard
IDP	Integrated Design Process
IPTN	Integrated Public Transportation Network
ISO	International Organisation for Standardisation
MMM	Mangaung Metropolitan Municipality
NDoT	National Department of Transport

NEES	National Energy Efficiency Strategy
NEMA	National Environmental Management Act (Act 107 of 1998)
NFSD	National Framework for Sustainable Development
NGERS	National Greenhouse and Energy Reporting Scheme
NPI	National Pollutant Inventory
SANEDI	South African National Energy Development Institute
SAP	Sustainability Action Plan
SDF	Spatial Development Framework
UNEP	United Nation's Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standards

DEFINITIONS

Biodiesel - A fuel typically made from soybean, canola, or other vegetable oils; animal fats; and recycled grease. It can serve as a substitute for petroleum-derived diesel or distillate fuel.

Biofuels - Liquid fuels and blending components produced from biomass feedstock, used primarily for transportation.

Compressed Natural Gas (CNG) - Natural gas compressed to a pressure at or above 200-248 bar (i.e., 2900-3600 pounds per square inch) and stored in high-pressure containers. It is used as a fuel for natural gas-powered vehicles.

Concentrating Solar Power (CSP) – a solar energy conversion system characterised by the optical concentration of solar rays through an arrangement of mirrors to generate a high temperature working fluid.

Conventional Natural Gas – natural gas that is produced by a well drilled into geologic formation in which the reservoir and fluid characteristics permit the natural gas to readily flow to a wellbore.

Carbon Cycle – all carbon sinks and exchanges of carbon from one sink to another by various chemical, physical, geological, and biological processes.

Carbon Disclosure – the practice by which companies measure their impact on global warming or the deleterious impacts associated with increases in the earth's atmospheric temperature through the calculation of tonnes of carbon dioxide equivalents.

Carbon Footprint – a measure of the exclusive total amount of CO₂ emissions that is directly and indirectly caused by an activity or is accumulated over the life stages of a product.

Carbon Offset – a measurable avoidance, reduction or sequestration of carbon dioxide (CO₂) or other GHG emissions.

Carbon Sink – A reservoir that absorbs or takes up released carbon from another part of the carbon cycle. The four sinks, which are regions of the Earth within which carbon behaves in a systematic manner, are the atmosphere, terrestrial biosphere (usually including freshwater systems), oceans, and sediments (including fossil fuels).

Carbon Tax - a tax on the carbon dioxide (CO₂) equivalent of greenhouse gas emissions.

Ecosystems – a dynamic system of plants, animals and micro-organisms communities and their non-living environment interacting as a functional unit.

Energy Efficiency – an economical and efficient production and utilisation of an energy carrier or resource.

Environment – based on the definition provided in the National Environmental Management Act (Act 107 of 1998, NEMA), the environment is defined as:

“‘environment’ means the surroundings within which humans exist and that are made of –

- (i) The land, water, and atmosphere of the earth;
- (ii) Micro-organisms, plant, and animal life;

- (iii) Any part or combination of (i) and (ii) and the interrelationships among and between them; and
- (iv) The physical, chemical, aesthetic, and cultural properties and conditions of the foregoing that influence human health and wellbeing.”

Environmental Sustainability – the ability of an activity to continue indefinitely at current and projected levels, without depleting the social, cultural and natural resources required to meet present and future needs.

Nett Electricity Consumption – consumption of electricity computed as generation, plus imports, minus exports, minus transmission and distribution losses.

Renewable Energy – energy generated from natural non-depleting resources including solar energy, wind energy, biomass energy, biological waste energy, hydro energy, geothermal energy and ocean and tidal energy.

Geothermal Energy – hot water or steam extracted from geothermal reservoirs in the earth's crust. Water or steam extracted from geothermal reservoirs can be used for geothermal heat pumps, water heating, or electricity generation.

Greenhouse Gases – gases present in the atmosphere, which reduce the loss of heat into space and thereby contributing to an increase in global temperatures through a process known as the greenhouse effect.

Hydraulic Fracturing – fracturing of rock at depth with fluid pressure. Hydraulic fracturing at depth may be accomplished by pumping water into a well at very high pressures. Under natural conditions, vapour pressure may rise high enough to cause fracturing in a process known as hydrothermal brecciating.

Water Consumption – “water removed from the ground or diverted from a surface-water source for use,” and water consumption, “the part of water withdrawn that is evaporated, transpired, incorporated into products or crops, consumed by humans or livestock, or otherwise removed from the immediate water environment” (U.S. Geological Survey 2009).

1. INTRODUCTION

1.1 General Introduction

South Africa aspires to be a sustainable, economically prosperous and self-reliant nation state that safeguards its democracy by meeting the fundamental human needs of its people, by managing its limited ecological resources responsibly for current and future generations, and by advancing efficient and effective integrated planning and governance through national, regional and global collaboration (National Framework of Sustainable Development (NFSD, 2008).

In line with the above, several cities in South Africa have developed Integrated Public Transportation Networks (IPTN). The reason is that such systems relieve inhabitants' reliance on private transportation, which in turn, reduce greenhouse gas (GHG) emissions and therefore reduce the impact of the city on the environment. The IPTN is developed in line with the National Public Transport Strategy and Action Plan released in 2007 by the National Department of Transport (NDoT). The strategy proposes the implementation of Integrated Rapid Public Transport Networks (IRPTN) in 12 (now 13) South African cities. Some of the cities which have successfully implemented this system are Cape Town (MyCiTi), Johannesburg (Rea Vaya) and Pretoria (A re Yeng). Mangaung Metropolitan Municipality (MMM) has decided to implement an IPTN and to make the system as sustainable as possible.

1.2 Purpose of the Sustainability Action Plan

This Sustainability Action Plan (SAP) was developed to assist with the implementation of the IPTN Sustainability Framework that was workshopped with the relevant MMM officials on 27 May 2016. The action plan supports the framework for future action with the aim to alleviate environmental, social and economic challenges, raise awareness with the local population on these challenges and establish MMM's commitment to work in partnership with the wider community to achieve a more sustainable city.

The National Environmental Management Act (Act 107 of 1998, NEMA) sets out a number of principles (which include principles regarding sustainability) that are pertinent to the Sustainability Action Plan. According to the NEMA, these principles are applicable throughout the Republic to the actions of all organs of State that may significantly affect the environment". Amongst others, these principles include:

- Ensure that development is socially, environmentally and economically sustainable.
- Sustainable development:
 - The following factors have to be considered in terms of sustainable development:
 - That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;

- That waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;
 - That the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource.
 - That a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
 - That negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.
- Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.
 - Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued and special measures may be taken to ensure access hereto by categories of persons disadvantaged by unfair discrimination.
 - Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.
 - Community well-being and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means.
 - The social, economic and environmental impacts of activities, including disadvantages and benefits must be considered, assessed and evaluated and decisions must be appropriate in the light of such consideration and assessment.
 - There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment.
 - Global and international responsibilities relating to the environment must be discharged in the national interest.
 - The environment is held in public trust for the people. The beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.
 - The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.

In line with these principles, keeping in mind that people and their needs are at the forefront of sustainable development, MMM developed a vision and mission for sustainability on the IPTN, which is outlined in the section below.

2. VISION AND MISSION

The implementation of the MMM IPTN is a major development and the system must be a sustainable one. The purpose of the Sustainability Action Plan (SAP) is to evaluate and optimise the MMM IPTN as a whole in relation to the principles of sustainable development. This will make it possible to identify imbalances and deficiencies between the realms of the environment, society and the economy in and around MMM and to outline areas which may be optimised resulting in a sustainable IPTN.

In May 2016 a Sustainability Framework was workshopped with members of MMM. During this workshop, the following vision and mission was adopted:

2.1 Vision

To underpin the planning, design and implementation of the IPTN in order to create a public transportation network founded on environmental sustainability, affordability and universal access for the improvement of the living standard of all Mangaung's inhabitants.

2.2 Mission

Mangaung Metropolitan Municipality is committed to ensuring that the IPTN bears the hallmark of integrated environmental sustainability, by focusing on reducing emissions and minimizing the carbon footprint of the entire network, and by enhancing green elements throughout the system, to make Mangaung a more habitable city. Educating and empowering of all inhabitants is crucial, as this would contribute towards keeping the network safe, affordable and accessible to all.

3. POLICY, LEGISLATION AND INSTITUTIONAL FRAMEWORK

There are a number of legislative and policy frameworks as well as guidelines that are important to this Sustainability Action Plan. The most pertinent of these are highlighted below so that the reader may have an overview and be able to find a specific Act, policy, guideline or system if s/he needs more information:

ISO 20121 - is a practical tool for managing events so that they contribute to the three dimensions of sustainability – economic, environmental and social. It allows commitment to sustainability to be demonstrated in a globally recognized manner. Events based in different geographical locations around the world will experience different sustainability issues, but they will all be able to implement the ISO 20121 framework.

ISO 26000 - is designed to assist organizations in contributing to sustainable development, encouraging them to go beyond basic legal compliance, and to promote common understanding in the field of social responsibility, complementing other instruments and initiatives for social responsibility.

ISO 37101 - is designed to help communities define their sustainable development objectives and put in place a strategy to achieve them. It helps to create a more sustainable future for communities. This

means an improved local environment, a happier and healthier place for citizens, and a community that can better anticipate and adapt to natural disasters, economic shocks and climate change.

The Global Reporting Initiative (GRI) - is a voluntary reporting framework. The GRI reporting guidelines are being replaced by the GRI reporting standards (that will come into effect on 01 July 2018). There are sector supplements that explain sustainability indicators and measurement techniques that can be applied or adapted across most sectors.

The National Pollutant Inventory (NPI) - has a series of Emission Estimation Technique (EET) manuals for each reporting industry outlining the industry processes and approaches for estimating emissions. The techniques can be used even if an enterprise is not required to report to the NPI under the National Greenhouse and Energy Reporting Scheme (NGERS).

Carbon Tax Act, 2019 (Act No. 15 of 2019) –The Act was gazetted on 23 May 2019 (Gazette No. 42483), together with the Customs and Excise Amendment Act No. 13 of 2019 (Gazette No. 42480). Since climate change represents one of the biggest challenges facing humankind, the primary objective of carbon tax is to reduce greenhouse gas (GHG) emissions in a sustainable, cost effective and affordable manner. This Act gives effect to the polluter-pays-principle for large emitters and helps to ensure that firms and other consumers take the negative adverse costs into account in their future production, consumption and investment decisions. The design of this tax also provides for significant tax-free emission allowances ranging from 60 per cent to 95 per cent in this first phase. Amongst other things, this includes a basic tax-free allowance of:

- 60 per cent for all activities;
- a maximum 10 per cent allowance for companies that use carbon offsets to reduce their tax liability;
- a performance allowance of up to 5 per cent for companies that reduce the emissions intensity of their activities; and
- a 5 per cent carbon budget allowance for complying with the reporting requirements.

The first phase of the tax is from 1 June 2019 to 31 December 2022, with a tax rate of R120.00 per tonne of carbon dioxide equivalent to the Greenhouse gas emissions of a taxpayer. In the first phase, the Carbon Tax will initially only apply to Scope 1 emitters. According to the GHG Protocol Corporate Standards, a company's GHG emissions can be classified into three "scopes". Scope 1 emissions are direct emissions from owned or controlled sources, Scope 2 emissions are indirect emissions from the generation of purchased energy and Scope 3 emissions are all indirect emissions (not included in Scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions. Furthermore, Schedule 2 of the act prescribes the sectoral activities that carbon tax will be calculated against. The Intergovernmental Panel on Climate Change (IPCC) Code 1A3B makes reference to road transportation which at this stage does not have a threshold. Therefore, emitters such as the Integrated Public Transport Network will not be taxed in this phase since they are not direct emitters from any of the owned or controlled sources.

Although the IPTN will be excluded from paying tax in the first phase of the Carbon Tax, it is critical for MMM to ensure that the negative adverse costs (externalities) that come with this tax are taken into account when the municipality makes decision on the future production, consumption and investment options that they are likely to explore.

National Environmental Management Act, 1998 (Act No.107 of 1998, NEMA) - refers to constitutional rights and states that many inhabitants of South Africa live in an environment that is harmful to their health and well-being. The Act states that everyone has the right to an environment that is not harmful to his or her health or well-being. Therefore, the State must respect, protect, promote and fulfil the social, economic and environmental rights of everyone and strive to meet the basic needs of previously disadvantaged communities, inequality in the distribution of wealth and resources, the resultant poverty, as well as the results of environmentally harmful practices are covered in the Act. The Act stresses sustainable development and states that sustainable development requires the integration of social, economic and environmental factors in the planning.

Regulations in Terms of Section 12L of the Income Tax Act, 1962 (Act No. 58 of 1962) on Allowance for Energy Efficiency Savings - the promulgation of the regulations on the allowance for energy efficiency savings in terms of section 12L of the Income Tax Act as amended came into effect on November 1, 2013. Tax incentives are being introduced for businesses that can show measurable energy savings. The 12L regulation sets out the process for determining the quantum of energy efficiency savings, and the requirements for claiming the proposed tax deduction. Section 12L incentives include all energy efficiency projects that reduce energy use and is claimable until 2020. These tax incentives are available for savings in all energy forms and not only electricity. The expected tax relief would be a 45 cents deduction on taxable income per kilowatt hour of energy saved – subject to all the conditions in the 12L regulations being met (South African National Energy Development Institute, 2013).

National Greening Framework - the National Green Framework supports realistic strategies for climate change action and improved environmental sustainability. The national greening framework was developed to manage potential significant environmental impacts, both positive and negative. It has six environmental focus areas: Waste reduction and processing; energy efficiency; maximum use of efficient public and non-motorised transport, with the emphasis on reducing carbon emissions; water use efficiency and minimisation of water contamination; protecting and enhancing biodiversity; and promoting responsible tourism.

National Energy Efficiency Strategy of South Africa (NEES), 2005 - the White Paper on Energy Policy (1998) gives a mandate to the Department of Energy (DoE) to pursue Energy Efficiency programmes, which is one of the lowest cost options for reducing energy consumption. The original NEES was drafted to ensure that the necessary resources are made available to establish systems and legislation to facilitate the specification, collection, storage, maintenance and supply of energy-related data, according to the requirements of integrated energy planning and international standards.

National Strategy for Sustainable Development and Action Plan 2011-2014 - is derived from the South African National Framework for Sustainable Development (NFSD) to address issues of sustainability in South Africa. This strategy illustrates South Africa's commitment to a long-term

sustainable development path that is economically, socially and environmentally sustainable. It then presents an understanding of sustainable development and elaborates the route South Africa is taking toward sustainability. It covers the key areas of human development (people), ecological protection (the planet) and economic growth (prosperity) (National Strategy for Sustainable Development and Action Plan (NSSD1) 2011-2014).

National Framework on Sustainable Development, 2008 - the purpose of this framework is to enunciate South Africa's national vision for sustainable development and indicate strategic interventions to re-orientate South Africa's development path in a more sustainable direction. This framework provides the basis for a long-term process of integrating sustainability as a key component of the development discourse and shows South Africa's commitment to the principles developed at international summits and conferences in the economic, social and environmental fields, including the 2002 World Summit on Sustainable Development.

MMM Climate Change Policy – according to the Climate Change Synthesis Report (2014), Mangaung has not yet formally adopted a Climate Change Adaptation Strategy and there is hardly a link between climate change and planning within MMM at the time of compiling this report. Given the climate change challenges faced by the municipality such as water shortages and flooding, there is need for more focused strategies and policies on how the municipality can adapt to these challenges.

MMM Spatial Development Framework - Mangaung's Spatial Development Framework (SDF) has been designed to address the inequalities of the past and to create a more sustainable spatial environment. According to the Local Government Handbook (2015), the government sector in Mangaung has seen the fastest growth in the last five years as a result of increased programmes in livelihood improvement interventions.

4. GUIDING PRINCIPLES AND RELEVANT MMM DOCUMENTATION

4.1 Overarching Principles

In order for the IPTN project to become climate change responsive, the following principles must be considered:

1. Climate change mitigation, which addresses the causes of climate change and is concerned with actions to reduce the emissions of greenhouse gases into the atmosphere.
2. Climate change adaptation, which addresses the effects of climate change and is concerned with promoting actions to reduce the unavoidable impacts of extreme weather events caused by this changing climate.
3. Awareness raising on climate change issues and actions that everyone can take.

4.2 Guiding Documents

The Integrated Development Plan (IDP) 2016/2017 made provision in its Medium Term Strategic Framework in line with the National Development Plan for the various priority outcomes that all

spheres of government must achieve. Of these, three priorities stood out and were key to this action plan and the implementation thereof:

- An efficient competitive and responsible economic infrastructure;
- Sustainable human settlements and improved quality of household life; and
- Environmental assets and natural resources that are well protected and continually enhanced.

The IDP further takes into account the establishment of the Mangaung Integrated Public Transport Network plan. It states that, amongst other reasons, the IPTN is being implemented to meet the current and future commuter demands and provide alternative transport options to the community. For these to be implemented in the most sustainable manner, additional economic impact assessments, social impact assessments and environmental impact assessments must be undertaken.

The Environmental Management Framework (EMF) is a tool that guides the management of development in a way that ensures sustainable development to the benefit of both current and future generations (Mangaung EMF, 2006). The EMF focused on specific environmental, social and economic aspects. Of these, this action plan takes note of the hydrology and water quality, transport (both road and rail), electricity and refuse removal (as part of the bulk services).

The Mangaung Environmental Policy (Draft), 2004 is a statement of intent a commitment of certain principles and ethics and to the development of sectorial strategies that details the goals, targets, programmes, and actions needed to ensure sustainable resource use and management to this unique environment for the benefit of the communities. Of these sectorial approaches, water resources, transportation, energy, and waste are pertinent to the implementation of this action plan.

MMM currently does not have a Council approved climate change strategy (although a final draft exists). This document, the *MMM Climate Change Adaptation and Mitigation Strategy*, provides an overview of the current and possible future adaptation options to the climate change risks identified in the Strategy Document for the different sectors in Mangaung. It also includes MMM's adaptive capacity as well challenges that may constrain adaptation and mitigation. Issues discussed in these reference documents that are pertinent to the Sustainability Action Plan include:

- **Water:** In the water sector, the current adaptation options and priority areas include wetland rehabilitation and management and removal of alien plants and replacing them with indigenous plants.
- **Energy:** Some of the adaptation options under the energy sector include community awareness programmes on energy conservation and alternative energy sources and creations of new job opportunities in renewable energy, flood management, geo-engineering, disease control, and insurance.
- **Transport:** The adaptations options for MMM include providing the public with affordable, comfortable, safe and reliable public transport. The priority areas in this sector are mainly focused on providing infrastructure for public transport, low carbon transport systems and assessing other alternative transport fuel sources e.g. biofuels.
- **Waste management:** This issue is mentioned in the document, but not discussed in detail.

Research has also been conducted to determine the provincial position on climate change issues. The Department of Economic Development, Tourism and Environmental Affairs (DETEA) does not have a Climate Change strategy; however it explicitly mentions its obligation to the National Climate Change Policy (White Paper) and the commitments made by the country as a signatory of the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol to make efforts to reduce GHG emissions in the country. The MMM is therefore obligated to adhere to these commitments.

The above municipal policies give an indication that the IPTN Sustainability Framework links with the existing policies and is in keeping with what MMM has set out to achieve. The Framework provided the impetus to compile the Sustainability Action Plan (SAP). *The SAP thus aims to take into consideration the key environmental aspects identified in the Framework that need to be measured and monitored with the aim of reducing and minimising impacts that will result from the IPTN.*

4.3 Mangaung IPTN Sustainability Action Plan

This SAP has taken into consideration the environmental aspects agreed upon by the forum from the workshop held on 27 May 2016 and approved as part of the Framework. The environmental aspects that have been identified as priorities are grouped into two:

- Priority I:
 - Energy.
 - Transportation.
 - Universal Access.
 - Community Participation.
- Priority II:
 - Water.
 - Carbon Emissions.
 - Resource Management.
 - Local Procurement.
 - Waste Management.

These are further discussed in **Section 5** below.

5. ASPECTS UNDER CONSIDERATION

The Environment and Sustainability Work Stream identified a number of actions to achieve sustainable implementation of the IPTN project. The following were identified as priority areas required to improve the sustainable implementation of the IPTN. Ensuring sustainability with regard to these aspects will provide the impetus to integrate sustainable solutions in the project. The most important aspects to consider to ensure a sustainable IPTN are:

- Energy (specifically electricity) Use and Efficiency.
Energy efficient bus stations, depots, etc.
- Transportation Management.
Fuel Alternatives.

- Universal Accessibility and Affordability.
An integrated and universally accessible transport system for MMM.
- Community Participation.
Raise awareness, educate and involve the community.
- Water Management.
Develop and maintain an efficient and secure water management system.
- Waste Management.
Waste Reduction, Reuse and Recycling.
- Carbon Emissions.
Innovation for adaptation and mitigation efforts.
- Sustainability through Local Procurement and Supply Chain.
Efforts to promote local business and economic development, as well as ensuring that sustainability is addressed as part of the tendering process.

Each of these aspects or focus areas were analysed to determine viable alternatives that would result in a more sustainable transportation system. These were evaluated and proposals were made that would be both sustainable and implementable by MMM. A summary of the findings of each focus area is provided in tabular format hereunder. The key consideration is to give effect to these initiatives during the planning of the IPTN, so that after the Go-Live date of July 2019, sustainability of the system can be measured, analysed and accurately reported.

5.1 Priority 1: Electricity Use and Efficiency

ASPECT / ACTION AREA: ELECTRICITY USE AND EFFICIENCY					
Justification: South Africa is currently experiencing a shortage of electricity, and government has put in place urgent programmes for generation of more electricity in the country. It is therefore the city's intention to roll out steps in which electricity use can be minimised and the IPTN's dependence on fossil fuels can be reduced. The IPTN project is one way the city is able to show efforts and actions towards energy saving in its operations.					
Objectives: <ul style="list-style-type: none">Reduce consumption of fossil-fuel based electricity, integrate the use and development of renewable energy into the IPTN Bus operations.					
Indicators: <ul style="list-style-type: none">Measure energy usage for all bus stations, depots, IPTN head offices, ablution facilities and intermodal facilities.					
Potential Impact	Potential Impact			Target	Priority
	1	Inefficient use of energy will increase the levels of greenhouse gases in the atmosphere when more energy is produced to meet the demand.		<ul style="list-style-type: none">Establish current volumes of energy used.Reduce energy usage by 20% in the first year of operation.	High
	2	The increased use of energy will increase the cost of the electricity bill for the IPTN operations.		<ul style="list-style-type: none">Establish the current electricity bill for the IPTN bus operations.Reduce the electricity bill by 5% annually over a period of six years.	High
	Description of Actions		Implementation Timeframe	Advantages & Disadvantages	Preliminary Cost Estimate
	A	Implement Compact Fluorescent Lights (CFL) lighting points at the bus stations, depots, IPTN head offices, ablution facilities, intermodal facility and street lights.	Implementation Date: Prior to go live Duration / Frequency: Each time when changing bulbs	<ul style="list-style-type: none">CFL is slightly more costly than normal bulbs, but it lasts longer.Using energy saving light bulbs decreases the dependence of fossil-fuel generated electricity. Substantial savings will be observed in the electricity bill, compared to the use of normal light bulbs	<ul style="list-style-type: none">Inclusion of the CFL street lighting was included in the street light designs by the Electric Engineer.A normal bulb costs approximately R12-00. A CFL bulb costs approximately R27-00.
		Implement (Light Emitting Diode) LED for street lights along the IPTN routes.	Initial Location: Willow Area – Ella, Park, Victoria and King Edward (253 street lights)	<ul style="list-style-type: none">LED is much more costly than normal bulbs and CFL, but it lasts even longer than CFL.LED light bulbs use only 2-17 watts of electricity (1/3rd to 1/30th of Incandescent or CFL). LED bulbs used in fixtures inside the home save electricity, house remains cool and save money on replacement costs since LED bulbs	<ul style="list-style-type: none">Energy used (Watt)<ul style="list-style-type: none">Incandescent bulb 60WCFL 14WLED 10WAverage Lifespan<ul style="list-style-type: none">Incandescent Bulb 50 daysCFL 333 daysLED 1,041 days

				last so long. Small LED flashlight bulbs will extend battery life 10 to 15 times longer than with incandescent bulbs.	<ul style="list-style-type: none"> Proposed: LED 35 Watt 10kVA @ 253 lights = R260/kVA R2,600-00 Currently LED 70 Watt 20kVA @ 253 lights R260/kVA R5,200-00
	B	Implement solar street lighting throughout the IPTN bus routes.	Implementation Date: Go live Duration / Frequency: Once off Location: Bus Stations and Mangaung Township	<ul style="list-style-type: none"> Renewable energy solutions have become the first choice in energy use in order to relieve the current stress on fossil fuel generated electricity. The use of solar energy decreases the dependence of fossil-fuel generated electricity. Substantial savings will be observed in the electricity bill. 	<ul style="list-style-type: none"> A solar street light costs approximately R4,463-00. 1 Solar Street will produce 127Watt from the sun. System Operating Voltage- 12V LED USED - 1W to 3W LED Make-Seoul Semiconductor/Osram Driver Circuit efficiency- above 85% Load disconnect- 11.2V +0.2 (Battery Voltage)
	C	Use of insulation at the bus stations, bus depot and head office buildings to reduce the amount of heat lost to the atmosphere through the roof and walls.	Implementation Date: Go live Duration / Frequency: Once-off Location: Bus stations, bus depot and head office	<ul style="list-style-type: none"> Insulation in buildings prevents air and moisture filtration and less energy is lost. During summer, insulated buildings remain cool and in winter buildings are able to store energy. Use double glazed windows. Substantial energy savings will be obtained and the electricity bill will be reduced. 	<ul style="list-style-type: none"> Cost of insulation – approximately R55-00 to R70-00 per square metre.
	D	Implementation of solar thermal power or a small windmill on the roof of bus depots.	Implementation Date: As soon as practicable after construction	<ul style="list-style-type: none"> Solar energy can be used to operate the bus stations, bus depots and the head office. Instead of electricity generated from fossil fuels. 	<ul style="list-style-type: none"> Cost of solar panels: <ul style="list-style-type: none"> 80 Watt R782-00 100 Watt R1,070-00 305 Watt R3,424-29 Cost of a small windmill is approximately R27,550-00.

			Duration / Frequency: Once off Location: Bus Depot roof and parking	<ul style="list-style-type: none">Legislation with regards to installing mass solar panels must be adhered to.Substantial energy savings will be obtained and the electricity bill will be reduced.	<ul style="list-style-type: none">Rated Power: 20kWSystem Voltage: 240VSolar Panel Type: Monocrystalline and Polycrystalline.				
Mitigation Methods for Impact 2	Description of Actions		Implementation Timeframe	Reason	Preliminary Cost Estimate				
	A	As above							
	B	As above							
	C	As above							
	D	As above							
Preferred Mitigation	Potential Impact		Preferred Mitigation Method	Reason	Year of Implementation (FY 1-5)				
					1	2	3	4	5
	1	Inefficient use of energy will increase the levels of greenhouse gases in the atmosphere when more energy is produced to meet the demand once the IPTN goes live.	Options A, B and D	The implementation of these methods is practical and realistic. Together these methods will ensure the reduction of energy consumption for this IPTN project.		Ongoing			
	2	The increased use of energy will increase the electricity bill for the IPTN bus operations.	Options A, B and D	As above.		Ongoing			
Monitoring of Impacts	Target to be Measured		Monitoring Method	Frequency	Timeframe	Cost / annum		Responsibility	
	1	Reduced use of greenhouse gases.	Monthly energy audits to measure the reduction of greenhouse gases through the energy that was saved.	Monthly	Ongoing	Appoint a sustainability auditor with annual salary commensurate with the relevant MMM level.		Sustainability Auditor	
	2	Reduced electricity bill.	Monthly energy audits to measure the decrease in the electricity bill through the use of renewable energy	Monthly	Ongoing	As above		Sustainability Auditor	

			and energy saving techniques.				
Comments	NOTE: All prices are approximate values.						

5.2 Priority 1: Transport Management

ASPECT: TRANSPORT MANAGEMENT					
Justification: Transport contributes to the economy of the country. The MMM’s transport is also a contributing factor to its local economic development. The dominant public transport mode in the MMM region is the minibus-taxi. MMM does not have a community bus service at present. There is a privately-owned commuter bus service (Interstate Bus Lines). The IPTN will be MMM’s first bus service.					
Objectives: <ul style="list-style-type: none">• Promote a low-cost IPTN.• Make the IPTN the preferred choice of transport system for the community.					
Indicators: <ul style="list-style-type: none">• Accessibility of the buses to the general public.• Affordability of the buses to the general public. (Affordability will be discussed under the heading Universal Access and Affordability.)• Use of non-motorised transport and other transport systems to access the buses.					
Potential Impact	Potential Impact		Target		Priority
	1	An inefficient transport system results in the community being unable to get to work, school, hospital, etc.	<ul style="list-style-type: none">• Establish the effective use of the IPTN in the first month.• Transform 50% of the current transport system to a scheduled reliable service.		High
	2	Only a small number of commuters using the IPTN.	<ul style="list-style-type: none">• Establish the effective use of the IPTN in the first month.• Increase use of the IPTN by approximately 10 to 30% in the first 6 months of operation.		High
Mitigation Methods for Impact 1	Description of Actions		Implementation Timeframe	Advantages & Disadvantages	Preliminary Cost Estimate
	A	Implement an integrated public transport system that is easily accessible.	Implementation Date: During the planning phase Duration / Frequency: Once off	<ul style="list-style-type: none">• Assist commuter to get to and from work on time.• Commuters spend less time on the road.• It increases the community morale.• Aids with the local businesses. If workers reach the work place on time, they can be more productive.	Already accounted for.

				<ul style="list-style-type: none">An increased use in public transport and decrease in single vehicles on the road will decrease the carbon emissions on the road.						
	C	Implement a transport system that is attractive to tourists and contributes to economic growth. Include the tourist attraction attribute. Specialist to assist with developing the synergy with the current transport system.	Implementation Date: Go live Duration / Frequency: Ongoing	<ul style="list-style-type: none">Tourist will benefit the local business in MMM. The economy of city will be positively impacted.	<ul style="list-style-type: none">Tourist specialist input approx. R100,000-00, once off payment.					
	D	Promote use of non-motorised transport to access the bus stations. Educate and raise awareness on use of NMT and the benefit to the community through workshops at schools, churches, and other organised groups. Promote Eco-mobility in the inner city. Media coverage (TV, newspapers, magazines, Radio, etc.)	Implementation Date: Prior to go live date Duration / Frequency: Continual, every six months	<ul style="list-style-type: none">The use of NMT encourages the community to walk/cycle more and as result the community will exercise and improve their health.An increased use in public transport and decrease in single vehicles on the road will decrease the carbon emissions on the road.	<ul style="list-style-type: none">Cost of facilitator, venue, etc. for workshops, approximately R10,000-00 per workshop.Media coverage cost. Dependent on the type of media coverage sought.					
Mitigation Methods for Impact 2	Description of Actions									
	A	Please refer to the Universal Access table.								
	B	Please refer to the Community Participation table. Once customers are satisfied, they will continue to use the system.								
Preferred Mitigation	Potential Impact		Preferred Mitigation Method	Reason	Year of Implementation (FY 1-5)					
	1	An inefficient transport system will result in the community being unable to get to work, school, hospital, etc.	All	The implementation of these methods is practical and realistic and can be achieved. Together these methods will ensure the reduction of energy consumption for this IPTN project.		Ongoing				
	2	Increase the number of commuters using the IPTN.	Please refer to Community Participation	As depicted in the Universal Access and Community Participation tables		Ongoing				
Monitoring of Impacts	Target to be Measured		Monitoring Methods	Frequency	Timeframe	Cost / annum		Responsibility		
	1	An efficient and effective affordable IPTN that is used by people from all walks of society.	Undertake surveys to determine the use of the IPTN by	Quarterly	Ongoing	As in the Community		Manager: Customer Services		

			the general public (See: Community Participation).			Participation table	
	2	Members of society preferring NMT above private transportation to go to bus stations and the Intermodal Facility.	As above	As above	As above	Included in the above	As above
General Comments	NOTE: All prices are approximate values.						

5.3 Priority 1: Community Participation

ASPECT / ACTION AREA: COMMUNITY PARTICIPATION					
Justification: As with any service with customers, customer care is crucial for two primary reasons: <ul style="list-style-type: none">• Firstly, when customers feel that they are not placed at the centre of an operation, the tendency is not to make use of the service – which is exactly the opposite of what is required.• Secondly, customers often come with novel solutions and challenges that could not have been anticipated otherwise.					
Objectives: <ul style="list-style-type: none">• Ensure that of 25% of IPTN customers participate through the established communication channels by FY5.• Ensure that at least 90% of those customers who do participate have their issues resolved to the customer’s satisfaction.					
Indicators: <ul style="list-style-type: none">• Measure the number of participants (through all the commenting avenues) against the number of users of the IPTN system in MMM.• Measure the level to which the participating customers are satisfied with the service provided after they complained, made queries, or suggestions.					
Potential Impact	Potential Impact		Target	Priority	
	1	A loss of customers due to complaints and queries that are not dealt with to the customer’s satisfaction.	No lost users due to unresolved customer complaints.	High	
	2	When customers do not receive feedback on suggestions, that alienates them and they feel that the system does not value them and care for them.	All suggestions are evaluated and feedback provided to the customer.	High	
Mitigation Methods for Impact 1	Description of Actions		Timeframe	Advantages and Disadvantages	Preliminary Cost Estimate
	A	Implement a comprehensive customer care service (encompassing face-to-face, telephone (call centre), e-mail and social media). It is crucial that responses are provided to all customer complaints / queries / suggestions.	Implementation: Commence during planning phase Frequency: Ongoing	<ul style="list-style-type: none">• Such a contact (or customer care) centre is essential to ensure that the IPTN has a face and that continual improvement can take place.• Without a customer care centre, many people will not use the IPTN.	<ul style="list-style-type: none">• Specialists to develop and implement an equipped Customer Care Centre R710,000-00.• Two full-time multi-lingual trained staff members paid as per the appropriate MMM level.• Telephone and Internet bandwidth (approximately R10,000-00/month).

				<ul style="list-style-type: none"> Cost is the only negative side to this proposal. 	
	B	<p>Conduct client satisfaction surveys that include:</p> <ul style="list-style-type: none"> Both closed questions and a semi-structured component (the semi-structured section should cover both complaints and suggestions). The surveys should cover both existing customers (to see what their experiences and suggestions are) and non-customers to find out why they are not participating in the IPTN. Feedback will have to be given in the media or other forum on the outcomes of the surveys and the actions taken. 	<p>Implementation: Commence in month 6 from go live date</p> <p>Frequency: 1 month (every six months)</p>	<ul style="list-style-type: none"> The advantage is that there will be a scientific process to find out where challenges and suggestions are. Cost is the only negative side to this proposal. 	Approximately R600,000-00/annum.
	C	Request bus drivers and IPTN staff to keep up a register that is submitted monthly.	<p>Implementation: 1 month</p> <p>Frequency: Ongoing</p>	<ul style="list-style-type: none"> The advantage is that customers can easily raise issues and suggestions. This option will also not be expensive. The disadvantage is that workers such as bus drivers, etc. do not have the time and freedom to stop what they are doing to do justice to a customer query by recording it. 	<ul style="list-style-type: none"> One hour internal training per staff member, negligible. The customer care centre staff (or another staff member) will have to deal with these registers as they come in. In the case that there is a customer care centre, it can be dealt with by the staff there. If there is no customer care centre, there will be a need to appoint a trained staff member to conduct the training in addition to his/her other work.
	D	Request Ward Councillors to include the IPTN as a standing point on their ward meeting agenda. They should provide information, receive input and give feedback to the attendants at the meeting (and especially persons who raised issues).	<p>Implementation: At go live date</p> <p>Frequency: Ongoing</p>	<ul style="list-style-type: none"> The ward councillor can record complaints, queries and suggestions and can also give messages about the IPTN to the attendants. This will be one of the cheapest ways of gathering information and getting information across. 	<ul style="list-style-type: none"> There will be no additional cost for each meeting. There will be a need for a staff member to respond to the complaints, queries and suggestions. This can be an existing staff member or a new appointment will have to be made according to the relevant MMM level.

Mitigation Methods for Impact 2	Description of Actions		Implementation Timeframe	Advantages and Disadvantages	Preliminary Cost Estimate				
	A	Create a specific procedure within the customer care centre to deal with complaints, queries and suggestions to ensure that the people who communicated receive feedback as well as the wider community (they may have the same issues, but just did not raise them).	Implementation: Before go live date Frequency: Ongoing	<ul style="list-style-type: none"> A procedure is a replicable way to ensure that issues are consistently dealt with. It is not a costly effort, yet effective and can form part of the quality management system of IPTN. 	This will form part of the set-up of the customer care centre.				
	B	Create a specific procedure for ward councillors and IPTN staff members to raise the issues, etc. received with the customer care centre. The customer care centre should, likewise have a procedure to ensure that the answers come back to the person who communicated the issue.	Implementation: Before go live date Frequency: Ongoing	<ul style="list-style-type: none"> A procedure is a replicable way to ensure that issues are consistently dealt with. It is not costly, yet effective and can form part of the quality management system of IPTN. 	This will form part of the set-up of the customer care centre.				
	C	Create a monthly (or so) editorial (for newspapers) or communication slot (radio), and IPTN Newsletter where IPTN issues, etc. are discussed and feedback is provided.	Implementation: At go live date Frequency: Ongoing Newsletter – every three months	<ul style="list-style-type: none"> Making use of existing media (newspapers and radio) will be a targeted way to reach the demographic that needs to be informed about the IPNT and specifically the issues, complaints and suggestions and what the staff is doing to upgrade the system / service. A dedicated newsletter can be used for a number of objectives (e.g. to give feedback to the wider community on some of the issues and suggestions considered, sustainability awareness, safety issues, new expansions, fares, discounts, competitions, etc.) 	<ul style="list-style-type: none"> Agreements can be reached with newspapers and radio stations to speak in their community news sections – which should be free of charge. The newsletter will start with a cost of approximately R115,000-00 for the first run and R110,000-00 per quarter during operation. This cost will expand as the IPTN becomes more popular and more users require a newsletter. 				
Preferred Mitigation	Potential Impact		Preferred Mitigation Method	Reason	Year of Implementation (FY 1-5)				
					1	2	3	4	5

	1	A loss of customers due to complaints and queries that are not dealt with to the customer’s satisfaction.	Method 1A; 1B; and 1D	Together, these methods will provide a clear view from both customers and those who do not use the service (non-customers). 1C is not advised as it will hamper the normal tasks of IPTN staff. They should rather be trained to refer the customer to the correct avenue to raise their issue.			Ongoing
	2	When customers do not receive feedback on suggestions, that alienates them and they feel that the system does not value them and care for them.	All	As above			Ongoing
Monitoring of Impacts	Desired Outcome		Monitoring Method	Frequency	Timeframe	Cost / annum	Responsibility
	1	No customers lost due to complaints and queries that are not dealt with to the customer’s satisfaction.	Follow-up surveys of 10% of those who raised issues, complained or made suggestions (using a quantitative survey)	Quarterly	Ongoing	Included in the salary for the customer care officers or to be done by the customer survey experts mentioned in 1C above.	Manager: Customer Services
	2	Feedback on suggestions and queries so that customers feel important, that they were heard and that appropriate action was taken.	As above	Quarterly for the newsletter. More frequently for the radio and newspapers.	Ongoing	Cost of the newsletter (starting at around R50,000-00 every three months).	Manager: Customer Services
General Comments	NOTE: All prices are approximate values.						

5.4 Priority 1: Universal Access and Affordability

ASPECT / ACTION AREA: UNIVERSAL ACCESS AND AFFORDABILITY				
Justification: Universal Access is a Work Stream on its own, while affordability is part of the work of the Business and Finance Work Stream. These Work Streams are part and parcel of the planning of the entire IPTN at present. For this reason, only additional actions (that will only take place once the IPTN go live) will be mentioned.				
Objective(s): <ul style="list-style-type: none"> Ensure that those who need Universal Access knows about the system and how to use it. Ensure that those who need Universal access has the opportunity to provide input in the continual improvement of the system. Ensure that the IPTN remains affordable. 				
Indicator(s): Records of: <ul style="list-style-type: none"> The number of Universal Access demonstrations held. The number of Universal Access customers who provided input via the Community Participation avenues (customer care centre and surveys). Surveys that specifically request information regarding the affordability of the system. 				
Potential Impact	Potential Impact		Target	Priority
	1	Universal Access customers (physically disabled, blind, deaf, the elderly, children, persons with large parcels or small children, etc.) do not know how to make use of the system.	Universal Access customers are aware of the IPTN and know how to use it.	High
	2	Universal Access customers do not have the opportunity to provide their input into the continual improvement of the system.	Universal Access customers have fora to provide their input and they know where to get assistance / complain if they need to	Medium
	3	The IPTN is not an affordable system and customers do not use the system due to it being too expensive.	An IPTN that is affordable to all potential customers over time.	High
Mitigation Methods for Impact 1 Above	Description of Action		Advantages and Disadvantages	Preliminary Cost Estimate
	A	Implement awareness campaigns such as bring-a-friend initiatives with a focus on those who make use of Universal Access, e.g.: <ul style="list-style-type: none"> School tours. Old age home inhabitants. Schools and institutions for the disabled and the blind. 	Timeframes Implementation Date: Go live Duration / Frequency: Weekly for the first three months. Quarterly thereafter.	According to the Universal Access Work Stream, there are 15 distinct groups of universal access passengers that need to be accommodated in a campaign run. It is estimated that the first round of campaigns would cost R954,000-00, since outside facilitators would be needed. Thereafter, the campaign cost will vary between R72,000-00 and R246,000-00 – depending on the kind of activities planned.

					(An outside guide must be used and train local guides who work for MMM. This would cut costs.)				
	B	Arrange with MMM to sponsor the cost of the ticket prices of Universal Access passengers and allow the care givers of Universal Access passengers to travel for free.	Implementation Date: Go live Duration / Frequency: Ongoing	<ul style="list-style-type: none">This will be an incentive to Universal Access customers to make use of the system.It will have a cost implementation.	The possibility of this proposal needs to be interrogated by the Business and Finance Work Stream. The Environment & Sustainability and Universal Access Work Streams have agreed to work together on a policy to eliminate the possibility of corruption in this system.				
Mitigation Methods for Impact 2 Above	Description of Actions		Timeframes	Advantages & Disadvantages	Preliminary Cost Estimate				
	A	As part of the surveys done by the Customer Care Centre, specific surveys should target Universal Access customers and those who do not yet make use of the system.	Implementation Date: After go live date Duration / Frequency: Ongoing, twice per year.	As stipulated in the Community Participation table.	Will form part of the surveys proposed in the Community Participation table and therefore will not have additional cost.				
Mitigation Methods for Impact 3 Above	Description of Actions		Timeframes	Advantages & Disadvantages	Preliminary Cost Estimate				
	A	As part of the surveys done by the Customer Care Centre, specific surveys should include questions regarding affordability. These questions should be asked to both customers and those who do not yet make use of the system.	Implementation Date: After go live date Duration / Frequency: Ongoing, twice per year.	As stipulated in the Community Participation table.	Will form part of the surveys proposed in the Community Participation table and therefore will not have additional cost.				
Preferred Mitigation	Potential Impact		Preferred Mitigation Method	Reasons	Year of Implementation (FY 1-5)				
	1	Universal Access customers (physically disabled, blind, deaf, the elderly, children, persons with large parcels or small children, etc.) do not know how to make use of the system.	All	Universal Access customers are limited in their transportation options and their participation should be actively encouraged.	1	2	3	4	5
						Ongoing			

				Universal Access customers are often not well-paid, unemployed or on pension and therefore need a discount to make the system more affordable to them.			
	2	Universal Access customers do not have the opportunity to provide their input into the continual improvement of the system.	All	Universal Access customers have very specific needs and will have a particular point of view that other customers or MMM staff may not be aware of.		Ongoing	
	3	The IPTN is not an affordable system and customers do not use the system due to it being too expensive.	All	If the system is not affordable, it will simply not last.		Ongoing	
Monitoring of Impacts	Desired Outcome		Monitoring Methods	Frequency	Timeframe	Cost / annum	Responsibility
	1	Universal Access customers are aware of the IPTN and know how to use it.	Number of campaigns held and feedback from these campaigns		Ongoing	R20,000-00	Manager: Customer Care
	2	Universal Access customers have fora to provide their input and they know where to get assistance / complain when they need to.	Results from surveys	Every six months	Ongoing	Included in surveys	Manager: Customer Care
	3	An IPTN that is affordable to all potential customers.	Results from surveys	Every six months	Ongoing	Included in surveys	Manager: Customer Care
General Comments	NOTE: All prices are approximate values.						

5.5 Priority 2: Water Management

ASPECT / ACTION AREA: WATER MANAGEMENT	
Justification: Water is becoming a scarce resource globally and it is often a crisis for South Africa as a whole. Increased or decreased rainfall conditions will affect the amount of water available for drinking. Bloemfontein is situated in an area that generally receives low rainfall area and is one of the cities to experience hard conditions in dry seasons.	
Objectives: <ul style="list-style-type: none"> Reduce water consumption for the IPTN Bus operations. Increase water efficiency at bus depots and stations. 	

Indicators: <ul style="list-style-type: none"> • Measure water usage for all bus stations and depots. • Measure the water usage for all landscapes along the bus routes and at the bus depots. • Measure water usage the IPTN head offices. • Measure water usage at ablution facilities. • Measure water usage at the intermodal facility. 				
Potential Impact	Potential Impact	Target		Priority
	1 Inefficient use of water will add to the burden on the availability of surface water and drinking water from reservoirs. It will also increase the water bill for the IPTN.	<ul style="list-style-type: none"> • Establish current volumes of water used. • Reduce water usage by 20% in the first year of operations. 		High
Mitigation Methods for Impact 1	Description of Actions	Implementation Timeframe	Advantages & Disadvantages	Preliminary Cost Estimate
	A Implement efficient washing bays and provide storm water drainage for the washing bays.	Implementation Date: Prior to the go live date Duration / Frequency: Once off Location: Bus Depot	<ul style="list-style-type: none"> • Efficient washing bays will ensure water is not abused and is used efficiently. 	Construction cost will be included in the bill of quantities for the depot site. Install oil traps and use biodegradable soap.
	B Implement water harvesting and reuse tanks. Downspouts from roof runoff can be directed into a vessel specially designed to capture and temporary store rainwater for various uses, including greywater reuse and landscape irrigation. Water landscape late afternoon when the sun is not too hot.	Implementation Date: Go live Duration / Frequency: Once off Location: Bus Stations and Bus depot	<ul style="list-style-type: none"> • The use of harvested water will result in less use in municipal water and therefore decreasing the water bill. • Substantial savings in water consumption will be observed 	Cost of a harvesting tank (Reinforced Concrete, Cement or metal) 500l is R1,457-00.
	C Ensure there is no tap and toilet leakage at facilities. Maintain broken taps and leaking toilets frequently.	Implementation Date: At go live	<ul style="list-style-type: none"> • Maintaining leaking taps and toilets will decrease the water bill. 	<ul style="list-style-type: none"> • A plumber is between R360-00 to R680-00 per hour.

		Employ a plumber to both do inspections and fix broken taps and toilets.	Duration / Frequency: Monthly inspections Location: Bus station and bus depot						
	D	Make use of Eco Wash for washing buses. It saves water by using a minimal 300ml of liquid instead of 250 litres used in conventional car washes.	Implementation Date: At go live Duration / Frequency: Once off Location: Bus Depot	<ul style="list-style-type: none">The use of the ECO Wash machines will save water	<ul style="list-style-type: none">The price of an Eco Wash is confirmed when ordering the unit.				
Preferred Mitigation	Potential Impact		Preferred Mitigation Method	Reasons	Year of Implementation (FY 1-5)				
	1	Inefficient use of water will add to the burden on the availability of surface water and drinking water from reservoirs. It will also increase the water bill for the IPTN.	All	The implementation of these methods is practical and realistic. Together these methods will ensure the reduction of water consumption for this IPTN project.	1	2	3	4	5
Monitoring of Impacts	Target to be Measured		Monitoring Method	Frequency	Timeframe	Cost / annum		Responsibility	
	1	Efficient use of water will conserve MMM’s available water and reduce the water bill.	Monthly water consumption audits to measure the reduction of water use that was saved.	Monthly	Ongoing	Appoint a sustainability auditor with annual salary commensurate with the relevant MMM level.		Sustainability Auditor	
General Comments	NOTE: All prices are approximate values.								

5.6 Priority 2: Waste Management

ASPECT / ACTION AREA: WASTE MANAGEMENT				
Justification: Improper management of waste has emerged as an important threat to the environment and public health. As a result, there is a need to find ways to mitigate the potential impacts that result from improper waste management.				
Objective(s): <ul style="list-style-type: none"> Reduce the amount of waste by 20% by 2020 				
Indicator(s): Records of: <ul style="list-style-type: none"> Waste management savings per annum. 				
Potential Impact	Potential Impact	Target		Priority
	1	Potential land pollution (tyres and bus batteries).	Eliminate from go-live date.	High
	2	The amount of general solid waste to landfill.	Reduce the amount of waste to landfill by 10% by 2020.	Medium
Mitigation Methods for Impact 1 Above	Description of Actions		Advantages & Disadvantages	Preliminary Cost Estimate
	A	Return old batteries to the manufacturer for reclamation.	Implementation Date: As soon as batteries become faulty Duration / Frequency: Ongoing	<ul style="list-style-type: none"> The lead, battery plastic and acid can be made again into new batteries. Depends on the manufacturer's prices.
	B	Recycle used tyres by recapping tyres in good condition to be reused.	Implementation Date: As soon as tyres become worn Duration / Frequency: Ongoing	<ul style="list-style-type: none"> Prevents waste rubber from polluting the environment. Some recycling alternatives used for tyres require no extensive processing while other alternatives require that tyres be split, punched, or shredded to make new products. This processes can lead to a strong deterioration of the desired physical properties of the rubber. http://www.calrecycle.ca.gov

	Description of Actions		Timeframes	Advantages & Disadvantages	Preliminary Cost Estimate
	A				
Mitigation Methods for Impact 2 Above		Proper management of general waste by recycling.	Implementation Date: Planning phase Duration / Frequency: On-going	<ul style="list-style-type: none"> Besides paper recycling, there are no reliable recyclers for glass, aluminium and plastic that could be found within the Free State Province. Environmental benefits – recycling waste means less disposal to landfill and less overall harm to the environment. Managing and handling waste is costly and reducing the amount of waste sent directly to landfill can bring large savings on landfill tax. Producing some recycled products e.g. aluminium uses far less energy than direct manufacturing from raw materials. Collection and sorting of waste materials for recycling requires space. Plastic containers in food waste or different materials in glass waste can affect the quality of the recycling collections, which can increase treatment costs; it takes time and effort to eliminate contamination. 	

Preferred Mitigation	Potential Impact		Preferred Mitigation Method	Reason		Year of Implementation (FY 1-5)				
						1	2	3	4	5
	1	Return old batteries to the manufacturer for reclamation and recycle used tyres by recapping tyres in good conditions to be reused.	Method 1A and B	Reduces land pollution.						
	2	Recycle general waste.	Method 2A (just for paper at present)	Has many environmental benefits.						
Monitoring of Impacts	Desired Outcome		Mitigation Methods	Frequency	Timeframe	Cost / annum		Responsibility		
	1	Reduced land pollution.	Monitor the amount of batteries and tyres taken in for recycling.	Ongoing	Once per annum			Environmental manager		
	2	Reduced waste to landfill.	Monitor the amount of waste taken in for recycling.	Ongoing	Once per month			Environmental manager		
General Comments	NOTE: All prices are approximate values.									

5.7 Priority 2: Carbon Emissions

ASPECT / ACTION AREA: CARBON EMISSIONS					
Justification: Climate change has emerged as an important threat to economic development, the environment and public health. As a result, there is a need to find ways to mitigate the impact of climate change that is linked to carbon emissions.					
Objective(s): Reduce the amount of carbon emissions by 24% by 2020.					
Indicator(s): Records of: <ul style="list-style-type: none">Audited records of carbon emissions per annum.Audited savings on carbon tax.					
Potential Impact	Potential Impact		Target	Priority	
	1	Potential deterioration of the air quality due to increased carbon emissions.	Reduce the amount of carbon emissions by 24% by 2020	High	
Mitigation Methods for Impact 1 Above	Description of Action		Timeframes	Advantages and Disadvantages	Preliminary Cost Estimate
	Type of bus based on fuel type/ source				
	A	Implement diesel-hybrid buses. These buses use electricity and diesel fuel and have a regenerative braking	Implementation Date: Planning phase	<ul style="list-style-type: none">Currently, both hybrid-diesel (60%) and electric buses (100%) more costly than normal diesel buses. However, it only provides an energy saving	Not Applicable

	system that recharges the batteries and increases brake life.	Duration / Frequency: Every time a new bus is procured	<p>of 15% (for hybrid-diesel) and 40% (for electric) buses. The lifespan of these buses are between 10 and 12 years and the batteries need to be replaced once during the lifetime of the bus. A battery for a hybrid-diesel bus is 15% of the price of the bus and the battery for an electric bus is 50% of the acquisition cost. For these reasons, both hybrid-diesel and electric buses need to be subsidised. (Approximately \$100-\$250 per ton of CO₂ saving for a hybrid-diesel bus and \$750 for an electric bus.) Despite the potential benefits, these facts seem to make both the hybrid-diesel and electric buses irrelevant for use by MMM. (Source: http://blogs.worldbank.org/transport/are-hybrid-and-electric-buses-viable-just-yet)</p> <ul style="list-style-type: none"> • Environmentally friendly and have twin powered engine (gasoline engine and electric motor), this will cut fuel consumption and conserve energy. • Hybrid buses are estimated to cut emissions by as much as 75 percent when compared to conventional diesel buses and have demonstrated lower carbon emissions than those of a conventional diesel/petrol bus as a result of improved fuel economy (Federal Transit Administration, 2003). • Can be expensive and has high maintenance costs due to the dual engine, continuous improvement in technology, and higher maintenance cost can make it difficult for mechanics to repair the bus. It is also difficult to find a mechanic with such expertise. http://www.biofuel-cities.eu/fileadmin/template/projects/biofuels/files/Publications/Biofuel_cities2.pdf • In South Africa, the country's dependence on fossil fuel power stations might just externalise the impact to other areas within the country where these power stations are and not solve the overall problem. 	
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			<ul style="list-style-type: none">Until the Beta – Harvard – Merapi 400kV Transmission line is constructed, it is doubtful if the Free State will have the amount of additional electricity that this system would need. Electricity prices are highly volatile and have been climbing steadily. This option will become progressively more expensive.	
B	Use buses that are powered by biodiesel.	Implementation Date: Planning phase Duration / Frequency: Every time a new bus is procured	<ul style="list-style-type: none">Not readily available in the Free State Province.Can greatly reduce carbon emissions and is less toxic.Easily biodegradable.Requires new/upgraded pumps.Mainly produced from edible oil, which could cause shortages of food supply and increased prices. http://tf.llu.lv/conference/proceedings2014/Papers/36_Viesturs_D.pdf	Not Applicable
C	Implement buses powered by Compressed Natural Gas (CNG).	Implementation Date: Planning phase Duration / Frequency: Every time a new bus is procured	<ul style="list-style-type: none">Natural gas costs are lower than gasoline. On average, natural gas costs one-third less than gasoline at the pump.Historically, natural gas prices have exhibited significant price stability compared to the prices of petroleum-based fuels. This stability makes it easier to plan accurately for long-term costs.Natural Gas Vehicles have lower emissions and maintenance costs, because the natural gas burns cleanly and results in less wear and tear on the engine and extends the time between tune-ups and oil changes. http://auto.howstuffworks.com/fuel-efficiency/alternative-fuels/ngv4.htm Natural gas is convenient and abundant. A well-established natural gas company exists in Virginia, Free State Province and some of the Megabus fleets in the Province are already powered by compressed natural gas.	<ul style="list-style-type: none">Price for a litre of CNG is R9-20.Training for staff = R10,000-00.
D	Make use of diesel buses.	Implementation Date: Planning phase	<ul style="list-style-type: none">Fuel efficiency is high.Requires frequent maintenance.	<ul style="list-style-type: none">Cost for a litre of diesel is R11-50.

			Duration / Frequency: Every time a new bus is procured	<ul style="list-style-type: none">Has high Carbon emissions.It is not difficult to find a mechanic with such expertise.					
	E	Make use of electric buses	Implementation Date: Planning phase Duration / Frequency: Every time a new bus is procured	<ul style="list-style-type: none">Use of cleaner electric energy.Can greatly reduce Carbon emissions.Has quiet operation.Possible need for public recharging infrastructure.Can be expensive and has high maintenance costs.Requires continuous improvement in battery technology.Electricity load shedding is a huge challenge in South Africa.Higher maintenance cost can make it difficult for mechanics to repair the bus. It is also difficult to find a mechanic with such expertise.	Not Applicable (please see “A” above).				
Preferred Mitigation	Potential Impact		Preferred Mitigation Method	Reason	Year of Implementation (FY 1-5)				
					1	2	3	4	5
	1	Implement buses powered by Compressed Natural Gases (CNG).	Method 1C AND/OR	<ul style="list-style-type: none">The Natural Gas Vehicle has many advantages and benefits over the other types of vehicles such as lower emissions and maintenance costs.					
	2	Make use of the diesel buses	Method 1D	<ul style="list-style-type: none">There are numerous trusted suppliers.Although it requires frequent maintenance, it is not difficult to find a mechanic with expertise.					
Monitoring of Impacts	Desired Outcome		Monitoring Method	Frequency	Timeframe	Cost / annum		Responsibility	
	1	Improve the air quality by reducing the emissions of carbon.	Monitor the exhaust gas or fuel gas that is emitted as a result of the combustion of fuels such as natural gas, gasoline, petrol, diesel fuel and ensure the emissions are within the Emissions Standards of South Africa.	Ongoing	Once per annum			Fleet Manager	
Comments	NOTE: All prices are approximate values.								

5.8 Local Procurement and Supply Chain Management

ASPECT / ACTION AREA: LOCAL PROCUREMENT AND SUPPLY CHAIN MANAGEMENT					
Justification: Local procurement and supply chain management are already addressed within MMM’s structures. As a responsible organ of state, it is imperative that MMM focuses on ensuring that (as far as practicable) local companies and individuals get to benefit from the employment and services that the IPTN project will generate. Likewise, it is important to ensure that Broad-Based Black Economic Empowerment (B-BBEE) remains in firm focus. Finally, procuring the most sustainable (looking holistically at environment, social aspects, and the economy) is crucial. Note that supply chain management also encompasses recycling, etc. of old products.					
Objectives: <ul style="list-style-type: none">• Ensure the appointment of maximum local individuals and companies during planning, execution and operation – according to the MMM procurement policies.• Ensure that MMM’s B-BBEE quotas are adhered to.• Focus on procuring the most sustainable solution possible.• Investigate the possibility of reuse, recycling, etc.					
Indicators: <ul style="list-style-type: none">• Advertise opportunities for individuals and companies locally, before advertising nationally.• Compliance with MMM’s B-BBEE quotas.• Include sections regarding sustainability in tenders / bids and allocate points towards the sustainable execution of contracts (e.g. using more sustainable products during construction, etc.).• Investigate the potential reuse, repurposing, and recycling of used products (e.g. tyres).					
Potential Impact	Potential Impact		Target	Priority	
	1	Individuals and companies from inside the metropolitan area will not be given preference for providing products and services.	<ul style="list-style-type: none">• Comply with and improve on current targets for local procurement.	High	
	2	Companies with a good B-BBEE standing and previously disadvantaged individuals will not benefit from the employment equity legislation.	<ul style="list-style-type: none">• Comply with and improve on current targets for B-BBEE.		
	3	Service and product providers will not be encouraged to look for the most sustainable option if this does not form part of tender requirements and MMM will not reap the benefits of having the most practicable sustainable option.	<ul style="list-style-type: none">• There is a sustainability component to all tenders /bids from MMM. There will be points allocated to the sustainability aspect so that being more sustainable will influence the decision as to which service / product provider will be appointed.		
	4	More solid waste will be generated (resulting from used products) and MMM will forfeit the potential cost savings of reducing, reusing, repurposing or recycling products and materials.	<ul style="list-style-type: none">• Actively look for opportunities to reduce, reuse, repurpose, and recycle products and material that MMM cannot use for its original purpose anymore.		
Mitigation Methods for Impact 1	Description of Actions		Implementation Timeframe	Advantages & Disadvantages	Preliminary Cost Estimate
	A	The MMM procurement department should regularly review their strategies for ensuring local procurement for IPTN appointments.	Implementation Date: Prior to the go live date and ongoing	<ul style="list-style-type: none">• Ensuring the use of local labour / products / services will strengthen the local economy and will bring	There will be no additional cost.

		The MMM procurement department may consider advertising locally prior to advertising nationally for individuals, products and services.	Duration / Frequency: Ongoing	political stability into the metropolitan area.	
Mitigation Methods for Impact 2	Description of Actions		Implementation Timeframe	Advantages & Disadvantages	Preliminary Cost Estimate
	A	<p>The MMM procurement department should regularly review their strategies for ensuring attracting the right B-BBEE companies and previously disadvantaged individuals for IPTN appointments.</p> <p>The MMM procurement department may consider advertising the demographics of where opportunities are advertised to ensure the attraction of the right demographics for IPTN appointments.</p>	<p>Implementation Date: Prior to the go live date and ongoing</p> <p>Duration / Frequency: Ongoing</p>	<ul style="list-style-type: none"> Ensuring the appointment of companies with a good B-BBEE rating and individuals from previously disadvantaged backgrounds will serve to build a more equal economic environment. 	There will be no additional cost.
Mitigation Methods for Impact 3	Description of Actions		Implementation Timeframe	Advantages & Disadvantages	Preliminary Cost Estimate
	A	Ensure that all MMM bids and tenders that has to do with the IPTN have a specific section on ensuring sustainability. This section must be linked to the points that a company receives, otherwise the incentive will not be strong enough for a company to look for sustainable alternatives.	<p>Implementation Date: Prior to the go live date and ongoing</p> <p>Duration / Frequency: Ongoing</p>	<ul style="list-style-type: none"> The advantage will be that MMM will be able to benefit from more sustainable solutions. The only disadvantage is that (as a once off) the points system for tenders are redesigned to include sustainability aspects. 	There will be no additional cost.
Mitigation Methods for Impact 4	Description of Actions		Implementation Timeframe	Advantages & Disadvantages	Preliminary Cost Estimate
	A	The MMM supply chain management department should task departments with investigating how they may reduce the use of products, reuse, repurpose or recycle where ever possible even before the IPTN commences.	<p>Implementation Date: Prior to the go live date and ongoing</p> <p>Duration / Frequency: Ongoing</p>	<ul style="list-style-type: none"> Focusing on reduce, reuse, repurpose and recycle will result in significant cost savings for MMM IPTN in the long run. 	There will be no additional cost, besides research by some of the staff members.

Preferred Mitigation	Potential Impact		Preferred Mitigation Method	Reasons		Year of Implementation (FY 1-5)				
						1	2	3	4	5
	1	Individuals and companies from inside the metropolitan area will not be given preference for providing products and services.	1A	The implementation of this suggestion is practical and realistic and can be achieved.			Ongoing			
	2	Companies with a good B-BBEE standing and previously disadvantaged individuals will not benefit from the employment equity legislation.	2A	The implementation of this suggestion is practical and realistic and can be achieved.			Ongoing			
	3	Service and product providers will not be encouraged to look for the most sustainable option if this does not form part of tender requirements and MMM will not reap the benefits of having the most practicable sustainable option.	3A	The implementation of this suggestion is practical and realistic and can be achieved.			Ongoing			
	4	More solid waste will be generated (resulting from used products) and MMM will forfeit the potential cost savings of reducing, reusing, repurposing or recycling products and materials.	4A	The implementation of this suggestion is practical and realistic and can be achieved.			Ongoing			
Monitoring of Impacts	Target to be Measured		Monitoring Method	Frequency	Timeframe	Cost / annum		Responsibility		
	1	Local individuals and companies received preferential treatment in terms of tenders and jobs.	Annual reports that show a comparison between local and external appointments	Annual	Ongoing	No additional cost		Director: Procurement		
	2	Suitable companies with a good B-BBEE standing receive preferential procurement.	Annual reports that show the number of B-BBEE and previously disadvantaged appointments in relation to all appointments.	Annual	Ongoing	No additional cost		Director: Procurement		
	3	* Analysis of tenders show that potential service / product providers sought sustainable solutions.	Annual analysis of tenders	Annual	Ongoing	No additional cost		Director: Procurement		
	4	Products are used sustainably (reduced, reused, repurposed, and recycled) as far as possible.	Six-monthly analysis of products / materials	Every six months	Ongoing	Time from an existing employee		Heads of Departments in the IPTN project		

General Comments	<p>NOTE 1: All prices are approximate values.</p> <p>* NOTE 2: During discussions with the MMM Work Stream Leader for Environment and Sustainability it has become clear that changes to the standard Tender Documentation will not be possible. Despite this, this Work Stream has chosen to keep the recommendation, since it is believed to be crucial.</p>
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6. COORDINATION OF THE SUSTAINABILITY ACTION PLAN

Coordination to ensure effective implementation and monitoring of the desired outcomes is an integral part of this Sustainability Action Plan. This chapter identifies who would be responsible for implementing and monitoring the various actions set out in Chapter 5. Over and above implementation and monitoring, it is also important to ensure that legal requirements are followed and updated as and when relevant laws are promulgated and/or updated, e.g. Carbon Tax Law. In addition, timely reports must be prepared and served to the relevant persons / committee within the Municipality that is in a position to make decisions and change policy or make improvements as and when required.

6.1 Functions within the Environment and Sustainability Coordination Portfolio

The portfolio of coordinating the Environment and Sustainability function will entail the following:

- **Implementation of mitigation measures** as set out in this Sustainability Action Plan.
- **Adequate monitoring** of outcomes post implementation.
- **Continual improvement** of the Sustainability Action Plan.
- **Maintaining of the Environment and Sustainability** legal register.
- **Reporting** on issues pertaining to Environment and Sustainability (including sustainability reporting that must form part of the IPTN Annual Report).

6.2 Need for a Coordinated Approach

The IPTN is a massive undertaking with many activities that must work together to ensure the proper operation of the system as a whole. Sustainability considerations are cross-cutting and the staff working on sustainability will have to work closely with a number of other departments to ensure that they both maintain the IPTN as a sustainable operation and also improve on the sustainability of the system over time. This implies that the coordinator will have to rely on a number of managers / staff members outside of his/her department to assist with the implementation, monitoring and improvement of the sustainability system. This will necessitate a coordination committee that meets at regular intervals to discuss matters pertaining to implementation, monitoring and continual improvement. *For this reason, the relevant person should have a suitable position in order to avoid so conflicts in terms of priorities or seniority / hierarchy within the organisation.*

6.3 Complexities Related to the Coordination Function

The complexity of this portfolio is as a result of:

- The vastness of the areas covered by the concepts of environment and sustainability (which includes both the bio-physical as well as the human-social environments).
- The fact that this member of staff will have to work closely with the following persons in a collaborative manner:
 - Senior staff members in various departments.
 - Junior staff members in various departments.
 - Consultants that may have been appointed by other departments.
- The fact that it might be necessary for this person to do some of the monitoring him/herself.

- The fact that this person will need:
 - A working knowledge of both environmental and sustainability laws.
 - Knowledge of sustainability issues.
 - Research capability.
 - The ability to make and defend recommendations to the executive of MMM.

6.4 Recommendation

For the reasons outlined above, **it is recommended that this task be shared between a more senior and a less senior person** – possibly called a sustainability officer and a sustainability manager.

From a meeting held with Messrs. Vivian Minnaar and Samantha Haddad of the Environmental Management Department on Thursday 16 March 2017, it transpired that it is not currently clear if there would have to be a new appointment(s) or if the work can be given to an existing member(s) of staff. Due to the fact that there is a wider need for sustainability management within MMM, it might be appropriate to appoint two new persons (as suggested above) that can deal with more than just sustainability on the IPTN. (More clarity regarding these appointments and where the appointments will sit within the MMM will become apparent as the planning unfolds.)

7. CONCLUSION

Climate Change is a global reality which is widely accepted today. Some of its impacts are unavoidable and some cannot be adequately mitigated. MMM alone will not be able to address the complexities of climate change through implementation of even the most sustainable initiatives without the assistance of the sectorial industries that contribute to the high levels of GHG emissions. However, everyone should play their part in this global challenge. This Action Plan seeks to contribute in an effective way to meeting the challenge.

The actions proposed in this action plan will aid to improve the transport system in MMM not only from the environmental point of view, but also socially and economically. The actions proposed aim to improve the operations of the transport system by ensuring that they run effectively and efficiently. The mitigation measures that were proposed have been carefully considered with inputs from various technical experts in multidisciplinary teams and are deemed to be suitable to the MMM context.

Over time and through the monitoring programme proposed, improvements are anticipated even if only due to technological progress and/or operational requirements. To aid with the effective implementation, a robust Education and Awareness programme for the operation staff as well as the broader community is needed. Community engagement for this project will give the opportunity for commuters to experience a level of ownership and take pride in a transport infrastructure that is efficient and effective.

The implementation of Section 5 will aid with adhering to the principles proposed in Section 4, i.e. climate change adaptation, mitigation and awareness raising. The commitment outlined in the mission would therefore become more achievable. MMM is commended for giving due consideration to sustainable development in implementing the IPTN. MMM is encouraged to get its Climate Change Strategy approved and adopted by Council as this would support of the proposals made in this Action Plan. MMM must be seen to have the political will to implement a climate change response strategy within all its operations and to have supporting policies that have been signed-off by the leadership of local government in MMM.

Given that climate change is a dynamic field, MMM is encouraged keep abreast of changes and newly released literature in order to make its strategy relevant and suitable for the project. MMM can continue to use the National Climate Change Response Plan (NCCRP) and this Framework to ensure that the IPTN meets its objectives and is operated in a sustainable manner.

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MM Annexure MM: Economic Impact

2015-2036

MMM – City Wide Integrated Public Transport Plan



Annexure MM



INTEGRATED
PUBLIC
TRANSPORT
NETWORK

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MM IPTN DRAFT AFFORDABILITY ASSESSMENT REPORT

MM.1 INTRODUCTION

The rates paid for public transport and the impact it has on the households disposable income has been a contentious point of discussion for many years. It is a known fact that poorer household’s find it more difficult to pay for transport than those on the other end of the spectrum. Transport costs is not applied at a sliding scale which is proportionate to the household’s income. Transport cost is applied at a fixed rate as the application of a sliding scale cost will be very difficult and costly to enforce and monitor. A further factor which aggravates the imbalance between those who can afford transport and those that can’t. The longer the travel distance the higher the transport cost, especially for those who cannot afford it.

Nowhere is it more evident than in Mangaung where the jurisdictional area consists of Bloemfontein, Thaba Nchu and Botshabelo where the latter two areas are 70km from Bloemfontein CBD. The objective of this section of the report is to investigate the affordability of the first two phases of the IPTN of Mangaung.

MM.2 BACKGROUND

Understanding transport affordability and what can be considered as affordability, it is necessary to consider the definition of affordability. According to Todd Litman (2017) Transportation affordability refers to the financial burden households bear in purchasing transportation services, particularly those required to access basic goods and activities (healthcare, shopping, school, work and social activities).

“Affordability” is described by the World Bank (2005) as the extent to which the financial cost of journeys put an individual or household in the position of having to make sacrifices to travel or the extent to which they can afford to travel when they want to.

Furthermore, according to Krynauw M and Cameron B, Moving South Africa “The Action Agenda”, (MSA, 1998) sets out the NDOT’s strategic vision for transport in the horizon year 2020 and thus took the strategic targets of the White Paper further and suggested strategies which could be used to achieve them. One of these strategies were to limit walking distance to 500m to get to the nearest PT system and the other to limit the spending of transport costs to 10% of the households income.

According to the MSA (1998), transport is considered affordable if households spend less than 10% of their household income on transport. This criteria will guide this assessment in order to determine the levels of affordability of PT within the Mangaung IPTN area.

MM.3 METHODOLOGY

Recent research conducted by Stats SA indicated that two thirds of the poorest income earners in SA spend more than 20% of their annual income on transport. This investigation thus aims to investigate the annual amounts which commuters in Mangaung spend on transport costs. Secondly, this investigation will utilise this information obtained to determine the levels of affordability for the proposed IPTN planned for Mangaung.

MM.3.1 National Statistics

The National Household Travel Survey (NHTS, 2013) draws a comparison between the most important factors influencing a household’s mode of choice between the NHTS conducted between 2003 and 2013. In the Free State during 2003 the first priority for mode of choice was “safety from accidents” and with the 2013 NHTS commuters identified “cost of travel” as their first priority.

The NHTS (2013) further found that the preferred transport mode in the Free State was Taxis at 44,8% and walking second at 24,4%, with bus transport at a low 5,8%. An overview of the public transport use during the preceding months of the surveys for the Free State are provided in Table 1 below.

Table 1: Public Transport Use by Households in preceding month of Surveys (2003 and 2013)

Location	Mode of Transport					
	Taxi		Buses		Trains	
	2003	2013	2003	2013	2003	2013
Free State	60,7	68,6	9,9	14,4	1,0	1,8
Increase	+13,01%		+45,45%		+80%	

Source: Stats SA National Household Travel Survey (2013)

The table above indicate substantial increases in all modes of transport within the Free State. Taxi as a preferred mode of transport increased with an average of 1,3% per annum whilst bus transport increased with an average of 4,5% per annum over a period of 10 years.

Important to note is that the NHTS (2013) indicate that households spend substantial amounts of their household income on Transport. Table 2 below provides a summary of the monthly transport costs paid per household for the main modes as well as the mean monthly transport costs for the Free State.

Table 2: Monthly cost of transport per main mode

Location	Percent of Province (%)					
	Taxi			Bus		
	R1 R100	– R101 R200	R200+	R1 R100	– R101 R200	R200+
Free State (population)	5,4%	13,5	81,1	4,7%	8,4	86,9
Mean monthly Rand paid for Transport	R 364-00 (R 487-11)*			R 467-00 (R 624,95)*		

Source: Stats SA National Household Travel Survey (2013)

Note: *monthly escalated transport cost to 2018 at 6% escalation rate

The table above that the majority of the commuter population pay more than R 200-00 for transport per month. This is clear from the 81,1% and 86,9% of the commuters that pay more than R 200-00 per month to make use of taxis and buses respectively. Using the aforementioned mean monthly transport costs, a Free State household could spend between R 4 368-00 and R 5 604-00 per annum on transport costs for taxi and bus transport respectively.

These costs can be substantially higher in 2018 should an annual growth rate of 6% be applied to the mean annual transport costs of 2013. The annual escalated transport costs in 2018 would thus be R 5 845,37 for taxi and R 7 499,42 for bus transport in the Free State.

Using these figures as a benchmark, a household using either modes of transport should thus generate an annual household income of between R 59 000 and R 75 000, should the 10% of household income be considered as a benchmark rate of affordability.

MM.3.2 Mangaung Statistics

The National Household Travel Survey (2013) provides an indication of the macro transport perspective for the Free State and thus reflects the high level transport statistics of the Free State. A Mangaung Household Travel Survey (MHTS) was conducted during 2017 in the Mangaung Municipal area in order to inform commuter behaviour, demand and mode choice for purposes of defining the route phasing, the business model and to set cost effective fare structures for the IPTN. This information was further used to define the number-off and service types of existing PT service providers which will be affected by the implementation of the IPTN system.

The sample size of the HTS was however limited to 2 502 households due to the cost involved to conduct surveys as well as project timeline constraints. The results obtained from the MHTS only represents 1% of the Mangaung population and cannot thus be seen as a representative sample of the entire Mangaung Metropolitan area. It however provides the Municipality with a fair indication of commuter behaviour and preferences relating to modal choice, fares paid and its affordability relating to household income.

The results of the MHTS will however be augmented with the results obtained from a Socio-economic survey which is currently being conducted within the Mangaung Municipal area. The availability of the results from the Socio-economic survey will however not be available for use in this investigation. The results from the Socio-economic study could typically contribute to the quality of household information in relation to:

- household spending on transport,
- modal preference,
- number of times travelled per week,
- reason for travel,
- etc.

Specific information in the MHTS highlighting the perception of affordability of Public Transport by households in Mangaung. This information is utilised to assess affordability but with much sensitivity as the level of confidence (accuracy) of the survey results are not representative of the entire Mangaung population. Table 3 indicates the main mode of transport used by the commuting population of Mangaung.

Table 3: Main mode of transport – (All trips)

Reporting Zone	Percentage of all trips						
	Bus	Taxi	Company transport	Lift Club	Car	Walk all the way	Other
Central	5.6%	21.5%		0.6%	29.0%	42.1%	1.2%
Oranjesig	1.0%	7.5%		1.8%	73.6%	16.1%	
Mangaung	6.8%	54.7%	0.7%	4.3%	14.1%	18.6%	0.7%
Airport/Estoire	9.8%	19.2%	2.3%	1.8%	64.0%	2.5%	0.3%
Naval Hill/Bayswater	1.7%	13.9%	1.4%	2.6%	54.9%	25.0%	0.5%
Tempe/Dan Pienaar	6.3%	5.7%	1.5%	0.9%	78.0%	7.0%	0.6%
Langenhoven Park/Woodlands	12.7%	8.7%	0.5%	1.5%	71.1%	3.9%	1.6%
Universitas	3.6%	18.4%	0.2%		50.4%	26.6%	0.7%
Pellissier/Fichardt-Ehrlich Park	3.5%	8.9%	0.8%	2.0%	71.9%	10.8%	2.1%
Thaba Nchu	14.7%	60.0%	0.4%	3.7%	8.0%	12.8%	0.3%
Botshabelo	19.1%	35.9%	1.9%	1.6%	9.0%	31.6%	0.9%
N-E Rural	1.2%	23.0%	3.6%	3.6%	37.4%	30.1%	1.0%
N-W Rural	7.2%	29.1%	2.7%	0.8%	26.7%	33.5%	
S-W Rural	2.5%	22.2%	0.6%	4.2%	52.4%	17.0%	1.1%
S-E Rural	9.0%	28.3%		1.7%	39.5%	18.0%	3.5%
Naledi	5.9%	19.3%	0.6%	0.8%	17.7%	52.4%	3.3%
Mangaung Municipality	10.1%	39.6%	1.1%	2.8%	22.8%	22.6%	0.9%

Source: Mangaung Household Travel Survey (2017)

It can be deduced from the above table that some residential areas within Mangaung prefer using bus transport rather than taxis, especially where both service types are on offer. Taxi transport is however according to the table above the preferred choice of transport in the majority of areas within Mangaung, Thaba Nchu and Botshabelo.

Commuters staying in areas closer to Bloemfontein’s CBD predominantly make use of Taxi transport to get to their place of work, education or leisure. Table 4 indicates the percentage work trips undertaken for the specific reporting zones in Mangaung.

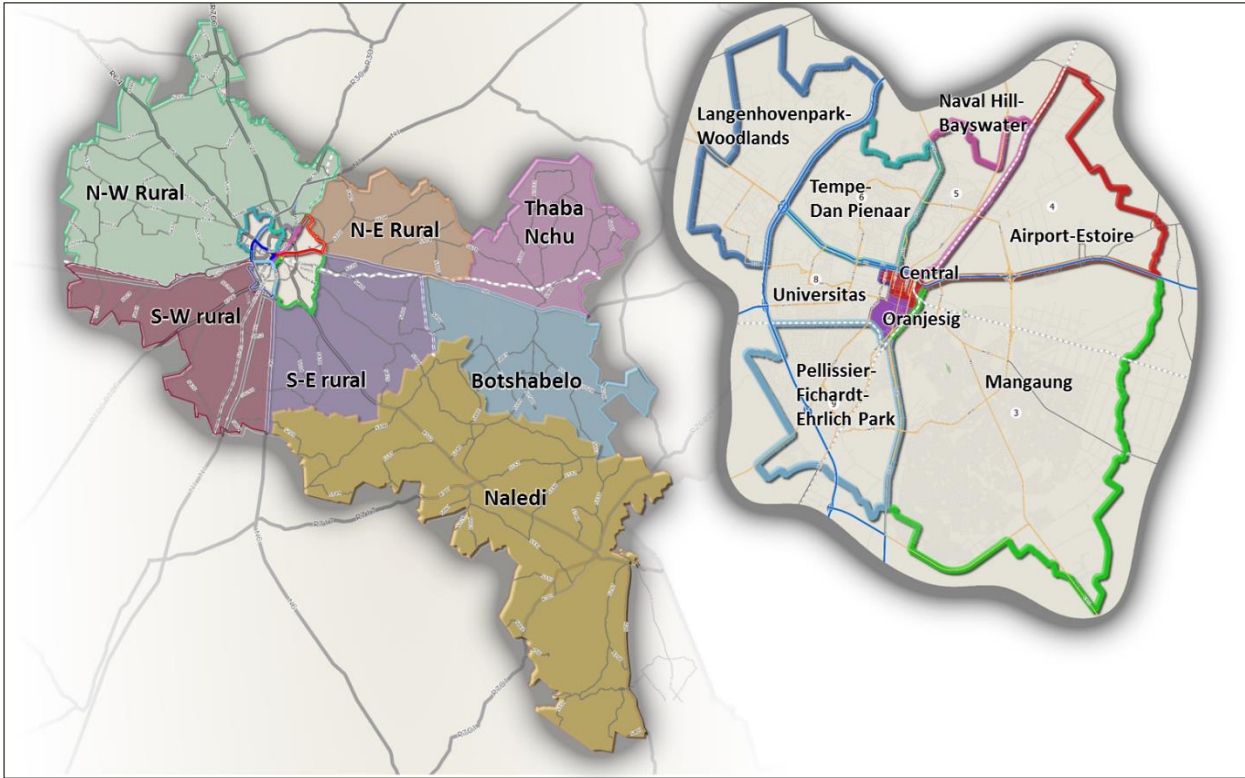
Table 4: Main mode of work trips according to Reporting Zones

Reporting Zone	Percentage of work trips						
	Bus	Taxi	Company transport	Lift Club	Car	Walk all the way	Other
Central	5.0%	12.3%			47.5%	35.2%	
Oranjesig		6.4%			84.6%	9.0%	
Mangaung	1.2%	61.4%	2.6%	1.1%	27.0%	6.4%	0.3%
Airport/Estoire	0.8%	21.7%	6.9%		62.4%	7.1%	1.1%
Naval Hill/Bayswater		17.4%	4.7%		70.7%	6.4%	0.8%
Tempe/Dan Pienaar	0.3%	5.0%	4.4%		87.4%	3.0%	
Langenhoven Park/Woodlands		2.6%	1.7%	0.7%	93.9%	1.1%	
Universitas	1.7%	9.9%	0.7%		77.5%	9.2%	1.0%
Pellissier/Fichardt-Ehrlich Park		8.7%	1.9%	2.1%	84.6%	1.2%	1.5%
Thaba Nchu	29.2%	51.5%	1.6%	2.2%	9.9%	5.6%	
Botshabelo	33.2%	38.3%	11.2%		6.9%	10.4%	
N-E Rural		30.8%	7.2%	0.9%	30.3%	30.9%	
N-W Rural	4.9%	14.0%	6.1%		24.4%	50.6%	
S-W Rural		22.6%	1.5%	5.8%	48.4%	21.0%	0.8%
S-E Rural	4.9%	21.5%		0.6%	59.4%	1.4%	12.2%
Naledi	0.9%	8.1%	0.5%		37.1%	46.3%	7.0%
Mangaung Municipality	9.0%	37.5%	4.0%	1.1%	34.2%	13.3%	0.9%

Source: Mangaung Household Travel Survey (2017)

A map which is representative of the main areas indicated in the table above are shown in Figure 1 below.

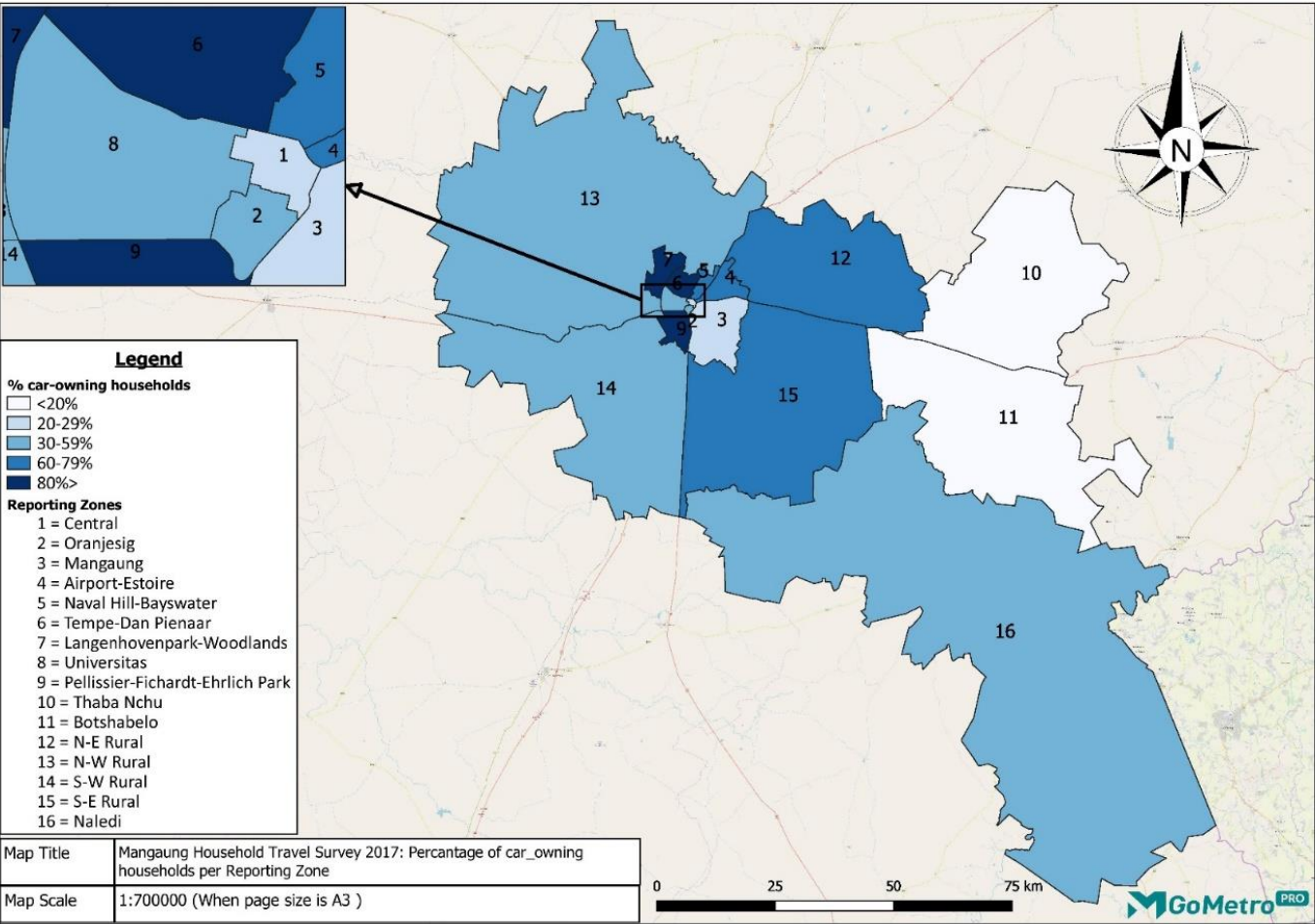
Figure 1: Reporting Zones



Source: Derived from Mangaung Household Travel Survey (2017)

Figure 2 below provides an illustration of private vehicle ownership within the Metropolitan area and specifically those areas where private vehicle ownership is low and the communities are dependent on PT to get to their destinations. The Central, Mangaung, Thaba Nchu and Botshabelo areas are those that have less than 20% car-ownership, thus implying that walking and PT are the main modes of transport in these areas.

Figure 2: Private Vehicle Ownership by Households

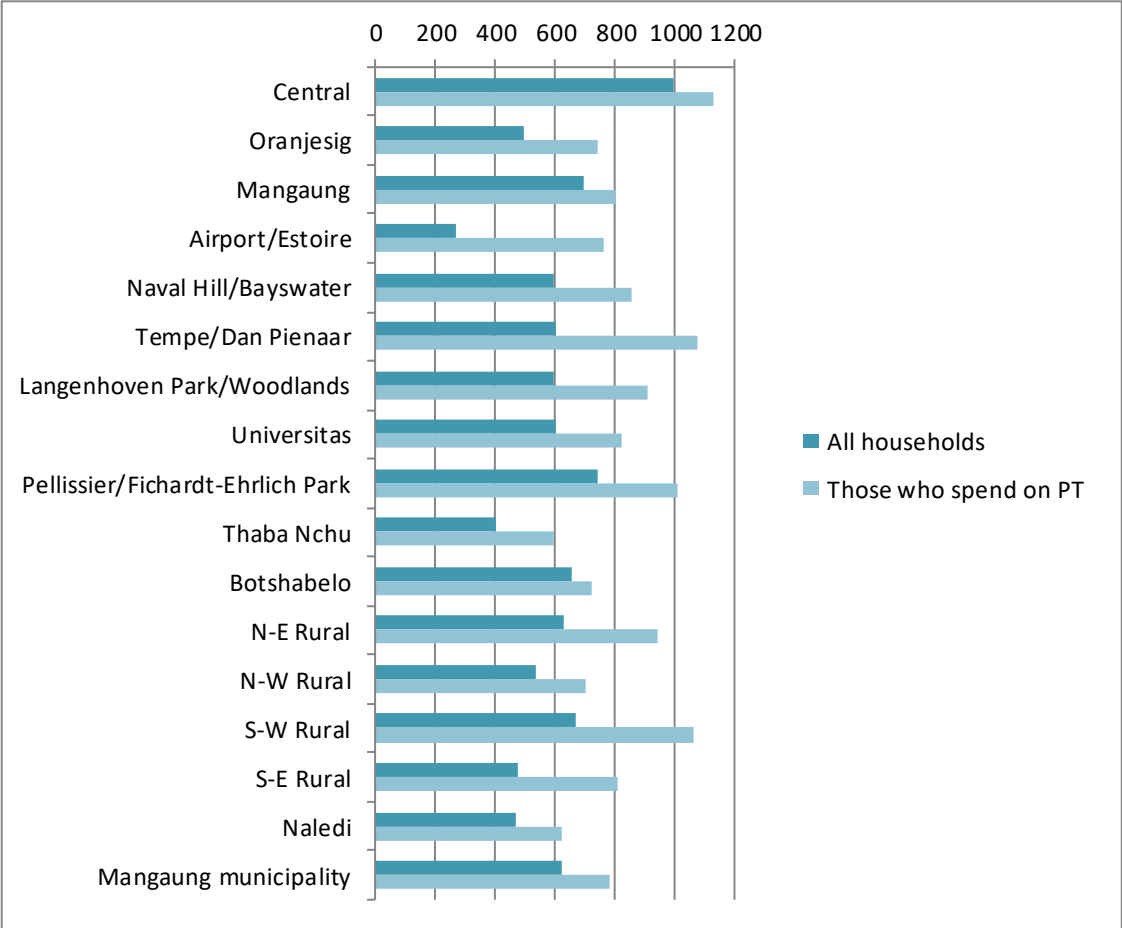


Source: Mangaung Household Travel Survey (2017)

Table 5 indicates in which areas the households are situated that spend at least R1 000 per month on public transport – namely, the Central zone, Tempe/Dan Pienaar, Pellissier/Fichardt- Ehrlich Park and the S-W Rural zone.

According to the Mangaung Household Travel Survey (MHTS) the mean monthly expenditure of all respondents (including those who do not spend anything on public transport) is R620 and those who do spend on public transport is R780 per month. These values are higher than the average values for the Free State as well as the costs assumed in this investigation and might be due to more than one individual in the household having to travel by PT. Table 5 reflects the mean expenditure on public transport for the various areas within Mangaung as per the MHTS (2017).

Table 5: Mean expenditure on public transport (R per month)



Source: Mangaung Household Travel Survey (2017)

The areas with the highest cost as reflected in the figure above are the most affected. Table 6 reflects the percentage of households and their average transport costs, compared to the household income and the reason for travel.

Table 6: Monthly household expenditure on public transport

Purpose	Percentage of households					
	R0	R1 - R200	R201 - R400	R401 - R600	R601 - R1 000	R1 001+
Work	56.9	3.5	13.2	11.5	12.1	2.8
Education	73.0	2.8	9.1	7.8	7.0	0.4
Other	29.7	27.3	22.9	11.4	6.6	2.1

Source: Mangaung Household Travel Survey (2017)

The majority of the household population in Mangaung spend R nil on transport costs for work, education and other purposes. This is mainly due to them walking to work, education or other which might be as a result of the high costs of transport or the short distances they have to travel which does not warrant the use of PT.

MM.4 Living Standards Measure

What is the Living Standards Measure or LSM? The LSM () has become the most widely used marketing research tool in Southern Africa. It divides the population into 10 LSM groups, 10 (highest) to 1 (lowest). The LSM is a unique means of segmenting the South African market. It cuts across race and older techniques of categorising people, and instead groups people according to their living standards using criteria such as degree of urbanisation and ownership of cars and major appliances.

How is it applied in the context of this affordability investigation? It is important to understand the spread of the Mangaung population into these groupings as people have different demands in life. Their ability to afford specific services changes from LSM 1 to LSM 10. Table 7 provides an indication of the household income spread based on the LSM categories based on the NHTS. The LSM categories are not directly applied in this investigation but rather the specific salary ranges based on the Stats SA data sets.

Table 7: Household Income per LSM Categories

Household Income Categories	LSM Categories	Income Group
No income	LSM 1	Low Income
R 1 - R 4800		
R 4801 - R 9600		
R 9601 - R 19 600		
R 19 601 - R 38 200	LSM 2 - 9	Middle Income
R 38 201 - R 76 400		
R 76 401 - R 153 800		
R 153 801 - R 307 600		
R 307 601 - R 614 400	LSM 10	High Income
R 614 001 - R 1 228 800		
R 1 228 801 - R 2 457 600		
R 2 457 601 or more		
Unspecified		

Source: Statssa: General Household Survey (2017)

According to the Stats SA small areas data sets the LSM categories are broken down into smaller ranges between the different LSM categories. These categories are reflected in Table 8 below.

Table 8: Household Income for Main LSM Categories

Household Income Categories	LSM Categories	Income Group
No income	LSM 1	Low Income
R 1 - R 1 633		
R 4801 - R 9600		
R 9601 - R 19 600		
R 19 601 - R 38 200	LSM 2 - 4	Middle Income
R 38 201 - R 76 400	LSM 5 – 6	High Income
R 76 401 - R 153 800	LSM 7	
R 153 801 - R 307 600	LSM 8 - 9	
R 307 601 - R 614 400	LSM 10	
R 614 001 - R 1 228 800		
R 1 228 801 - R 2 457 600		
R 2 457 601 or more		

Note: This assessment does not consider different household income types as all income contribute to the household income.

For purposes of this investigation it was assumed that households falling in the LSM 7 to LSM 10 categories can most probably afford to purchase a car and therefore are not dependant on the use of PT as their daily transport mode. The categories falling in the categories LSM 1 to LSM 6 are the individuals that are dependant of PT for their daily commute. The LSM grouping applied to this affordability investigation for the Mangaung IPTN model, is shown in Item 3.5 below.

MM.5 Fare Structure

The existing fare costs for the various transport modes were obtained from conducting extensive route surveys of all bus (IBL) and taxi operations in the affected areas (Phases 1 and 2) of the IPTN. The fare costs reflected in Table 9 below are currently in use by the different transport modes in Mangaung Thaba Nchu and Botshabelo.

Table 9: Current PT Fare Structure within Mangaung

Destination	Ticket Type	Minibus-taxi Fare	Bus Fare
Mangaung (Bloemfontein)	Single	R 11-00 to R12-00	R 8-65 to R12-33
Thaba Nchu	Single	R 26-00	
	Multi Journey		R 17-56 to R20-00
Botshabelo	Single	R24-00	
	Multi Journey		R 17-56 to R20-00

Source: Derived from PT Surveys conducted during 2017 to 2018 and defined in the Draft Operations Plan of the Mangaung IPTN.

The fare cost reflected in the Table above were used as a benchmark rate in order to derive at the rates proposed for the Phase 1 section of the IPTN for Mangaung. These rates were determined with due consideration of the current fares, cost recovery challenges, affordable levels of subsidies and affordability of fares in general. The detail as to how these fares were derived at, are not collaborated on in this report but forms part of the Draft Operations Plan of the Mangaung IPTN (Volumes 1 to 3). Table 10 reflects the fare structure proposed for implementation on the Mangaung IPTN for the various modes of transport in Mangaung.

Table 10: Proposed PT Fare Structure for IPTN (Phase 1)

Destination	Ticket Type	Minibus-taxi Fare	Bus Fare
Mangaung (Bloemfontein)	Single	R 10-00	R 26-00
Thaba Nchu	Single		R 26-00
Botshabelo	Single		R 26-00

Source: Mangaung IPTN (2018).

MM.6 Affordability Test

In determining the affordability of the proposed fares in comparison to household income the 2011 Census information could not be utilised as it is outdated. For purposes of this section of the investigation the following Household Income figures and LSM categories as reflected in Table 11 are utilised.

Table 11: Household Income per Annum for Mangaung

Number Households

	Annual Income	Household	National	Mangaung	Percentage of National Total
LSM 1	0 - 2 400		47 000	1 000	2.13%
	2 400 - 6 000		289 000	5 000	1.73%
	6 000 - 12 000		1 174 000	19 000	1.62%
LSM 2-4	12 000 - 18 000		1 388 000	22 000	1.59%
	18 000 - 30 000		1 871 000	31 000	1.66%
	30 000 - 42 000		1 639 000	28 000	1.71%
LSM 5-6	42 000 - 54 000		1 208 000	21 000	1.74%
	54 000 - 72 000		1 153 000	20 000	1.73%
	72 000 - 96 000		940 000	17 000	1.81%
LSM 7	96 000 - 132 000		884 000	16 000	1.81%
	132 000 - 192 000		843 000	15 000	1.78%
	192 000 - 360 000		1 072 000	20 000	1.87%
LSM 8-9	360 000 - 600 000		520 000	9 000	1.73%
	600 000 - 1 200 000		291 000	5 000	1.72%
	1 200 000 - 2 400 000		62 000	1 000	1.61%
LSM 10	2 400 000+		8 000	0	0.00%
Total Households		13 389 000	230 000		1.72%

Source: STATS SA and CoGHSTHA. Values reflected are rounded up for purposes of this assessment.

The calculations of the affordability levels are based on the assumption that an economically active individual can either have a 5 or 6 day work week. A further assumption in testing affordability was that only one individual of the household travels to their place of work on a monthly basis. The negative impact of transport cost on household income increases as more members of the household have to travel by means of PT to get to work, school/university or for leisure purposes.

In calculating the affordability of transport per household, it was also assumed that daily travel for work purposes includes for two trips. Table 12 reflects the number of trips for all modes of transport should one member of the household have to make use of PT to get to work or for educational purposes.

Table 12: Trips per Annum by Taxi and Bus Commuters in Mangaung

	Number Working days	
	5	6
Trips per week	10	12
Trips per month*	40	48
Trips per annum	480	576

Note: * trips travelled per month is based on a 4 week month.

The number of trips was assumed per annum and used to determine the annual transport cost paid by a typical household in Mangaung. The proposed IPTN transport rates for the different modes of transport were multiplied by the rates for taxi and bus transport as indicated in Table 13 below.

Table 13: Assumed Transport Cost per Mangaung Household per Annum

Transport cost per household (Double trip)	Working days 5		Working days 6	
	Taxis @ R10 per Trip		Bus @ R26 per Trip	
Monthly Cost	R 400.00	R 480.00	R 040.00	R 248.00
Annual Cost	R 800.00	R 760.00	R 480.00	R 976.00

Source: Derived from Mangaung IPTN (2018).

In calculating the affordability of transport different percentages (scenarios) of household income was used to measure the impact of household income. Table 14 below indicates the impact which different percentages of transport costs will have on household income.

Table 14: Modelled 10% of Household Income used for Transport Cost per Annum

1	2	3	4	5	6	7	8	9	10
Household Income per Annum	Number of Mangaung HH's	Moving SA (Household Budget available per annum)	Monthly Household Budget available for Transport	Number Single Trips		Mangaung IPTN			
				Cost per Taxi trip	Cost per Bus trip	5 Day work week	6 Day work week	5 Day work week	6 Day work week
						Percentage of Annual Household Income (Taxi)		Percentage of Annual Household Income (Bus)	
				R 10.00	R 26.00	R 4 800.00	R 5 760.00	R 12 480.00	R 14 976.00
0-2 400	1 000	240	R 20.00	2	0.77	200.00%	240.00%	520.00%	624.00%
2 400-6 000	5 000	600	R 50.00	5	1.92	80.00%	96.00%	208.00%	249.60%
6 000-12 000	19 000	1 200	R 100.00	10	3.85	40.00%	48.00%	104.00%	124.80%
12 000-18 000	22 000	1 800	R 150.00	15	5.77	26.67%	32.00%	69.33%	83.20%
18 000-30 000	31 000	3 000	R 250.00	25	9.62	16.00%	19.20%	41.60%	49.92%
30 000-42 000	28 000	4 200	R 350.00	35	13.46	11.43%	13.71%	29.71%	35.66%
42 000-54 000	21 000	5 400	R 450.00	45	17.31	8.89%	10.67%	23.11%	27.73%
54 000-72 000	20 000	7 200	R 600.00	60	23.08	6.67%	8.00%	17.33%	20.80%
72 000-96 000	17 000	9 600	R 800.00	80	30.77	5.00%	6.00%	13.00%	15.60%
96 000-132 000	16 000	13 200	R 1 100.00	110	42.31	3.64%	4.36%	9.45%	11.35%
132 000-192 000	15 000	19 200	R 1 600.00	160	61.54	2.50%	3.00%	6.50%	7.80%
192 000-360 000	20 000	36 000	R 3 000.00	300	115.38	1.33%	1.60%	3.47%	4.16%
360 000-600 000	9 000	60 000	R 5 000.00	500	192.31	0.80%	0.96%	2.08%	2.50%
600 000-1 200 000	5 000	120 000	R 10 000.00	1 000	384.62	0.40%	0.48%	1.04%	1.25%
1 200 000-2 400 000	1 000	240 000	R 20 000.00	2 000	769.23	0.20%	0.24%	0.52%	0.62%
2 400 000+	230 000								

Note: Calculation is only performed on higher income value for the specific Household Income as the lower income in the range will reduce the allowable trips per annum even further.

From the Table above, columns 7 to 10 are the percentages should a household travel 480 trips (40trips per month x 12 months) per annum by taxi (@ R10 per trip) or bus (@ R26 per trip) for the representative week days. These actual transport costs per household are then compared to the allowable household budget provision at a rate of 10%, 20%, 30% or 40% household income.

According to the table above it is clear that a household earning R 30 000 per annum will only be able to travel 25 single trips in a month in order to only spend 10% of their household income on transport. Table 12 indicates that a typical working household will at least have to travel 40 times a week to get to their place of work. This implies that a family earning a maximum of R 30 000 per annum will not be able to travel to work per month and only spend 10% of their household income on transport. Similarly, a household earning R 30 000 will only be able to travel 10 single trips per month on a bus if they want to remain within the 10% transport cost margin.

Furthermore, it can be deduced from the Table above that for a 5 week day per annum, the first household to be able to remain within the 10% transport cost margin, will be the household that earns between R 42 000 and R 54 000 per annum for transport by taxi. For households making use of bus transport, 5 days a week will similarly have to earn between R 96 000 and R 132 000 per annum to remain within the 10% transport cost margin.

Table 15 reflect the calculations should the transport cost margin increase to 20% of the household income per annum.

Table 15: Modelled 20% of Household Income used for Transport Cost per Annum

1	2	3	4	5	6	7	8	9	10
				Number Single Trips		Mangaung IPTN			
				Cost per Taxi trip	Cost per Bus trip	5 Day work week	6 Day work week	5 Day work week	6 Day work week
						Percentage of Annual Household Income (Taxi)	Percentage of Annual Household Income (Taxi)	Percentage of Annual Household Income (Bus)	Percentage of Annual Household Income (Bus)
		20%		R 10.00	R 26.00	R 4 800.00	R 5 760.00	R 12 480.00	R 14 976.00
0-2 400	1 000	480	R 40.00	4	1.54	200.00%	240.00%	520.00%	624.00%
2 400-6 000	5 000	1 200	R 100.00	10	3.85	80.00%	96.00%	208.00%	249.60%
6 000-12 000	19 000	2 400	R 200.00	20	7.69	40.00%	48.00%	104.00%	124.80%
12 000-18 000	22 000	3 600	R 300.00	30	11.54	26.67%	32.00%	69.33%	83.20%
18 000-30 000	31 000	6 000	R 500.00	50	19.23	16.00%	19.20%	41.60%	49.92%
30 000-42 000	28 000	8 400	R 700.00	70	26.92	11.43%	13.71%	29.71%	35.66%
42 000-54 000	21 000	10 800	R 900.00	90	34.62	8.89%	10.67%	23.11%	27.73%
54 000-72 000	20 000	14 400	R 1 200.00	120	46.15	6.67%	8.00%	17.33%	20.80%
72 000-96 000	17 000	19 200	R 1 600.00	160	61.54	5.00%	6.00%	13.00%	15.60%
96 000-132 000	16 000	26 400	R 2 200.00	220	84.62	3.64%	4.36%	9.45%	11.35%
132 000-192 000	15 000	38 400	R 3 200.00	320	123.08	2.50%	3.00%	6.50%	7.80%
192 000-360 000	20 000	72 000	R 6 000.00	600	230.77	1.33%	1.60%	3.47%	4.16%
360 000-600 000	9 000	120 000	R 10 000.00	1 000	384.62	0.80%	0.96%	2.08%	2.50%
600 000-1 200 000	5 000	240 000	R 20 000.00	2 000	769.23	0.40%	0.48%	1.04%	1.25%
1 200 000-2 400 000	1 000	480 000	R 40 000.00	4 000	1 538.46	0.20%	0.24%	0.52%	0.62%
2 400 000+	230 000								

Source: Derived from Mangaung IPTN (2018).

According to the table above it is clear that a household earning R 30 000 per annum will thus be able to travel 50 single trips in a month and spend 20% of their household income on transport by taxi. This implies that a family earning a maximum of R 30 000 per annum will be able to travel to work on a monthly basis and only spend 20% of their household income on transport. The same household will only be able to travel 20 single trips per month on a bus if they want to remain within the 20% transport cost margin. The first household being able to travel 40 bus trips per month within the 20% margin will be a household earning between R 54 000 and R 72 000 per annum.

Table 16 reflect the calculations should the transport cost margin increase to 30% of the household income per annum.

Table 16: Modelled 30% of Household Income used for Transport Cost per Annum

1	2	3	4	5	6	7	8	9	10
				Number Single Trips		Mangaung IPTN			
				Cost per Taxi trip	Cost per Bus trip	5 Day work week	6 Day work week	5 Day work week	6 Day work week
						Percentage of Annual Household Income (Taxi)	Percentage of Annual Household Income (Taxi)	Percentage of Annual Household Income (Bus)	Percentage of Annual Household Income (Bus)
		30%		R 10.00	R 26.00	R 4 800.00	R 5 760.00	R 12 480.00	R 14 976.00
0-2 400	1 000	720	R 60.00	6	2.31	200.0%	240%	520%	624%
2 400-6 000	5 000	1 800	R 150.00	15	5.77	80.0%	96%	208%	250%
6 000-12 000	19 000	3 600	R 300.00	30	11.54	40.0%	48%	104%	125%
12 000-18 000	22 000	5 400	R 450.00	45	17.31	26.7%	32%	69%	83%
18 000-30 000	31 000	9 000	R 750.00	75	28.85	16.0%	19%	42%	50%
30 000-42 000	28 000	12 600	R 1 050.00	105	40.38	11.4%	14%	30%	36%
42 000-54 000	21 000	16 200	R 1 350.00	135	51.92	8.9%	11%	23%	28%
54 000-72 000	20 000	21 600	R 1 800.00	180	69.23	6.7%	8%	17%	21%
72 000-96 000	17 000	28 800	R 2 400.00	240	92.31	5.0%	6%	13%	16%
96 000-132 000	16 000	39 600	R 3 300.00	330	126.92	3.6%	4%	9%	11%
132 000-192 000	15 000	57 600	R 4 800.00	480	184.62	2.5%	3%	7%	8%
192 000-360 000	20 000	108 000	R 9 000.00	900	346.15	1.3%	2%	3%	4%
360 000-600 000	9 000	180 000	R 15 000.00	1 500	576.92	0.8%	1%	2%	2%
600 000-1 200 000	5 000	360 000	R 30 000.00	3 000	1 153.85	0.4%	0%	1%	1%
1 200 000-2 400 000	1 000	720 000	R 60 000.00	6 000	2 307.69	0.2%	0%	1%	1%
2 400 000+	230 000								

Source: Derived from Mangaung IPTN (2018).

According to Table 16 above it can be deduced that a household earning R 18 000 per annum will thus be able to travel 45 single trips in a month. This number of trips will be adequate to get to work for the entire month and still have a few trips in reserve. The same household will however only be able to travel 17 single trips per month on a bus if they want to remain within the 30% transport cost margin. The first household being able to travel the 40 bus trips per month within the 30% margin will be a household earning between R 30 000 and R 42 000 per annum.

Table 17 reflect the calculations should the transport cost margin increase to 40% of the household income per annum.

Table 17: Modelled 40% of Household Income used for Transport Cost per Annum

1	2	3	4	5	6	7	8	9	10
				Number Single Trips		Mangaung IPTN			
				Cost per Taxi trip	Cost per Bus trip	5 Day work week	6 Day work week	5 Day work week	6 Day work week
						Percentage of Annual Household Income (Taxi)	Percentage of Annual Household Income (Taxi)	Percentage of Annual Household Income (Bus)	Percentage of Annual Household Income (Bus)
		40%		R 10.00	R 26.00	R 4 800.00	R 5 760.00	R 12 480.00	R 14 976.00
0-2 400	1 000	960	R 80.00	8	3.08	200.0%	240%	520%	624%
2 400-6 000	5 000	2 400	R 200.00	20	7.69	80.0%	96%	208%	250%
6 000-12 000	19 000	4 800	R 400.00	40	15.38	40.0%	48%	104%	125%
12 000-18 000	22 000	7 200	R 600.00	60	23.08	26.7%	32%	69%	83%
18 000-30 000	31 000	12 000	R 1 000.00	100	38.46	16.0%	19%	42%	50%
30 000-42 000	28 000	16 800	R 1 400.00	140	53.85	11.4%	14%	30%	36%
42 000-54 000	21 000	21 600	R 1 800.00	180	69.23	8.9%	11%	23%	28%
54 000-72 000	20 000	28 800	R 2 400.00	240	92.31	6.7%	8%	17%	21%
72 000-96 000	17 000	38 400	R 3 200.00	320	123.08	5.0%	6%	13%	16%
96 000-132 000	16 000	52 800	R 4 400.00	440	169.23	3.6%	4%	9%	11%
132 000-192 000	15 000	76 800	R 6 400.00	640	246.15	2.5%	3%	7%	8%
192 000-360 000	20 000	144 000	R 12 000.00	1 200	461.54	1.3%	2%	3%	4%
360 000-600 000	9 000	240 000	R 20 000.00	2 000	769.23	0.8%	1%	2%	2%
600 000-1 200 000	5 000	480 000	R 40 000.00	4 000	1 538.46	0.4%	0%	1%	1%
1 200 000-2 400 000	1 000	960 000	R 80 000.00	8 000	3 076.92	0.2%	0%	1%	1%
2 400 000+	230 000								

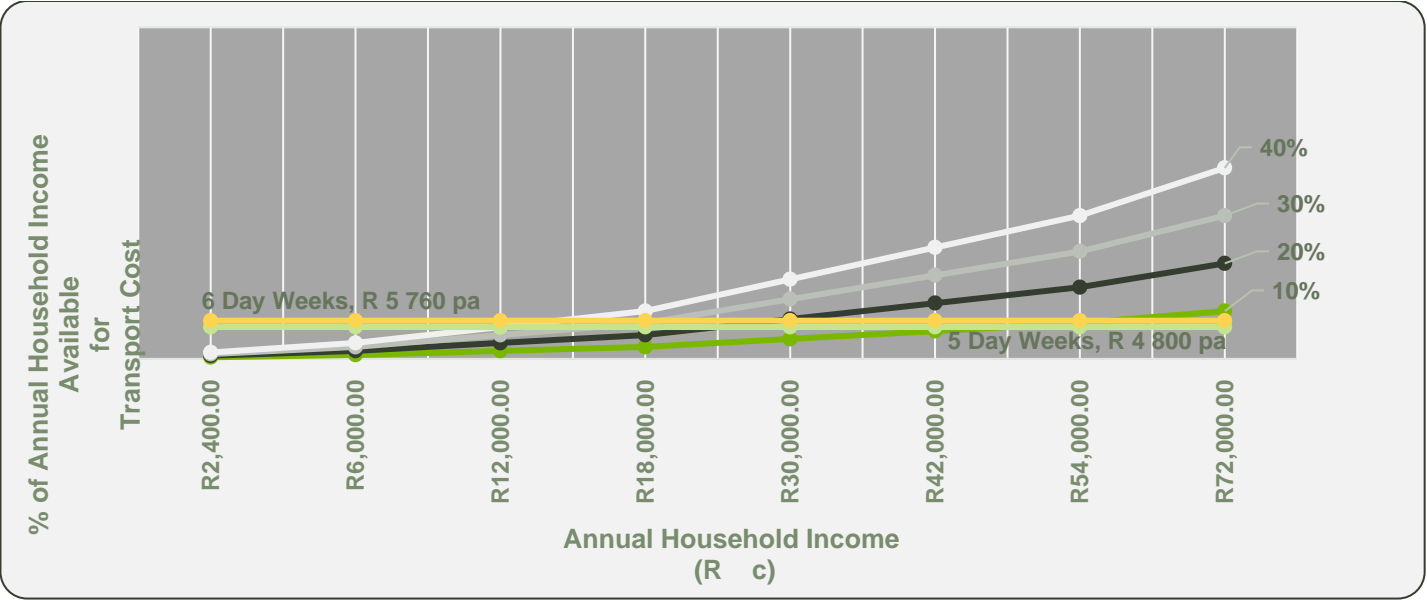
Source: Derived from Mangaung IPTN (2018).

According to the table above it is clear that a household earning R 12 000 per annum will thus be able to travel 50 single trips in a month and spend 40% of their household income on transport. This implies that a family earning a maximum of R 12 000 per annum will be able to travel to work per month and only spend 40% of their household income on transport. The same household will only be able to travel 15 single trips per month on a bus if they want to remain within the 40% transport cost margin. The

first household being able to travel the 40 trips per month within the 40% margin will be a household earning between R 18 000 and R 30 000 per annum.

Figure 3 and Figure 4 reflect the percentages of household income spend on annual transport costs for both taxi and bus transport in Mangaung. The graphs do not reflect the entire income range of the Mangaung population as the high end earners of the population do not experience problems to pay for PT. Figure 3 below indicate the different scenarios where 10%, 20%, 30% and 40% were deducted from the local Mangaung population’s household income as a benchmark to test affordability.

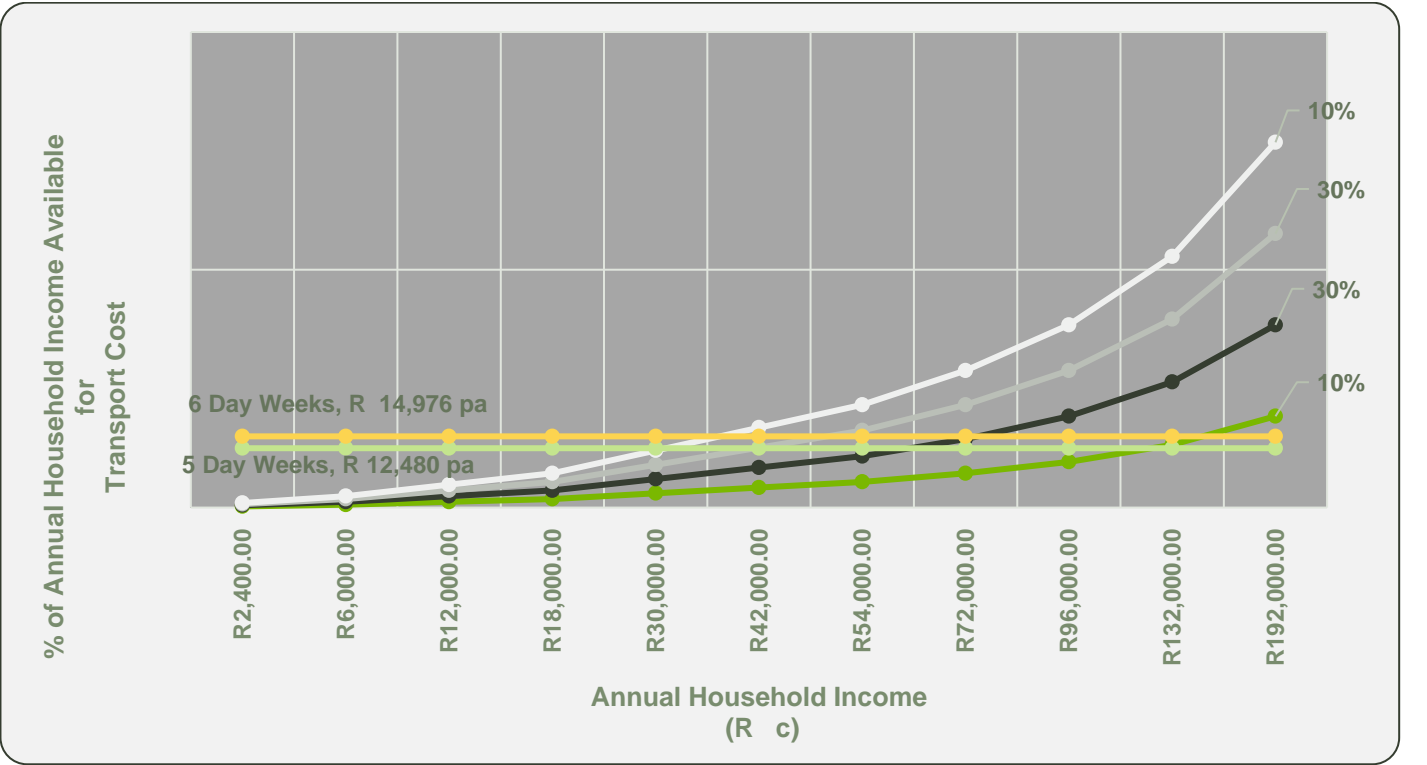
Figure 3: Annual Household Income spend on Taxi Transport Cost



Source: Derived from Mangaung IPTN (2018).

From Figure 3 above it is clear that a large portion of the Mangaung population will not be able to afford taxi or bus transport to get to work per annum. At 10% of household income almost 47% of the household population will not be able to travel a minimum of 40 trips per month for a year. Similarly, Figure 4 represent an illustration of the percentage scenario’s modelled of household income spend on bus transport costs.

Figure 4: Annual Household Income spend on Bus Transport Cost



Source: Derived from Mangaung IPTN (2018).

At 10% household income almost 71% of the household population will not be able to travel a minimum of 40 trips (per month) by bus for a year.

The results of this affordability test thus indicate that with the proposed 10% transport cost margin it is virtually impossible for those households earning less than R 54 000 per annum to remain within the 10% range. The poor households earning less than R 12 000 per annum will have to spend more than 40% of their household income to travel at least 40 trips per month to get to work.

Household wise it is important to know how many of the Mangaung households can travel to work for a period of one month when a specific percentage of the household income is spent on transport costs. Table 18 reflect the number of households within Mangaung which will be able to afford the proposed transport costs of the IPTN compared to a specific percentage of the household income.

Table 18: Affordability of Transport Costs in relation to Household Income

Transport Mode	Percentage of Household Income	Affordability				Total Number Mangaung Households
		HH can not travel for one month	% of HH Population	HH can travel for one month	% of HH Population	
Taxi	10%	106 000	46%	124 000	54%	230 000
	20%	47 000	20%	183 000	80%	
	30%	25 000	11%	205 000	89%	
	40%	6 000	3%	224 000	97%	
Bus	10%	164 000	71%	66 000	29%	230 000
	20%	127 000	55%	103 000	45%	
	30%	78 000	34%	152 000	66%	
	40%	47 000	20%	183 000	80%	

Source: Derived from Mangaung IPTN (2018).

The above table indicates that a larger portion of the household population would struggle to afford to travel by bus compared to those who can travel by taxi. This is predominantly due to the longer distances travelled, with subsequent higher costs involved.

MM.7 FINDINGS

Based on the results obtained by this investigation the following findings are highlighted, namely:

- The Provincial average monthly household income spent on transport cost is higher than that obtained from the HTS (2018) for Mangaung. The average escalated Provincial monthly travel cost for transport by taxi is R 487,11 and for bus transport is R 624,95 compared to that obtained by the HTS for Mangaung being between R620 and R780 per month.
- At 10% of household income almost 46% of the household population will not be able to travel a minimum of 40 trips per month for a year.
- At 10% household income almost 71% of the household population will not be able to travel a minimum of 40 trips (per month) by bus for a year.

MM.8 RECOMMENDATIONS

That when determining the proposed fare charge for taxi and bus transport, the findings of this report be incorporated and due consideration be given to the following:

- Discounts for scholars, pensioners and special needs individuals.
- Discount rates for multi journey ticket (monthly) holders.
- Discount rates where more than two individuals of the same household have to make use of PT daily.

Giving considerations to these proposals will go a far way in assisting those individuals of households that currently cannot afford to travel to work, school or to study at University due to unaffordable transport costs.

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2015-2036

MMM – City Wide Integrated Public Transport Plan



Annexure MM
Economic Impact Study



INTEGRATED
PUBLIC
TRANSPORT
NETWORK

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MM SOCIO-ECONOMIC STUDY OF THE PROPOSED INTEGRATED PUBLIC TRANSPORT SYSTEM (S-EIA)

This socio-economic study builds on the previous study that was conducted at a very early stage in the project. The work conducted for this report forms part of the work to establish an Integrated Public Transport Network (IPTN) for the Mangaung Metropolitan Municipality (MMM). The estimates are based on the best available information and include approximations of the identified routes.

The implementation of the MMM IPTN design is scheduled to be achieved over 8 phases in an area comprising Bloemfontein City and the Townships that fall within the jurisdiction of the Metropolitan Municipality: Bloemfontein, Botshabelo and Thaba Nchu.

The Socio-Economic Impact Assessment (S-EIA) will comprise of two components, namely:

- The socio-economic study; and
- The economic impact assessment.

MM.1 Purpose

The purpose of this report is to provide an indication of the socio-economic benefits that may be derived by the construction and operation of and IPTN. This study is therefore being done even before the most appropriate system or sites are selected. At this point in time, the inputs used for the socio-economic study are conservatively estimated, in order not to inflate the socio-economic impact on the national, provincial and municipal economies.

As the project progressed over time, and more details emerged from the study, it is possible to refine these estimates. It has been agreed that the impact assessment model, using new refined estimates (as they become available) will be undertaken.

MM.2 Background

The National Department of Transport coordinate the development of IPTN in metropolitan areas. These however are planned and implemented by Metropolitan authorities under the guidelines provided by the National Department of Transport. The IPTN's are funded by National Treasury through the annual proclamation of the Public Transport Network Grant as it is contained in the Division of Revenue Act.

The purpose of implementation of an IPTN is to improve public transport services. This is done broadly by reducing the cost of public transport provision and the related substances, to provide affordable fares to public transport users, and to improve the efficiency of the city in general.

MM.3 The Socio-Economic Impact Assessment Process

The Socio-Economic impact analysis is based on the premise that operations within various industries in an economy are interconnected to each other. Therefore, an increase in the activity levels in one industry or sector will produce a ripple effect on other industries or sectors. The initial increase in the activity of one sector is the direct effect. The ripple effects are either indirect or induced. Direct economic effects are therefore the economic activities related to labour and

expenditures emanating from firms involved with the public transport operations. Indirect and induced economic effects are described separately as the 'Total Impact'. These derive from those activities, which support public transport businesses, and the increase in the goods and services produced within an economy, arising from the spending power of direct and indirect employees. This economic activity is accounted for by multipliers, which attempt to quantify the interactive linkages within the local economy impacted by direct economic activity.

The S-EIA examines the effect of an event¹ on the economy in a specified area². It usually measures changes in business revenue, business profits, personal wages, and/or jobs. The economic event analysed often includes the implementation of a new policy or project. An S-EIA is commonly conducted when there is public concern about the potential impacts of a proposed project or policy. The impact usually tries to measure the potential value-added impact, which estimates the increase in the study region's gross regional product³. This impact estimates the increase in local employee wages plus local business profits and the output impact.

Economic impact analyses usually employ one of two methods for determining impacts. The first is an input-output model for analysing the regional economy. These models rely on inter-industry data to determine how effects in one industry will impact other sectors. Secondly, economic simulation models are developed to measure the economic impact analyses. These include more complex econometric and general equilibrium models.

This study will use the input-output (I-O) approach as they are robust, give accurate results and do not face insurmountable the data and methodological constraints.

MM.4 Methodology

MM.4.1 Economic modelling and the estimation of multipliers

An input-output matrix (I-O) is a representation of national or regional economic accounting that records the way industries trade with one another and produce (in other words the flows of goods and services). Those flows are registered in a matrix, simultaneously by origin and by destination (OECD 2006). The I-O analysis is the standard method for measuring the spread effects of changes in the final demand for the product of an industry or sector. The input-output analysis is the standard method for measuring the spread effects of changes in the final demand for the product of an industry or sector. The main applications of input-output analysis have been discussed in Leontief (1987), (Miller & Blair 2009), and the United Nations (1999).

A standard I-O table is shown in Figure 1. Input flows are recorded in the columns of the table, and outputs are recorded in the rows (Spörri et al. 2007). Intermediate demand (Z) represents the inter-industry transactions table, a matrix of transactions between the producing sectors. Final demand (y) consists of the household, government and rest of the world sectors. Value added to the producing sector consists of Capital and Labour, and receives interest and wages.

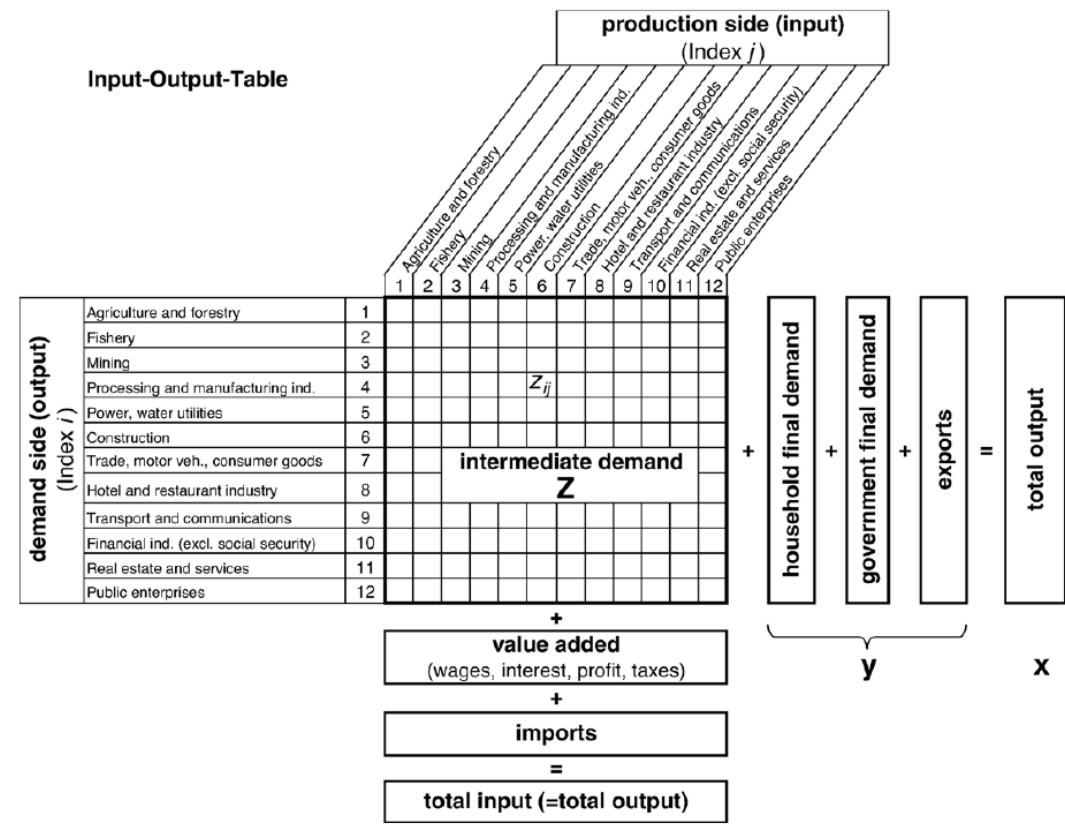
An I-O analysis is typically used to calculate the economic impacts resulting from exogenous changes in y. For example, the economic impact (in terms of industry output, employment and income) of a new public transport service development, in both the short- and the long-run impact on a specific economy.

¹ This can relate to any policy, program, project, activity or other economic activity.

² This may range from a single neighbourhood to the entire globe.

³ The gross regional product (GRP) is very similar to the nation's gross domestic product (GDP), and represents the total size of the local economy.

Figure 1: An illustrative I-O table



Source: Spörri et al 2007

If x represents the vector of industry outputs, y the vector of final demand and Z the matrix of inter-industry transactions, then the relationship between these is (Spörri et al 2007):

$$x = Z \begin{pmatrix} 1 \\ \cdot \\ \cdot \\ \cdot \\ 1 \end{pmatrix} + y \quad \text{Equation 1}$$

A matrix of technical coefficients (A) is then derived by dividing inter-industry transactions by output:

$$a_{ij} = \frac{z_{ij}}{x_j} \quad \text{Equation 2}$$

The elements of A describe the direct, first round direct impact of any change in final demand. In other words, how much input from sector i is used per monetary output of sector j . When this is solved for production as a function of final demand, the Leontief inverse matrix ($L = (I - A)^{-1}$) is calculated.

The Leontief inverse matrix can then be used to calculate the output multiplier, the income multiplier and income effects (Hernoncourt et al. 2011a).

The output multiplier for a particular industry can be defined as the total of all outputs from each domestic industry required in order to produce one additional unit of output.

$$(Output_multiplier)_j = \sum_i L_{ij} \quad \text{Equation 3}$$

The income multiplier indicates the increase in income from employment as result of a change of R1 of income from employment in each industry.

$$(Income_multiplier)_j = \sum_i \frac{v_i L_{ij}}{v_j} \quad \text{Equation 4}$$

Where:

- v is the ratio of employment to output for each industry.

Lastly, the income effects show the impact on income from employment throughout the economy arising from a unit increase in final demand for industry j 's output.

$$(Income_effects)_j = \sum_i v_i L_{ij} \quad \text{Equation 5}$$

The following assumptions underlie any I-O analysis:

- The production functions of industries do not change.
- The economy can be described with linear production functions.
- The region is large enough to make imports by individuals insignificant.

It is important to note that I-O tables assume linear relations between inputs and outputs from different sectors as well as linear relations between outputs and final demand (D'Hernoncourt, Cordier and Hadley 2011).

To determine the economic value of the different functions of the existing public transport and its contribution towards the Mangaung economy, an econometric model of the local economy must be constructed. Further it is important to understand all the economic activities of the existing public transport system.

To conduct a comprehensive economic impact assessment using an I-O analysis, a transactions matrix and I-O table for the region must be derived. There are two main approaches to construct such a regional transactions matrix:

- Surveys of local firms.
- Derive the local transactions matrix from the national transactions matrix.

This report follows the latter route. National technical coefficients a_{ij} are modified to yield local technical coefficients a_{ij}^L using regional purchase coefficients r_{ij} , such that:

$$a_{ij}^L = r_{ij} a_{ij} \quad \text{Equation 6}$$

To estimate r_{ij} , the location quotient method (Miller 1998) is used, where:

$$r_i = \begin{cases} 1 & \text{if } LQ_i^L \geq 1 (\forall j = 1 \dots n) \\ LQ_i^L & \text{if } LQ_i^L < 1 (\forall j = 1 \dots n) \end{cases} \quad \text{Equation 7}$$

And LQ_i^L is the location quotient for describing the importance of sector i in the local economy, relative to the national South African economy. A LQ_i^L greater than, or equal to one indicates that all the inputs in this industry can be locally supplied to the same extend as in the national economy. Any LQ_i^L less than one, implies that the inputs in the relevant industry cannot be locally supplied to the same extend as the national economy. Instead, it the location quotient represents the portion of the

requirement that can be supplied locally. The remaining input requirements are assumed to be fulfilled by imports from outside the region.

It is envisaged that the model will be able to determine what the impact of the integrated public transport network on the Mangaung, Free State and South African economies will have.

MM.4.2 The process

- Defining the study areas.
- Data collection, including a desktop review, undertaking of an investigative site visit comprising interviews with key informants, and a review of information from other specialist studies and the public participation process.
- The compilation of a baseline profile, including information on demographics, education, skills levels, employment, local and regional economic conditions, infrastructure and service delivery, health related issues, spatial development, claims and information pertaining to the prevalent concerns regarding and attitudes towards the proposed IPTN.
- An assessment of the total initial costs of the project and an average assessment of the operating costs of the IPTN. These estimates will obviously be revised once final determinations have been made regarding which model will be used and what the final routes will be.
- Assessment of impacts (including cumulative impacts) on the basis of issues identified through specialist opinion, interviews with key informants and the public participation process. Impacts were identified in terms of a number of categories, related to physical intrusion resulting from Project activities, economic pull factors, as well as indirect impacts. These categories were then linked to the applicable Project phase in which an impact was most likely to originate, namely the construction, operational or decommissioning phases. (The assessment of the socio-economic impact is discussed in detail below).

MM.5 Defining the Study Areas

The proposed Project is located in Mangaung Metropolitan Municipality (MMM), within the Free State Province. The socio-economic characteristics of the population within each of the aforementioned areas are listed below.

Mangaung Metropolitan Municipality is a Category A municipality. It is situated in the Free State province, in the central interior of South Africa. The Free State is bordered by Gauteng, the Eastern Cape, Northern Cape, KwaZulu-Natal and North West provinces, as well as the neighbouring country of Lesotho.

Mangaung, meaning “the place of the cheetah”, accentuates the vibrant, dynamic and energetic character of the tourism industry in the “City on the move (at the heart of it all)”. The economy is strongly driven by the government sector, which has seen the fastest growth in the last five years as a result of increased government programmes in livelihoods improvement interventions. The finance sector is the second-fastest growing sector due to very active estate and construction activities. Small businesses have a major role to play in the Mangaung economy, in terms of employment creation, income generation and output growth.

Mangaung Metropolitan Municipality incorporate Bloemfontein, Botshabelo, Mangaung, Thaba Nchu, and since the 2016 demarcation, it now also includes Naledi.

MM.5.1 Inequality

Like the rest of South Africa, Mangaung is a very unequal society and these inequalities are manifest spatially.

Table 1: Number of households per income group (in R000s)

	< 2,4	2,4 to 6	6 to 12	12 to 18	18 to 30	30 to 42	42 to 54	54 to 72	72 to 96	96 to 132	132 to 192	192 to 360	360 to 600	600 to 1200	1 200 to 2 400	>2 400
South Africa	47	289	1174	1388	1871	1639	1208	1153	940	884	843	1072	520	291	62	8
Mangaung	1	5	19	22	31	28	21	20	17	16	15	20	9	5	1	0,5

MM.5.2 Bloemfontein

Bloemfontein, the economic hub of the municipal area, remains at the core for future development. It is centrally located in South Africa and is served by major roads such as the N1 which links Gauteng with the southern and western Cape, the N6 which links Bloemfontein to the Eastern Cape and the N8 which links Lesotho in the east with the Northern Cape in the west via Bloemfontein.

Figure 2: Map of South Africa showing the centrality of Mangaung



Source: <https://commons.wikimedia.org>

The city has developed around Bloemfontein’s central business district in a concentric sectoral form. The poor communities live in the south-eastern section. The north/south railway line creates a e barrier cutting the poor from the economic opportunities that are mainly concentrated to the west of the railway line. Except for the industrial areas which flank these settlements, there are very few job opportunities and people need to travel up to 15 kilometres to get to the city centre.

Relocation of businesses from the Bloemfontein CBD to suburbs has led to under-utilised office space in the central business district. Manufacturing is declining in the city, which is a matter of concern. The areas surrounding the CBD have also developed as transgression areas, with a mixed land use character.

MM.5.3 Botshabelo

Botshabelo, 55 km east from Bloemfontein was developed along a major access route that runs in a north/south direction through the centre of the area. Communities need to travel to access the economic opportunities which have developed more to the northern parts of the town. Botshabelo is characterised by an oversupply of school sites and public open spaces. The allocated business sites are not developed inhibiting the development of sustainable neighbourhoods.

The FDC Industrial Park is the most important node for economic development and consist of 138 warehouses with a total floor area of 200 000m² with a value of R500 million. Factories manufacture textile, food processing, electrical enclosures, paraffin stoves and minor engineering services. The current occupancy rate at the node stand at 89, 54 % and employ 6 000 people.

The unemployment rate stands at 32.9 % which result in the huge urban dependency on Bloemfontein. Approximately 13 000 commuters that commute on a daily basis between Botshabelo and Bloemfontein. Approximately R200 million is annually spent on transport subsidies for bus transport in the MMM area of which the larger part is for bus transport between Botshabelo, Thaba Nchu and Bloemfontein.

MM.5.4 Thaba Nchu

Thaba Nchu is 67 km east from Bloemfontein is more scattered with villages surrounding the urban centre. Four of these villages have recently been formalised. The area is characterised by vast stretches of communal grazing areas that surround the urban centre. Many residents still keep cattle within the urban area.

Sector	Bloemfontein	Botshabelo	Estoire	Hamilton	Hilton	New East End	Old East End	Oranje	Selos ha	Thaba Nchu	Total
Agriculture	0	0	0	0	0	0		0	0	4	4
Manufacturing	8	79	5	53	12	30	10	4	15	4	220
Water and electricity	0	1	0	1	1	0	0	2	1	0	6
Construction	0	3	0	2	2	5	0	1	0	0	13
Transport and communication	0	2	5	19	3	18	6	0	0	0	53
Retail and trade	0	48	9	128	136	161	78	200	5	6	771
Financial	0	48	9	128	136	161	78	200	5	6	771
Community services	0	16	0	14	10	17	6	41	6	3	113
Total	8	150	19	218	164	235	100	249	27	17	1187

The majority of new urban developments have developed towards the west along Station Road, while the central business district has developed to the east of these extensions. Again, this leads to some urban communities centred on the urban core to be as far as 8 kilometres from these economic opportunities. Brand Street link the Thaba Nchu CBD with the N8 towards the south west. The area has also two industrial areas:

- One that developed to the west near the railway station and
- Another that developed to the east of the CBD.

The western industrial area was developed along the railway line and has side-line facilities and therefore more viable. There are 38 FDC factories with an occupancy rate of 65%.

MM.5.5 Historic perspective of industrialisation in Mangaung

According to a report commissioned by the MMM, “three factors have probably influenced the development of industry in Mangaung since the 1940s:

- **The first factor** is the Second World War, which spurred considerable industrialisation in South Africa.
- **The second factor** is the industrialisation that followed the Second World War, which mainly benefitted what is today known as Gauteng, eThekweni (Durban), Nelson Mandela Bay Metropolitan Area (Port Elizabeth), Buffalo City (East London) and Cape Town.
- **Thirdly**, progressive centralisation of production processes in South Africa led the apartheid government, in association with its policies of homeland development, to embark on a large-scale economic decentralisation project (Christopher, 1994). The consequence for Mangaung was the establishment of Botshabelo in 1979 and the declaration of Botshabelo as an industrial development point in the early 1980s and also the establishment of Bloemindustria as an intended border-industry area within the context of an industrial deconcentration point (Krige, 1991; Marais, 2008). Large-scale subsidies were available to especially Taiwanese business people and it was, in 1990, estimated that 57 factories provided job opportunities to between 10 000 and 12 000 local people (Krige, 1991; Tomlinson & Krige, 1997). The majority of these jobs were in the textile industries and high levels of exploitation were commonly found in Botshabelo (Krige, 1991). It is reported that by 1990, eight factories were operating in Bloemindustria. At the same time various integrated development plans (IDPs) and local economic development (LED).” (Mangaung 2013)

MM.5.6 Location of businesses located on industrial stands in Mangaung

Base on the Audit and survey of industrial hubs report in 2013, the manufacturing sector (18.53%) and the retail and trade sector (64.95%) are the more prominent in the industrial areas. Though manufacturing makes a substantial contribution (35.9%) to the economic development of the Botshabelo industrial area, the retail and trade sector (25.9%) is the most prominent in the Oranjesig area. (Source: Audit and survey of industrial hubs in Mangaung Metropolitan Municipality, Mangaung, 2013)

From a site investigation, discussions with MMM official and the Audit results per sector for businesses located on industrial stands in the MMM report, it is clear that manufacturing is not a significant driver of the metro’s economy. A considerable amount of space is being used as warehousing/storage. A significant percentage of businesses are involved in recycling. There is some textile manufacturing and the manufacture of plastic materials. There is a call centre that points the way to new services economy.

The export-base model of development is a favourite tool among of regional development policy practitioners. This theory posits that activities in an area divide into two categories: basic and non-basic. Basic industries are those exporting from the region and bringing wealth from outside, while non-basic (or service) industries support basic industries. In essence, manufacturing is considered an export-base activity. However, certain service sectors such as call centres, can also be considered part of the export-base.

From this analysis it would appear as though Mangaung has not succeeded sufficiently in broadening its export-base. Manufacturing forms are a very small portion of its value-added output. Unless significantly more manufacturing or other industries, such as tourism or call centres, can be relocated or established in the Metro, it is going to be very difficult to increase employment opportunities especially for the new immigrants into the Metro.

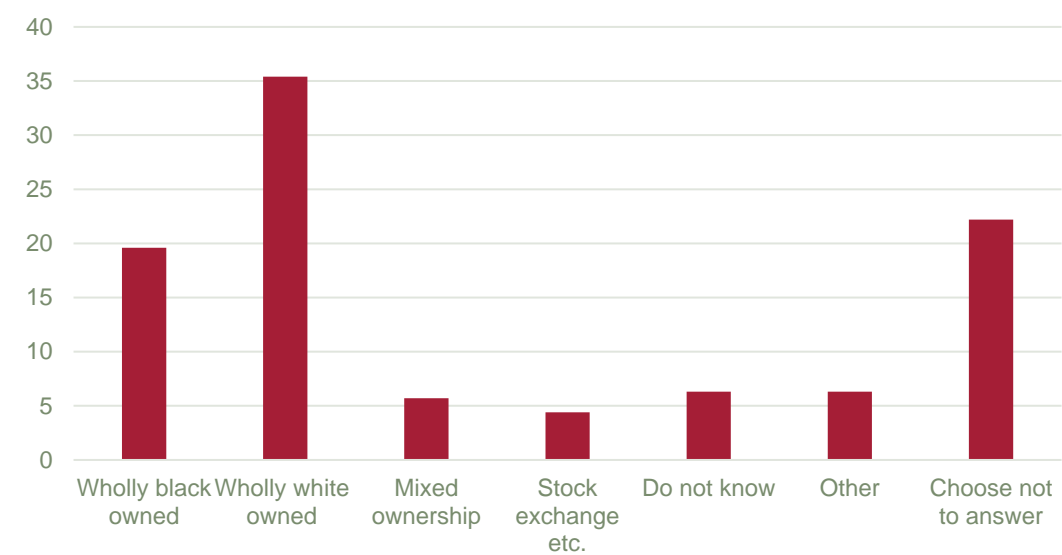
It is therefore critical that any public transport plans are closely aligned with industrial development. For this to be successful, manufacturing and other economic activities must be competitive. This implies that Mangaung enterprises are competitive. They must be productive, creative (or innovative)

and be able to produce consistently high-quality products or services. Productivity requires maximum use of capital and *three shifts* are considered the norm in successful exporting countries. The MMM will therefore have to ensure that there is sufficient *transport going to industrial areas 24 hours* per day. They also needs to be sufficient security for both the owners of the enterprises and the workers. It is also critical that housing, although not in the industrial areas, need to be close to the employment opportunities. The new economic activities, such as call centres, also require operations 24 hours per day. It is therefore also important that transport, security, and housing requirements are considered when recruiting or establishing new call centres in the Metro.

MM.5.7 Economic profile: ownership

In 2013 the MMM commissioned an ‘Audit of Industrial Hubs in Mangaung Metropolitan Municipality’. The brief made specific reference to eight industrial hubs and 800 industrial erven. The report reflects on the erf-to-erf investigation and also the responses to over 200 completed questionnaires.

Figure 3: Ownership profile of enterprises on industrial erven in Mangaung, 2013



Source Audit and survey of industrial hubs in Mangaung Metropolitan Municipality

Firms are still largely white-owned, but there seems to be a change. The high white-ownership can be attributed to the fact that there is a very sable business environment, which is a positive attribute for the Metro.

More than twenty percent of the respondents decided not to answer this particular question. Nearly one in five respondents indicated that the firm was owned by blacks only, 35% indicated that theirs was a white-owned firm, while nearly 6% reported mixed ownership. In respect of being listed on the stock exchange, 4.4% returned a positive response. Although the picture suggests that a substantial percentage of the enterprises are still white owned, it is significant that nearly 20% of enterprises are owned by blacks.

Enterprises that have established in Mangaung are mature and seemed to have a very high survival rate. Firms have been around on average for more than 15 years. Firms in areas such as Oranjesig have been around for more than 30 years. Enterprises in the industrial areas and the economic sectors suggest a relatively long period of commitment to Mangaung – a situation that could continue for a considerable time to come. As regards industrial areas, businesses in Hamilton have been in operation on the premises for the longest time.

MM.5.8 Main advantages of being located in Mangaung for business

Advantage	
Central location	38,1
Accessibility / close proximity	19,9
Market available / local support	14,8
Average costs (labour/services)	7,4
Good business / opportunities	7,4
No advantage	3,4
Space available	1,7
Do not know	1,1
Other	6,3

Centrality, close proximity to and market availability are all central to the advantages identified by enterprise. A few companies deem the average labour cost to be an advantage.

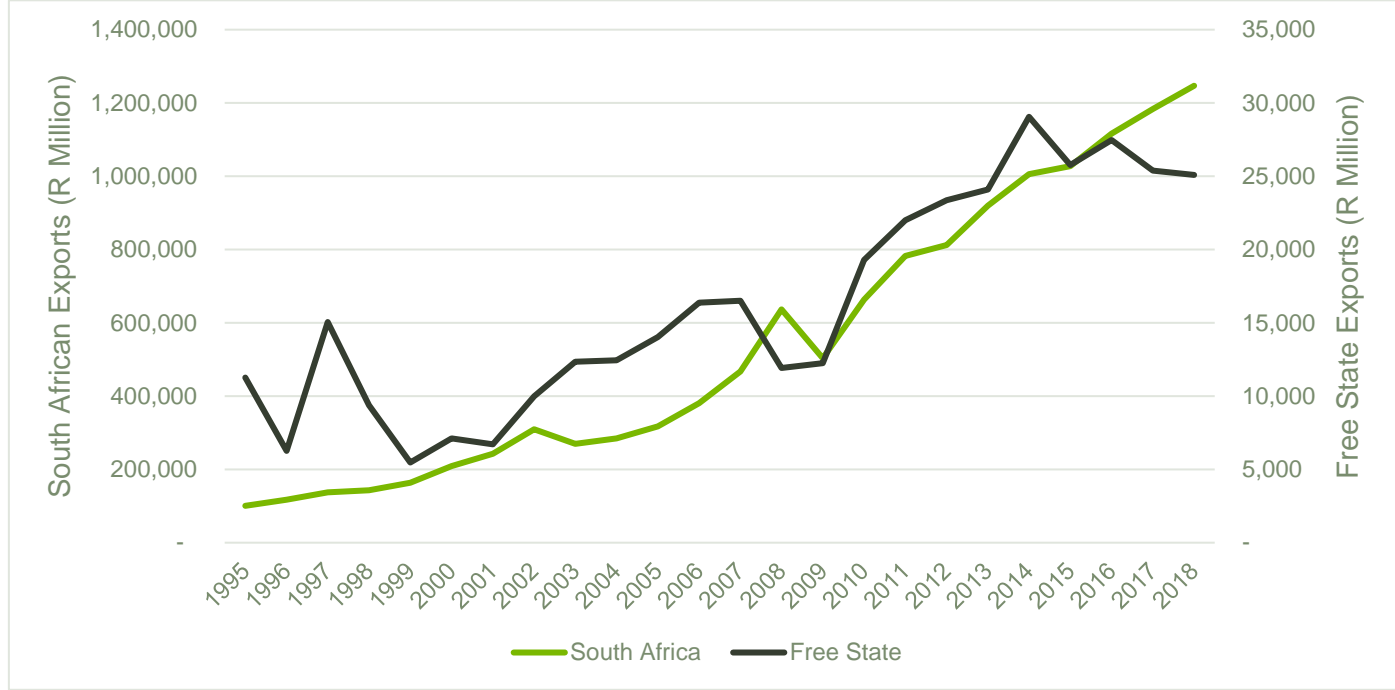
On the other hand, poor service delivery, high transport costs, unaffordability of products where highly cited disadvantage. Crime, as in the rest of South Africa is also a problem. Competition from, and access to raw materials and markets in Gauteng and the Western Cape were significant challenges.

MM.5.9 Imports and exports: international trade

The Industrial Policy Action Plan (the dti 2016, p3) states “There are a number of benefits that accrue to a country as a result of increased exports. These include the ability to specialise in attractive sectors, to build dynamic cluster economies of scale and scope, to increase employment and to increase foreign exchange earnings that enable the importation of advanced technologies. However, there are also major obstacles to exporting manufactured products. These include the need for a complex discovery process to learn about customer requirement s and competitor offerings in new markets. In addition, there are significant transaction complexities, costs and risks in doing business across different legal and financial systems.” The same can be said about both the South African and Free State economies.

South Africa’s exports are rising in nominal terms as the Figure 4 below shows. A similar trend can be seen for the Free State. However, in 2015 the Free State contributed only three percent to South Africa’s export basket and by 2018 this had dropped further to only 1,1%. This proportion is decreasing; it was almost 10% in 1995.

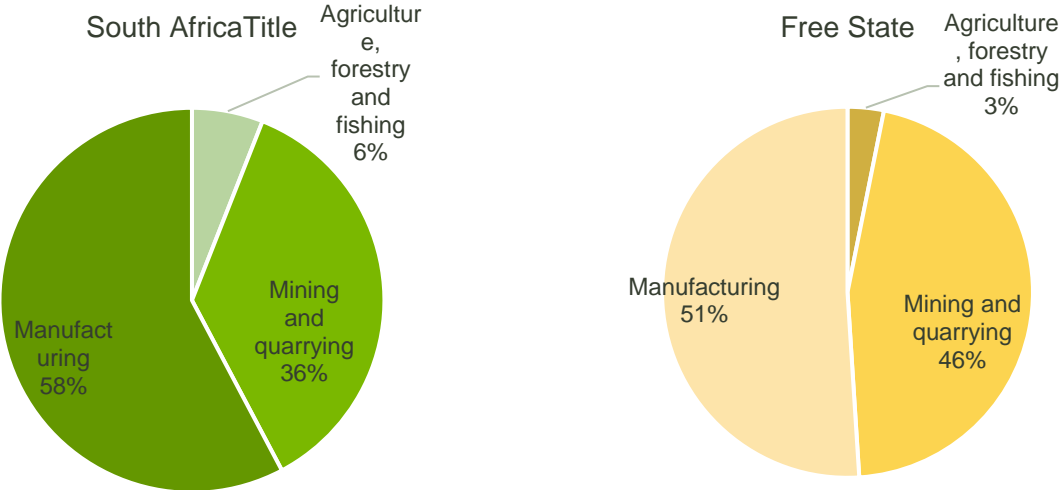
Figure 4: South Africa’s and the Free State’s exports



Source: Own calculations and SARS

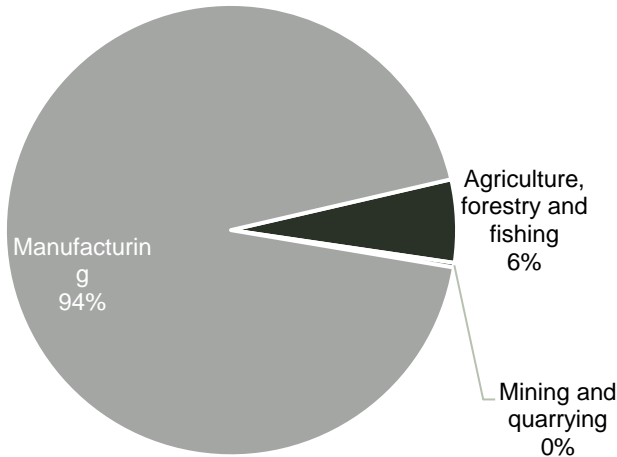
Although the manufacturing sector’s contribution to the economy has been on the decline since the 1970s (the sector’s contribution in 1971 averaged around 28%), the sector plays an important role in terms of employment and economic growth. However, shortages of skills, technology and market access are barriers to further growth. The competitive drivers listed by SA manufacturers as the most important were cost and availability of labour and materials, local market attractive-ness, energy costs and policies as well as physical infrastructure.

Figures 5a and b: Composition of South Africa’s and the Free State’s exports 2018



Source: Own calculations and Quantec

Figure 6: Mangaung’s exports: 2018



Source: Own calculations and Quantec

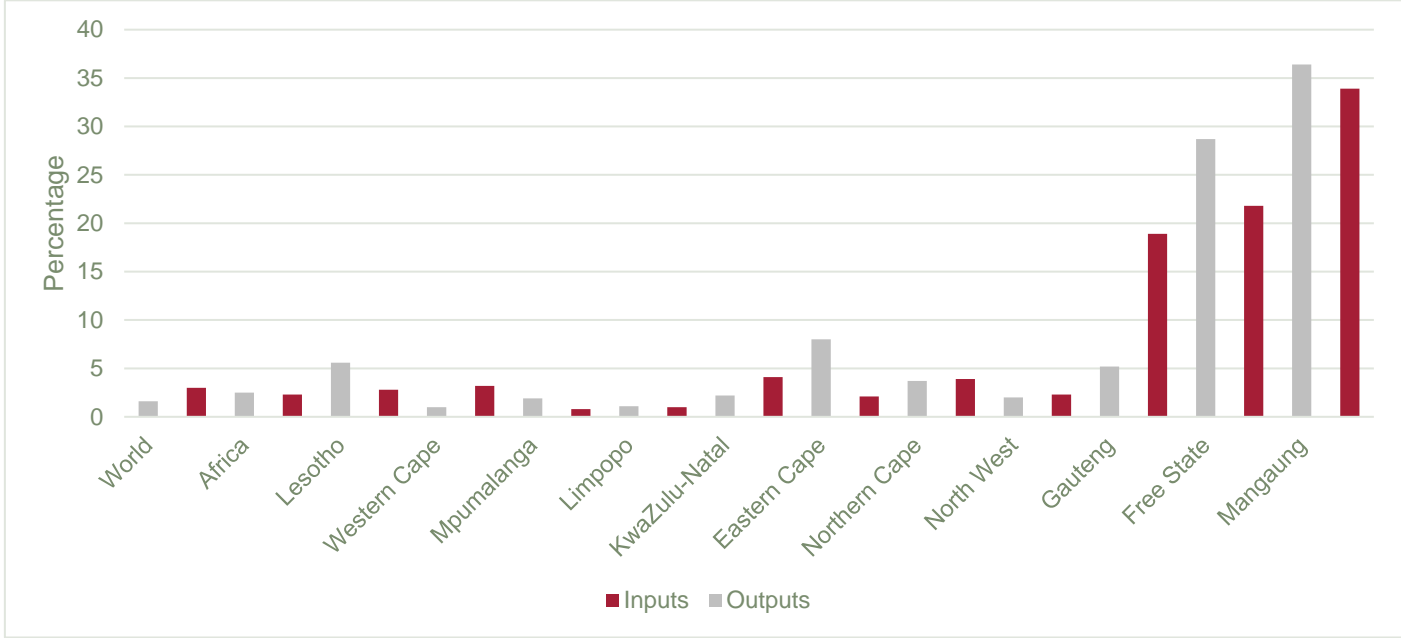
MM.5.10 Imports and exports: domestic trade

Marais (2013, 25) undertook a survey of business linkages in Mangaung where respondents were asked to give an indication of where they bought their business inputs and where they sold their products/service(s) relative to the geographical location of their customers.

Marais made the following points:

- Enterprises are mainly focused on Mangaung and the Free State, with 65% of their market being in these two areas.
- More than half of inputs originate from Mangaung and the Free State, but there is also a significant dependence on Gauteng in that 18.9% of all business inputs are sourced from this province.
- Western Cape is also important.
- The Eastern Cape (8%) is the biggest market outside the Free State, followed by Lesotho (5.6%) and the Northern Cape (3.9%). This confirms that many of the businesses serve the central South African market.
- Exports to the rest of Africa and the world remain quite small (4.1%). Imports of business inputs however constitute 5.3%.

Figure 7: South Africa’s and the Free State’s exports



Source: Marais (2013)

There is a well-constructed road network, connecting Johannesburg, Cape Town, Port Elizabeth, East London and Durban has Bloemfontein at its hub. This network is complemented by well-maintained roads radiating from the Free State capital to other centres throughout the country. Bloemfontein links up all the important railway connections between the industrial north and the south. The Braam Fischer (Bloemfontein) Airport is a modern commercial airport and is the third-largest airport under the jurisdiction of the Airports Company of South Africa (ACSA). This airport, which is only 10km from the city centre. The transport infrastructure linking the city to the rest of South Africa augurs well for the Metro.

The manufacturing sector has the highest outputs to areas outside the Free State, with 9.1% going to Gauteng, 22.8% to the rest of South Africa, 6.1% to Lesotho, 3.1% to Africa and 1.7% to the rest of the world (Refer to Table 2).

Table 2: Sources of inputs for Mangaung’s industries

Sector	Mangaung/ Free State	Gauteng	Rest of South Africa	Lesotho	Africa	World
Agriculture	78,6	7,1	14,3	0,0	0,0	0,0
Manufacturing	57,2	9,1	22,8	6,1	3,1	1,7
Construction	81,4	0,0	10,0	8,6	0,0	0,0
Transport	82,8	16,6	0,7	0,0	0,0	0,0
Retail	72,1	3,6	15,0	5,4	2,5	1,4
Services	33,0	13,2	17,9	12,0	12,0	2,0

Source: Marais (2013)

Marais’ is encouraging that from Marais’ survey that firms purchase more than 70 percent of inputs for construction from local suppliers (Refer to Table 3). This implies that much of the expenditure that will be made on the ITPC will remain in Mangaung and the Free State. Similarly, the transport sector supplies 60 percent of the requirements from either Mangaung or the Free State. It should be noted that these figures may not be fully representative since the survey was only done in specific industrial areas.

The consumer market in Mangaung and its immediate vicinity is surprisingly extensive. In addition to local residents, it includes the enormous buying power of thousands of Lesotho citizens, with farmers from the surrounding rural areas also boosting the retail market. It is estimated that more than 50% of the millions pumped into Lesotho from abroad is spent in Mangaung, representing a market of several million people.

Table 3: Sources of inputs for Mangaung’s Industries

Sector	Mangaung/ Free State	Gauteng	Rest of South Africa	Lesotho	Africa	World
Agriculture	50,0	50,0	0,0	0,0	0,0	0,0
Manufacturing	49,6	23,3	17,5	3,8	2,6	3,2
Construction	70,2	7,0	19,4	3,4	0,0	0,0
Transport	60,0	40,0	0,0	0,0	0,0	0,0
Retail	60,0	80,7	15,0	2,6	0,9	2,8
Services	36,2	11,4	21,1	10,4	10,4	10,4

Source: Marais (2013)

MM.5.11 Regional analysis

Shift-Share analysis can describe and decompose the employment changes in a specific time period while LQ technique can present the one year’s specialization of industries in the regions. Both of them just need easily accessible data and also give important results about regional and sectoral dynamics. Besides these, Shift-Share analysis emphasises the region-specific portion of the regional employment change with Regional Shift (RS) component.

MM.5.12 Base- or export-sector analysis

The economic base (or export-base) technique is the oldest, simplest and most widely used technique for regional economic analysis. Economic-base concepts originated with the need to predict the effects of new economic activity on cities and regions.

The basic view of the economic base theory is at the rate of economic growth of a region is determined by the amount of the increase in exports from that region. Among practitioners of regional development policy, the economic- or export-base model of development is a favourite tool. It posits that activities in an area divide into two categories:

- Basic and
- Nonbasic.

In other words, the basic sector is made up of local businesses (firms) that are entirely dependent upon external factors. The non-basic sector, in contrast, is composed of those firms that depend largely upon local business conditions.

Export activities are all activities that produce products and services that bring money in from outside the region and are called base activities. Therefore base-industries are those exporting from the region and bringing wealth from outside, while non-basic (or service) industries support basic industries. The extent to which a local, regional economy can produce the goods that consumers want, so they don’t have to be imported, has an enormous effect on the value of the export multiplier. In other words, Export industries represent the economic base of an economy and are responsible for attracting outside sources of revenue for the community.

Today, export activities purchase many services, and the comparative advantage of an area may well lie in the services it produces. There is less merchandise trade, especially of final products ready for

consumption, because technology permits small-scale manufacturing and assembly. This concept changed the ideas of what is considered basic.

Services in Mangaung that can be considered export or base industries include:

- Health services,
- Education, and
- Tourism.

The economic base theory also uses the Location Quotient to determine the extent that the product is manufactured in the region. It is used as a proxy to show what the region's comparative advantage is.

MM.5.13 The location quotient

The location quotient (LQ) is an indirect method of identifying export or base industries and is akin to the concept of revealed comparative advantage in international trade theory. Location quotients are calculated for each industry to determine if the local economy has a greater proportion of each industry than the national economy. Thus, the location quotient can reasonably determine which industries are comparatively exporting their goods and service and the extent of their involvement in “driving” the local economy.

The location quotient can be calculated using either employment data or value –added data. Using value-added data the applicable formula is:

$$LQ_i = \frac{V_i^r / V^r}{V_i^n / V^n}$$

Where;

- LQ_i is the location quotient for the region (Mangaung or the Free State) for sector i ;
- V_i^r is the value added for the region (Mangaung or the Free State) for sector i ;
- V^r is the value added in the region (Mangaung or the Free State);
- V_i^n is the value added for the country (South Africa) for sector i ;
- V^n is the value added in the country (South Africa).

The resulting location quotient may be interpreted as follows:

$LQ > 1.0$: The region has a greater share of employment in industry i than the national (or benchmark) region. The higher the LQ is, the greater the region's specialisation in this industrial sector. A location quotient is greater than 1 does not necessarily mean that an industry is competitive or growing. It may simply mean the industry is not as efficient and employs more people than the national average to produce the same level of output.

$LQ = 1.0$: The regions share of employment in industry i is equal to that of the national (or benchmark) region. It is assumed that the region is completely self-sufficient and neither exports nor imports the goods or services of this industry. All employment is considered non-basic.

$LQ < 1.0$: If industry i has a smaller share of employment than the national (or benchmark) region> in other words, the region falls below the level of self-sufficiency and needs to import to meet local demand for that particular industry sector's goods and services. All employment is considered non-basic.

Table 4: Location Quotient for Free State and Mangaung

	Free State	Mangaung	Bloemfontein	Botshabelo/ ThabaNchu
Agriculture	1,67	0,13	0,11	0,43
Forestry	0,36	0,06	0,05	0,22
Fishing	0,04	0,02	0,01	0,03
Coal	0,76	0,00	0,00	0,00
Gold	9,65	0,00	0,00	0,00
Metals	0,15	0,00	0,00	0,00
Other mining	2,66	0,23	0,09	2,67
Food	1,12	0,26	0,18	1,49
Beverages and tobacco	0,61	0,32	0,29	0,47
Textiles	0,36	0,17	0,13	0,63
Wearing apparel	0,98	0,26	0,08	3,20
Leather products	0,19	0,09	0,02	1,15
Footwear	0,19	0,12	0,04	1,43
Wood and wood products	0,33	0,11	0,09	0,47
Paper and paper products	0,27	0,13	0,11	0,42
Printing , recorded media	0,20	0,12	0,11	0,17
Petroleum products	2,02	0,10	0,08	0,44
Basic chemicals	1,63	0,16	0,11	0,93
Other chemical products	0,85	0,12	0,10	0,34
Rubber products	0,55	0,20	0,17	0,47
Plastic products	0,68	0,24	0,13	1,94
Glass and glass products	0,27	0,14	0,11	0,64
Non-metallic mineral products	0,73	0,26	0,20	1,12
Basic ferrous products	0,48	0,08	0,05	0,38
Non-ferrous products	0,18	0,07	0,06	0,30
Structural metal products	0,54	0,16	0,12	0,79
Other metal products	0,59	0,18	0,14	0,76
Machinery and equipment	0,36	0,14	0,12	0,38
Electrical machinery	0,40	0,22	0,18	0,84
Communication equip	0,27	0,13	0,11	0,42
Professional equipment	0,47	0,27	0,24	0,52
Motor vehicles, parts	0,32	0,17	0,15	0,32
Other transport equipment	0,23	0,10	0,08	0,31
Furniture	0,57	0,19	0,15	0,72
Other manufacturing groups	0,63	0,25	0,20	0,97
Electricity and gas	1,35	0,61	0,54	1,18
Water	1,18	0,34	0,23	2,08
Construction	0,75	0,26	0,22	0,79
Wholesale and retail trade	1,19	0,43	0,34	1,52
Hospitality	1,17	0,47	0,41	1,13
Transport and storage	1,00	0,41	0,32	1,53
Communication	0,77	0,46	0,43	0,58
Finance	0,64	0,33	0,31	0,38

	Free State	Mangaung	Bloemfontein	Botshabelo/ ThabaNchu
Professional business services	0,71	0,35	0,32	0,60
Business activities n.e.c.	0,86	0,37	0,29	1,54
Government	1,00	0,45	0,37	1,32
Local gov	0,92	0,31	0,25	1,15
Education	1,34	0,50	0,40	1,84
Health and social work	1,30	0,65	0,56	1,63
Other social services	1,27	0,42	0,34	1,50

The Free State has a comparative advantage in gold; other mining; petroleum products; agriculture; basic chemicals; and electricity.

Mangaung and Bloemfontein have a comparative advantage in health and social work; electricity and gas; education; hospitality; communication; government; wholesale and retail trade ; and social services. This is typical of a capital city with a relatively large government sector.

Botshabelo and Thaba Nchu have a comparative advantage in wearing apparel ; water; plastic products; education; and health and social work. The high location quotients in Botshabelo and Thaba Nchu for wearing apparel and plastic products is because the level of economic activity is low and there are industrial parks that produce these products.

MM.5.14 Global value chains

For the past century or so trade has been increasing and forms a significant part of most countries GDPs. However, as technologies have improved and the costs of communication and transport have come down, an additional dimension of globalization over the past two decades has been the emergence of global value chains (GVCs). Production processes have been more dispersed across the globe. This has given rise to systems of supply chains in which value is added at each stage before crossing the border to be passed on to the next stage—GVCs. This process has allowed countries to better exploit their comparative advantages, by giving them the opportunity to join a production chain without having to provide all the other upstream capabilities.

Although Mangaung is based In the Free State and is far from major seaports, it is centrally located in South Africa and well serviced by both rail and road. It is therefore possible that Mangaung can become more integrated into global value chains. However, it's poorly developed manufacturing sector and supporting industries will have to be improved significantly for this to happen. Mangaung will have to show itself as a producer of high-quality innovative products. Productivity will also have to increase significantly. The IPTN can make a contribution to improving labour productivity. (This will be discussed elsewhere)

MM.5.15 Shift-share analysis

Shift-share analysis is very practical in assessing the impacts of industrial restructuring on regional and local economies and for providing guidance for industrial targeting, and hence can make a significant contribution to understanding and selection of key leading industries in the region, which can help forming local industry partnerships. The shift-share model examines economic change (i.e., growth or decline) in a region by decomposing it into three components: national share, industrial mix, and regional share. The variable so decomposed may be employment, income, output, population or a variety of other economic factors that are imbedded in different hierarchical levels.

Shift-Share analysis is a framework for both describing and projecting secular changes in selected macroeconomic variables for subnational areas. Shift-Share analysis systematically describes differences in the growth rates, by industry and by regions. The purpose of Shift–Share analysis is to

disaggregate the growth of an industry into its three contributing parts - national share, industrial mix, and regional shift - of regional growth.

Shift-share is traditionally calculated using employment data, but can be calculated using value added data as was the case when calculating the location quotient. The shift-share formula, using employment data is given by the following formula:

$$\Delta e_i = e_{it} - e_{i(t-1)} = NS_i + IM_i + RS_i$$

Where

- Δe_i is the change in employment in in the region in industry i
- NS_i is a change due to national trends
- IM_i is a change due to the industry mix

The sub-components of the formula are given as follows:

NS_i is a change due to national shift:

$$NS_i = e_{i(t-1)} \times \frac{E_t - E_{(t-1)}}{E_{(t-1)}}$$

A rising tide lifts all boats. Therefore, if the national economy is growing, this should have an influence on the local economy. The national share component therefore measures the regional employment change that could have occurred if regional employment had grown at the same rate as the nation.

Similarly of the regional economy is growing, it would be expected that all sectors in the region would grow as well. The regional share component measures the differential shift due to differences in rates of growth of the same industry between the region and the nation as a result of factors such as national resources, other comparative advantages or disadvantages, leadership and entrepreneurial ability, and the effects of regional policy. This component is given below.

RS_i is a change due to regional shift

$$RS_i = e_{i(t-1)} \times \left(\frac{e_{it} - e_{i(t-1)}}{e_{i(t-1)}} - \frac{E_t - E_{(t-1)}}{E_{(t-1)}} \right)$$

If consumer tastes change. There would be an increase in demand in that sector and this may be the reason for the growth. This component is given below.

IM_i is a change due to industrial shift

$$IM_i = e_{i(t-1)} \times \left(\frac{E_{it} - E_{i(t-1)}}{E_{i(t-1)}} - \frac{E_t - E_{(t-1)}}{E_{(t-1)}} \right)$$

The industry mix component measures proportional shift due to a difference in industry growth between the region and the nation. A region that contains a relatively large share of industries that are fast (slow) growing nationally will have a positive (negative) industry mix effect. The positive values indicate that the industry composition of the local area was tilted toward faster growing industries. Similarly, a negative result would have indicated just the opposite.

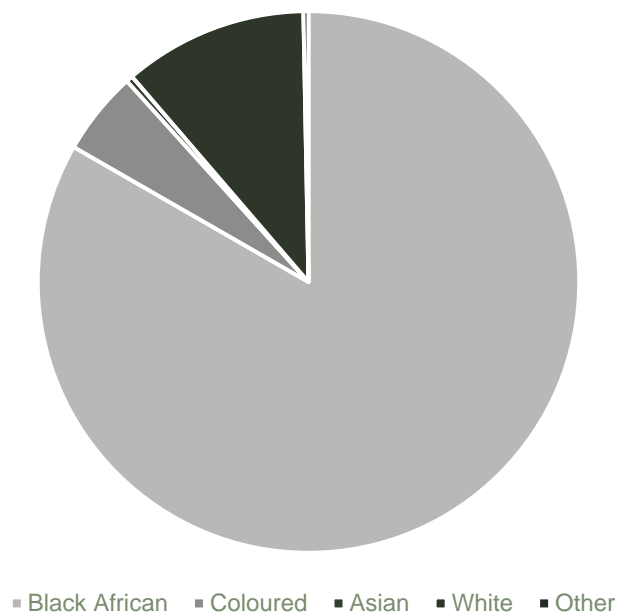
The most important result from the industry mix calculation is the “TOTAL” derived from summing over all industries. These can be seen in the **Annexure ??** Generally, the Free State has a negative total industry mix while Mangaung has a positive industry mix. This indicates that the industry mix in Mangaung is tilted toward positive growth while the industry mix in the Free State is tilted toward negative growth.

MM.6 Population and Demographics

According the 2011 census “Mangaung has a population of 747 431, of which 83,3% are black African, 11,0% are white, 5,0% are coloured, with other population groups making up the remaining 0,7%. Of those aged 20 years and older, 4,7% have completed primary education, 33,2% have some secondary

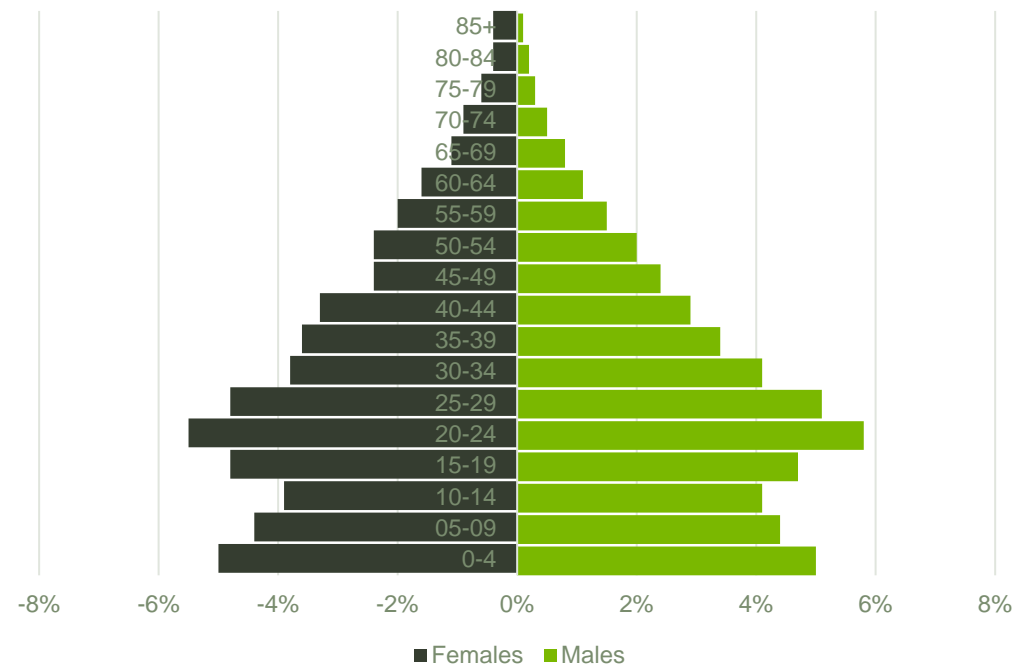
education, 30,3% have completed matric and 14,2% have some form of higher education. 4,3% of this group have no formal schooling”.

Figure 8: Mangaung’s population groups



Source: StatsSA (http://www.statssa.gov.za/?page_id=1021&id=mangaung-municipality)

Figure 9: Mangaung’s population groups



Source: StatsSA (http://www.statssa.gov.za/?page_id=1021&id=mangaung-municipality)

MM.6.1 Population Growth

Population growth is affected by three factors

MM.6.1.1 Fertility Rate

The fertility rate is typically measured by the number of children per one woman of child-bearing age. If the fertility rate is larger than 2, the rule of thumb is that the population should rise, as there are more children than their parents.

MM.6.1.2 Mortality Rate

A key factor affecting the growth of the population is the death, or mortality, rate. The factors that affect the mortality rate include the availability and affordability of quality health care and lifestyle habits.

MM.6.1.3 Immigration and Emigration

Cross-border migration is the act of people moving from one area to another. Migration is caused by a number of factors, such as better education, employment or joining family members. According to StatsSA⁴ “Migration is at the best of times a very complex phenomenon to study, and at the same time it is currently one of the most hotly contested themes in contemporary public debates and discussion. Because of its complexity, this volume is structured in such a way as to reflect the varied and dynamic context of the study of migration.”

Mangaung faces an outward migration to areas such as Gauteng and Cape Town but also faces the challenge of new immigrants from rural areas. With ever mounting pressures exerted further by the emergence of new informal settlements (due to inward migration) on the one hand, as well as new developments such as human settlements and commercial centres.

MM.6.2 Household dynamics

As would be expected, the number of households is increasing refer to Table 5. This is due to the increase in population as well as the size of the households shrinking. It would seem as though there are more female headed households and the number of households living in formal structures is on an upward trajectory, with more households owning their own homes.

Table 5:Household dynamics

Household Dynamics	2016	2011
Households	265 561	240 700
Average household size	3.0	3.10
Female headed households	41.4%	41.0%
Formal dwellings	87.1%	83.8%
Housing owned	70.1%	62.3%

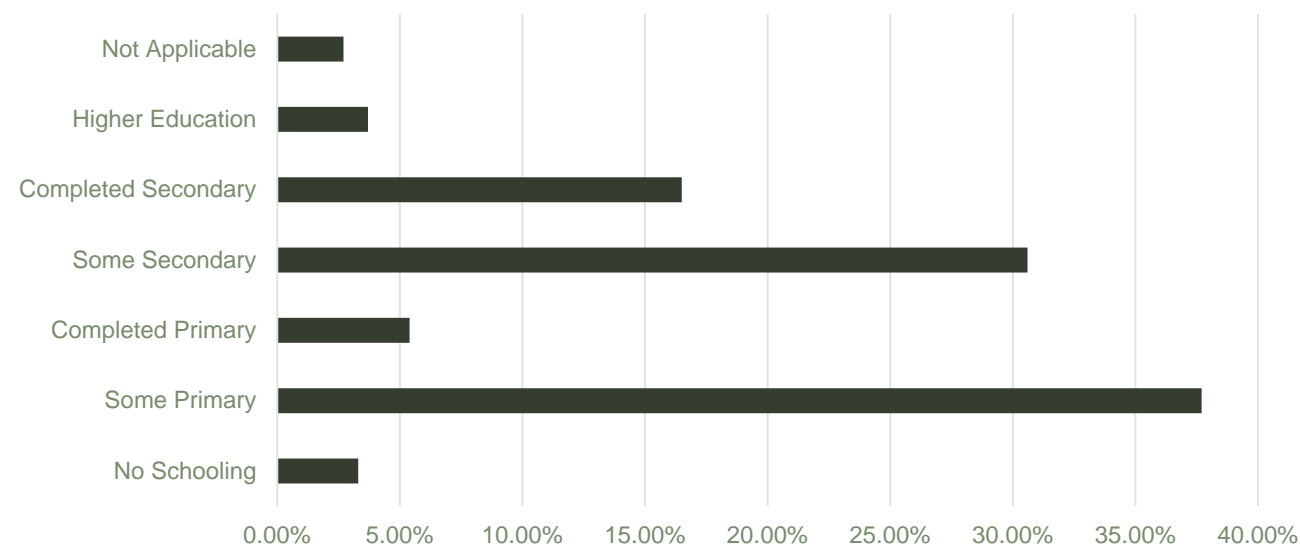
Source: localgovernment.co.za

MM.6.3 Educational Status

⁴ <http://www.statssa.gov.za/publications/Report-03-01-79/Report-03-01-792011.pdf>

Educational achievement is a key development indicator of a population. The majority of the population (ages over twenty) in the metro have not completed matric, however, there is a large percentage of learners who complete primary level education.

Figure 10: Mangaung’s highest level of education



Source: StatsSA (http://www.statssa.gov.za/?page_id=1021&id=mangaung-municipality)

MM.6.4 Employment and Labour

Unemployment is currently the greatest socio-economic problem facing South Africa, the Free State and Mangaung. If employment, especially decent jobs, could be increased, it would decrease poverty, Improve inequality and certainly lead to wealth creation. These in turn would contribute to a better life for all.

The working - age population comprises three groups:

- Those who have jobs,
- Those who are unemployed and actively looking for work , and
- Those who are not economically active such as discouraged work - seekers, full - time students, homemakers and retired people.

Table 6: Labour force characteristics

	South Africa	Free State	Free State - Non Metro	Mangaung
Population 15-64 yrs	36 272	1 875	1 351	524
Labour Force	21 211	1 176	831	344
Employed	16 018	825	559	266
Unemployed	5 193	351	272	79
Not economically active	15 061	700	520	180
Discouraged work-seekers	2 279	71	47	23

⁵ The unemployment rate usually rises in the first quarter of the year, as temporary staff hired to work over the busy festive season is dismissed.

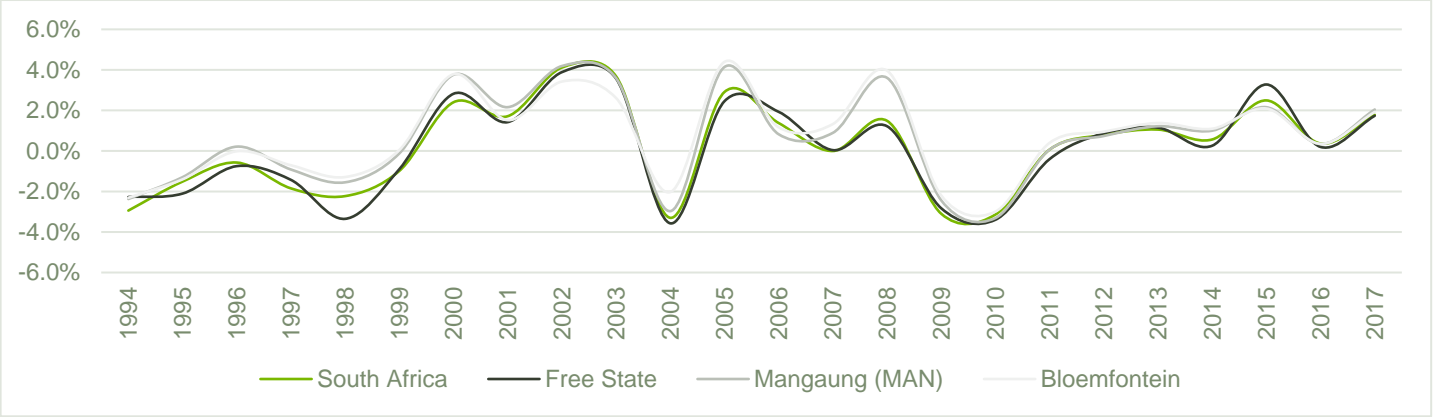
Other	12 782	629	472	157
Rates (%)				
Unemployment rate	24,5	29,8	32,7	22,8
Employed / population ratio (Absorption)	44,2	44,0	41,4	50,7
Labour force participation rate	58,5	62,7	61,5	65,7

Source StatsSA

According to Statistics South Africa, (2016) the employment rate for the Free State and MMM was 29,8% and 22,8% respectively. Mangaung has a lower unemployment rate than the Free State and South Africa. However, the Free State’s non-metro unemployment is very high at 32,7%. This puts pressure on inward migration into the metro.

The labour force participation rate is the measure to evaluate working-age population in an economy. The participation rate refers to the total number of people or individuals who are currently employed or in search of a job.

Table 7: Labour force participation rate (Percentage)

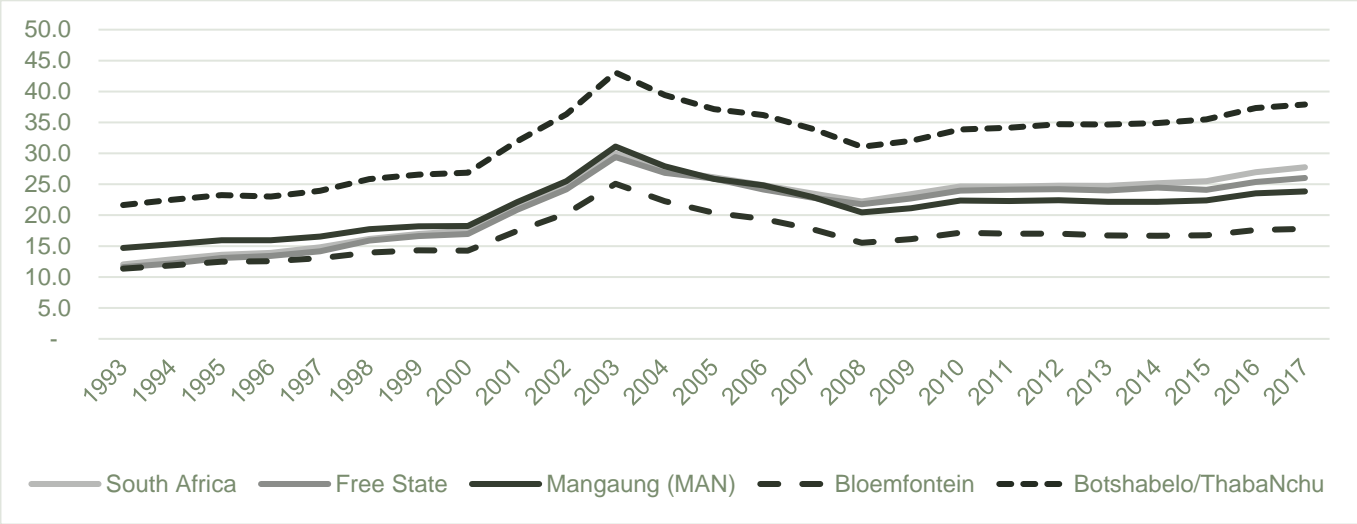


People who are still undergoing studies, housewives and persons above the age of 64 are not reckoned in the labour force.

South Africa’s labour force participation rate decreased to 58.80 percent in the first quarter of 2019 from 59.40 percent in the fourth quarter of 2018. The labour force participation rate in South Africa averaged 57.19 percent from 2001 until 2019, reaching an all-time high of 60.80 percent in the first quarter of 2001 and a record low of 53.60 percent in the fourth quarter of 2010.

The unemployment rate in South Africa rose to 27.6 percent in the first quarter⁵ of 2019 from 27.1 percent in the previous period. It is the highest jobless rate since Q3 2017, as the number of unemployed went up by 62 000 to 6.20 million and employment fell by 237 000 to 16.29 million. The unemployment rate averaged 25.7 percent from 2000 until 2019, reaching an all time high of 31.20 percent in the first quarter of 2003 and a record low of 21.50 percent in the fourth quarter of 2008.

Table 8: The unemployment rate



Unemployment reached a high point in 2003. After that the unemployment rate decreased until the 2007 recession. The unemployment rate has been slowly increasing since 2009.

According to StatsSA (2016), “Entrenched structural weaknesses in the labour market due to the mismatch between skills and available jobs are reflected in the high incidence of long - term unemployment among both youth and adults – at over 65,0% most years in the aftermath of the recession. This highlights the challenges faced by youth in finding employment given that as many as 55,0% of young people who are actively looking for jobs have education levels below matric while an additional 36,4% only have a matric qualification. Even among young people who are lucky to have a job, the level of education for many poses a serious constraint to their position on the occupational ladder. Despite the improvement in the education profile of employed youth over the period 2008 – 2015, in 2015 as many as 44,5% had an education level below matric while an additional 36,9% had only matric. Relatively few employed youth (21,2%) had a tertiary education. Large differences in the education profile by population group resulted in only 13,1% of black African youth and 10,5% of coloured youth having skilled occupations while one in every three Indian/Asian youth (36,2%) and 53,4% of white youth had such occupations.” A similar trend is applicable in both the Free State and Mangaung.

MM.7 Feedback: Increased Transport Efficiency

From economic theory and previous research undertaken on improved public transport systems, it is clear that this is improving the commuter’s quality of life, there is also an improvement in the economies productivity. However, until the entire project has been specified, it would be difficult to quantify what the productivity improvements would do for the Free State and Mangaung economies. Nevertheless, it is important to point out that they would be productivity improvements especially given the “apartheid spatial” design of the city.

MM.8 Macro-economic Impact Assessment

The IPTN or the *Hauweng* service is a very large project has a number of stages and a number of phases within each stage with planning until 2035/36 . The *Hauweng* service includes:

- Maphisa
- OR Tambo
- CBD
- Dr Belcher
- Botshabelo
- Thaba Nchu

MM.8.1 A description of the macroeconomic model

The impact of construction was derived by a commodity shock approach ($\Delta y = INV[I-A].\Delta x$ where Δx is the shock), which measures the value of additional commodities and services required to establish the transport hub. Matrix A refers to the structure of sectors within the economy. This approach requires the capital cost of the commodities classified in the SAM model. In this case the sectors Building construction, Civil engineering construction, Machinery and Equipment and Business services (design and project management) were involved. The project value also includes the cost of capital goods like Forklifts and Reach stackers, as well as Head office capital costs; and it includes VAT, a Contingency allowance and Engineering, Procurement and Construction Management (EPCM) costs-

MM.9 Cost Estimates

The capital costs used for the socio-economic impact are as follows:

Route	Capital cost
Maphisa	R279,17M
OR Tambo	R85,90M
CBD	R95,87M
Dr Belcher	R124,52M
Botshabelo	R136,04M
Thaba Nchu	R147,39M

An additional R466,82M has been budgeted for compensation.

MM.10 Methodology for Operational Impact

In the initial impact assessment, the operational impact was modelled using the total capital expenditure for the entire period until 2035/36.

MM.11 Results of the Macroeconomic Impact Assessment

Although the total capital cost is R1 772,34M, the macroeconomic impact assessment will only look at both the total capital infrastructure costs of R466,82 (this does not include ITS CAPEX, ITS OPS, Vehicle Acquisition and Branding of Feeder Vehicles).

The impact report below includes the indirect, direct and induced impacts.

MM.11.1 Aggregated Macroeconomic Impact

The table below summarises the impact of the construction phase on the national economy - it shows the direct, indirect and induced impact that the development of the project will have on the national, provincial and local economies.

Table 9: Macroeconomic Impact (R billions)

	Additional output ⁶	Compensation of employees	Intermediate consumption	Intermediate Imports	Net taxes on products	Gross value added ⁷	GOS	GDP ⁸	Value added ⁹
South Africa	R 4,93	R 0,88	R 2,39	R 0,59	R 0,13	R 1,82	R 0,90	R 1,96	R 1,78
Free State	R 2,32	R 0,35	R 1,20	R 0,35	R 0,07	R 0,70	R 0,35	R 0,77	R 0,69
Mangaung	R 2,12	R 0,31	R 1,11	R 0,33	R 0,06	R 0,62	R 0,31	R 0,68	R 0,61
Bloemfontein	R 2,08	R 0,30	R 1,09	R 0,32	R 0,06	R 0,60	R 0,30	R 0,66	R 0,60
Botshabelo/ Thaba Nchu	R 1,94	R 0,27	R 1,03	R 0,31	R 0,06	R 0,54	R 0,27	R 0,60	R 0,54

Each these elements (Additional output; Compensation of employees; Intermediate consumption; Intermediate Imports; Net taxes on products; Gross value added; GOS; GDP; Value added) are discussed below.¹⁰

MM.11.2 Additional output

The additional output at basic prices includes Intermediate plus final sales and is equal to total input (Intermediate costs plus value added). Intermediate output consists of the value of goods and services. The value-added components include compensation and gross operating surplus (GOS).

As can be expected, the sector that contributes the most to the additional output at basic prices is construction. Because the indirect, direct and induced impacts are all included wholesale and retail trade as well as other business activities are also important contributors to the impact.

MM.11.3 Gross domestic (or geographic) product

GDP or Gross Geographic Product (GGP)¹¹ is the value of final output of goods and services that are used or consumed by individuals, households, general government and firms and not processed further or resold. It is a more accurate measure of the performance of the economy or “an injection” into the economy such as the building of the ITPN. The output tends to double count sales and therefore exaggerates the actual impact of the project.

It can be disaggregated as follows:

Final output/demand
= Expenditure on GDP
= Gross domestic expenditure + Net exports
= Gross domestic product (GDP) at market prices

GDP at market prices (value added originating) is the value that the production processes and services rendered in the economy adds to the value of goods sold or services delivered.

It can be disaggregated as follows:

⁶ At basic prices

⁷ At basic prices

⁸ At market prices

⁹ At factor cost

Gross domestic product (GDP) at market prices
= Gross value added at basic prices + Net indirect taxes on products¹²
= Final output/demand

Unfortunately, taxes and subsidies on products are not generally available at sub-national level. Therefore, the GGP has to be estimated and the impact on the GGP of the ITPN is also an estimation. These estimates are given below.

MM.11.4 Compensation

The compensation of employees is the income received by employees, i.e. wages and salaries.

MM.11.5 Direct and indirect full-time equivalent jobs

An employee is defined as any person who is in regular or casual employment, including those holding managerial posts. Employment is the number of employees, including persons who are temporarily absent on paid sick or vacation leave.

Although hours worked is conceptually a better measure of labour input for productivity measurement purposes, it can be argued that employment is a more reliable measure. Hours worked are more erratic because the observation can be greatly affected by holidays, strikes, etc., which may have occurred in the reference week.

Appendix 1: Key labour market concepts

The working - age population comprises everyone aged 15 – 64 years who fall into each of the three labour market components (employed, unemployed, not economically active).

Employed persons are those who were engaged in market production activities in the week prior to the survey interview (even if only for one hour) as well as those who were temporarily absent from their activities. Market production employment refers to those who:

- a) Worked for a wage, salary, commission, or payment in kind.
- b) Ran any kind of business, big or small, on their own, or with one or more partners.
- c) Helped without being paid in a business run by another household member.

In order to be considered unemployed based on the official definition, three criteria must be met simultaneously:

- A person must be completely without work,
- Currently available to work, and
- Taking active steps to find work.

¹⁰ Full details including the sectoral breakdown are included in Appendix ??

¹¹ The GDP is generally a measure of economic activity at national level while the GGP is a similar measure at sub-national (provincial, metro, or municipal) level.

¹² These include Value Added Tax (VAT), Custom Duties, Excise Duties, and Fuel Levies.

The expanded definition excludes the requirement to have taken steps to find work.

The labour force comprises people that are employed plus those who are unemployed.

A person who reaches working age may not necessarily enter the labour force. He/she may remain outside the labour force and would then be regarded as inactive (not economically active). This inactivity can be voluntary – if the person prefers to stay at home or to begin or continue education – or involuntary, where the person would prefer to work but is discouraged and has given up hope of finding work.

Not economically active persons are those who did not work in the reference week because they either did not look for work or start a business in the four weeks preceding the survey, or they were not available to start work or a business in the reference week.

The not economically active is composed of two groups:

- Discouraged work - seekers and
- Other (not economically active, as described above).

Discouraged work - seekers are persons who wanted to work but did not try to find work or start a business because they believed that there were no jobs available in their area, or were unable to find jobs requiring their skills, or they had lost hope of finding any kind of work.

The unemployment rate measures the proportion of the labour force that is trying to find work.

The labour force participation rate is a measure of the proportion of a country ' s working - age population that engages actively in the labour market, either by working or looking for work; it provides an indication of the relative size of the supply of labour available to engage in the production of goods and services (ILO, KILM 2013).

The absorption rate (employment - to - population ratio) measures the proportion of the working - age population that is employed.

Graduates/Tertiary education (individuals who have qualifications categorised as “higher “education) are persons who have obtained an undergraduate or post - graduate degree or have completed secondary school and in addition obtained a certificate or diploma of at least six months ' full - time duration.

Youth:

- Youth are regarded as per sons aged 15 – 34 years and adults are aged 35 – 6 4 years.

Occupations:

- Skilled occupations are Managers; Professionals ; and Technicians grouped.
- Semi - skilled occupations are Clerks; Sales; Skilled agriculture; Craft and Machine operators grouped.
- Low - skilled occupations are Elementary and Domestic work.

Sectors:

Primary industries are Agriculture and Mining.

Secondary industries are Manufacturing; Utilities; and Construction.

Tertiary industries are Trade; Transport; Finance; Community and social services; and Private households.

1. Impact of the total construction

MM.12 South Africa

Figure 11: The impact of the total construction on additional output at basic prices in South Africa (R Million)

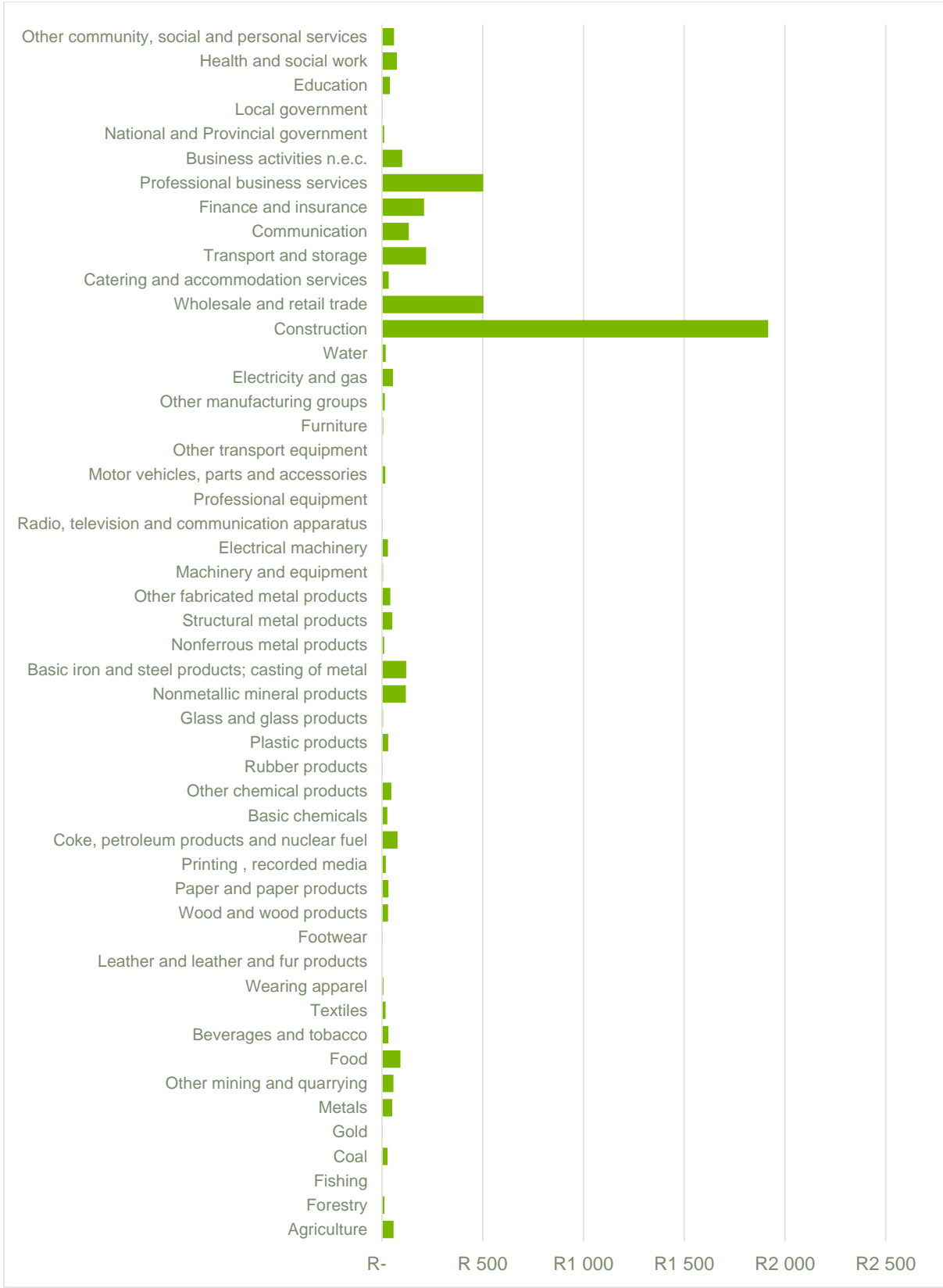


Figure 12: The impact of the total construction on GDP at market prices South Africa (R Million)

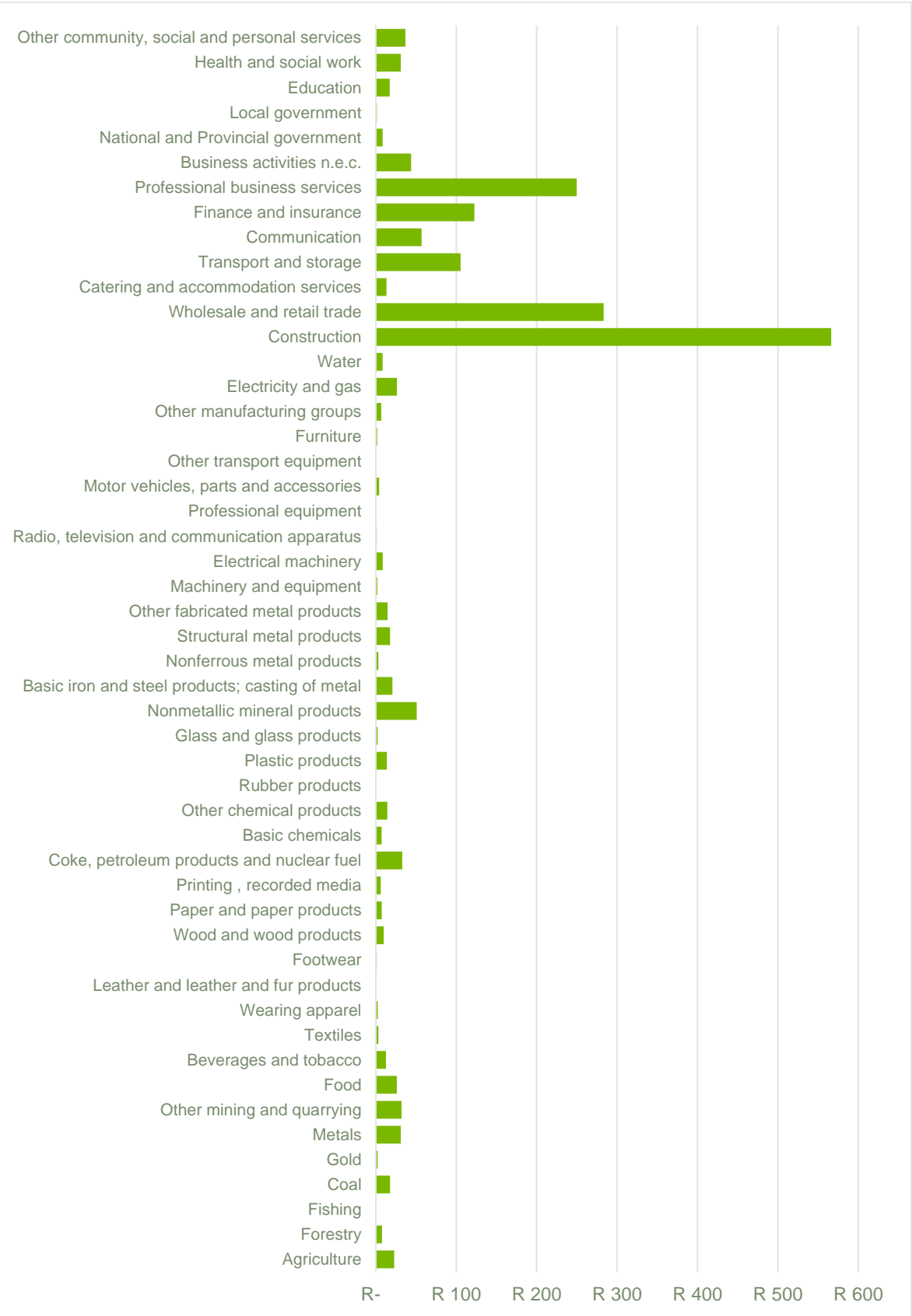


Figure 13: The impact of the total construction on compensation of employees South Africa(R Million)

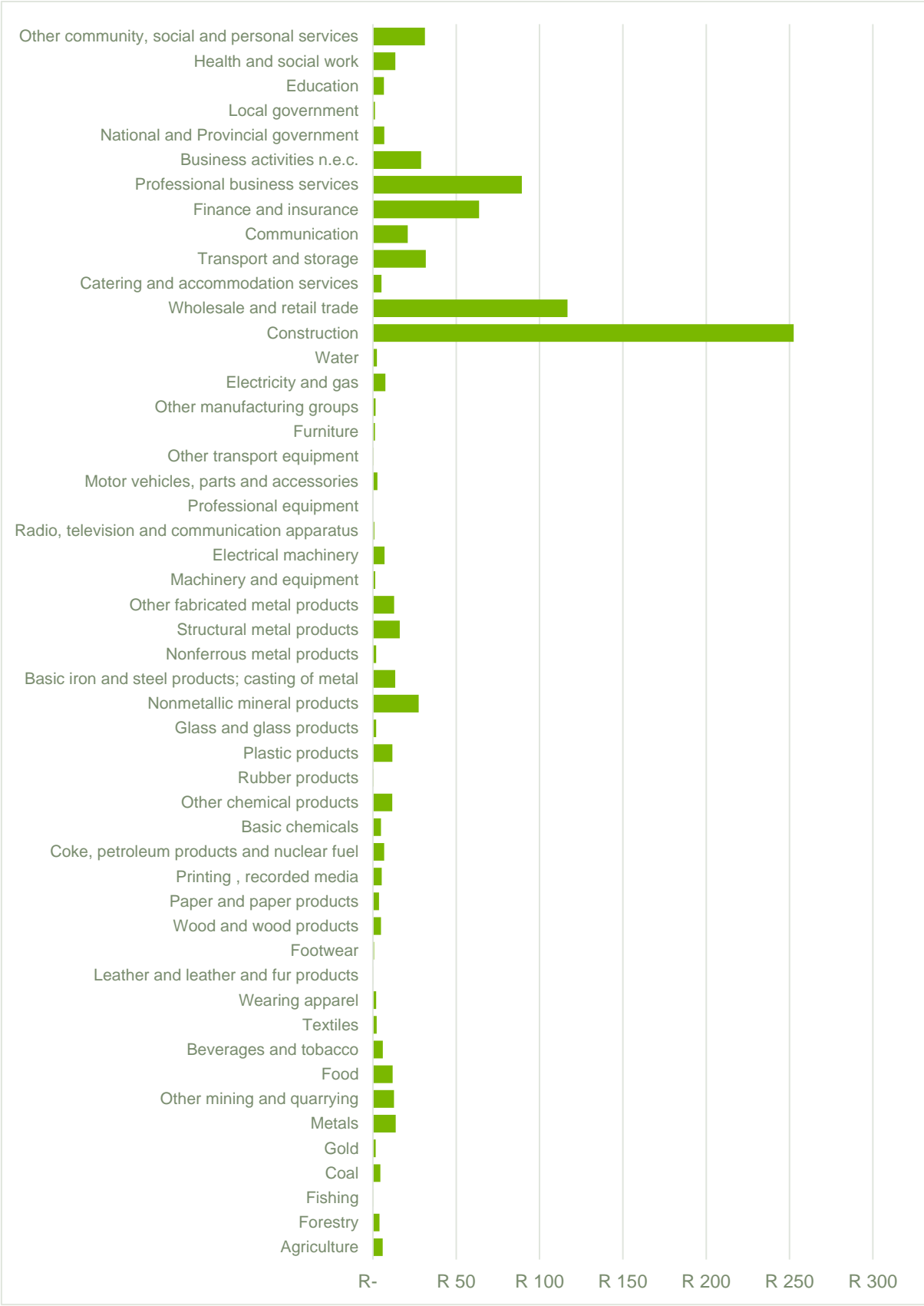


Figure 14: The impact of the total construction on South Africa’s job creation (Number)

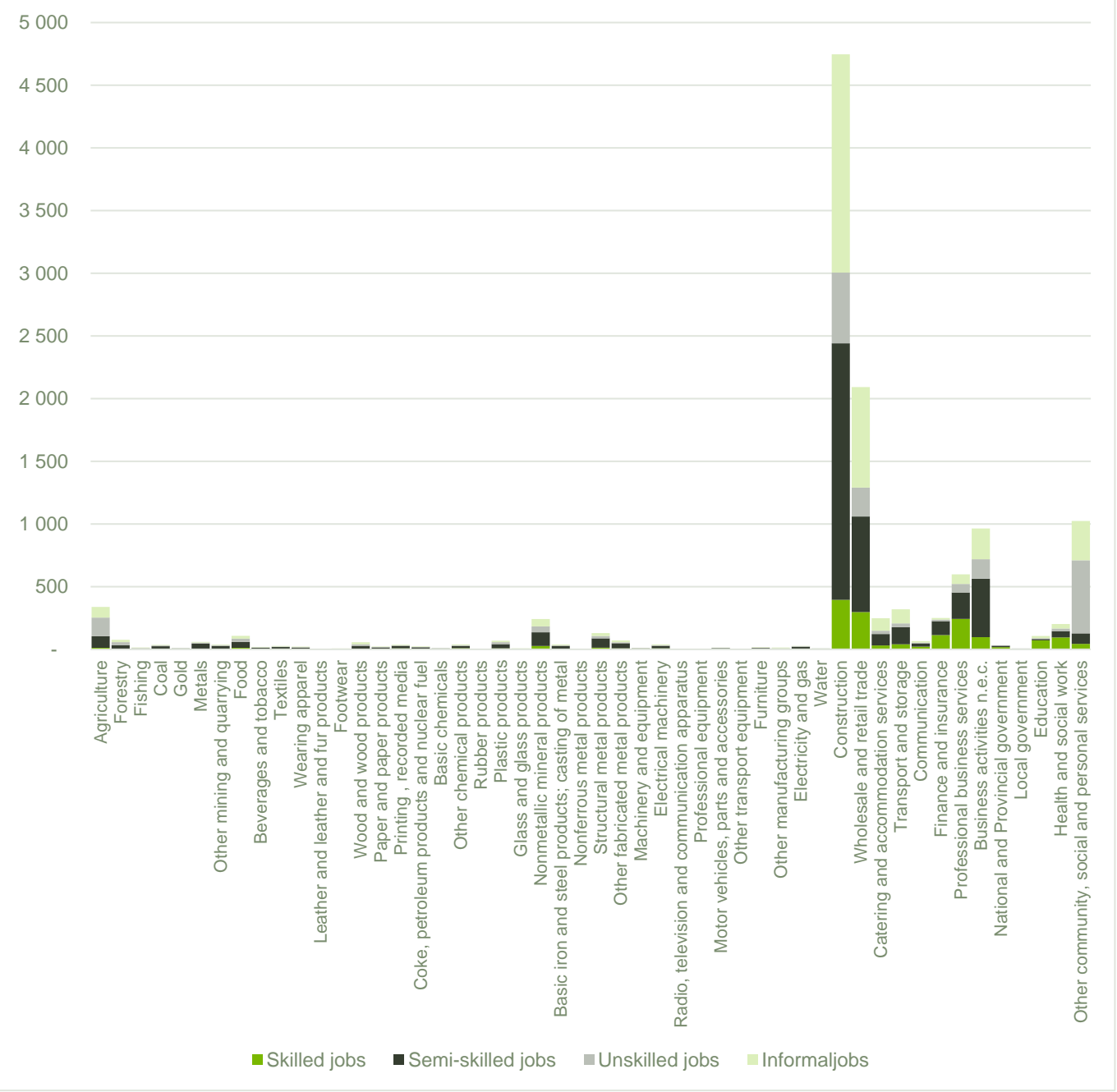


Figure 15: The impact of the total construction on South Africa’s gross operating surplus (R Million)

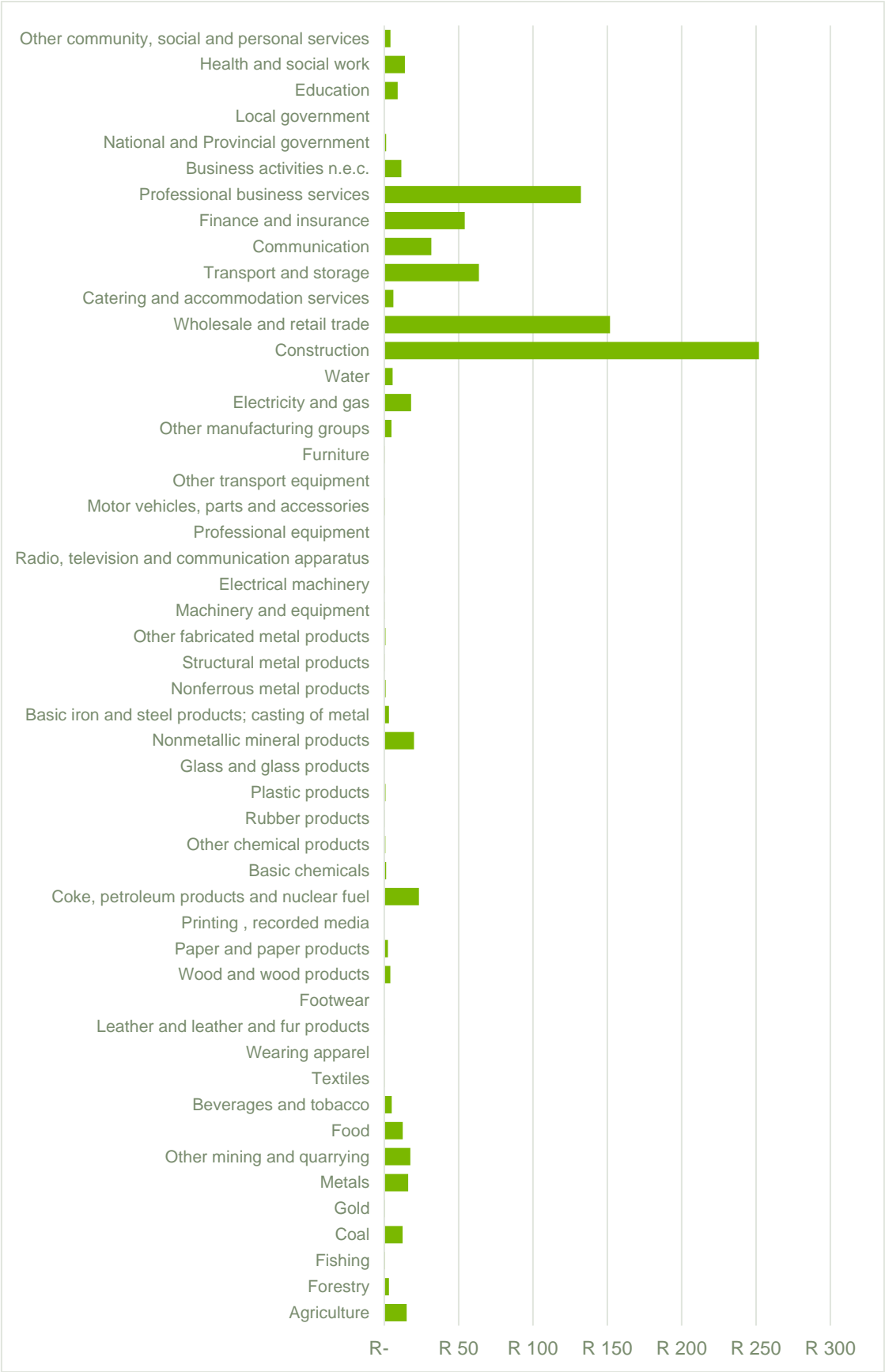
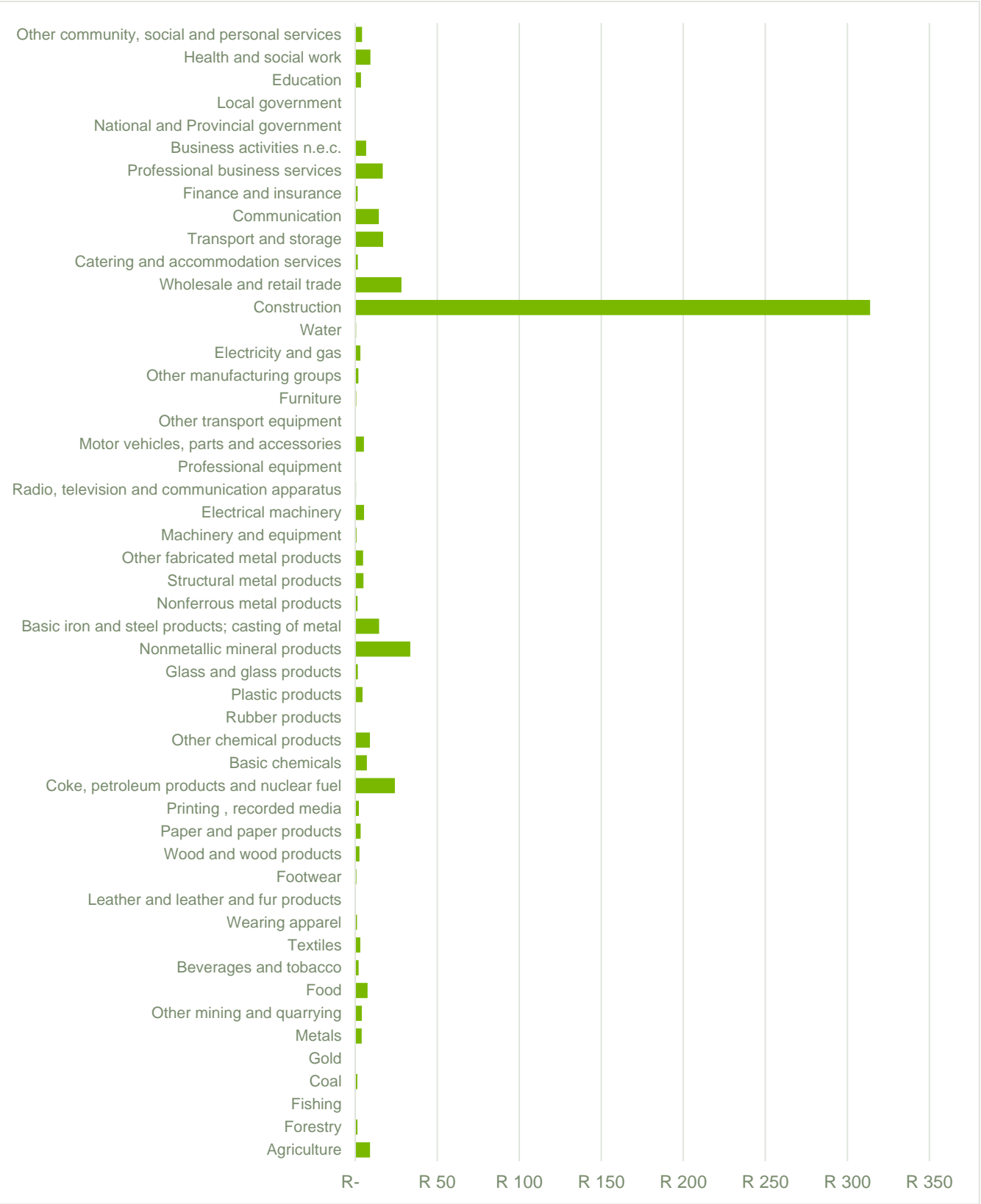


Figure 16: The impact of the total construction on South Africa’s intermediate imports (R Million)



MM.13 Free State

Figure 17: The impact of the total construction on additional output at basic prices in the Free State (R Million)

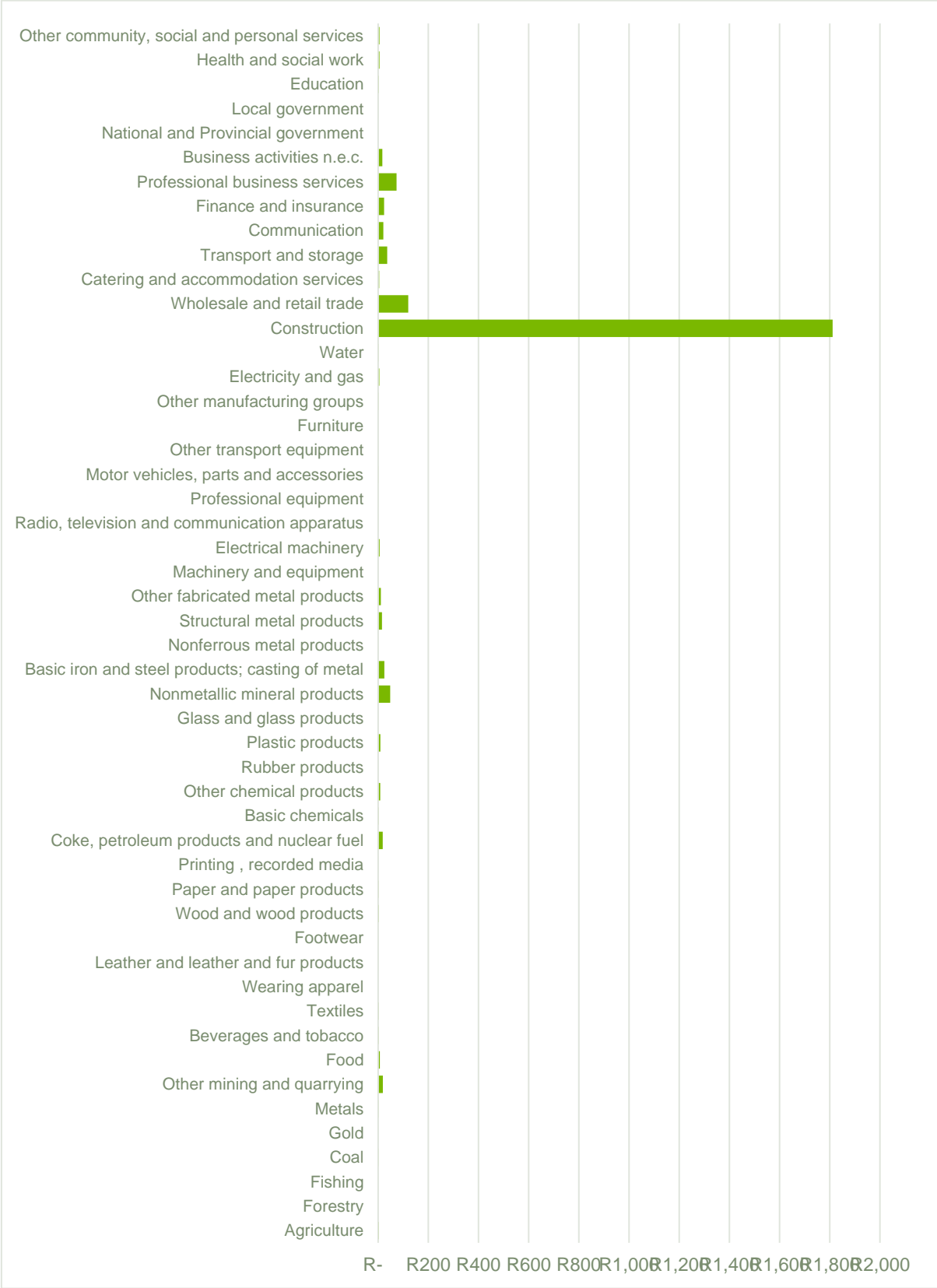


Figure 18: The impact of the total construction on GDP at market prices in the Free State (R Million)

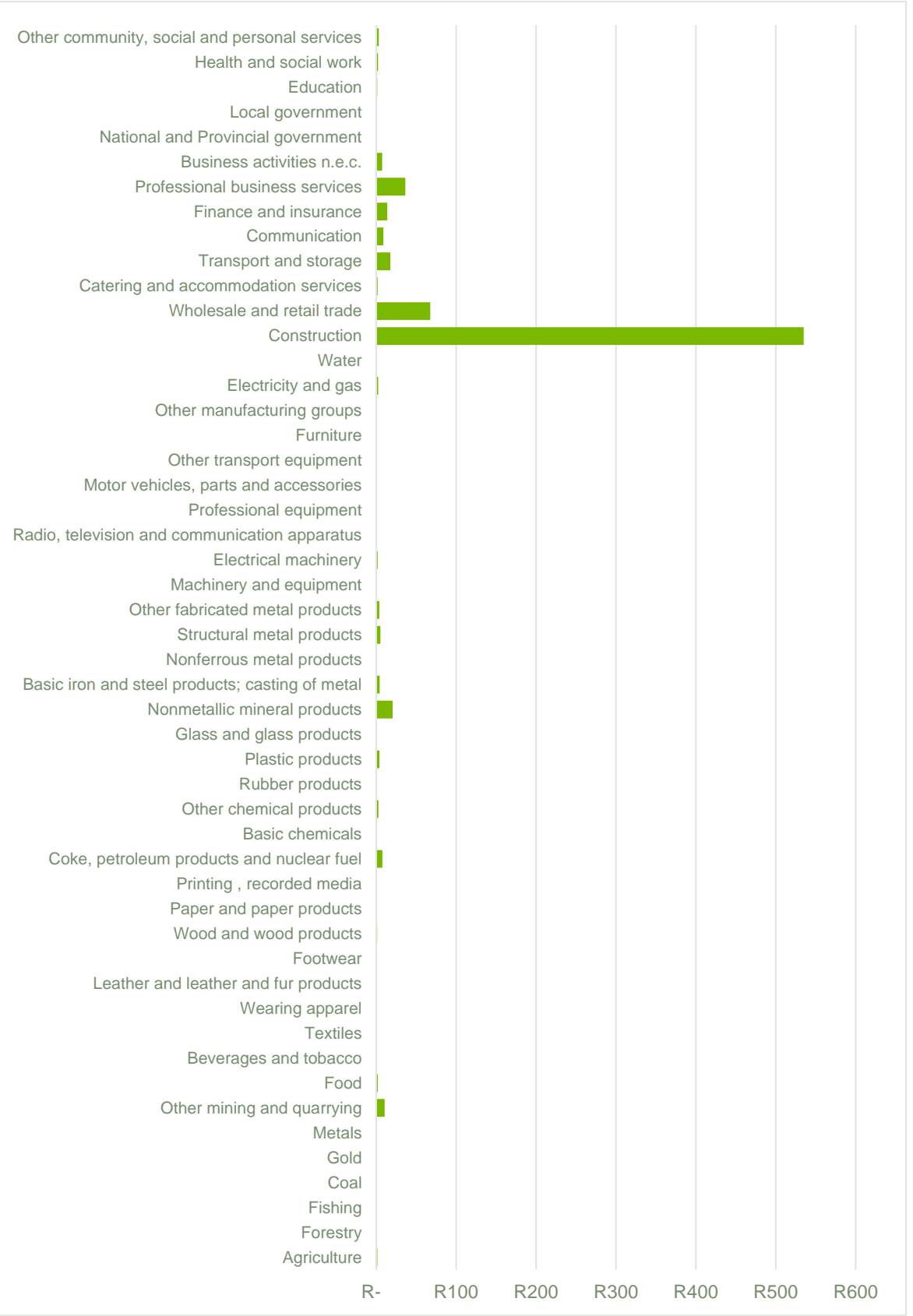


Figure 19: The impact of the total construction on compensation of employees in the Free State (R Million)

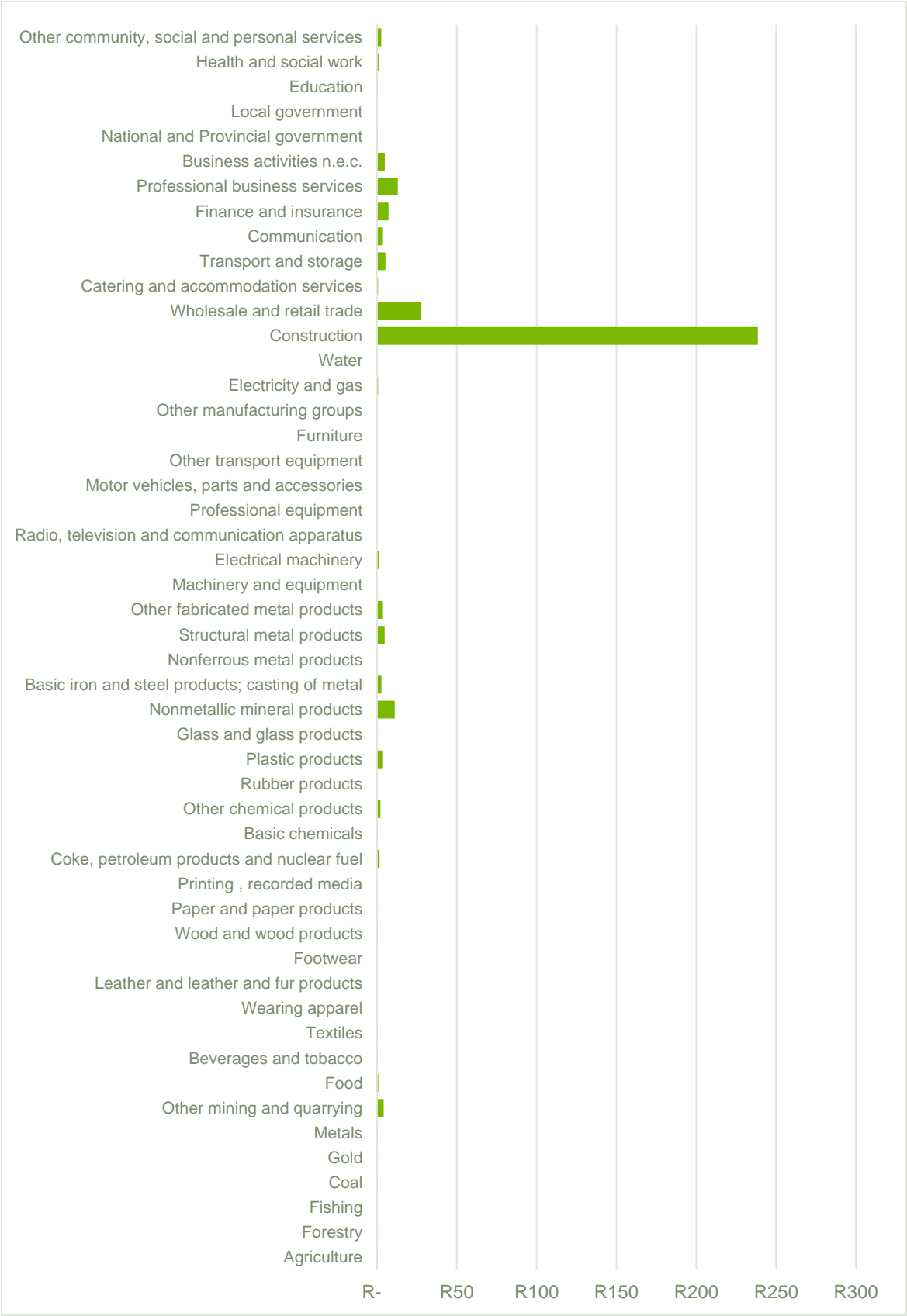


Figure 20: The impact of the total construction on in the Free State's job creation (Number)

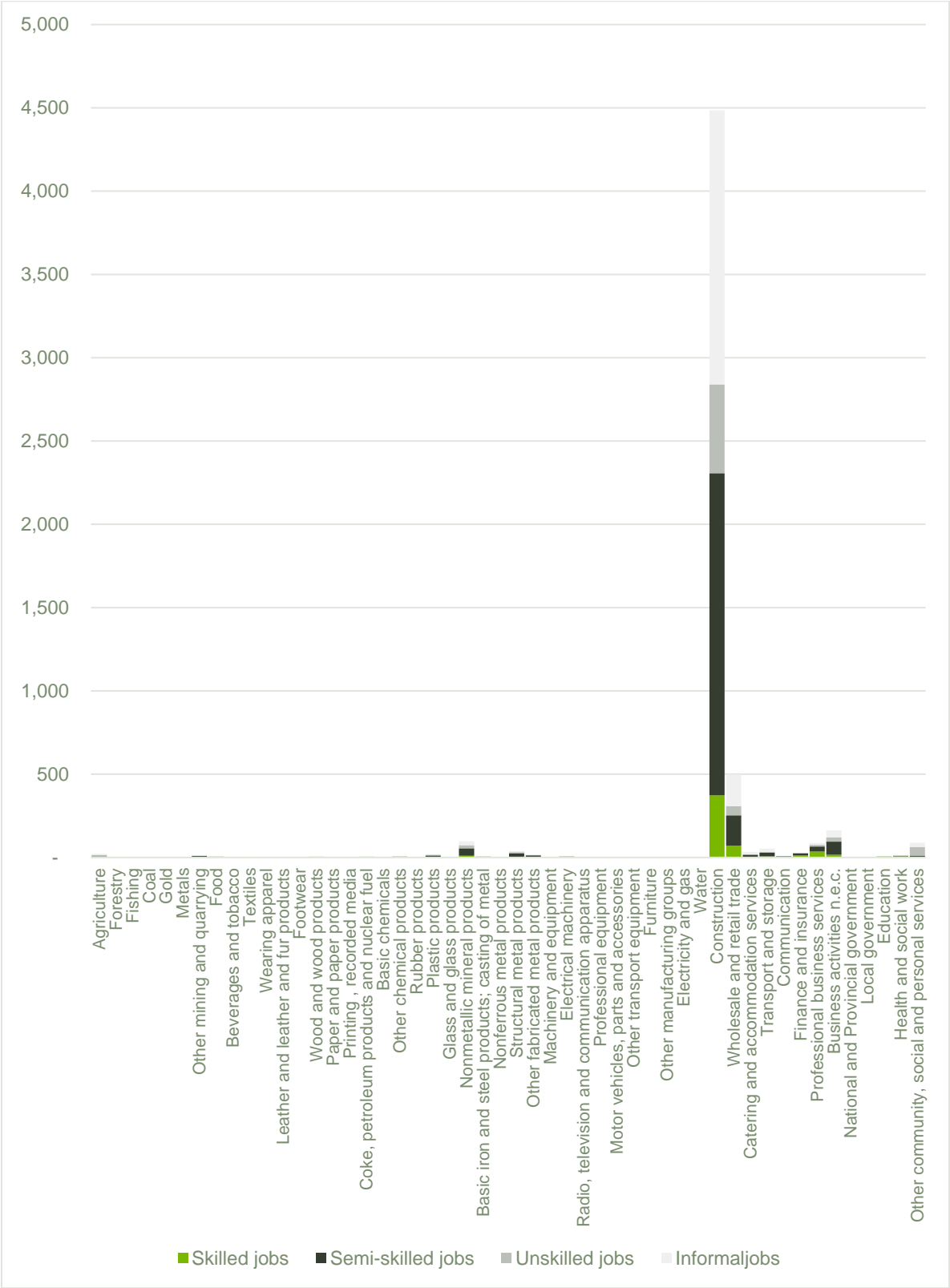
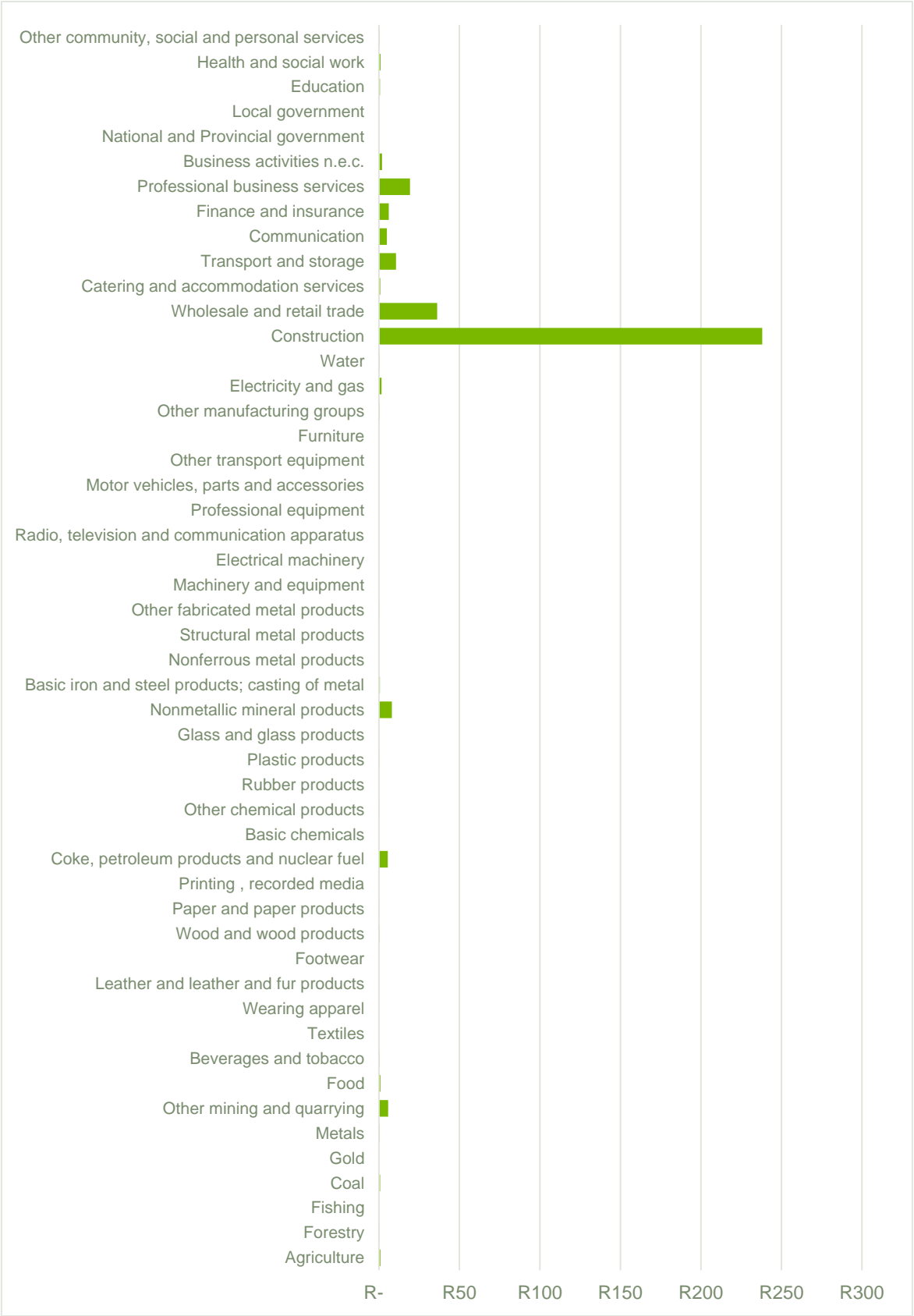


Figure 21: The impact of the total construction on in the Free State’s gross operating surplus (R Million)



MM.14 Mangaung

Figure 22: The impact of the total construction on additional output at basic prices in Mangaung (R Million)

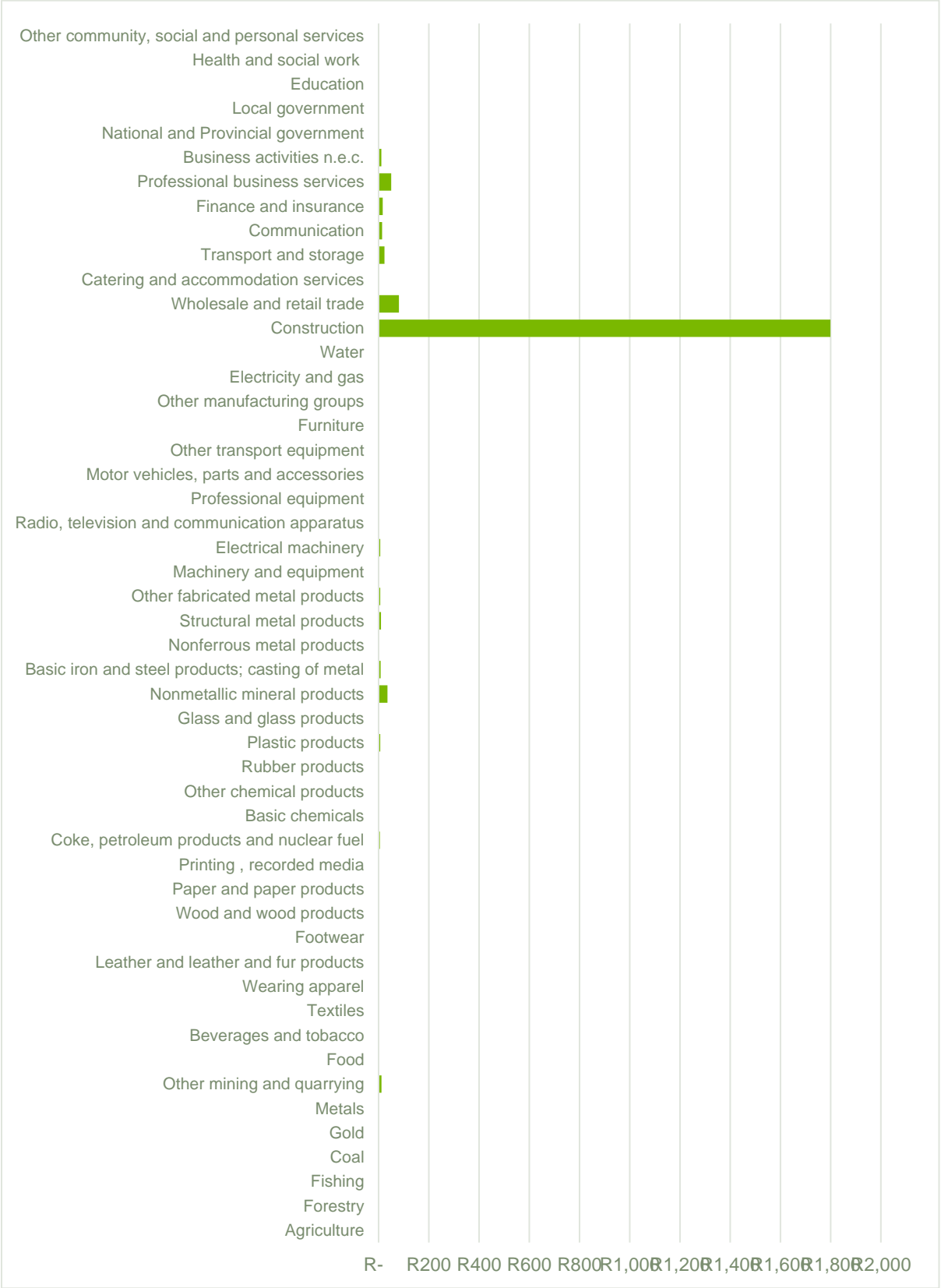


Figure 23: The impact of the total construction on GGP at market prices in Mangaung (R Million)

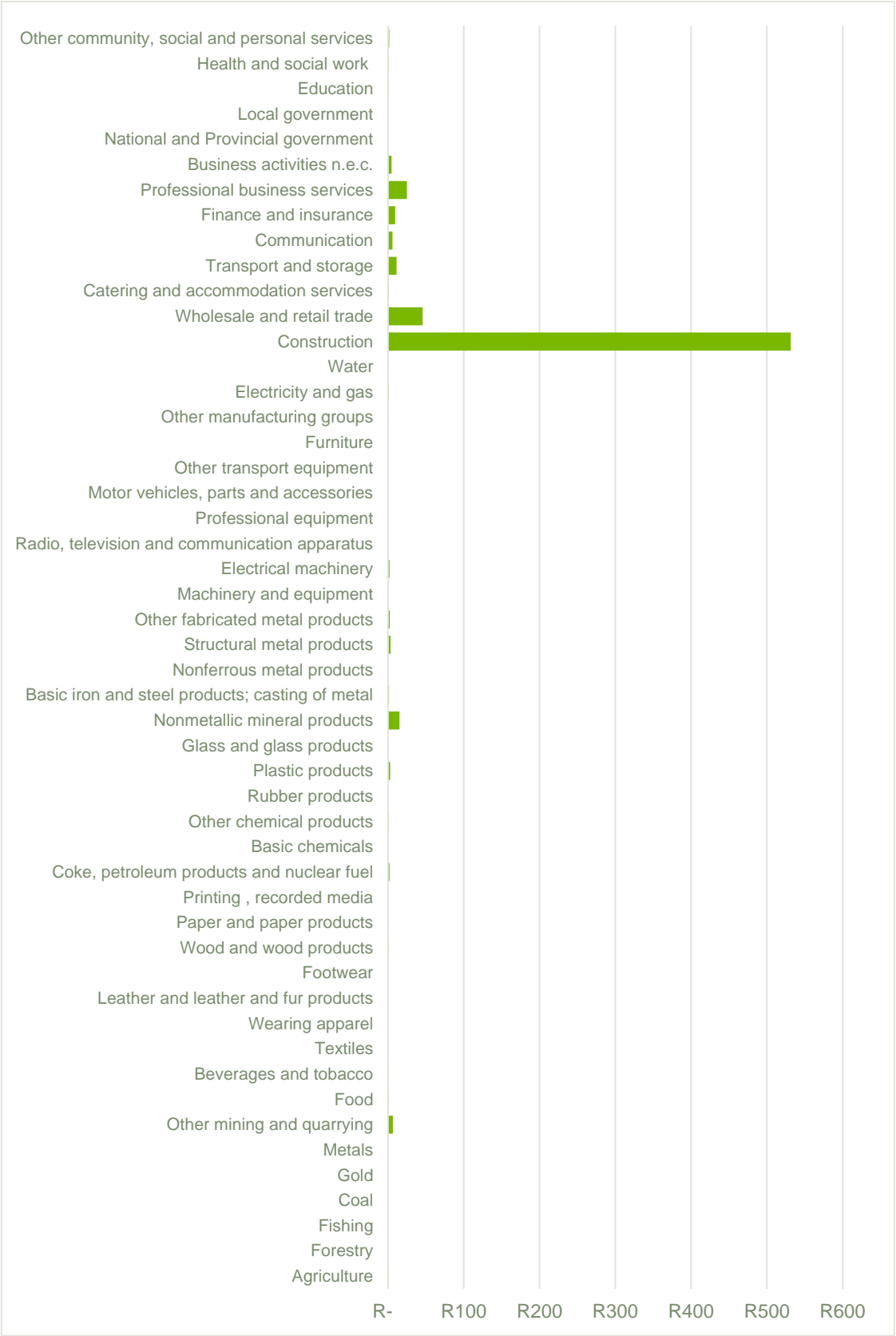


Figure 24: The impact of the total construction on compensation of employees in Mangaung (R Million)

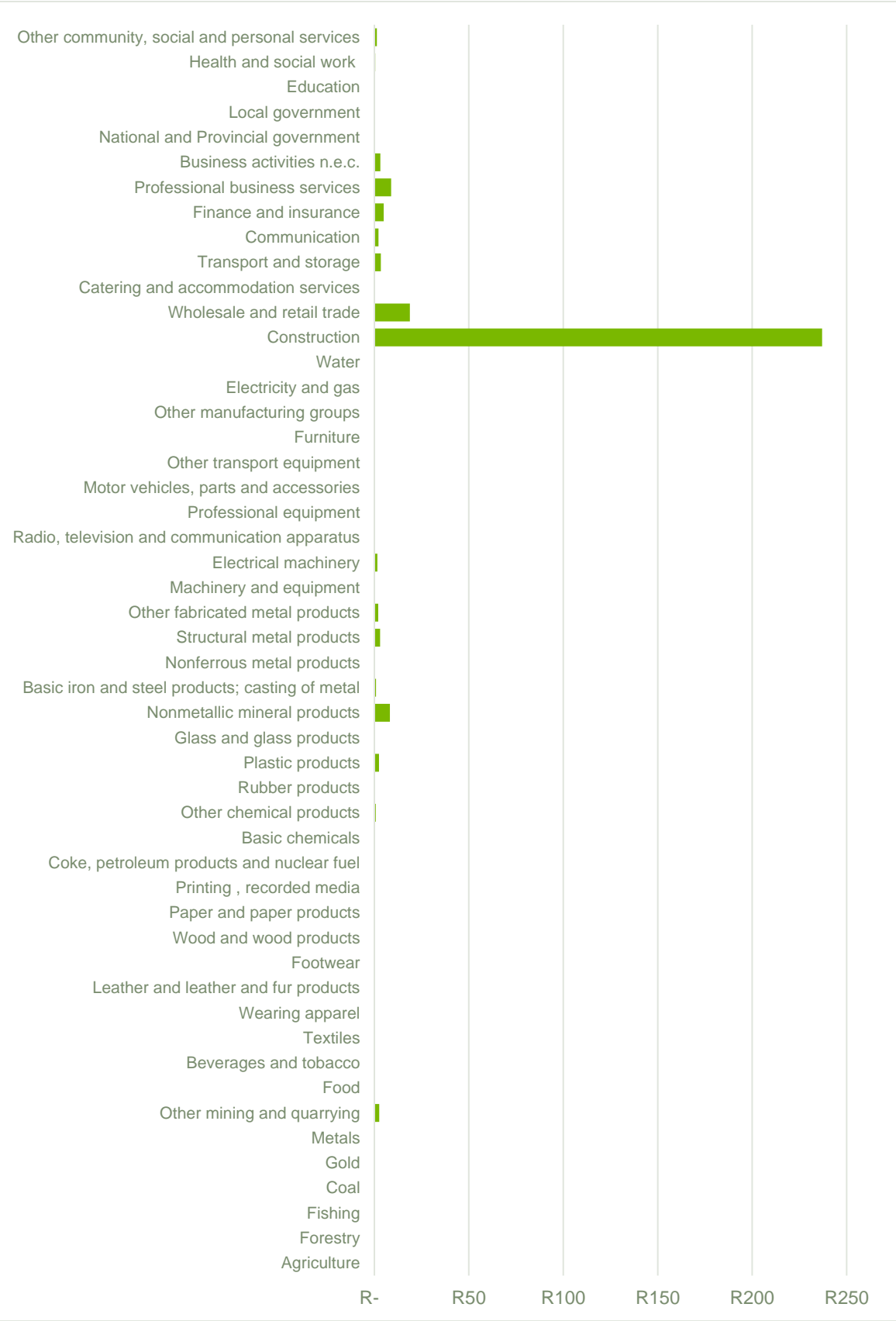


Figure 25: The impact of the total construction on Mangaung’s job creation (Number)

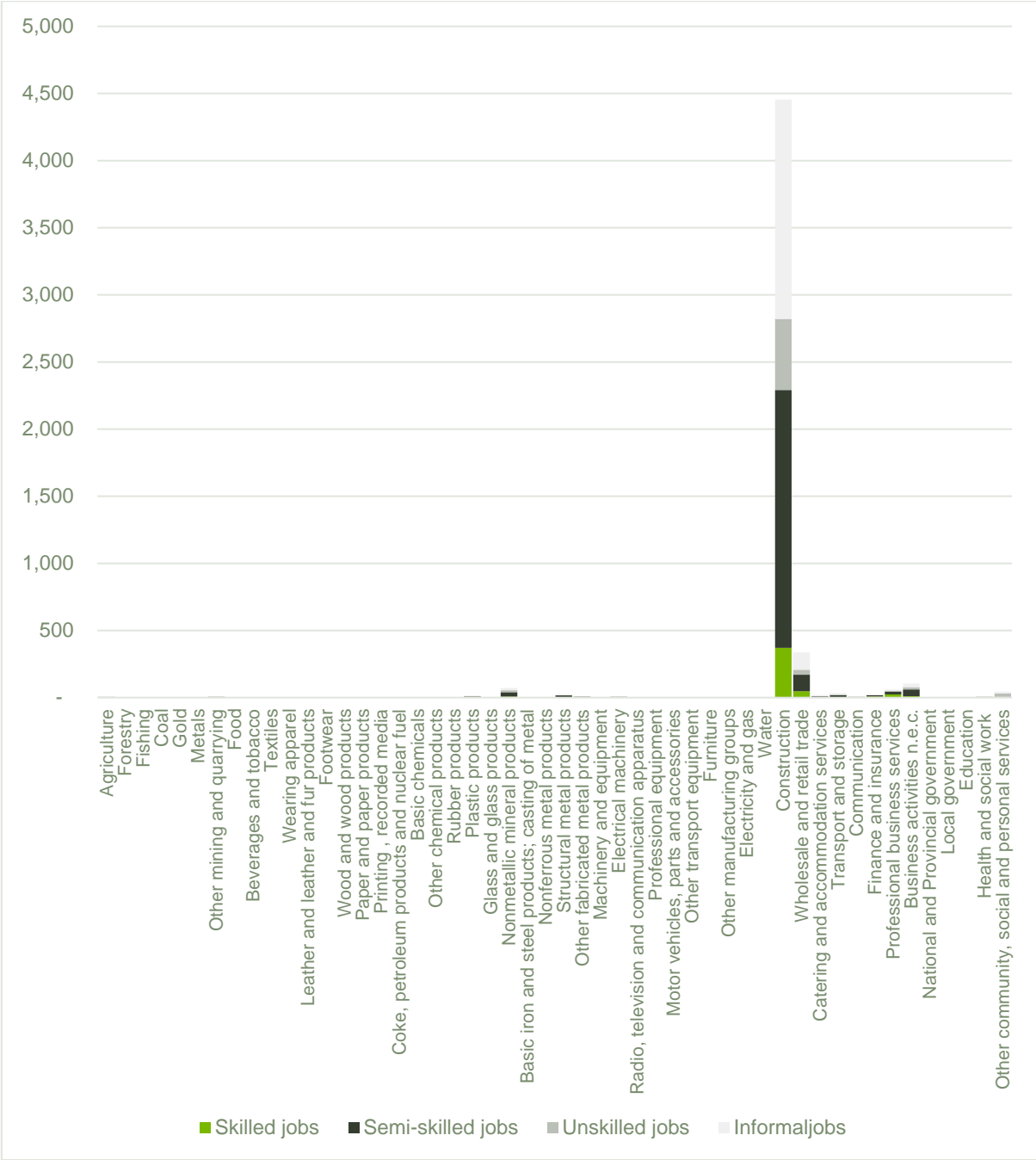
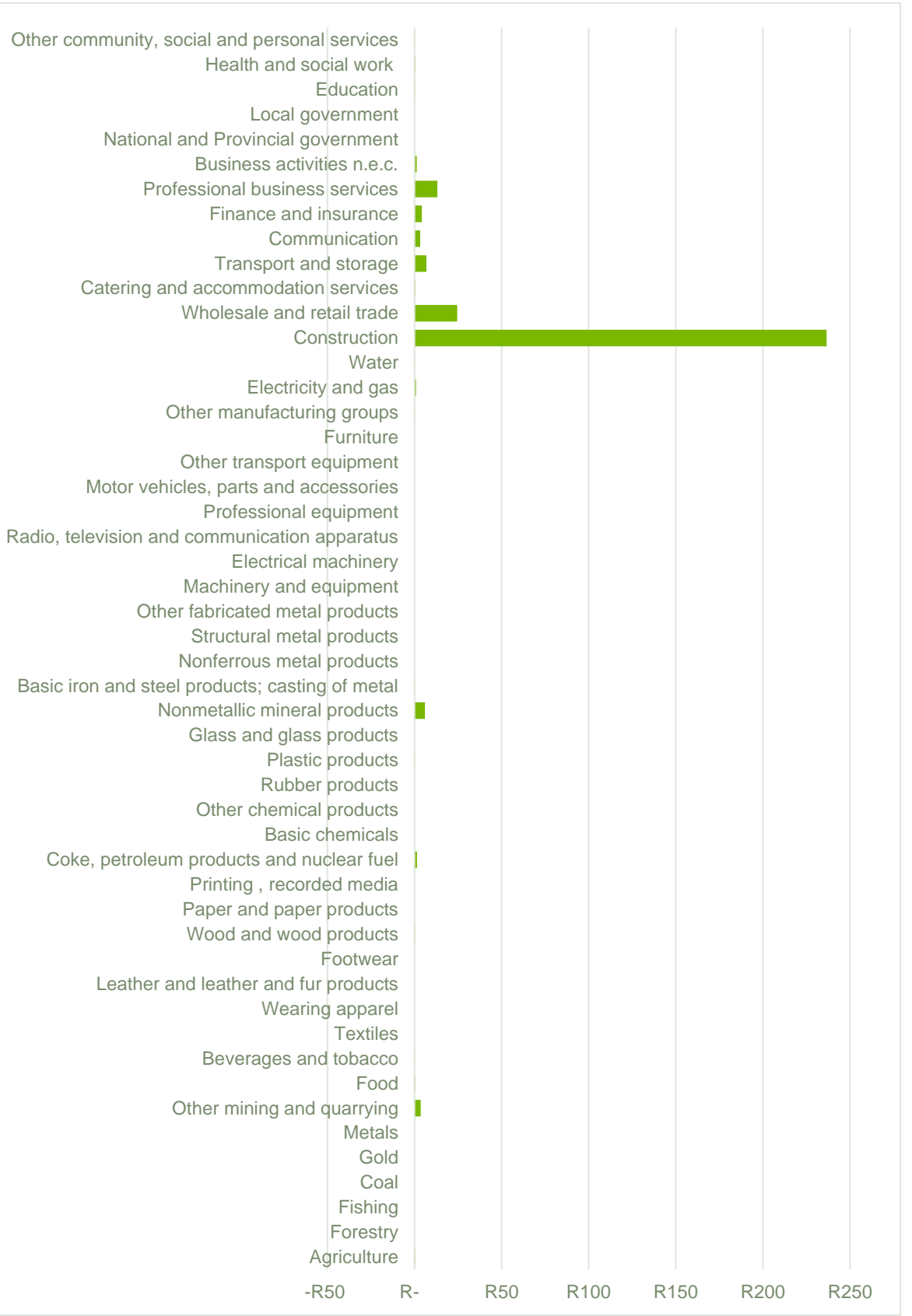


Figure 26: The impact of the total construction on Mangaung’s gross operating surplus (R Million)



MM.15 Bloemfontein

Figure 27: The impact of the total construction on additional output at basic prices in Bloemfontein (R Million)

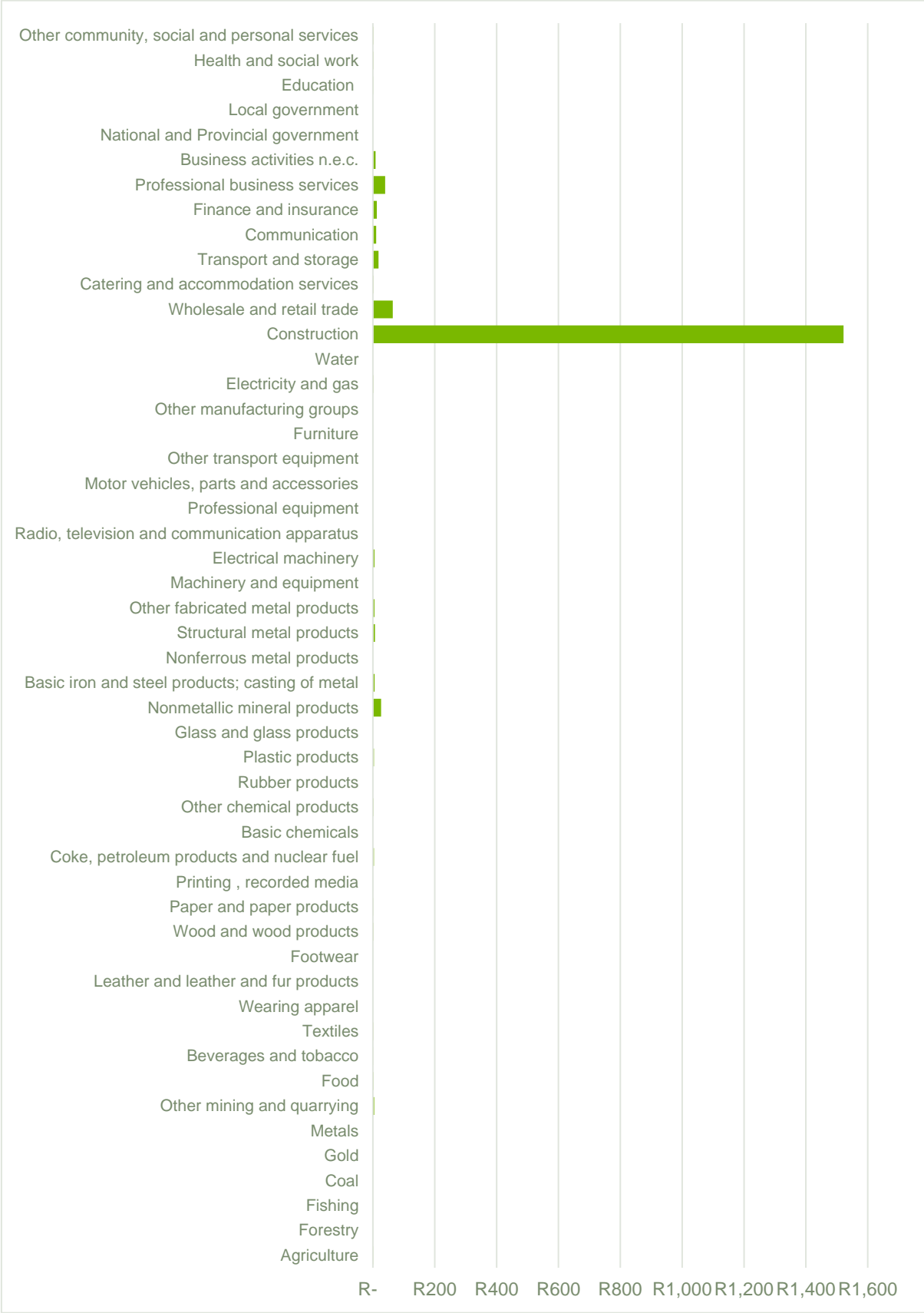


Figure 28: The impact of the total construction on GGP at market prices in Bloemfontein (R Million)

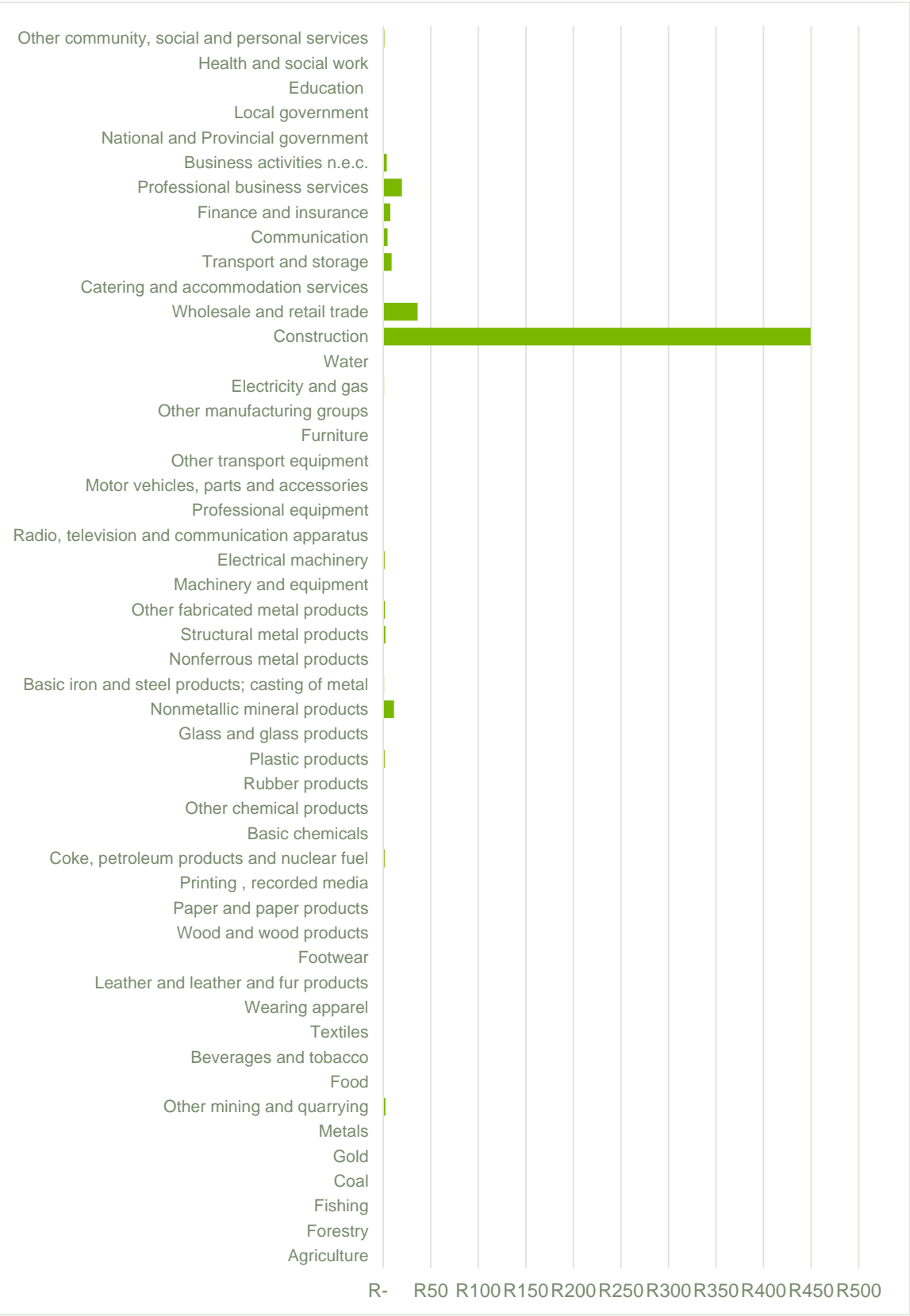


Figure 29: The impact of the total construction on compensation of employees in Bloemfontein (R Million)

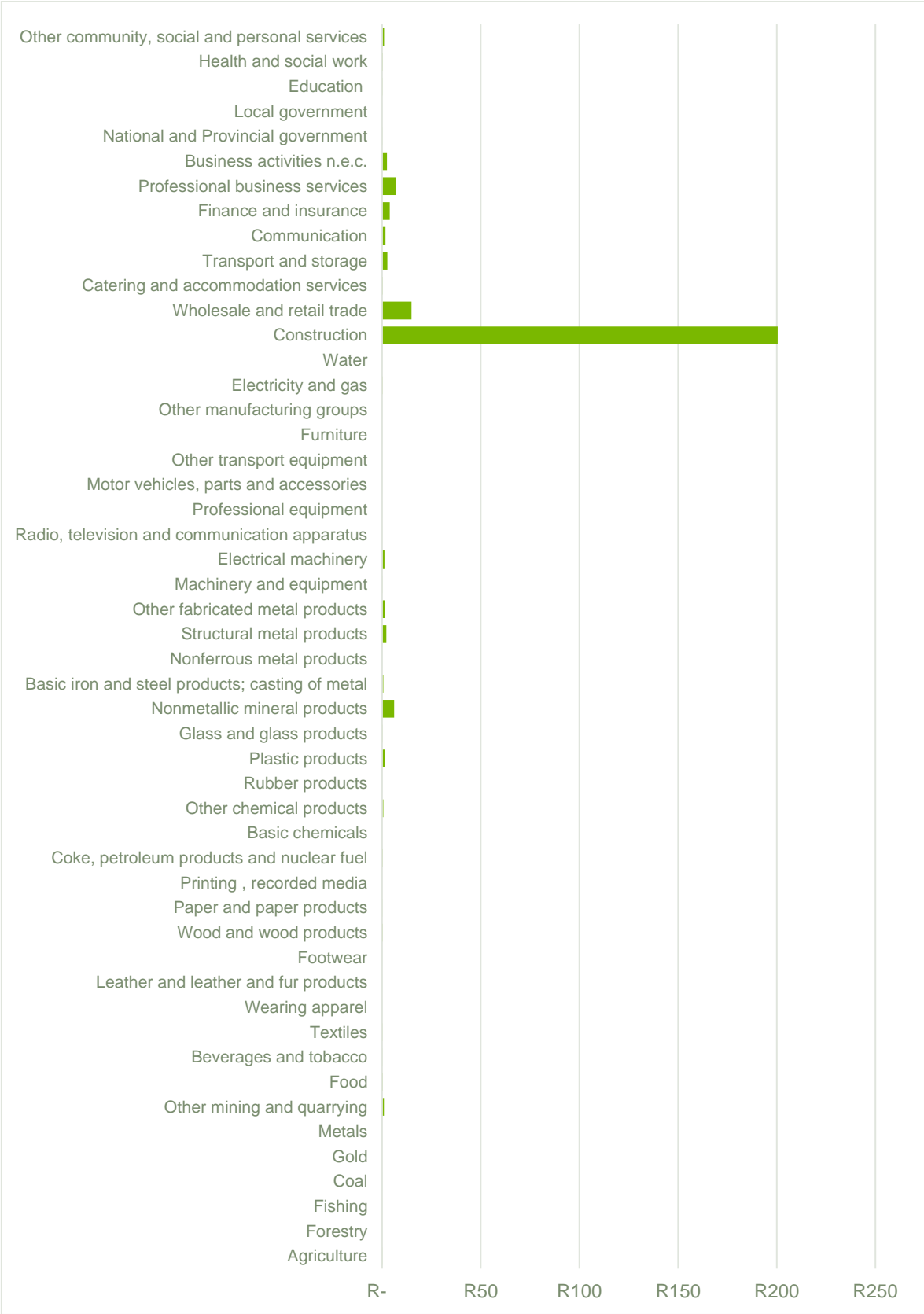


Figure 30: The impact of the total construction on in Bloemfontein’s job creation (Number)

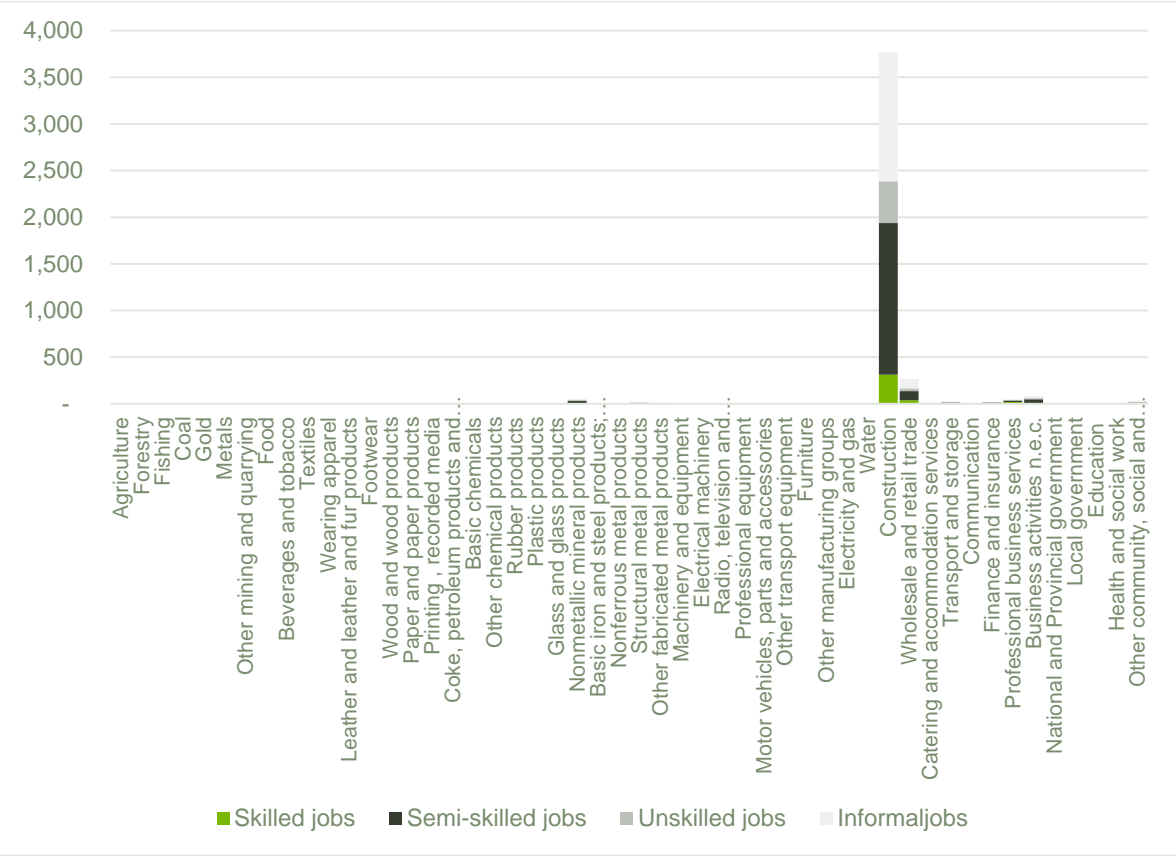
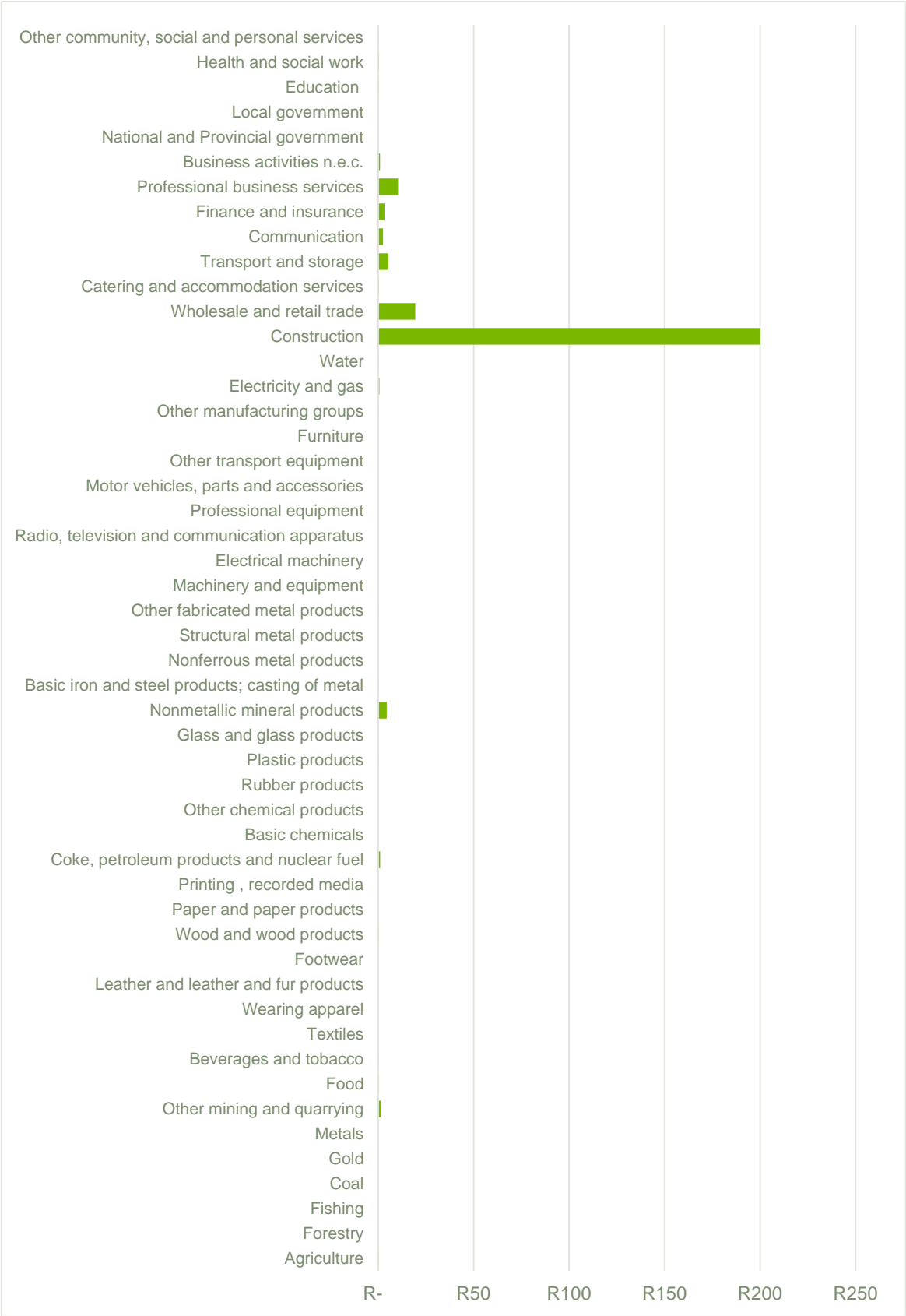


Figure 31: The impact of the total construction on in Bloemfontein’s gross operating surplus (R Million)



MM.16 Botshabelo and Thaba Nchu

Figure 32: The impact of the total construction on additional output at basic prices in Botshabelo and ThabaNchu

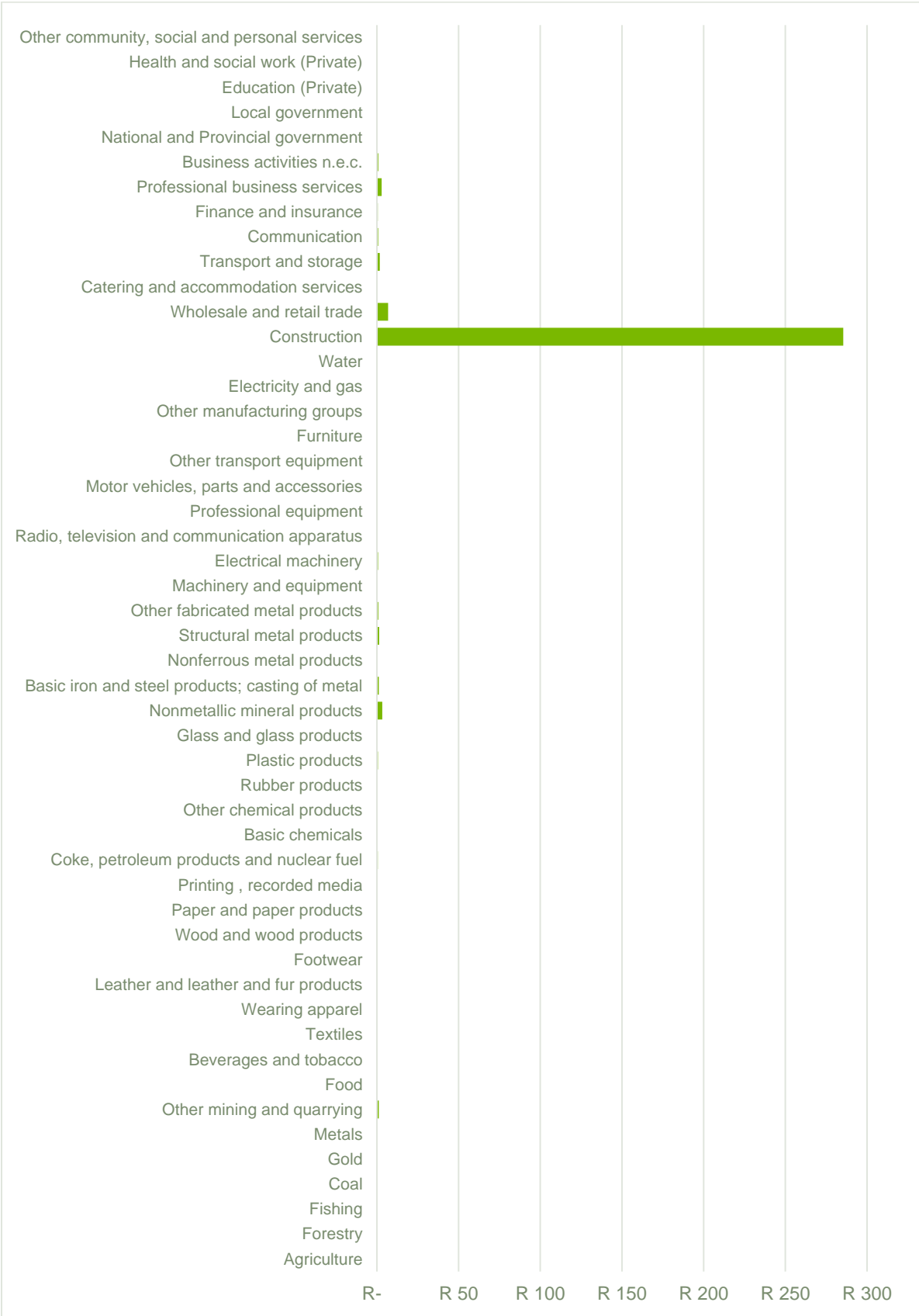


Figure 33: The impact of the total construction on GGP at market prices in Botshabelo and ThabaNchu

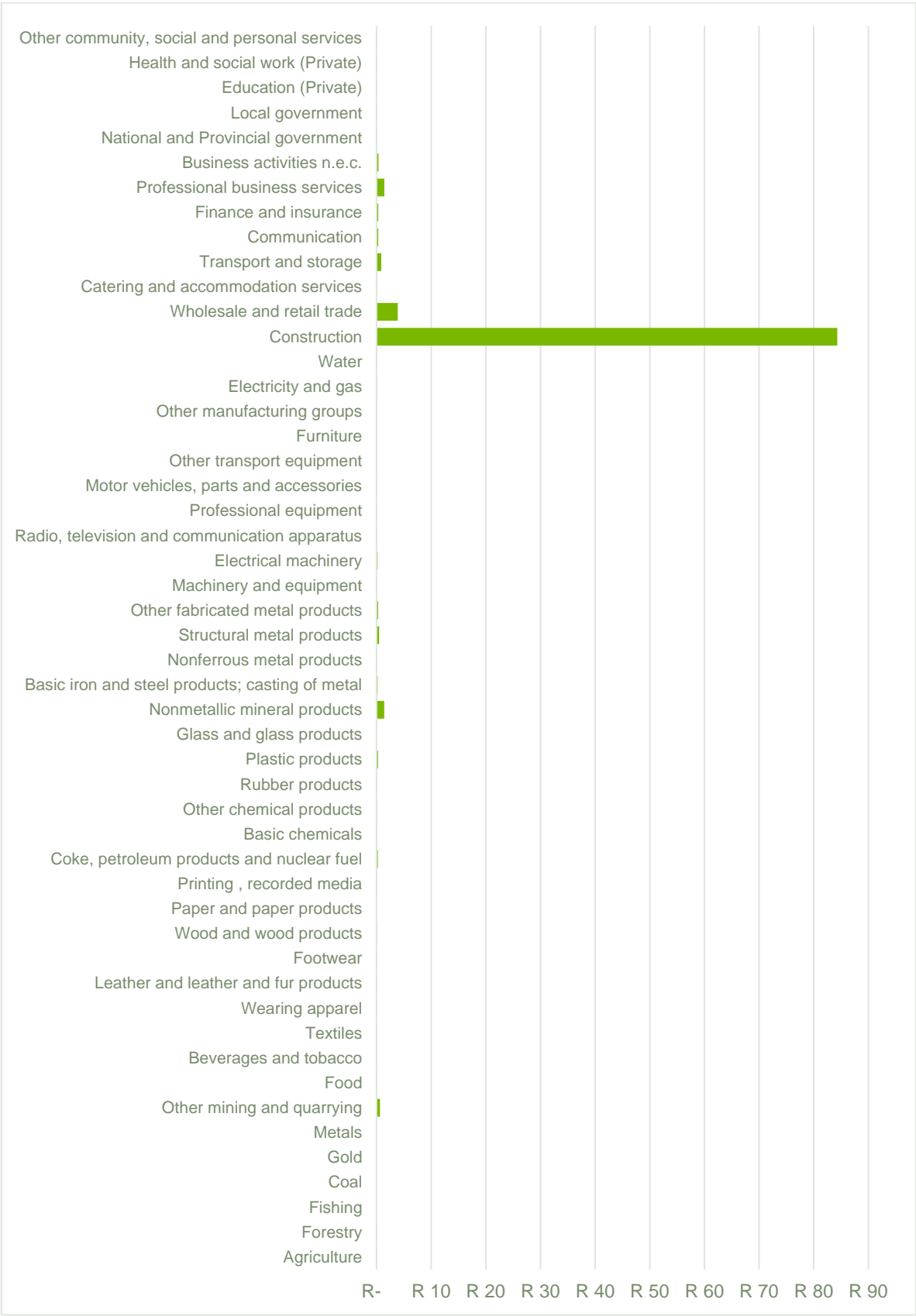


Figure 34: The impact of the total construction on compensation of employees in Botshabelo and ThabaNchu

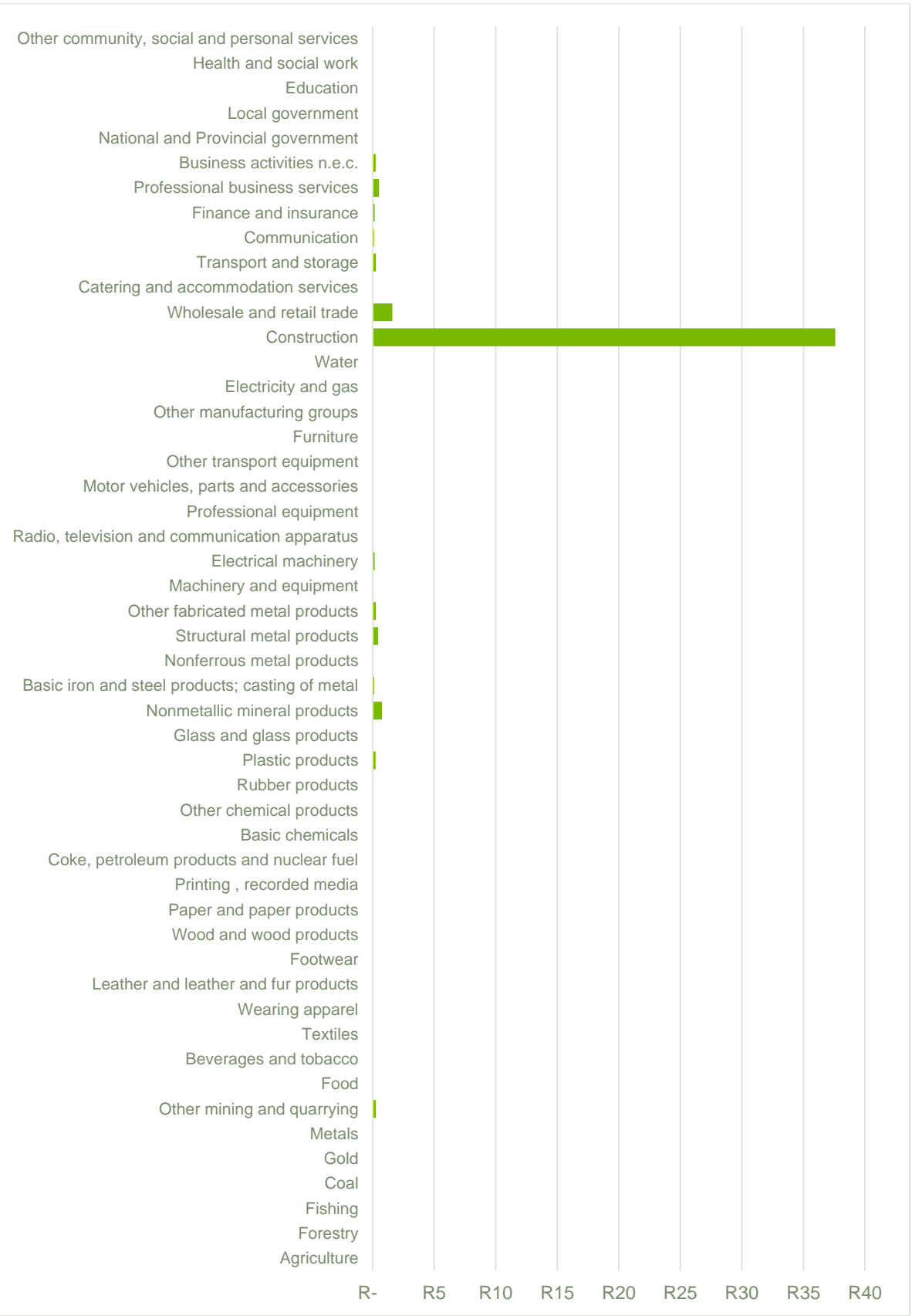


Figure 35: The impact of the total construction on Botshabelo and ThabaNchu’s job creation

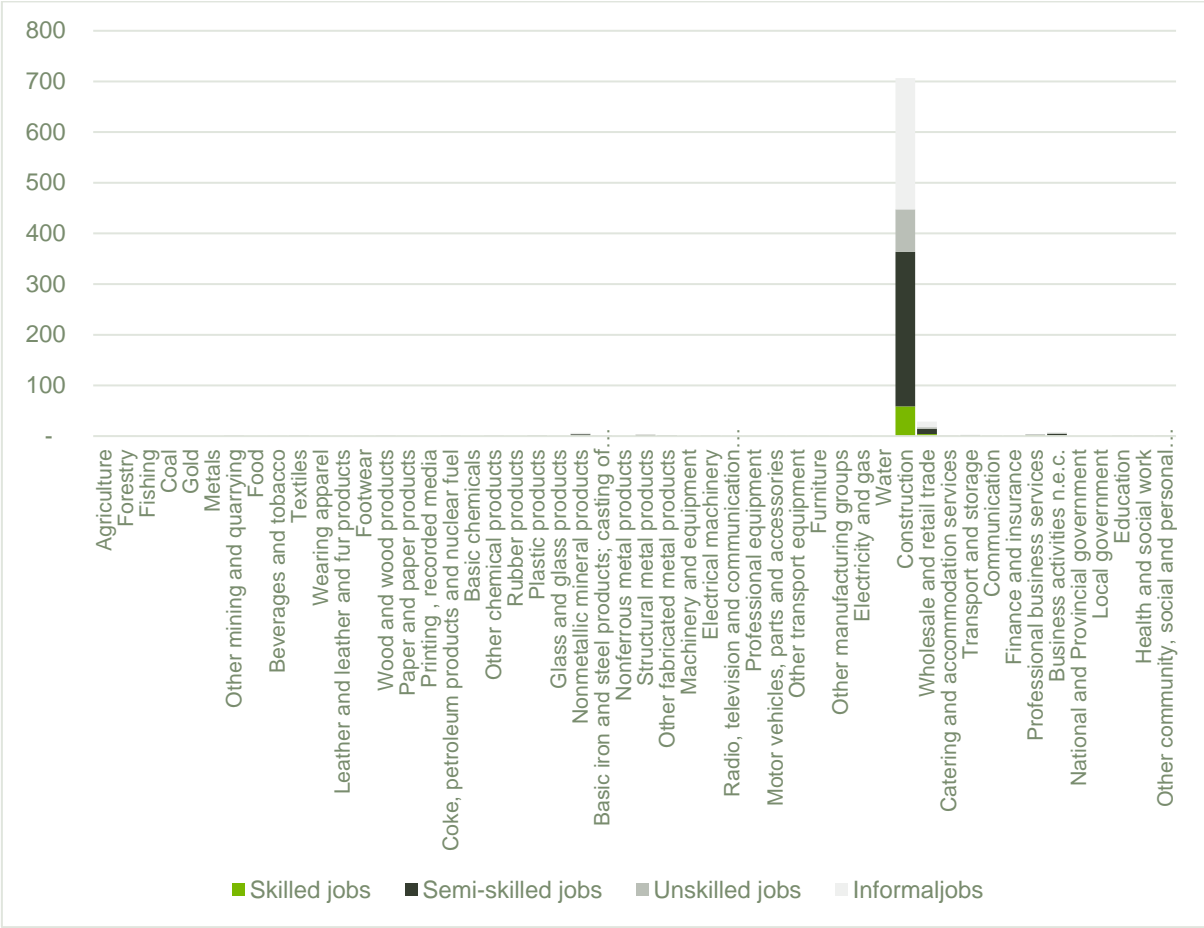
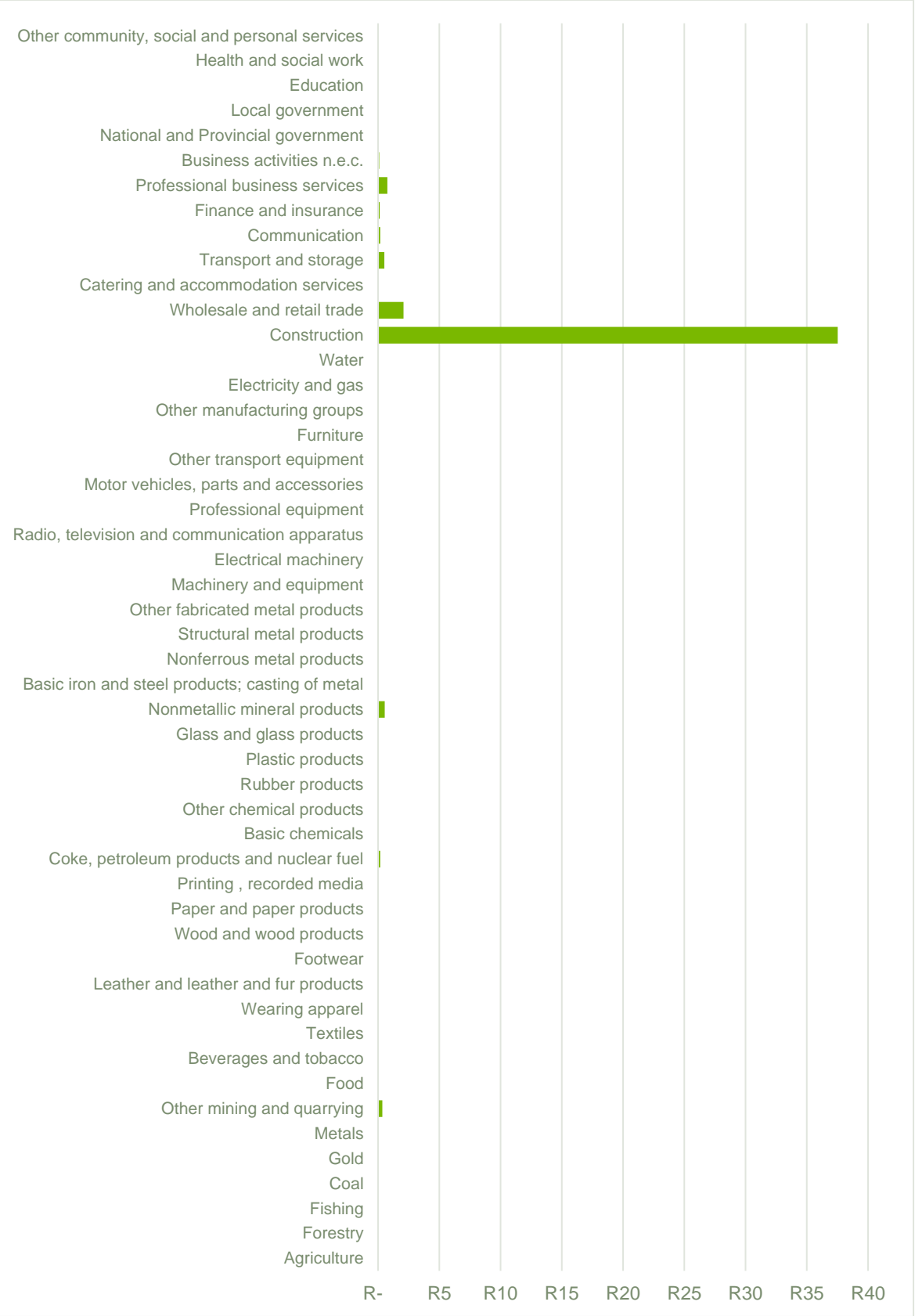
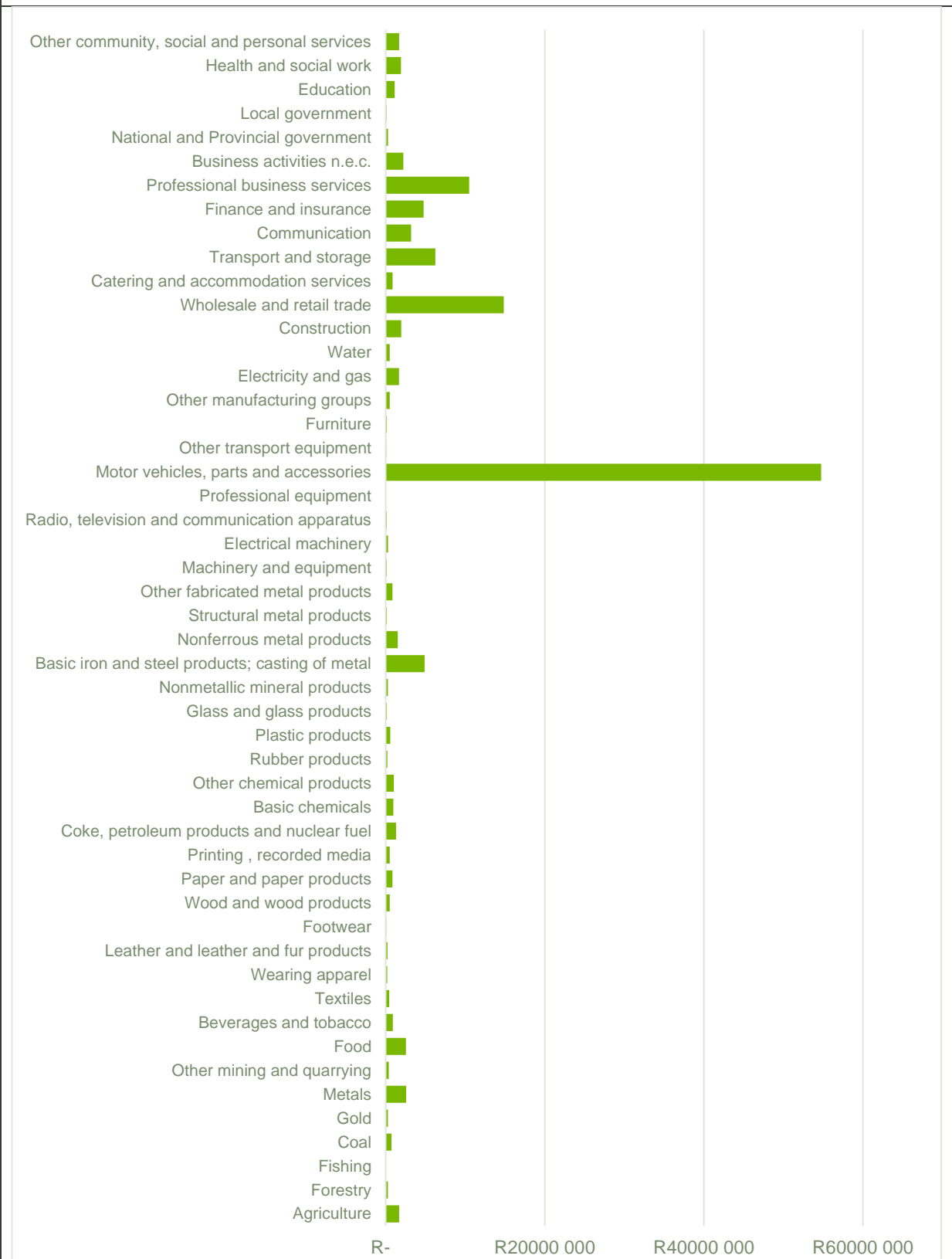


Figure 36: The impact of the total construction on Botshabelo and ThabaNchu’s gross operating surplus



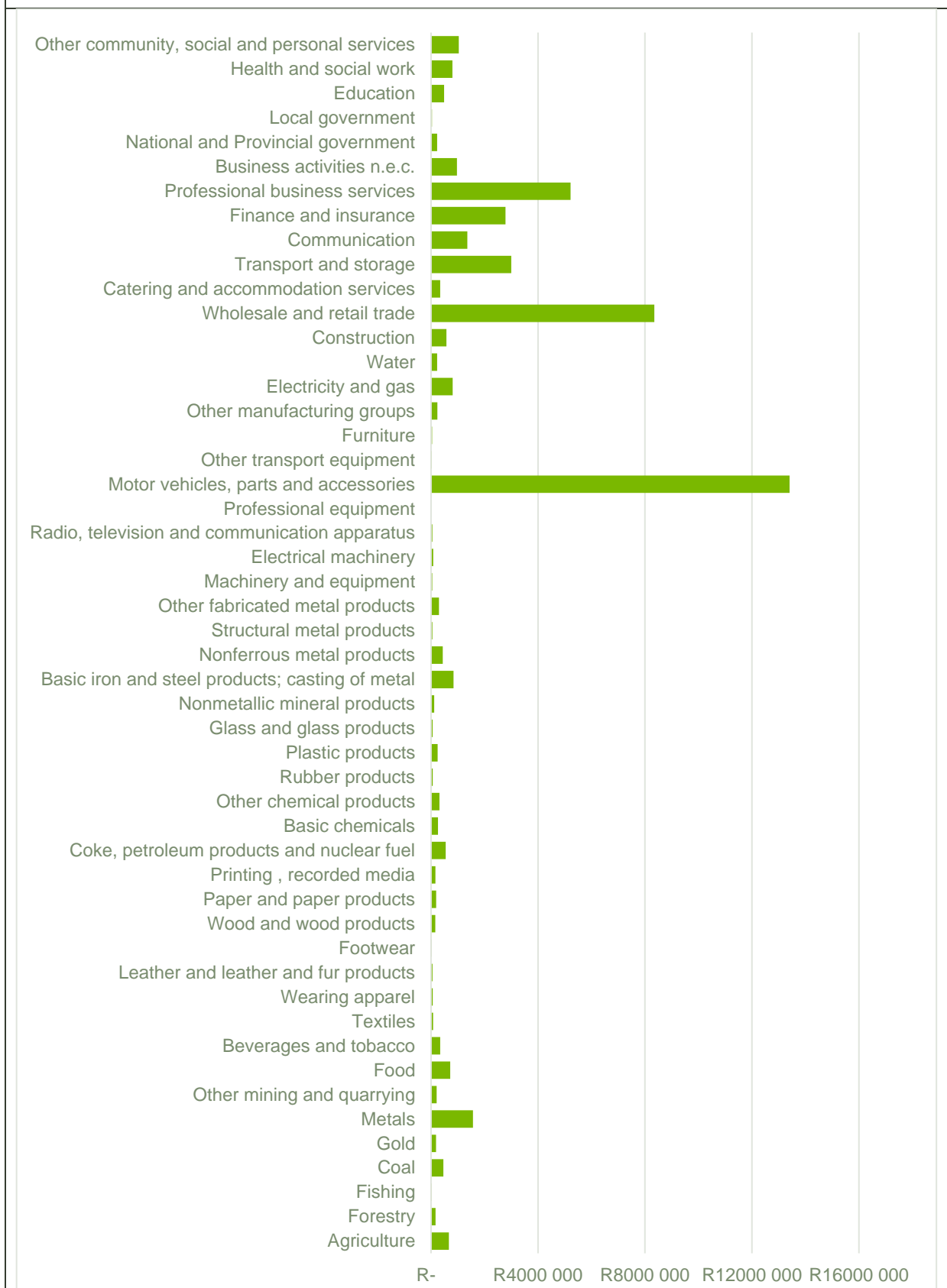
2. Purchase of busses

Figure 37: The impact of the purchase of busses on the output at basic prices in South Africa



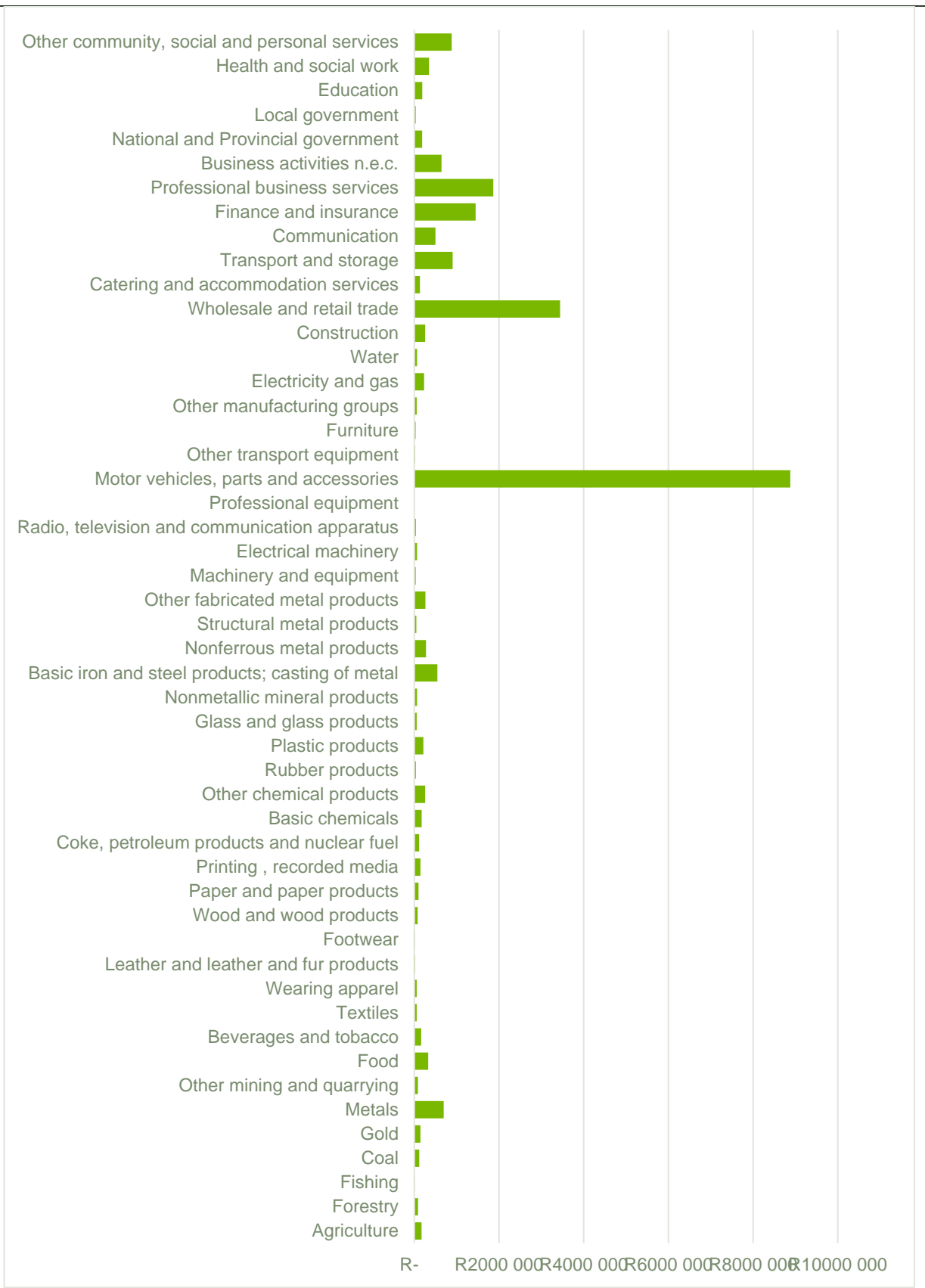
Source: Own calculations

Figure 38: The impact of the purchase of busses on the GDP at market prices in South Africa



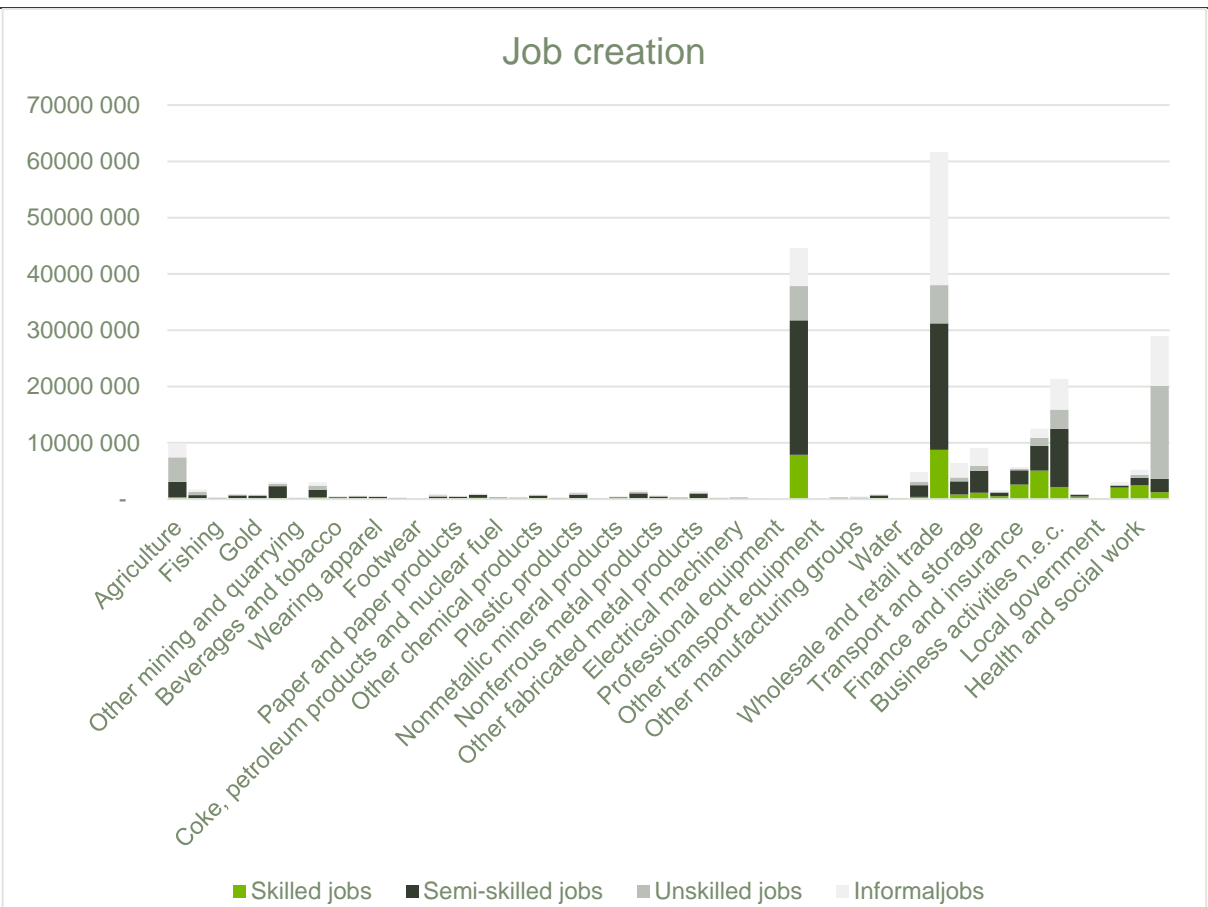
Source: Own calculations

Figure 39: The impact of the purchase of busses on the compensation of employees in South Africa



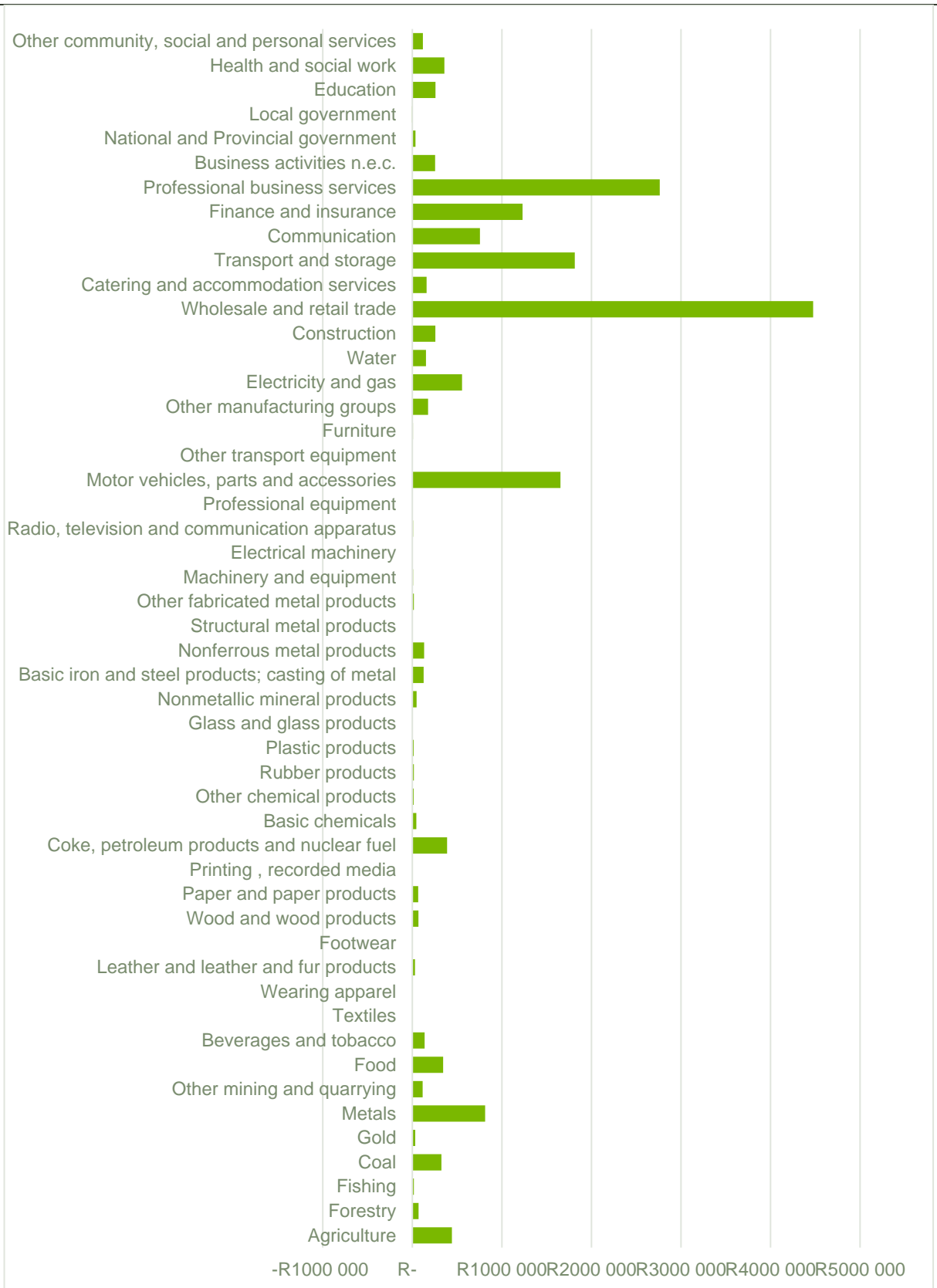
Source: Own calculations

Figure 40: The impact of the purchase of busses on job creation in South Africa



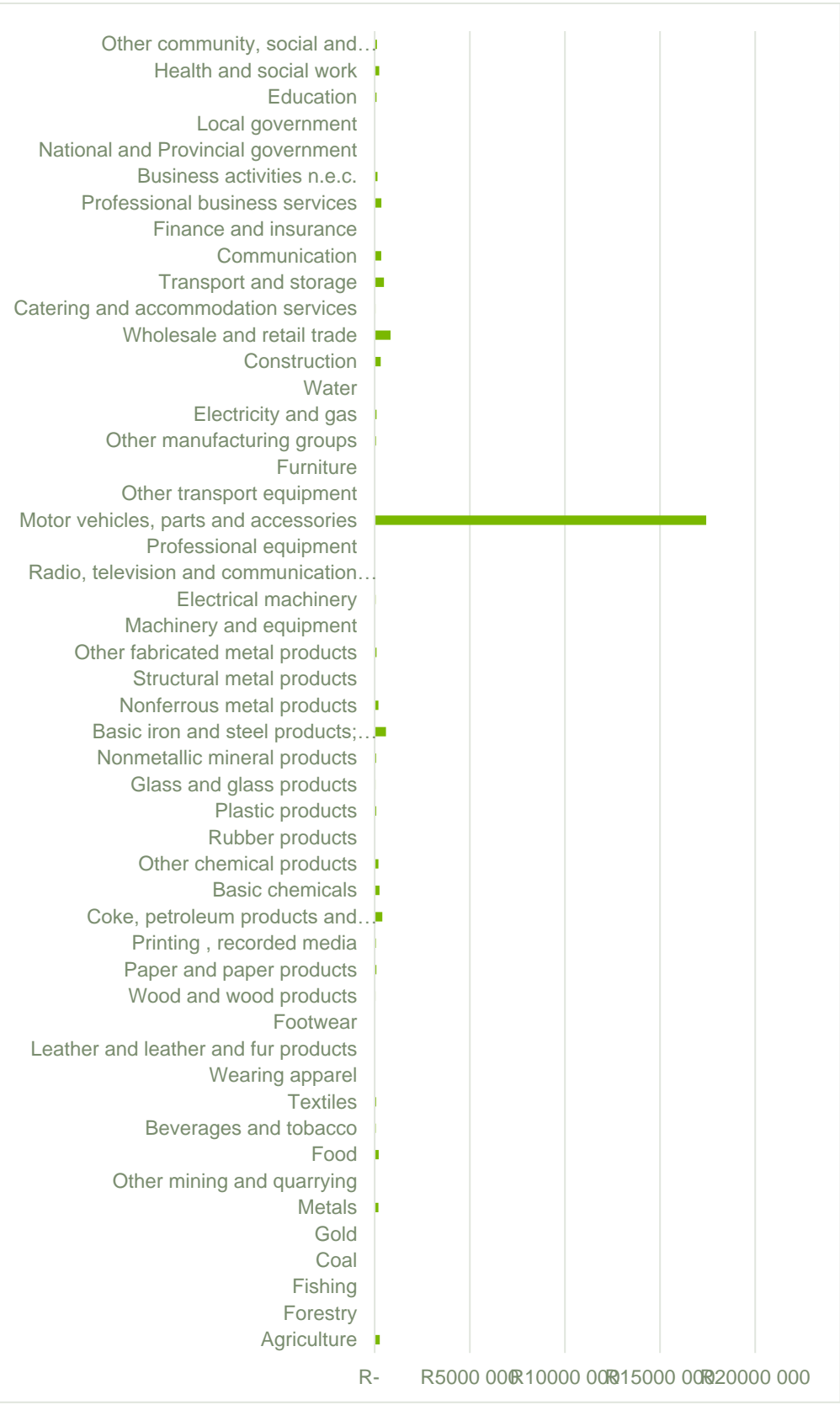
Source: Own calculations

Figure 41: The impact of the purchase of busses on gross operating surplus in South Africa



Source: Own calculations

Figure 42: The impact of the purchase of busses on intermediate Imports in South Africa



Source: Own calculations

Shrift Share analysis for South Africa, the Free State and Mangaung

	2012-13	2013-14	2014-15	2012-13	2013-14	2014-15	2012-13	2013-14	2014-15	2012-13	2013-14	2014-15	2012-13	2013-14	2014-15	2012-13	2013-14	2014-15
	Free State			Mangaung			Free State			Mangaung			Free State			Mangaung		
	NS						RS						IM					
Total	17 134	16 387	-5 050	6 772	4 274	-1 776	-6 902	-6 066	-6 254	1 032	-1 316	-46	0	0	0	0	0	0
SIC11	2 002	1 960	-617	10 422	6 779	-26 009	719	756	-8 733	42	-57	-2	-163	961	678	-19	117	83
SIC12	41	36	-10	-10 654	-7 709	-30 414	-134	-80	-172	1	-1	0	-54	18	23	-7	2	3
SIC13	8	9	-3	21 808	19 210	-26 579	21	21	-41	0	0	0	10	-18	-23	2	-4	-5
SIC21	27	26	-7	38 908	-6 257	16 297	0	-118	66	0	0	0	25	32	-45	1	1	-2
SIC23	1 067	956	-256	1 270	-18 624	15 464	-2 605	-4 573	1 803	4	-5	0	-1 361	-3 349	-4 361	-26	-74	-101
SIC24	16	14	-4	-6 070	-1 777	32 833	-56	-29	82	1	-1	0	22	-53	-17	4	-10	-3
SIC25	58	57	-18	19 099	15 869	24 210	34	47	270	1	-1	0	73	-75	-1	7	-8	0
SIC30	458	454	-145	13 063	9 083	5 154	357	406	562	25	-33	-1	215	216	173	63	65	53
SIC31	276	254	-76	-785	-1 684	-10 061	-449	-336	-387	12	-14	0	-522	-261	-169	-120	-61	-40
SIC32	81	71	-21	-8 883	-3 475	-6 015	-236	-99	-55	6	-6	0	-224	-164	-55	-84	-63	-21
SIC33	271	262	-81	7 768	1 728	-4 907	-19	-95	-80	7	-9	0	23	130	-67	4	19	-10
SIC34	69	63	-20	-2 655	5 759	-10 101	-130	18	-97	5	-6	0	-201	-62	47	-73	-23	17
SIC35	275	250	-75	-3 247	-4 161	-7 442	-543	-365	-228	14	-17	-1	-381	-470	-336	-109	-135	-97
SIC36	28	32	-10	37 603	13 334	-3 219	147	54	-11	3	-4	0	59	89	-15	33	51	-9
SIC37	19	22	-8	46 143	26 277	-17 569	127	91	-72	2	-3	0	52	102	51	29	58	29
SIC38	51	47	-14	98	-11 720	5 176	-69	-135	54	4	-5	0	-45	-92	-164	-21	-42	-76
SIC39	80	78	-25	8 351	8 456	-17 473	-4	61	-232	5	-6	0	-39	68	55	-12	22	18
SIC41	71	71	-21	16 694	-1 515	686	81	-97	22	5	-7	0	46	95	-120	19	39	-51
SIC42	42	44	-16	22 437	35 963	3 282	84	229	46	2	-3	0	-11	50	202	-3	15	62
SIC50	983	940	-294	5 305	4 579	-3 940	-412	135	-365	60	-76	-3	-616	158	567	-207	54	196
SIC61	653	589	-173	-4 266	-6 132	-1 709	-1 448	-1 174	-27	42	-51	-2	-682	-1 064	-921	-240	-384	-337
SIC62	1 416	1 372	-426	8 886	4 316	-76	26	-135	178	91	-118	-4	421	986	461	147	354	168
SIC63	615	589	-180	6 514	1 313	-15 517	-219	-368	-1 441	37	-48	-2	43	64	-205	14	22	-70
SIC64	550	530	-167	7 640	6 707	1 286	-89	181	253	40	-51	-2	-5	133	351	-2	54	143
SIC71	489	469	-143	5 434	-1 574	7 959	-182	-341	799	34	-43	-1	274	25	-224	104	10	-88
SIC73	77	76	-25	12 520	12 340	-3 885	64	137	-37	6	-8	0	50	198	212	22	89	97
SIC75	142	130	-38	-2 865	-10 274	-440	-246	-311	25	14	-17	-1	7	-37	-104	4	-20	-58
SIC81	384	357	-108	333	-654	-1 733	-483	-345	-38	36	-44	-2	-720	-145	-31	-369	-75	-16
SIC84	106	88	-24	-17 793	-19 059	-1 841	-477	-387	-9	7	-7	0	-136	-350	-302	-47	-123	-108
SIC88	1 660	1 598	-494	6 866	3 232	-5 188	-319	-449	-1 069	131	-167	-6	1 131	740	248	486	324	110
SIC91	1 406	1 310	-413	1 570	8 064	-1 136	-1 753	513	-94	110	-136	-5	-478	-1 128	998	-202	-490	441
SIC92	1 642	1 559	-473	5 503	1 122	1 149	-1 043	-1 395	532	114	-144	-5	-198	-252	-956	-74	-97	-375
SIC93	1 364	1 331	-411	10 226	3 857	5 429	335	-428	1 467	116	-151	-5	1 051	937	-32	485	444	-15
SIC99	704	742	-254	25 865	24 847	3 823	2 015	2 544	776	53	-74	-3	1 766	2 230	2 718	715	929	1 152

NN
Annexure NNA: Social Impact

OO Annexure OO Household Travel Survey Technical Report

Household Travel Survey

Mangaung Metropolitan Municipality

DRAFT REPORT

October 2018

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1. Background and Objectives

The development of the Integrated Transport Networks (ITN) in metropolitan areas is a process driven at national level by the NDoT. The ITN is planned and implemented by Metropolitan authorities under the direction and guidelines set by the NDoT and funded by National Treasury (NT).

The Mangaung Metropolitan Municipality (MMM) Integrated Public Transport Network (IPTN), hereafter referred to as the Mangaung IPTN, is intended to transform the public transport system in the City through the provision of a high-quality, safe and affordable public transport system. The IPTN system is aimed at improving the provision and level of service of road-based public transport.

The aim of the MMM Household Travel Survey (HTS), hereafter referred to as the Mangaung HTS is to gain strategic insight into the travel patterns and transport problems in the Metropolitan Municipality.

The Mangaung HTS was required to identify modal split between private, public transport (by mode) and non-motorised transport modes for work, education and other (social, shopping and business) trips. Furthermore, the HTS gave an indication of levels of dissatisfaction with the different aspects of the transport system and different modes of transport in the area, including travel times, costs, availability and accessibility, safety and the reliability of public transport services.

It was the intention that the HTS should also reflect average travel time to work and education, travel time for public transport trips to work, walking times to public transport by mode, and percentage of households spending more than 10 per cent of their income on public transport.

This report provides a synopsis of the technical details of the Mangaung HTS 2017. It starts by describing the questionnaire design process and the contents of the questionnaire. Section 3 considers the sampling frame, listing, sample design and questionnaire design. Section 4 recaps the procedures used during data collection, back-checking on interviews, Geocoding of addresses captured from interviews and weighting process. Section 5 discusses the development of the HTS data, conversion to a compatible file format for statistical analysis, the response rates and indicators of quality as well as highlighting the limitations of the study. The remaining five sections discuss the outcomes of analysing household characteristics, population characteristics, employment, trips as well as use and attitudes to public transport.

2. Survey Methodology

2.1 Reporting Zones

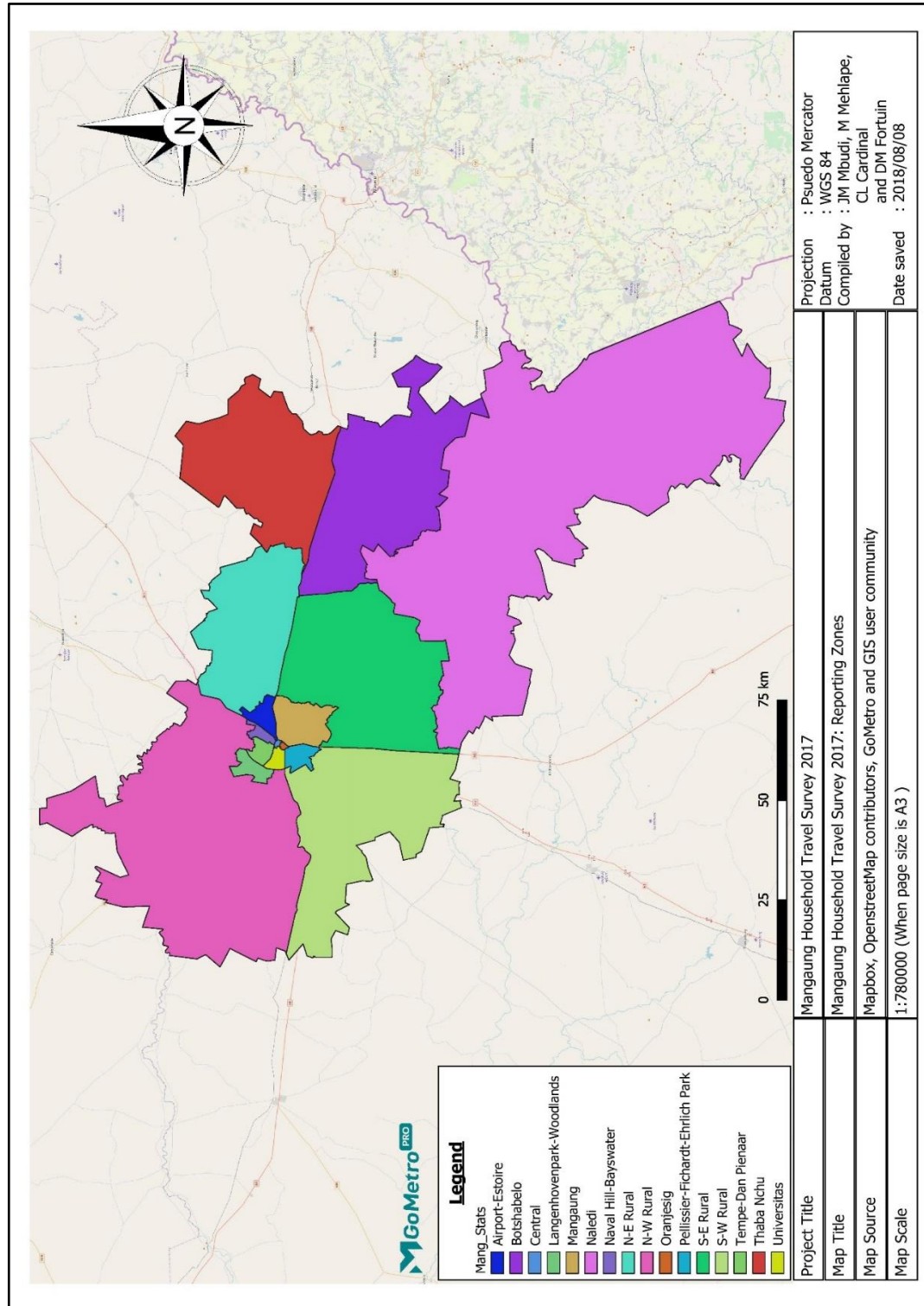


Figure 2-1: Mangaung HTS Reporting Zones

225 Traffic Zones were consolidated into 16 Reporting Zones as shown in Figure 2-1. The figure shows the survey area and the zoning system used for the data analysis.

2.2 Sample Design (Ariane)

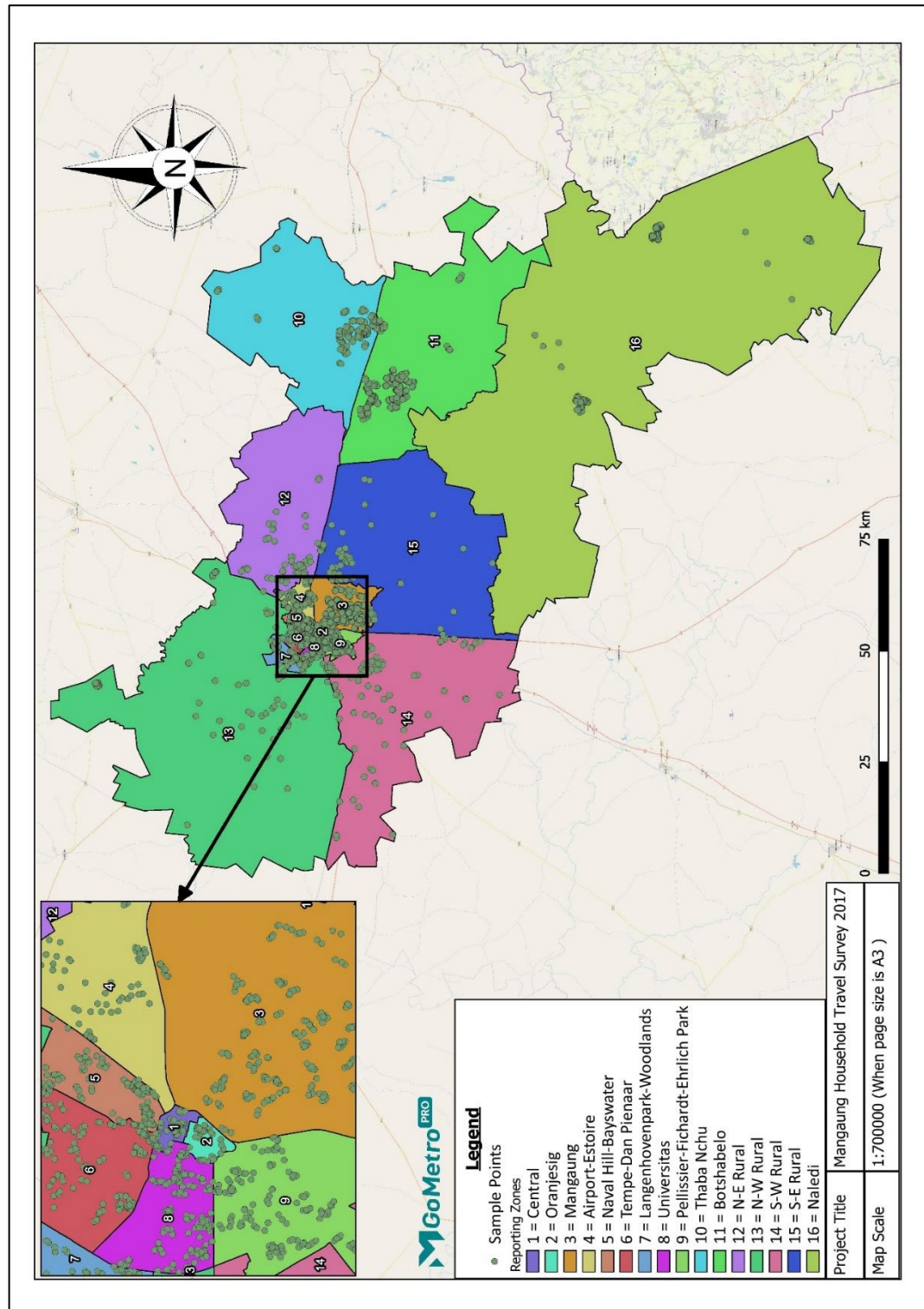


Figure 2-2: Mangaung HTS sample distribution

A stratified multistage cluster sample was used to design a household sample consisting of 2500 households. Traffic zones, combined into report zones, were taken as the explicit stratification variable with the number of dwelling units per zone as a measure of size. EAs (enumerator areas) were considered as primary sample units (PSUs), with households the secondary sampling units (SSUs).

2.2.1 Sampling frame

Statistics South Africa did not release an EA (enumerator area) sampling frame based on the 2011 population census therefore a new 2011 EA sampling frame was constructed by a team of specialists consisting of GEOTerralmage (Pty) Ltd (GTI) and Dr Ariane Neethling. The sampling frame is generated from a top down and bottom up approach. The top down approach utilizes the StatsSA 2011 and latest mid-year estimate data and the bottom up approach uses the GTI Building Based Land Use (BBLU) national dataset. StatsSA's Census 2011 information on Small Area Layer data, main and sub place is superimposed on the 2011 set of EA's through GIS techniques and statistical modelling. This information was simultaneously integrated with the latest GTI Land Use dataset which contains more than 15.5 million classified building structures points.

The sampling frame is updated annually and includes newest information gathered by GTI, including new developments and changes about EA type, information from fieldwork reports, and from other sources. Benchmarking and statistical modelling techniques are applied to the updated information annually to ensure that the demographic variables align to the latest mid-year population estimates as released by StatsSA.

The EA sampling frame consists of the demographic information and estimated population counts of number of households, number of people as well as numbers per population group, gender and per five-year age interval, per EA.

The sampling frame can be used from a national level, right down to local level to support the sampling process from design to weighting. A further advantage is that this output, together with the BBLU points can be used to also draw sampling/dwelling units for fieldwork during the sampling process. This BBLU information is used in the design and draw of the Mangaung Travel survey.

2.2.2 Allocation

Before the allocation was done, it was decided to combine all traffic zones into reporting zones, since the sample size was too small to make conclusions with good precision per traffic zone. The distribution of the traffic zones into reporting zones are summarised in

Table 2-1.

Table 2-1: Sample design size per reporting zone

Reporting Zone	Traffic Zones	Number of Households in designed sample
1	1, 2	102
2	96	78
3	37 - 82	330
4	28 - 31, 33, 35, 36	78
5	18, 20 - 27	150
6	3 - 17, 19	174
7	107 - 112	150
8	97 - 106	168
9	83 - 95	180
10	125 - 154	234
11	155 - 187	288
12	121 - 124	90
13	113 - 120, 205 - 208	132
14	194 - 204	90
15	188 - 193	96
16	209 - 225	162
Total		2 502

The power allocation rule, a disproportional allocation technique that is applied internationally, is applied to determine the number of EAs and households to be drawn per reporting zone (stratum). Power allocation results in an allocation between equal allocation and proportional allocation. The aim of using the power allocation rule is to decrease to a certain extent the allocation of EAs to the larger strata and to increase the allocation to the smaller strata. Hence, with this technique one can ensure, as far as the overall sample size allows you, that the sample sizes are large enough in the different reporting zones (strata) for the best possible precision of the estimates. The final allocation per reporting zone is given in

Table 2-1 above.

The allocation per reporting zone was thereafter proportionally divided among the traffic zones in the reporting zone. This final allocation is summarised in Appendix A.

2.2.3 Selection of EAs

The predetermined numbers of EAs were drawn using probability proportional to size systematic sampling with the number of dwelling units per EA as measure of size. All institutional, recreational and industrial EAs were excluded from the survey design.

2.2.4 Selection of visiting points per EA

The newest dwelling unit counts and GIS coordinates of GTI were used to draw the indicated number of visiting points per EA.

In each of the drawn EAs, six households (or a multiple of six for larger EAs) were systematically selected, after the visiting points were ordered according to their GIS coordinates.

2.2.5 Oversampling

For each hit of six selected households in an EA, four additional visiting points in the same EA were systematically selected. This oversample could be used when a substitute was needed, for example in the event of non-contact or refusals.

2.3 Questionnaire Design

2.3.1 Hard copy questionnaire

The hard copy questionnaire is available in Appendix B.

2.3.2 Programming of electronic questionnaire

GoMetro was provided with a hardcopy version of the questionnaire, with questions and structure nearing final draft. Using this structure, the electronic questionnaire for the survey was created in a proprietary software platform for creating online questionnaires. The survey team received questions that were to be asked in during interviews and determined the most appropriate question type for each question. The question types are discussed below as well as an example question for illustration.

Text Fields: These were used for questions that were open-ended, for example: Name of main household member.

Grid Text Fields: These grids enabled information to be captured in a two-dimensional matrix, thus allowing for more complex information to be captured, for example: During the past 7 days, how many times did you use the following modes?

Table 2-2: Electronic questionnaire grid text field example

Day	Walk all the way	Bus	School bus	Minibus taxi	Sedan taxi	Bakkie taxi
Mon						

Multiple-choice / Radio buttons / Drop-downs: These were used in cases where one selection was required out of many options, for example: Question: Type of dwelling. Options: 1. Dwelling/house or brick/concrete block structure on a separate stand or yard or on farm, 2.

Traditional dwelling/hut/structure made of traditional materials, 3. Flat or apartment in a block of flats, Cluster house in complex, 4. Town house (semi-detached house in complex), 5. Semi-Detached house

Date: These were used for questions that required a date input, for example: Trip Date

Checkboxes: These enabled the selection of more than one option from a selection. For the final version of the questionnaire, these were not used.

2.3.3 Finalization of questionnaire

Additional questions requested by relevant stakeholders and were added into the survey questionnaire. Once the questions were approved two versions were created, a hardcopy version physical capturing on paper and an electronic version SurveyGizmo for digital capturing online.

2.4 Interviewer training

2.4.1 Date and Venue

The interviewer training took place on 7 - 9 August 2018 at the Bram Fischer Building in Bloemfontein. The training team arrived 3 weeks before the training day on the 24 July 2017 in order to prepare equipment and procedures for the training and execution of the survey.

2.4.2 Training Team

The members of the training team were:

1. Letlhogile Mothoagae, Transport Engineer at GoMetro and onsite Project Manager for Mangaung HTS
2. Ndakhona Bashingi, Transport Engineering PhD Student at CUT Free State and Supervisor for Mangaung HTS

2.4.3 Program

Day 1

- Opening and Introduction
- Theoretical Training Session 1: Concept of the Household Travel Survey
- Theoretical Training Session 2: Walk through each question in the Household Travel Survey
- Theoretical Training Session 3: Filling in the interview by yourself

Day 2

- Practical Training Session 1: Peer to peer Mock Interviews
- Q & A Session 1
- Practical Training Session 2: Peer to peer mock interviews

- Q & A Session 2

Day 3

- Theoretical Training Session 4: Revision of Questions and Definitions
- Practical Training Session 3: Peer to peer mock interviews
- Q & A Session 3

2.4.4 Participants

The participants of the training were residents of various parts of MMM. Their contacts were obtained through the aid of municipality. The training programme had a total of 40 participants. During the training process additional supervisors were selected.

3. Survey execution

3.1 Pilot testing

3.1.1 Pilot Operations

Pilot testing for the survey execution happened on 15 and 16 August 2018.

For the pilot phase the 40 participants from the training phase were divided into 8 teams. The pilot phase was executed with the aim of testing:

1. Supervisor ability to coordinate their of enumerators to targets
2. Enumerator ability to receive coordinates and navigate to targets
3. Driver ability to work with the team

3.1.2 Lessons Learned during Pilot testing

During the pilot testing phase it was identified that:

- Different Teams should not receive targets from the same Enumeration Area, hereafter referred to as EA, to avoid confusion of targets in the field
- Interviewers need to be certain of the EA numbers and Household Questionnaire numbers of the Targets they interview
- Urban areas, where unemployment is low, more refusals rates per EA compared to townships and villages with relatively higher positive.

3.2 Fieldwork

Fieldwork was executed in 4 phases divided by pauses in operations. During the first three phases of the fieldwork the field team operated six days a week, Tuesday to Sunday.

- Phase 1: 22 August 2017 - 7 September 2017
- Phase 2: 19 September 2017 - 30 September 2017
- Phase 3: 3 October 2017 - 16 October 2017
- Phase 4: 13 February 2018 - 11 March 2018

Communication to the residents of MMM started to be implement from the 4th of September 2017. The plan included:

1. Reaching out to neighbourhood communication forums
2. Reaching out to newspapers
3. Reaching out to radio stations

Neighbourhood communication forums that were known by the communication team were contacted from 4 Sept 2018. Newspapers and radio stations were reached out in time for the third and fourth phases of field work.

3.3 Replacement of interviewers

For phase 1 - 3 the field team were informed to let others know about the survey. Those who responded positively were contacted and became standby staff.

3.4 Fieldwork problems

During the execution of the fieldwork challenges were faced by the survey team. These challenges are discussed below.

3.4.1 Delayed Payments of Fieldwork

Payments to the survey team were delayed, which in turn caused a delay in paying enumerators and supervisors. Payment delays had a negative impact on the team's progress due to the following:

1. Fieldworkers and supervisors struggled to pay for transport to come to work
2. Team morale declined
3. Surveys had to be paused until payments could be made to manage the project's cash flow

3.4.2 Technical Issues with internet connection

The survey made use of an online survey form that was captured on a tablet. In situations where the internet connection was not good, the survey team captured the interview on a hard copy version of the survey questionnaire. The hardcopy version would then be captured in the online version of the questionnaire by the enumerator once the internet connection was good enough.

3.4.3 Issues with electronic devices

Over time the following issues with devices were faced:

- Devices not responding as quickly as they used to
- Some devices were damaged
- Batteries started to run out of energy more quickly

To overcome these challenges the survey team made use of spare devices for damaged and slow devices and mobile external batteries to preserve the battery life over the day.

3.4.4 Navigating to households

The survey team received coordinates of households that were sampled for the Mangaung HTS. Enumerators received maps for each EA to navigate to the sampled household. In situations where the GPS of the tablet was malfunctioning, enumerators had to use their personal mobile devices to navigate.

3.4.5 Awareness of the Mangaung HTS by residents of MMM

During the first three phases of the survey, the households that were interviewed were not aware of the municipal survey that was taking place. This meant that the team had to prove the legitimacy of the survey. Enumerators presented letters from the municipality and name tags and were dressed in reflectors. Not all residents believed the enumerators and this resulted in a lot of refusals.

3.4.6 Interviewing Households on farms

Households situated on farms were sampled as part of the survey. Most households on farms refused to grant us access to the premises. There had been several crime incidents on farm areas before the survey began, making farm residents suspicious of strangers as they saw enumerators as a potential risk to the household. The team needed to first request permission from the farm owners before getting access to farm. In many cases the farm gates were locked and therefore the field team was not able to gain access to dwelling units located in farm areas.

3.4.7 Gaining access to security estates

A security estate is a group of homes and other buildings built together as a single development. These developments have security measures in place to ensure that only permitted visitors gain access to the development. Access to these estates was gained through individually contacting the body corporates requesting permission to access the estates.

(

4. Back-checking, coding, weighting

4.1 Back-checking of interviews

4.1.1 Formatting Data for Quality Assurance

The online **platform**, SurveyGizmo was used check records on a daily basis for completeness during the survey execution stage.

After the survey execution phase the data from the forms was exported to csv format, where it could be imported into Google Sheets for further back-checking to be done. The data underwent back-checking, calling back households to complete information and correcting information. The back-checking was done on four Google Sheets Files:

1. Hybrid Household File, with household data
2. Hybrid Attitude File, with household attitude data
3. Hybrid Person File, with household person data
4. Hybrid Trip File, with person trip data

Migrating the data from SurveyGizmo had the following advantages:

1. Back-checking in Google Sheets was simpler than back-checking in SurveyGizmo online platform
2. Having the data set up in the four files simplified the process of transferring the data into SPSS-compatible format

4.1.2 Implementation of Quality Assurance

Quality Assurance Statuses, hereafter referred to as QA Statuses, were given to each record in each of the four files listed above. Records that were correctly filled in were given the status “QA Passed”.

In the household data, the “QA Passed” status was assigned to a household data record if all the household fields are filled in completely and if the associated person data records and trip data records of household members that participated in the survey have the status “QA Passed”. There were cases where some household members refused to participate in the survey. Records representing these members were given the status “Blank Member”. A household record with associated person records with the status “Blank Member” was assigned the status “QA Passed” if the person records and trip records representing household members that did participate have the status “QA Passed”.

In the person data, the “QA Passed” status was assigned to a person data record if all the person fields are filled in completely.

In the trip data, the “QA Passed” status was assigned to a trip data record if all the trip fields are filled in completely.

In Table 4-1 the sampled number of households sampled and realised with the “QA Passed” status per reporting zone is shown.

Table 4-1: Households sampled and surveyed per reporting zone

Reporting Zone	Zone Category	Designed number of households	Realised number of households with QA passed	Success Rate
1	Internal Reporting Zone	102	93	91%
2	Internal Reporting Zone	78	69	88%
3	Internal Reporting Zone	330	286	87%
4	Internal Reporting Zone	78	78	100%
5	Internal Reporting Zone	150	136	91%
6	Internal Reporting Zone	174	137	79%
7	Internal Reporting Zone	150	121	81%
8	Internal Reporting Zone	168	157	93%
9	Internal Reporting Zone	180	138	77%
10	Internal Reporting Zone	234	154	66%
11	Internal Reporting Zone	288	274	95%
12	Regional Reporting Zone	90	55	61%
13	Regional Reporting Zone	132	100	76%
14	Regional Reporting Zone	90	50	56%
15	Regional Reporting Zone	96	82	85%
16	Regional Reporting Zone	162	138	85%
Total		2 502	2 068	83%

The reporting zones were categorised into internal and regional zones. As shown in Table 4-1 There were 11 internal reporting zones and 5 regional reporting zones. The internal zones have higher populations and were prioritised over regional reporting zones during the back-checking processing. In order to perform weighting the team. For the weighting process the team aimed for a success rate of 80%. An overall success rate of 83% for the overall sample. 8 out of 11 internal reporting zones meeting the target success rate. 2 out 5 regional zones meeting the required success rate.

4.2 Geocoding

Addresses provided for places:

- Households
- Educational institutions
- Employment places
- Trip origins
- Trip destinations

Coordinates were obtained using an open source online platform that takes the addresses of the abovementioned places as inputs and provides coordinates using a Google Maps API.

4.3 Weighting

Weights are assigned to make weighted sample records represent the target population as closely as possible. A weight (w_i) indicates the number of population elements "represented" by a single sample element. Therefore, the sum of the weights should be equal to the population total of elements.

Weights are usually developed in different stages to compensate for

- unequal inclusion probabilities,
- non-response,
- non-coverage and skewness resulting from sample design and fieldwork.

In order to obtain a representative sample of the population, a multistage stratified sample was designed with Reporting Zone as the explicit stratification variable. The sample was designed in different stages. In the first stage primary sampling units (PSU) – i.e. the enumerated areas (EA) – were selected with probability proportional to size (PPS) from the population sampling frame. In the second stage a predetermined number of households were selected systematically in each PSU in the sample.

The design weight of the household, person and trip were calculated as the inverse of the inclusion probability, according the design. The weight of an EA is as follows:

$$W_{EA} = \left(n_{EA} \frac{EA_{DU}}{POP_{DU}} \right)^{-1}.$$

where n_{EA} is the allocated number of EAs in the report zone (stratum),
 EA_{DU} the number of dwelling units (DUs) in the EA and,
 Pop_{DU} is the total number of dwelling units in the specific report zone.

In the second stage dwelling units were selected systematically in each EA in the sample. The newest available list of DUs gathered by GTI was used. The DU weight per EA is given by

$$W_{DU} = W_{EA} \left(\frac{n_{DU}}{EA_{DU}} \right)^{-1}$$

where n_{DU} is the number of selected dwelling units per EA.

In the next step, these weights were benchmarked to the 2017 population number of households per reporting zone:

$$W_{HH17} = \frac{W_{DU}}{\sum_{RZ} W_{DU}} RZ_{HH17}$$

where RZ_{HH17} is the estimated number of households, 2017, in the reporting zone. (See Appendix D.)

Hereafter the person weight could be calculated for all persons with a QA passed (see section 4.1 for description of “QA Passed”) for the household as well as person. It is calculated as follows:

$$W_{PP} = W_{HH17} \left(\frac{Count_{PP}}{HHSize} \right)^{-1}$$

where $Count_{PP}$ is the number of household members with a QA passed in the person file,

$HHSize$ is the number of household members in the household.

Since all persons in the person file did not have a QA passed for household and/or persons, these weights had to be adjusted to compensate for these non-QA passed cases:

$$W_{PP17} = \frac{W_{PP}}{\sum_{RZ} W_{PP}} RZ_{PP17}$$

where RZ_{PP17} is the estimated number of persons, 2017, in the reporting zone. See Appendix D.

Finally, the person weights are adjusted to compensate for differential non-response (i.e. under-representation of certain groups of the population): The SAS macro CALMAR, developed by INSEE in France, is used to benchmark these person weights to the 2017 based Mid-year population estimates for the population under consideration. The weights are benchmarked according to race, age and gender. See Appendix D for the population totals.

The trip weights are calculated accordingly for all persons in the trip file with a QA passed for household, person and trip:

$$W_{Trip} = W_{HH17} \left(\frac{Count_{PP\ Trip}}{HHSize} \right)^{-1}$$

where $Count_{PP\ Trip}$ is the number of household members in the trip file, with the necessary QA passed.

These weights were also adjusted to compensate for the non-QA passed cases, by

$$W_{Trip17} = \frac{W_{Trip}}{\sum_{RZ} W_{Trip}} RZ_{PP17},$$

and benchmarked to the 2017 population totals in Appendix E.

5. Data analysis

5.1 Development of database

A flat file based system was used to store and manage the data retrieved from the various online survey forms submitted.

The four tables of data are normalised to Second Normal Form (2NF) rules to ensure that:

1. Each Household record has a unique Questionnaire Number as a primary key
2. Each Attitude record has a unique Questionnaire Number
3. Each Person record has a unique Household Member Number as a primary key
 - a. Questionnaire Number as a foreign key relating the corresponding Household and Attitude record
4. Each Trip record has a unique Trip Number as a primary key
 - a. Questionnaire Number as a foreign key relating the corresponding Household and Attitude record
 - b. Household Member Number as a foreign key relating the corresponding person record

5.2 Transfer into SPSS-compatible files

SPSS software was used to analyse the weighted data. In order to make the data compatible with the software the following updates were made to the data:

1. Values that were *Not Applicable* were coded as -1
2. Values there were not filled in by the interviewer and could not be corrected as 999999
3. Categorised fields were normalised to 3NF database rules so that:
 - a. Fields with fixed / categorised responses were assigned numerical values
 - b. 1=Highly satisfied, 2=satisfied, 3= neutral, 4= dissatisfied, 5= highly dissatisfied.

This was done for the Household, Person and Trip Files respectively.

5.3 SPSS analysis

The data was validated and analysed using the IBM Statistics program, Version 25.

The data was subjected to stringent testing during the back checking process and inconsistencies revealed during the SPSS validation process, were corrected by phone calls to the relevant respondents as well as double checking the data and transfer process.

This resulted in 2 068 usable household records.

The results in the tables are based on the reported data, weighted and benchmarked to the 2017 mid-year population estimates.

6. Results: Household characteristics

In the household section of the questionnaire, information was collected about the following household characteristics from a responsible adult in the household:

- Dwelling type
- Household size
- Household income
- Vehicle ownership
- Access to services and amenities
- Expenditure on public transport
- Transport problems
- Factors influencing mode choice

The results of these questions are provided below.

6.1 Number of households and population

The weighted number of households and people living in the Mangaung municipality is provided in Table 6-1 below.

More than a third of the households and population reside in the Mangaung reporting zone and as expected, small numbers live in the central and outlying rural areas.

Table 6-1: Number of households and population

Reporting zone	Number of households	Population
Central	1 600	3 300
Oranjesig	600	1 600
Mangaung	106 200	322 500
Airport/Estoire	1 300	4 000
Naval Hill/Bayswater	6 400	16 600
Tempe/Dan Pienaar	11 400	26 900
Langenhoven Park/Woodlands	7 100	16 200
Universitas	11 600	22 600
Pellissier/Fichardt-Ehrlich Park	11 600	34 200
Thaba Nchu	33 300	96 500
Botshabelo	67 300	222 300
N-E Rural	4 600	11 100
N-W Rural	17 900	52 200
S-W Rural	11 900	40 700
S-E Rural	10 100	28 600
Naledi	10 900	31 200
Mangaung Municipality	313 800	930 500

6.2 Dwelling type

As can be seen in Table 6-2 below, the vast majority of the people in the survey area, live in houses on separate stands. That is also the case in most of the reporting zones – exceptions are Oranjesig and Universitas, where about half of the households live in flats and townhouses and the Central zone, where flats dominate. The only area with a significant proportion of informal dwellings is Naledi.

Table 6-2: Dwelling type

Reporting zone	Percentage of households					
	Dwelling on separate stand	Flat in block	Townhouse	Backyard dwelling	Informal dwelling	Other
Central	18.3%	80.7%	1.0%			
Oranjesig	42.9%	33.3%	19.1%	4.6%		
Mangaung	92.3%		0.3%	2.5%	4.3%	0.6%
Airport/Estoire	91.4%	1.7%	0.8%	6.2%		
Naval Hill/Bayswater	56.9%	28.8%	8.2%	6.1%		
Tempe/Dan Pienaar	68.7%	10.9%	16.1%	4.3%		
Langenhoven Park/Woodlands	57.3%	1.9%	37.9%	2.8%		
Universitas	50.8%	33.5%	9.8%	5.9%		
Pellissier/Fichardt-Ehrlich Park	87.5%	1.4%	10.5%	0.6%		
Thaba Nchu	93.6%			1.5%	3.7%	1.2%
Botshabelo	92.6%				5.8%	1.6%
N-E Rural	93.3%			4.2%		2.5%
N-W Rural	89.7%		2.8%		4.6%	3.0%
S-W Rural	88.2%			1.1%	2.1%	8.6%
S-E Rural	96.9%			1.9%	1.2%	
Naledi	87.0%			2.6%	10.3%	
Mangaung Municipality	87.6%	2.8%	2.7%	1.9%	3.8%	1.2%

6.3 Household size

Information about household size can be found in Table 6-3 and

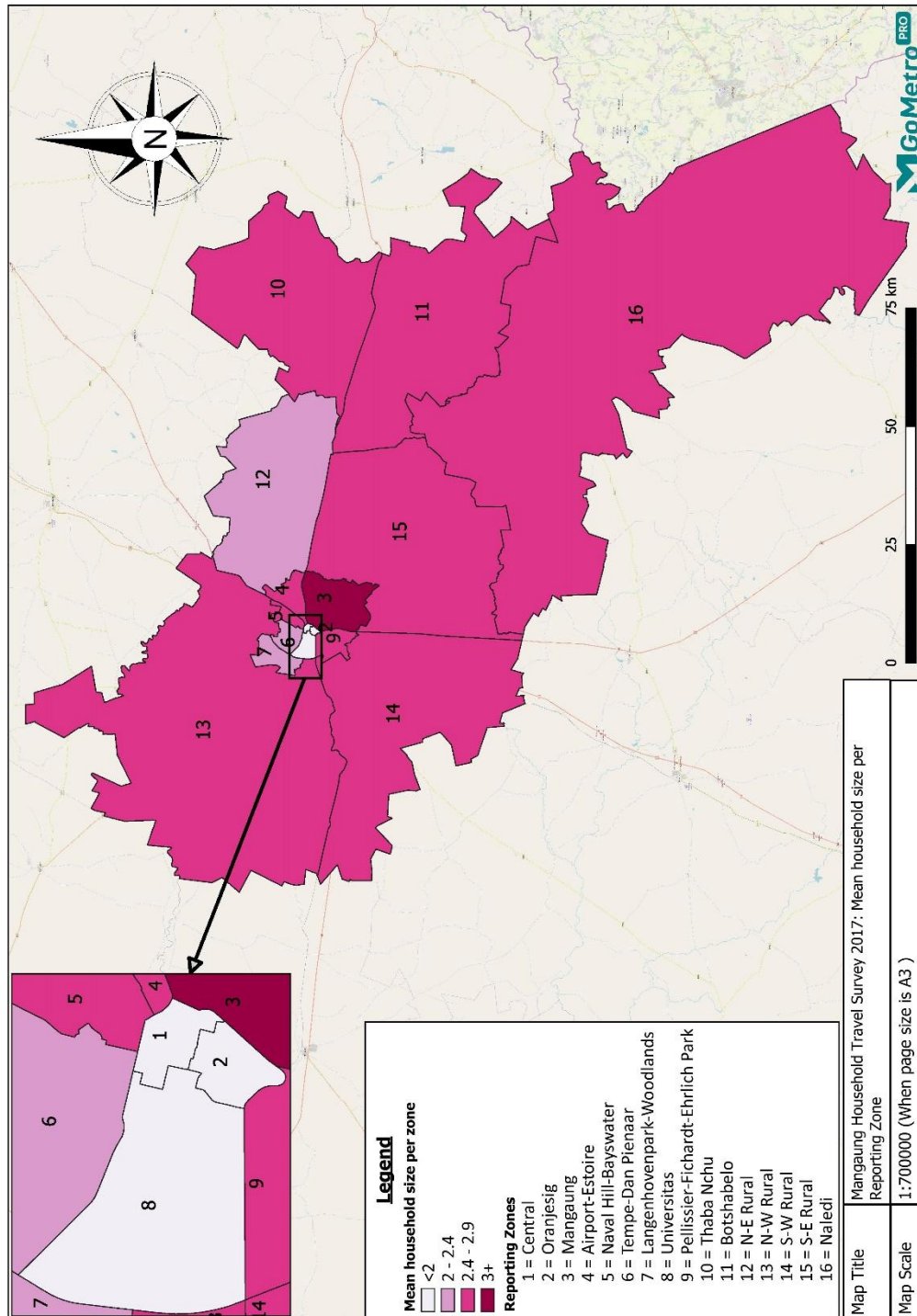


Figure 6-1. The table shows that the majority of households have between 2 and 4 household members (almost 70 % of the households in the survey area), but that almost 20 per cent of the households are single person households. Even in the rural areas, the multiple member households account for less than 20 per cent of the households.

The mean household size in the different areas ranges between 1.7 and 3.1, with a mean of 2.9 members in the survey area as a whole.

Table 6-3: Household size

Reporting zone	Percentage of households				
	1	2	3-4	5-6	7+
Central	51.9%	31.7%	13.8%	2.7%	
Oranjesig	53.9%	29.8%	14.2%	2.0%	
Mangaung	16.7%	24.4%	41.8%	15.5%	1.5%
Airport/Estoire	44.8%	12.3%	26.0%	14.4%	2.5%
Naval Hill/Bayswater	31.6%	25.7%	33.1%	8.5%	1.0%
Tempe/Dan Pienaar	34.2%	34.5%	29.4%	1.7%	0.1%
Langenhoven Park/Woodlands	44.7%	21.8%	25.6%	7.9%	
Universitas	39.8%	33.2%	24.7%	2.1%	0.2%
Pellissier/Fichardt-Ehrlich Park	24.8%	29.6%	36.8%	7.1%	1.6%
Thaba Nchu	16.5%	23.3%	46.3%	12.4%	1.4%
Botshabelo	12.4%	31.4%	48.1%	7.3%	0.9%
N-E Rural	40.7%	18.0%	31.0%	8.1%	2.2%
N-W Rural	16.9%	42.2%	25.3%	12.6%	3.0%
S-W Rural	16.2%	26.5%	42.0%	9.8%	5.4%
S-E Rural	15.1%	28.3%	46.0%	9.6%	1.0%
Naledi	22.0%	29.0%	34.5%	9.6%	4.9%
Mangaung Municipality	19.3%	27.9%	40.4%	10.8%	1.6%

On the map, the paler colours represent small household sizes and the darker colours larger household sizes. The areas with a mean household size of under 2 are the Central, Oranjesig and Universitas, and Mangaung is the only zone with a mean household size of 3 and over.

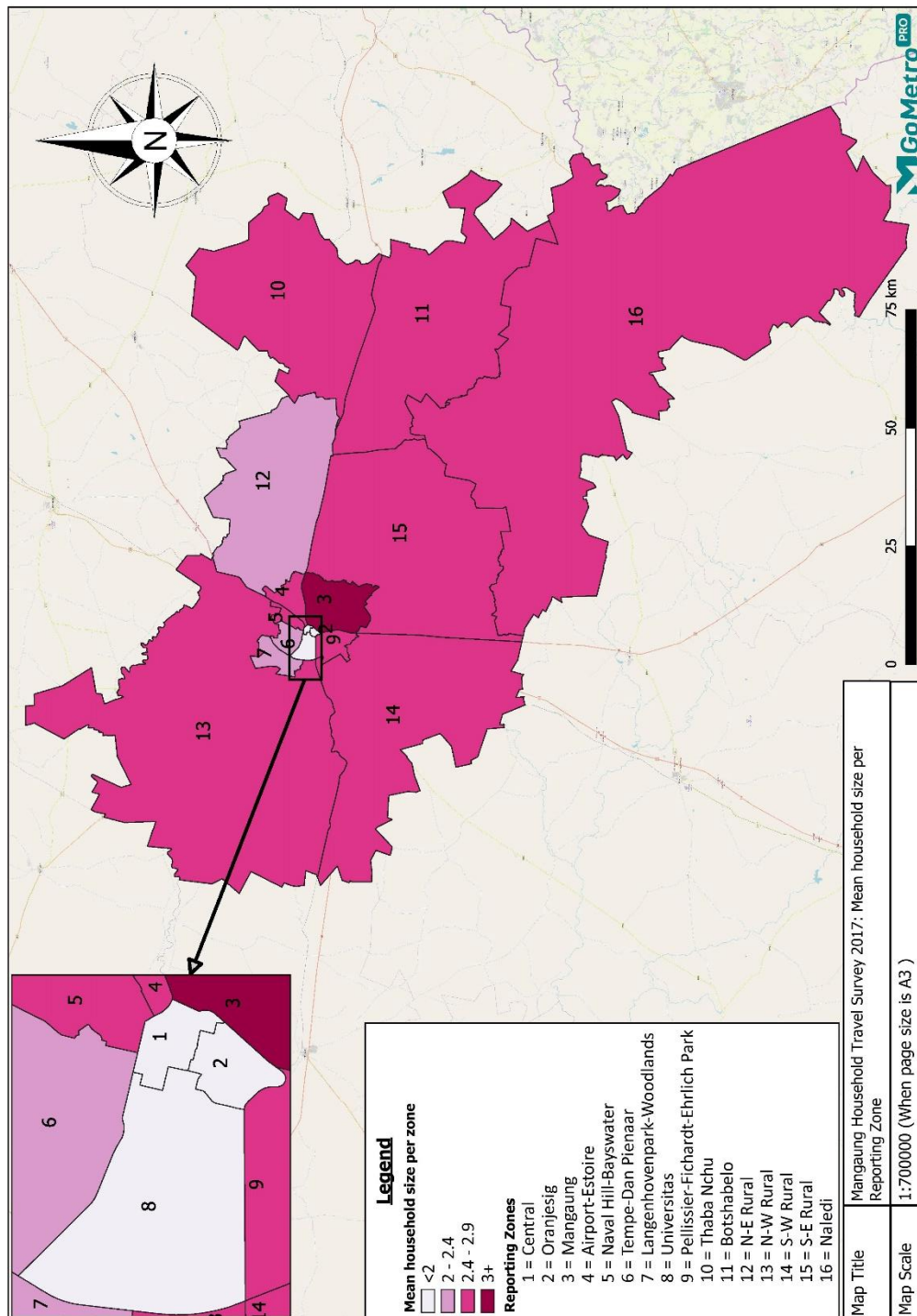


Figure 6-1: Mean household size

6.4 Household income

6.4.1 Main source of household income

Respondents were asked about the sources of income for the household and also which of those sources provided the most money for the household.

The results portrayed in Table 6-4 indicate that salaries are the main source of income for the majority of households in the survey area. The other important source of income is grants, especially Thaba Nchu and Botshabelo. In some areas with an aging population such as Tempe/Dan Pienaar and Pellissier/Fichardt-Ehrlich Park, a significant proportion of households rely on pensions.

Table 6-4: Main source of household income

Reporting zone	Percentage of households					
	Salaries	Business	Pensions	Grants	UIF, remittances	Other
Central	44.5%	5.7%	3.0%	3.6%	17.6%	25.7%
Oranjesig	42.5%	1.4%	10.7%	10.4%	8.5%	26.6%
Mangaung	60.9%	1.9%	11.5%	16.9%	2.8%	6.0%
Airport/Estoire	68.9%	4.3%	16.9%	7.2%	1.8%	0.9%
Naval Hill/Bayswater	57.1%	5.8%	13.2%	7.4%	4.0%	12.4%
Tempe/Dan Pienaar	62.5%	3.9%	17.0%	1.6%	4.8%	10.2%
Langenhoven Park/Woodlands	67.8%	5.6%	8.9%	1.5%	5.3%	11.0%
Universitas	56.8%	3.0%	11.4%	3.3%	3.2%	22.3%
Pellissier/Fichardt-Ehrlich Park	74.6%	1.8%	16.6%	5.9%	0.8%	0.3%
Thaba Nchu	40.6%	3.5%	8.5%	39.1%	1.3%	7.0%
Botshabelo	35.7%	1.4%	8.1%	41.5%	3.1%	10.2%
N-E Rural	76.9%		5.8%	9.4%	1.2%	6.7%
N-W Rural	59.6%	5.4%	9.9%	21.2%	1.4%	2.6%
S-W Rural	84.0%	1.1%	3.3%	8.4%	2.1%	1.1%
S-E Rural	71.3%	3.1%	8.4%	4.7%	9.6%	2.9%
Naledi	46.3%	3.4%	13.5%	25.8%	3.1%	7.9%
Mangaung Municipality	54.6%	2.5%	10.3%	22.2%	3.0%	7.5%

6.4.2 Household income

It is becoming more and more of a challenge to obtain reliable income from respondents and the matter has to be approached with skill and sensitivity. Unfortunately, for whatever reason, more than half of the survey respondents, and in some areas as many as 80 per cent, refused to provide the necessary information (as can be seen in Figure 6-2). *The lack of information has serious implications, as it prevents the calculation of valuable indicators, such as the relationship between household income and household expenditure on public transport.*

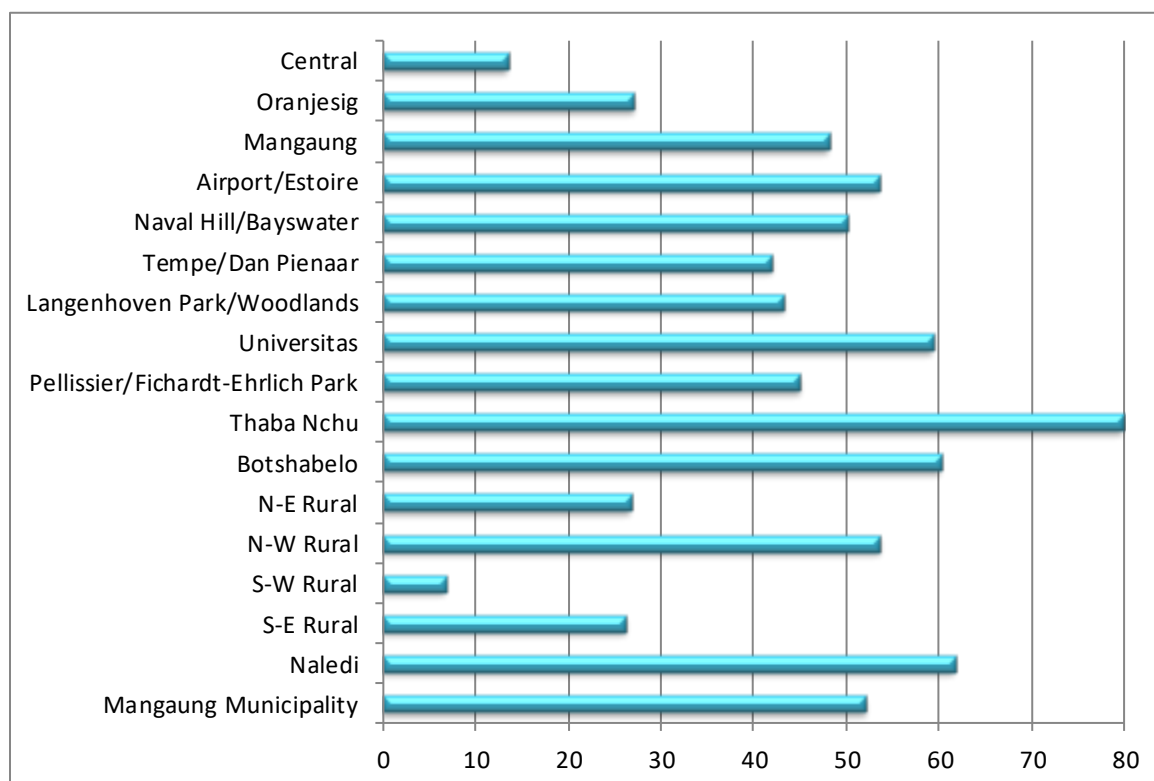


Figure 6-2: Percentage of households that did not provide income information

Table 6-5 provides an indication of the household incomes in the area, based on the information provided by the respondents that were willing to answer the question. In the area as a whole, about 42 per cent of the households reported a monthly income of lower than R4 500. In Naledi and Thaba Nchu the proportion of low-income families is 57 and almost 80 per cent respectively. However, in Naledi the households are relatively evenly spread over the different groups. Only 16 per cent of the households have an income of more than R16 000 per month.

Table 6-5: Monthly household income

Reporting zone	Percentage of households				
	R201 - R1 500	R1 501 - R4 500	R4 501 - R8 000	R8 001 - R11 000	R16 001 +
Central		48.3%	22.2%	25.5%	4.0%
Oranjesig	4.4%	42.3%	34.9%	15.6%	2.7%
Mangaung	14.1%	23.3%	19.3%	21.7%	21.5%
Airport/Estoire	4.5%	17.7%	10.8%	17.1%	49.8%
Naval Hill/Bayswater	9.3%	24.8%	15.8%	28.3%	21.8%
Tempe/Dan Pienaar	0.9%	15.4%	14.5%	31.7%	37.6%
Langenhoven Park/Woodlands	1.2%	25.3%	11.4%	33.8%	28.4%
Universitas	0.8%	19.7%	20.5%	28.1%	31.0%
Pellissier/Fichardt-Ehrlich Park	10.6%	17.1%	11.1%	23.6%	37.5%
Thaba Nchu	34.8%	42.9%	12.0%	7.8%	2.5%
Botshabelo	21.6%	29.7%	31.3%	15.8%	1.6%
N-E Rural	16.0%	53.9%	13.6%	12.1%	4.5%
N-W Rural	15.6%	49.9%	11.0%	20.1%	3.5%
S-W Rural	9.1%	32.0%	19.9%	24.7%	14.3%
S-E Rural	4.1%	23.5%	32.6%	28.4%	11.3%
Naledi	27.4%	29.2%	22.1%	12.1%	9.2%
Mangaung Municipality	14.2%	27.9%	20.6%	21.2%	16.1%

The mean monthly household income of those that provided income information is displayed in

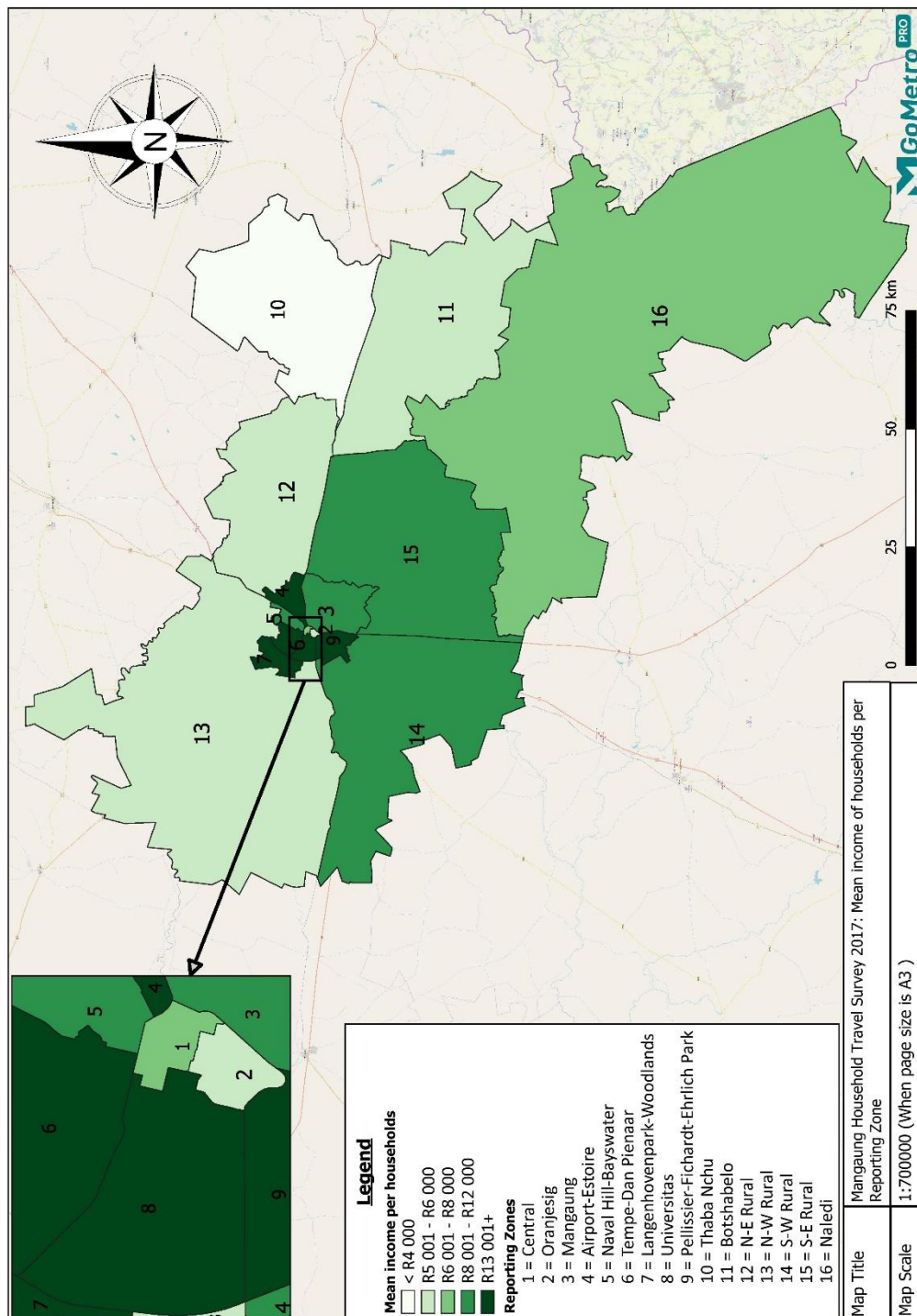


Figure 6-3Error! Reference source not found. – the darker the shading, the higher the income. The incomes range between a low of R3 700 in Thaba Nchu and a high of R16 000 in the Airport/Estaire area. The mean income the municipality is R9 000.

Please note that this picture is based on a small proportion of the sample in each area (in Thaba Nchu only 20 % and in Naledi 38% of the achieved sample) and should therefore be interpreted with circumspection.

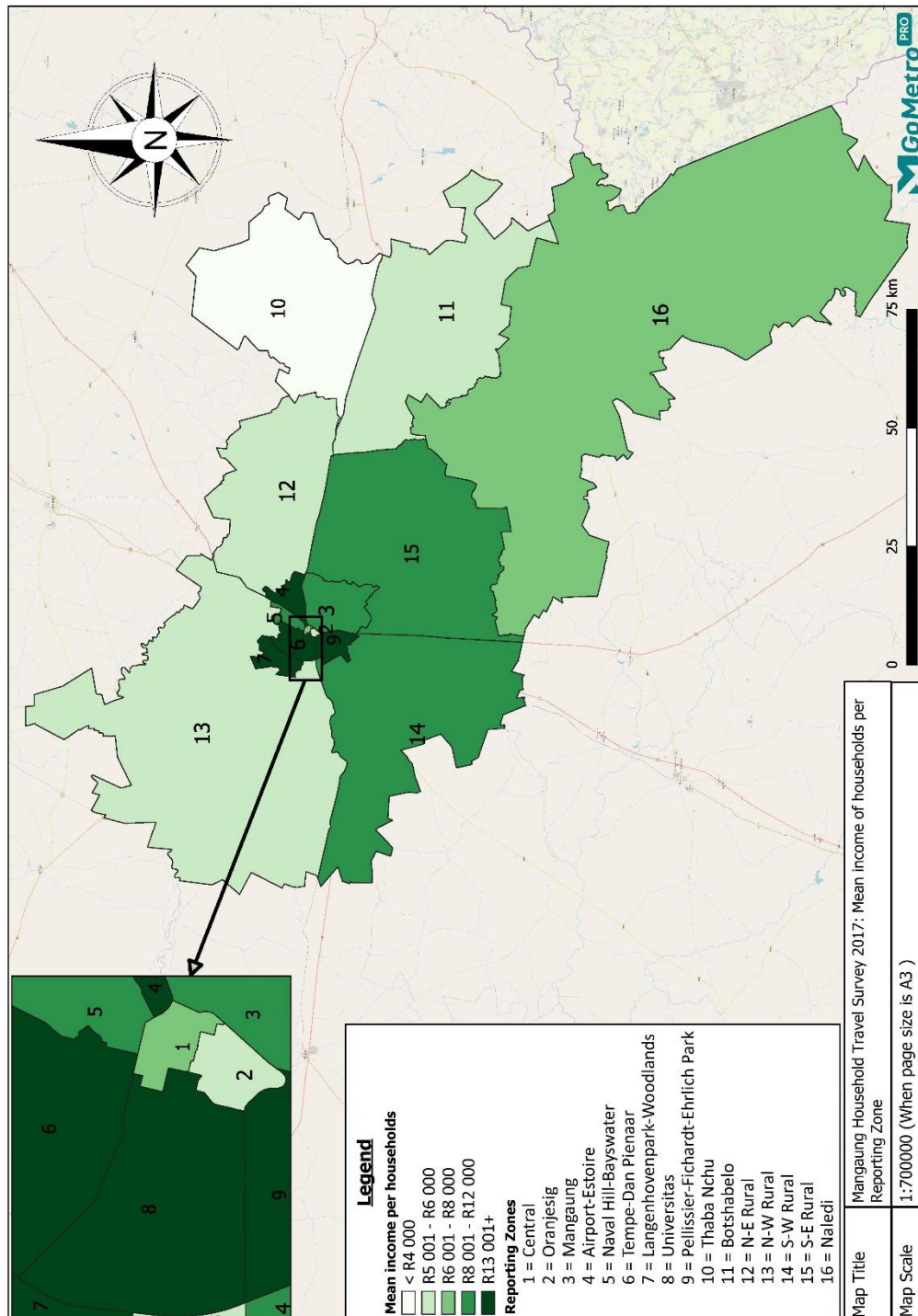


Figure 6-3: Mean monthly household income

6.5 Vehicle ownership and availability

Respondents were asked to provide information about the different types of vehicle owned by or available to the household for private use. Table 6-6 shows that the ownership of animal-drawn vehicles (with the exception of the S-E rural zone) and motor-cycles is negligible. Bicycle ownership is higher, and on average, eight per cent of households own bicycles. Access to employer-owned vehicles remain relatively low, and as can be expected, car ownership is high (between 80 and 90%) in the established urban areas at the western side of the central zone.

Table 6-6: Vehicle ownership and availability - % of households and mean number of vehicles

Reporting zone	Bicycles		Motorcycles/ scooters		Motor vehicles owned by employer		Motor vehicles owned by household		Animal-drawn vehicles	
	%	Mean	%	Mean	%	Mean	%	Mean	%	Mean
Central	0.5	0.0	0.0	0.0	0.5	0.0	28.2	0.3	0.0	0.0
Oranjesig	2.0	0.0	2.5	0.0	2.5	0.0	59.3	0.7	0.0	0.0
Mangaung	6.3	0.1	0.0	0.0	3.2	0.0	25.1	0.4	0.0	0.0
Airport/Estoire	12.8	0.2	4.9	0.1	9.8	0.1	73.0	1.2	1.1	0.0
Naval Hill/Bayswater	11.4	0.2	2.4	0.0	12.0	0.1	66.6	1.0	0.0	0.0
Tempe/Dan Pienaar	21.1	0.3	1.8	0.0	9.1	0.1	84.2	1.3	0.0	0.0
Langenhoven Park/Woodlands	15.5	0.3	2.8	0.0	9.2	0.2	84.2	1.4	0.8	0.0
Universitas	12.8	0.2	2.5	0.0	10.8	0.1	58.6	0.9	0.0	0.0
Pellissier/Fichardt-Ehrlich Park	22.7	0.3	3.1	0.0	12.2	0.2	89.3	1.3	0.3	0.0
Thaba Nchu	1.4	0.0	0.0	0.0	2.5	0.0	13.0	0.1	0.4	0.0
Botshabelo	1.2	0.0	0.0	0.0	1.8	0.0	9.8	0.1	0.6	0.0
N-E Rural	5.6	0.1	1.1	0.0	11.9	0.2	59.7	0.7	0.0	0.0
N-W Rural	20.9	0.2	0.0	0.0	11.7	0.1	40.9	0.6	1.0	0.0
S-W Rural	26.6	0.4	3.3	0.0	14.8	0.3	57.3	0.7	1.1	0.0
S-E Rural	9.5	0.1	0.0	0.0	11.0	0.2	67.4	0.8	5.3	0.1
Naledi	5.2	0.1	0.0	0.0	3.1	0.0	34.2	0.4	0.0	0.0
Mangaung municipality	8.0	0.1	0.6	0.0	5.3	0.1	33.1	0.5	0.5	0.0

More detailed information about the availability of motor vehicles can be seen in Table 6-7. Of the car-owning households, almost half have more than one vehicle available to the household. However, in the more affluent areas such as the Dan Pienaar and the Langenhoven Park zones and the N-W rural area, car-owning households are likely to have two or more cars available.

Table 6-7: Availability of motor vehicles

Reporting Zone	Percentage of households			
	0	1	2	3
Central	71.8%	26.3%	1.4%	0.5%
Oranjesig	40.7%	49.4%	5.2%	4.6%
Mangaung	74.3%	15.1%	9.5%	1.2%
Airport/Estoire	27.0%	35.3%	28.1%	9.6%
Naval Hill/Bayswater	31.3%	34.8%	28.1%	5.7%
Tempe/Dan Pienaar	15.8%	40.6%	32.1%	11.5%
Langenhoven Park/Woodlands	15.0%	37.4%	33.0%	14.6%
Universitas	40.9%	26.5%	28.0%	4.6%
Pellissier/Fichardt-Ehrlich Park	10.7%	48.5%	26.9%	13.9%
Thaba Nchu	85.7%	11.2%	3.1%	
Botshabelo	90.2%	8.0%	1.8%	
N-E Rural	40.3%	40.9%	10.3%	8.5%
N-W Rural	57.0%	17.7%	18.3%	7.0%
S-W Rural	42.7%	35.3%	4.8%	17.2%
S-E Rural	32.6%	43.1%	16.6%	7.8%
Naledi	65.8%	24.0%	9.3%	0.9%
Mangaung Municipality	66.4%	19.4%	10.8%	3.5%

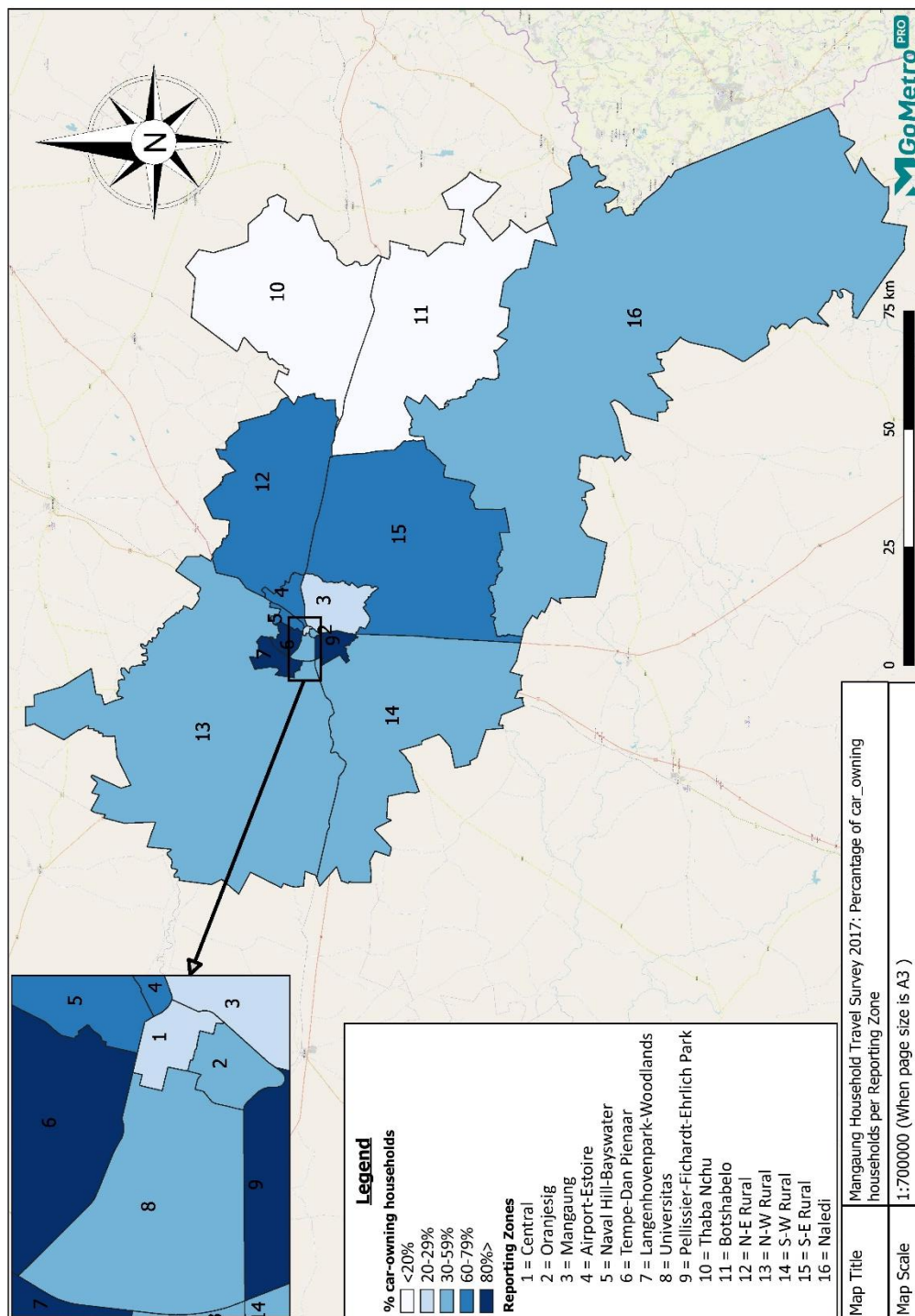


Figure 6-4 portrays the information about motor vehicle availability graphically. As can be expected, the darker-shaded areas (indicating a higher proportion of car-owning households) coincide to a great extent with the darker shades in the income map. In Thaba Nchu and Botshabelo, less than 20 per cent of households own a car.

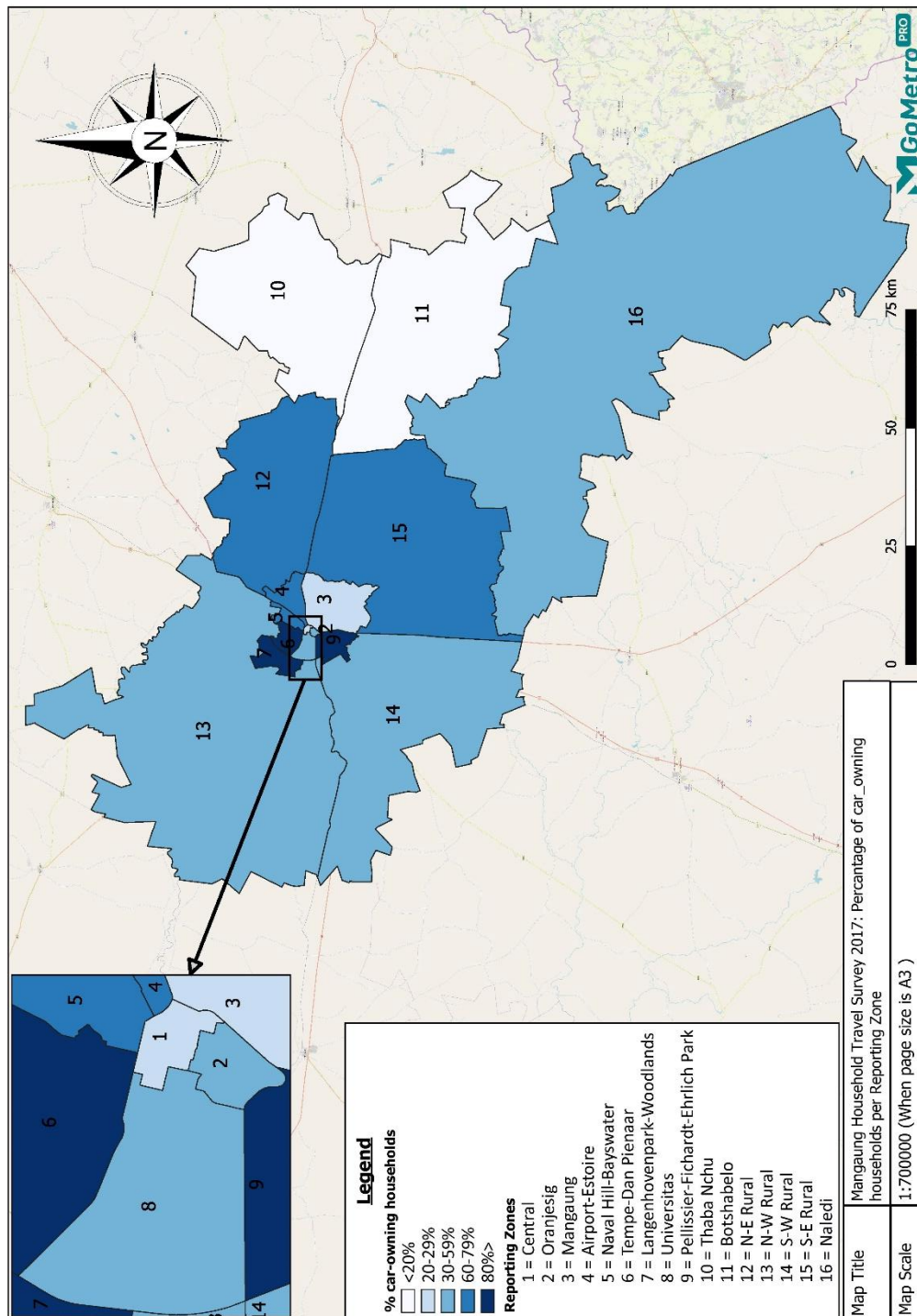


Figure 6-4: Percentage of car-owning households

6.6 Access to public transport services

Respondents were asked how long it would take them to walk from their homes to the closest bus stop and taxi service. The information given by the respondents gives an indication of residents of an area's perception about their access to public transport, but it does not imply that the respondents actually use the service. These perceived walking times are tabulated in Table 6-8 and Table 6-9 below.

The information shows that a range of between three and almost 80 per cent of respondents and 28 per cent on average, reported that there was no bus service in the area or that they were not aware of a service. Areas with very low accessibility to bus services are the Airport/Estoire and Naledi zones.

Table 6-8: Perceived walking times to bus stops

Reporting zone	Percentage of households				
	1 - 5 mins	6 - 10 mins	11 - 20 mins	21+ mins	Don't know/No service
Central	41.3%	20.0%	5.1%		33.6%
Oranjesig	29.7%	6.8%	6.3%		57.2%
Mangaung	42.4%	18.7%	6.8%	2.5%	29.7%
Airport/Estoire	2.9%	8.9%	9.5%	1.1%	77.6%
Naval Hill/Bayswater	31.5%	13.1%	4.1%	2.0%	49.4%
Tempe/Dan Pienaar	23.9%	15.1%	7.3%	1.0%	52.8%
Langenhoven Park/Woodlands	23.3%	29.9%	7.6%	1.7%	37.6%
Universitas	33.0%	15.6%	1.9%	2.2%	47.3%
Pellissier/Fichardt-Ehrlich Park	32.7%	16.0%	8.2%	4.3%	38.8%
Thaba Nchu	32.3%	21.0%	34.7%	7.2%	4.7%
Botshabelo	49.3%	25.6%	19.0%	3.5%	2.6%
N-E Rural	1.1%		18.8%	25.5%	54.6%
N-W Rural	21.9%	6.9%	8.1%	13.3%	50.0%
S-W Rural	3.3%	5.7%	5.0%	29.4%	56.5%
S-E Rural	2.7%	26.9%	15.2%	8.3%	46.9%
Naledi	9.7%	15.2%	9.7%	1.5%	64.0%
Mangaung Municipality	34.9%	18.9%	12.8%	5.3%	28.2%

Taxi services appear to be accessible with between 2 and 55 per cent of the respondents reporting that taxis were unavailable. The most badly-provided areas are the Airport/Estoire and Tempe/Dan Pienaar zones. In the municipality overall, 15 per cent perceived that there was no taxi service available to them.

Table 6-9: Perceived walking times to taxi services

Reporting zone	Percentage of households				
	1 - 5 mins	6 - 10 mins	11 - 20 mins	21+ mins	Don't know/No service
Central	51.0%	22.9%	6.9%	1.4%	17.8%
Oranjesig	32.9%	10.5%	9.4%		47.2%
Mangaung	55.2%	25.7%	12.7%	1.8%	4.7%
Airport/Estoire	8.1%	15.8%	20.2%	1.1%	54.8%
Naval Hill/Bayswater	48.2%	8.4%	7.9%	1.3%	34.1%
Tempe/Dan Pienaar	31.6%	16.3%	6.8%		45.3%
Langenhoven Park/Woodlands	21.7%	33.8%	7.8%	2.9%	33.7%
Universitas	35.4%	18.5%	7.3%	1.1%	37.7%
Pellissier/Fichardt-Ehrlich Park	29.7%	20.5%	10.6%	1.7%	37.5%
Thaba Nchu	48.1%	17.3%	29.6%	1.3%	3.7%
Botshabelo	48.2%	34.6%	14.2%	0.6%	2.4%
N-E Rural	3.4%	2.3%	28.4%	28.0%	37.8%
N-W Rural	22.0%	13.8%	16.2%	14.1%	33.8%
S-W Rural	3.3%	14.9%	22.8%	18.3%	40.6%
S-E Rural	8.4%	25.7%	17.7%	6.7%	41.4%
Naledi	43.1%	21.4%	20.5%	6.0%	8.9%
Mangaung Municipality	42.7%	24.1%	15.3%	3.4%	14.5%

Figure 6-5 displays the percentage of households that are within a 10-minute walk to a bus and taxi service respectively. Not unexpectedly, taxis are perceived to be available by more respondents than are buses. Botshabelo, the Central zone and Mangaung are relatively accessible to both public transport modes.

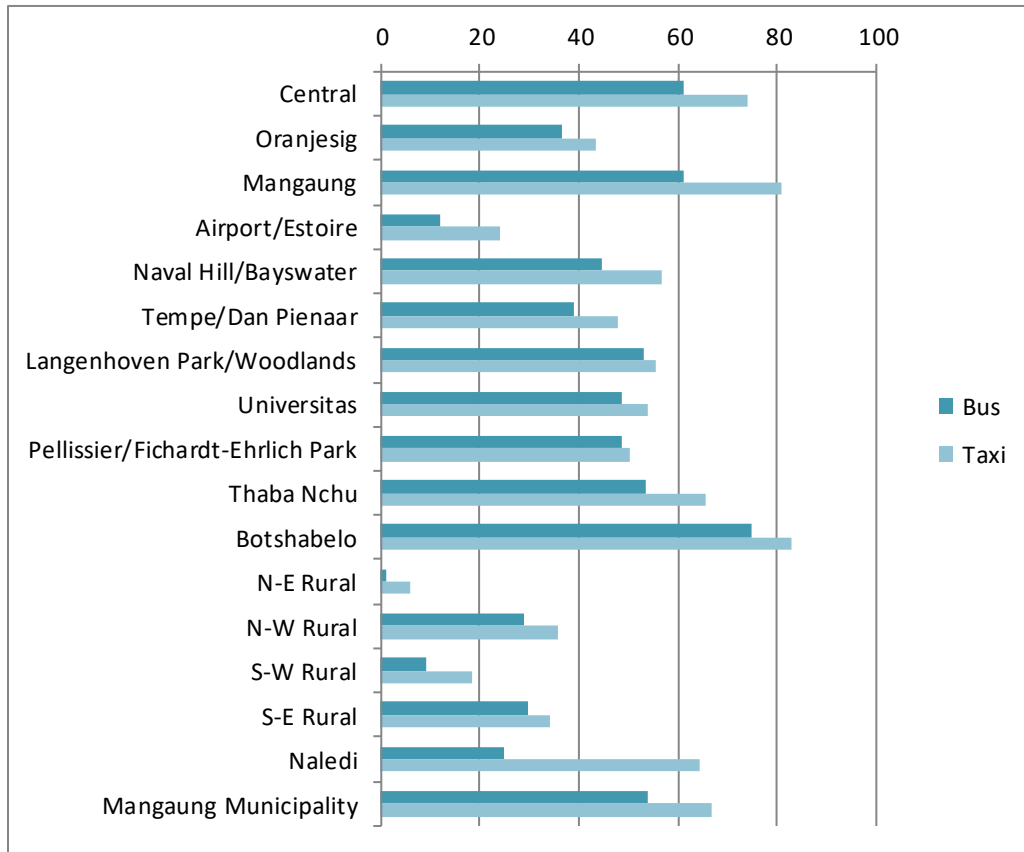


Figure 6-5: Percentage of households that are within a 10 minute walk to public transport

6.7 Access to services and amenities

The responses to the questions about modes to services and amenities are shown in Table 6-10 and Table 6-11. According to the results, walk is the dominant mode for travel to the nearest food and other shops, while taxi is the most-used mode for travel to other services and amenities. Very small proportions of households can't get to the services or don't go there. Understandably, 38 per cent of the households do not visit tribal authorities.

Table 6-10: Modes to services and amenities

Service	Percentage of households					
	Walk	Taxi	Car/bakkie/ truck/lorry	Metered taxi/Bicycle/ Motorcycle	Can't get there/Do not know	Don't go there
Food shop	47.6	31.7	20.0	0.4	0.1	0.2
Other shops	41.2	36.7	21.5	0.5	0.1	0.0
ATM/Bank	18.6	57.4	23.3	0.7	0.1	0.0
Medical services	20.8	53.4	25.0	0.7	0.1	0.0
Post Office	16.0	59.0	24.0	0.4	0.3	0.2
Welfare offices	11.2	57.6	22.8	0.2	4.3	3.9
Police station	21.9	52.6	24.2	0.5	0.7	0.1
Municipal offices	15.1	58.9	24.8	0.6	0.5	0.1
Tribal Authority	26.6	25.5	9.3	0.0	0.8	37.8

The majority of households who do so, are able to travel to all the services and amenities listed in the table below within 20 minutes: 68 per cent to a food shop, 75 per cent to other shops, 60 per cent to an ATM, 59 per cent to medical services, 58 per cent to a post office, 52 per cent to a welfare office, 58 per cent to a police station, 53 per cent to municipal offices and 65 per cent to their Tribal authority. The vast majority can get there within 30 minutes.

Table 6-11: Travel time to services and amenities

Service	Percentage of households				
	5 mins	6 - 10 mins	11 - 20 mins	21 - 30 mins	31+ mins
Food shop	25.4	18.0	25.1	24.0	7.6
Other shops	18.7	26.2	30.6	15.5	8.9
ATM/Bank	8.3	12.8	38.5	29.3	11.0
Medical Services	3.6	8.9	46.1	29.4	12.1
Post Office	5.8	10.3	41.6	30.9	11.4
Welfare Office	1.8	6.9	43.7	31.5	16.2
Police Station	4.5	14.0	39.3	30.4	11.8
Municipal Offices	3.0	7.2	42.5	31.6	15.7
Tribal Authority	7.8	13.5	43.3	21.4	13.9

Public transport expenditure Table 6-12 shows the percentage of households that spend money on public transport to work for different purposes. The majority of households have no expenditure on transport to work and 73 per cent do not spend money on travel to education. For other purposes, however, the majority of households have some public transport expenditure.

Table 6-12: Monthly household expenditure on public transport

Purpose	Percentage of households					
	R0	R1 - R200	R201 - R400	R401 - R600	R601 - R1 000	R1 001+
Work	56.9	3.5	13.2	11.5	12.1	2.8
Education	73.0	2.8	9.1	7.8	7.0	0.4
Other	29.7	27.3	22.9	11.4	6.6	2.1

Only 20 per cent of households in the Mangaung municipality do not spend any money on public transport – see Table 6-13. The proportion of households obviously differs from area to area, ranging from a low of 10 per cent in Botshabelo and 65 per cent in the Airport/Estoire zone, where the majority of households reported that they did not have access to public transport. On the other side of the picture, the same proportion of households (20%) spend more than R1 000 per month on public transport.

Table 6-13: Total monthly household expenditure on public transport

Reporting Zone	All households	Those who spend on PT
Central	996	1130
Oranjesig	496	742
Mangaung	700	804
Airport/Estoire	272	767
Naval Hill/Bayswater	600	860
Tempe/Dan Pienaar	607	1079
Langenhoven Park/Woodlands	598	911
Universitas	603	826
Pellissier/Fichardt-Ehrlich Park	744	1012
Thaba Nchu	402	597
Botshabelo	655	724
N-E Rural	634	945
N-W Rural	536	702
S-W Rural	669	1064
S-E Rural	476	811
Naledi	470	623
Mangaung municipality	622	784

The graph in

Figure 6-6 shows clearly in which areas the households spend at least R1 000 per month on public transport – namely, the Central zone, Tempe/Dan Pienaar, Pellissier/Fichardt- Ehrlich Park and the S-W Rural zone. The mean monthly expenditure of all respondents (including those who do not spend anything on public transport) is R620 and those who do spend on public transport, R780 per month.

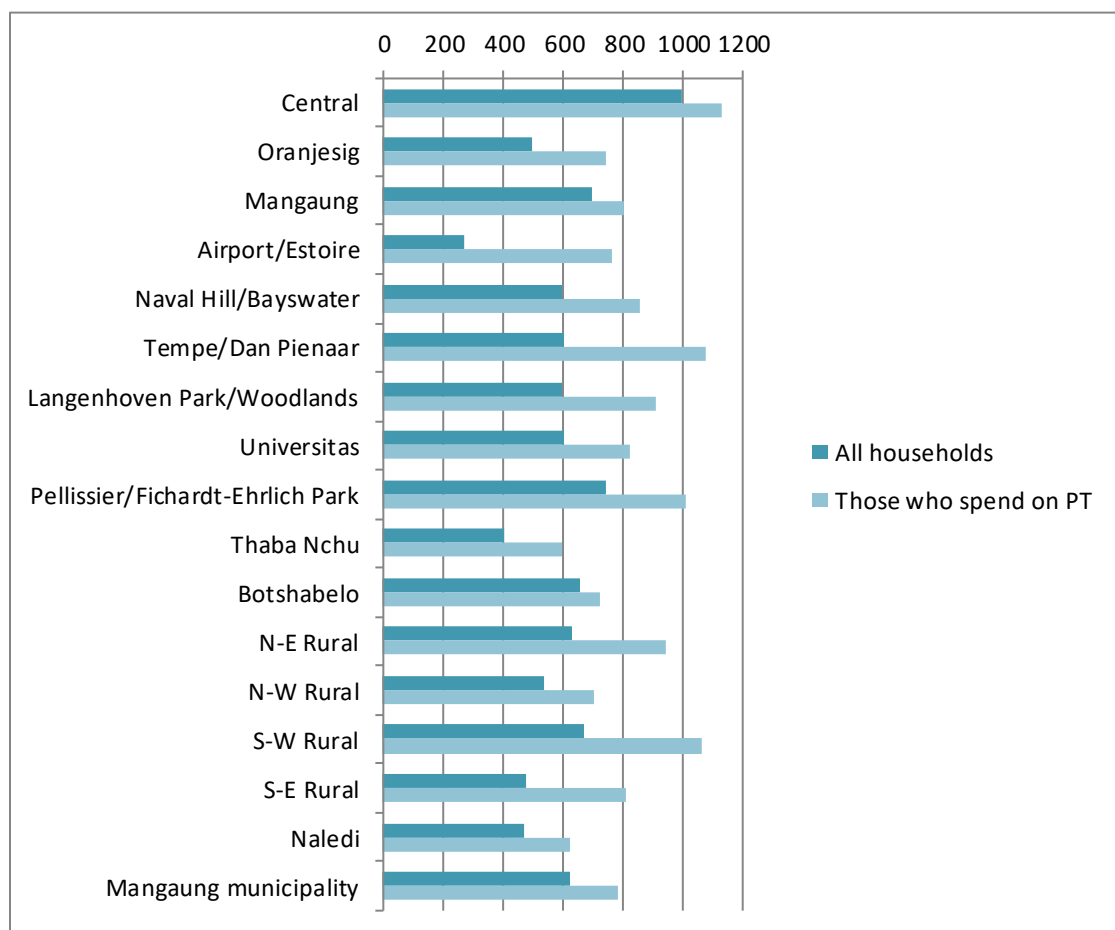


Figure 6-6: Mean expenditure on public transport (R per month)

6.8 Transport problems

Relatively early in the interview, before other questions could introduce bias, respondents were asked what the most important transport-related problem was that the household experienced. The answers to that question are portrayed in Figure 6-7. It is obvious that the residents experience many problems, but the poor condition of roads and the lack of availability of buses were mentioned most often. In fact, three of the top four problems are related to the bus service.

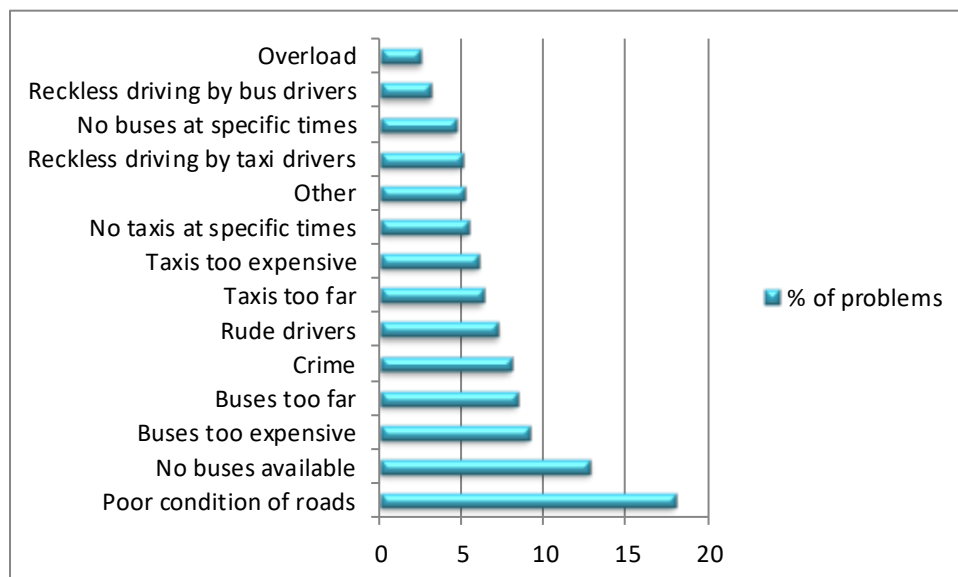


Figure 6-7: Problems mentioned by respondents

The problems mentioned obviously varied between the zones and the two problems that were mentioned most often in the different zones, are listed in Table 6-14. In seven of the zones, the poor condition of the road emerged as the top problem and in six other zones as the second. The lack of availability of buses was mentioned as the top problem in seven zones and as second in four other zones. Crime was mentioned most often in the Pellissier/Fichardt-Ehrlich Park zone, and the distance to buses in Thaba Nchu. Other secondary problems are crime, the distance to buses and the cost of bus travel in two zones each.

Table 6-14: Transport problems experienced by households in the different zones

Reporting Zone	Factors	% of problems
Central	Poor condition of roads	54.4
	No buses available	16.1
Oranjesig	Poor condition of roads	39.5
	No buses available	11.9
Mangaung	Poor condition of roads	18.4
	No buses available	11.7
Airport/Estoire	No buses available	39.2
	Poor condition of roads	25.0
Naval Hill/Bayswater	No buses available	17.2
	Poor condition of roads	16.2
Tempe/Dan Pienaar	Poor condition of roads	34.4
	Crime	21.9
Langenhoven Park/Woodlands	Poor condition of roads	33.9
	Crime	13.6
Universitas	Poor condition of roads	26.8
	No buses available	10.2
Pellissier/Fichardt-Ehrlich Park	Crime	25.3
	Poor condition of roads	17.3
Thaba Nchu	Buses too far	25.2
	Buses too expensive	17.2
Botshabelo	Poor condition of roads	19.9
	Buses too expensive	19.4
N-E Rural	No buses available	41.4
	Poor condition of roads	14.8
N-W Rural	No buses available	27.5
	Poor condition of roads	13.8
S-W Rural	No buses available	41.6
	Buses too far	23.9
S-E Rural	No buses available	41.4
	Buses too far	12.5
Naledi	No buses available	32.5
	Poor condition of roads	17.9
Mangaung Municipality	Poor condition of roads	17.9
	No buses available	12.7

6.9 Factors influencing mode choice

Respondents were also asked what the most important factor was that they considered when choosing a mode of transport. The results are displayed in Figure 6-8 in order of frequency of mention. Travel time was responsible for 27 per cent of the mentions, and comfort and flexibility for a further 23 per cent.

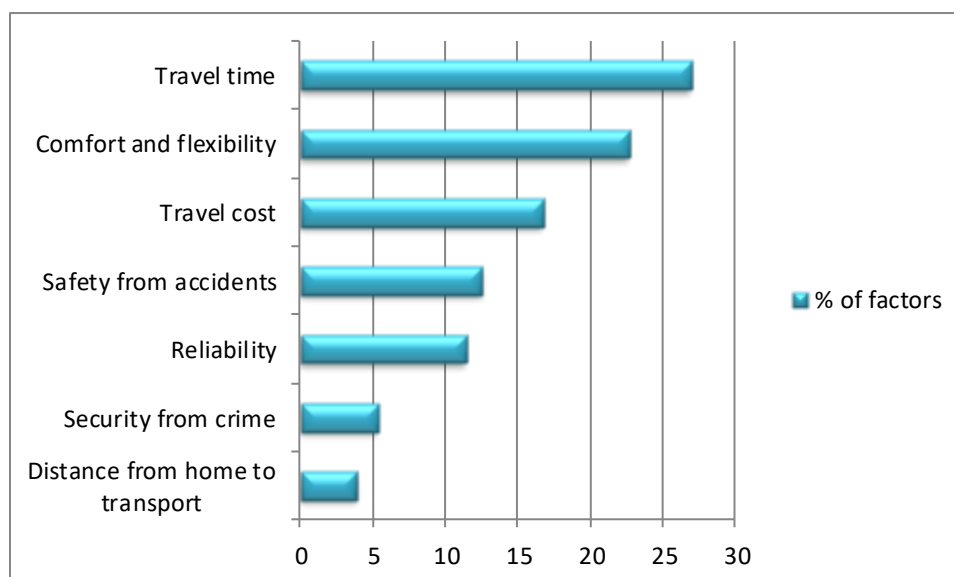


Figure 6-8: Most important factor for mode choice

When studying the results by reporting zone in Table 6-15, it is evident that those were the factors mentioned most often or second most often in most of the zones, with the exception of Naledi where travel cost and safety from accidents were the two relevant factors. Travel cost also featured in four other zones and safety from accidents and reliability in four.

Table 6-15: Most important factors influencing mode choice

Reporting Zone	Factors	% of factors
Central	Reliability	32.8
	Comfort and flexibility	26.7
Oranjesig	Safety from accidents	23.4
	Comfort and flexibility	21.4
Mangaung	Travel time	26.9
	Travel cost	16.2
Airport/Estoire	Travel time	36.8
	Safety from accidents	31.3
Naval Hill/Bayswater	Travel time	25.8
	Reliability	24.5
Tempe/Dan Pienaar	Safety from accidents	26.6
	Travel time	26.2
Langenhoven Park/Woodlands	Reliability	26.3
	Travel time	26.2
Universitas	Travel time	26.8
	Safety from accidents	17.2
Pellissier/Fichardt-Ehrlich Park	Travel time	30.4
	Comfort and flexibility	23.1
Thaba Nchu	Travel time	37.2
	Comfort and flexibility	32.0
Botshabelo	Comfort and flexibility	46.7
	Travel time	20.0
N-E Rural	Travel time	44.6
	Travel cost	21.3
N-W Rural	Travel time	32.1
	Travel cost	17.4
S-W Rural	Travel time	25.1
	Travel cost	25.0
S-E Rural	Travel time	35.2
	Reliability	17.6
Naledi	Travel cost	23.2
	Safety from accidents	18.4
Mangaung Municipality	Travel time	26.8
	Comfort and flexibility	23.9

7. Results: Population characteristics

It is important to collect and report on demographic variables, as these influence travel needs and behaviour.

7.1 Age

The age structure of the population is shown in Table 7-1. Because of the weighting process, the proportions reflect those of the 2017 population estimates. In the survey area as a whole, 27 per cent of the population is under 15 years of age. In some zones, such as the Langenhoven Park/Woodlands and Mangaung zones, that proportion rises to over 30 per cent. Fifty percent of the municipality's population lies in the productive 25 – 64 age group. Overall, 7 per cent of the population are older than 64, while that figure rises to 12 per cent in the Oranjesig and Tempe/Dan Pienaar zones.

Considering the sample row at the bottom of the table, it shows that the younger age groups were underrepresented in the achieved sample, and the older age groups overrepresented. *This anomaly can be explained by a misunderstanding between the client and the survey team, who understood that personal details of household members under 6 years of age need not be recorded.*

Table 7-1: Population age

Reporting Zone	Percentage of all persons						
	0 - 4	5 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+
Central	4.3%	5.9%	46.6%	19.8%	9.5%	12.2%	1.8%
Oranjesig		5.8%	23.8%	17.0%	18.3%	22.8%	12.3%
Mangaung	12.8%	19.7%	17.1%	19.4%	12.2%	14.4%	4.3%
Airport/Estoire	3.1%	13.8%	9.0%	16.0%	17.1%	38.5%	2.5%
Naval Hill/Bayswater	6.9%	12.3%	17.9%	19.9%	17.8%	18.5%	6.7%
Tempe/Dan Pienaar	2.1%	15.0%	16.1%	9.8%	23.2%	21.5%	12.2%
Langenhoven Park/Woodlands	19.1%	15.8%	15.6%	18.4%	13.9%	13.4%	3.9%
Universitas	0.8%	6.1%	35.0%	18.6%	16.2%	16.4%	6.8%
Pellissier/Fichardt-Ehrlich Park	6.3%	10.2%	13.8%	11.3%	17.6%	32.9%	7.8%
Thaba Nchu	9.5%	20.8%	10.5%	17.0%	17.0%	19.0%	6.2%
Botshabelo	6.6%	21.7%	18.0%	14.9%	11.4%	17.5%	9.9%
N-E Rural	15.3%	5.0%	11.0%	29.7%	11.4%	22.3%	5.4%
N-W Rural	3.6%	7.8%	10.0%	33.0%	17.7%	23.0%	4.8%
S-W Rural	7.3%	16.7%	7.7%	21.9%	19.9%	22.1%	4.4%
S-E Rural	3.0%	22.1%	13.3%	20.3%	20.1%	18.5%	2.7%
Naledi	4.6%	22.7%	21.6%	14.7%	9.6%	17.8%	9.0%
Mangaung Municipality	8.7%	18.4%	16.1%	18.3%	14.1%	17.9%	6.5%
Sample	2.5%	12.8%	18.0%	19.2%	16.0%	22.4%	9.1%

7.2 Gender and race

The sample information in the bottom row of Table 7-2 indicates that there was an underrepresentation of male respondents in the achieved sample. Similarly, there was an overrepresentation of white respondents at the cost of Blacks.

The rest of the table reflects the gender and age characteristics of the 2017 mid-year population estimates. In the rural areas of Naledi and Thaba Nchu, females dominate. With the exception of the zones to the western side of the central zone, Blacks form the majority of the population.

Table 7-2: Gender and race of the population

Reporting Zone	Percentage of all persons					
	Gender		Race			
	Male	Female	Black	Coloured	Asian/ Indian	White
Central	60.6%	39.4%	94.7%	1.2%	0.7%	3.4%
Oranjesig	54.2%	45.8%	39.2%	10.5%	0.1%	50.3%
Mangaung	47.9%	52.1%	91.1%	7.6%	0.9%	0.4%
Airport/Estoire	68.4%	31.6%	29.0%	20.2%	0.1%	50.7%
Naval Hill/Bayswater	51.7%	48.3%	40.1%	16.2%	0.4%	43.2%
Tempe/Dan Pienaar	56.4%	43.6%	22.6%	5.1%	0.6%	71.8%
Langenhoven Park/Woodlands	52.9%	47.1%	20.9%	0.9%		78.2%
Universitas	60.5%	39.5%	56.0%	2.8%		41.1%
Pellissier/Fichardt-Ehrlich Park	56.2%	43.8%	35.0%	5.5%	0.3%	59.2%
Thaba Nchu	39.8%	60.2%	100.0%			
Botshabelo	47.1%	52.9%	99.9%	0.1%		
N-E Rural	45.8%	54.2%	79.9%			20.1%
N-W Rural	47.8%	52.2%	80.5%	4.6%		14.9%
S-W Rural	63.2%	36.8%	62.9%	4.8%		32.4%
S-E Rural	65.2%	34.8%	91.9%	2.3%		5.8%
Naledi	41.4%	58.6%	88.1%	3.7%		8.2%
Mangaung Municipality	49.0%	51.0%	84.7%	4.2%	0.3%	10.8%
Sample	44.9%	55.1%	75.3%	4.2%	0.4%	20.1%

7.3 Education

Table 7-3 provides information about the educational levels of all members of the household. It is understandable that the zones with bigger than average proportions of young children, also have bigger than average proportions of people with no formal education. As might be expected, the zones to the west of the central zone have more people with degrees and other post Grade 12 education.

Table 7-3: Highest education level attained (all ages)

Reporting Zone	Percentage of all persons							
	None	Some primary school	Completed primary school	Some high school	Completed high school	NTC certificate	Other certificate or diploma	Degree
Central	4.3%	6.4%	1.5%	18.1%	56.3%	6.5%	2.8%	4.2%
Oranjesig		6.8%	2.5%	23.0%	57.1%	2.7%	4.8%	3.2%
Mangaung	14.1%	19.7%	3.1%	22.3%	32.1%	2.1%	4.7%	1.9%
Airport/Estoire	3.9%	9.9%	2.8%	18.0%	37.7%	2.3%	8.8%	16.5%
Naval Hill/Bayswater	7.9%	10.5%	3.1%	10.8%	45.1%	5.2%	9.2%	8.2%
Tempe/Dan Pienaar	2.4%	10.9%	0.8%	18.1%	31.0%	3.5%	11.7%	21.7%
Langenhoven Park/Woodlands	22.5%	13.4%	0.4%	13.7%	22.0%	3.5%	7.2%	17.3%
Universitas	1.9%	4.3%		11.1%	55.9%	5.7%	10.7%	10.4%
Pellissier/Fichardt-Ehrlich Park	7.4%	7.4%	2.5%	20.3%	34.6%	6.4%	9.5%	11.9%
Thaba Nchu	12.8%	20.6%	5.5%	29.5%	25.4%	1.2%	4.0%	1.0%
Botshabelo	11.2%	26.9%	6.1%	30.6%	21.5%	2.1%	0.8%	0.9%
N-E Rural	18.5%	11.6%	3.2%	43.1%	15.1%	0.5%	3.9%	4.1%
N-W Rural	10.9%	25.3%	4.2%	29.8%	18.1%		8.5%	3.3%
S-W Rural	12.5%	22.6%	3.9%	27.5%	21.9%	1.8%	6.3%	3.6%
S-E Rural	8.8%	22.3%	2.2%	27.0%	27.7%	6.1%	4.8%	1.1%
Naledi	7.6%	28.4%	4.5%	30.5%	22.7%	3.6%	1.3%	1.5%
Mangaung Municipality	11.8%	20.9%	4.0%	25.7%	27.7%	2.4%	4.4%	3.2%

It is worth mentioning that only two per cent of the 15 and over population has no formal education and those are mainly situated in the rural zones in the south of the city.

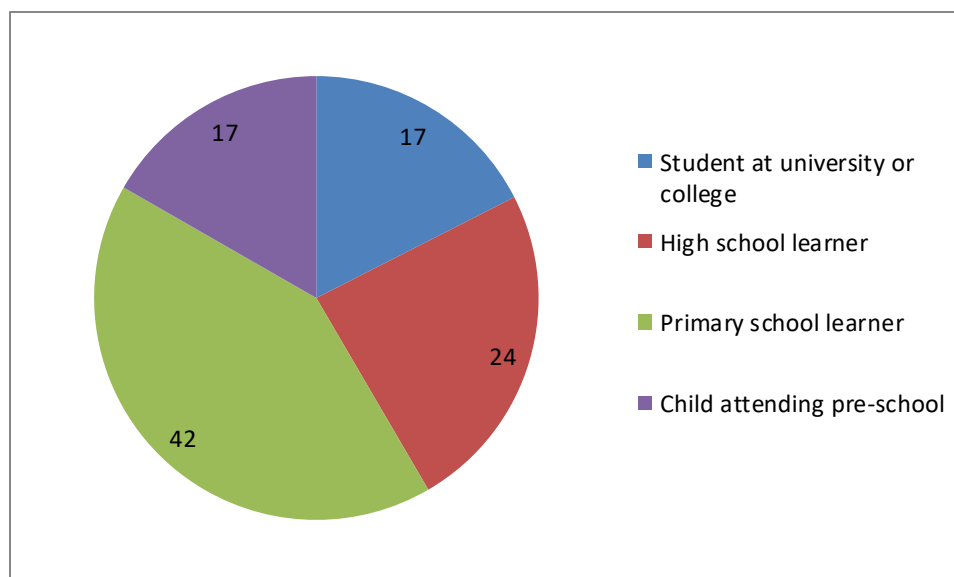


Figure 7-1: Student/learner types – percentage of all

The different student types are displayed in Figure 7-1. Not surprisingly, the biggest proportion of the estimated 310 000 attends primary school (about 130 000), a quarter (about 74 000) attends high school, and 17 per cent are students at a college or university (54 000) and children attending pre-school (52 000).

All learners attend school five days a week, as well as the majority of students (83%) and pre-school attendees (73%).

Overall, 61 per cent of all students/learners attend an institution in the same zone as their homes – 74 per cent of primary school learners, 72 per cent of high school learners, 70 per cent of pre-school attendees, but not surprisingly, only 6 per cent of students.

7.4 Main occupation

Table 7-4 shows the occupational status of all persons – this obviously affects the individual's need to travel. In the Mangaung Municipality, about one in four people works in a full-time capacity and almost the same proportion is unemployed. The proportion unemployed is markedly higher in Botshabelo and N-W rural. Not surprisingly, a third of the people living in the Universitas are students.

Table 7-4: Occupational status – all persons

Reporting Zone	Percentage of all persons										
	Full-time worker	Part-time worker	Un-employed	Unable to work	Pensioner	Housewife /husband	Student	High school learner	Primary school learner	Pre-school/ day-mother	Child staying at home
Central	29.8%	0.5%	16.7%	6.5%	3.5%	0.9%	26.9%	5.2%	5.1%	2.5%	2.6%
Oranjesig	26.3%	15.2%	14.8%	1.6%	12.5%	1.1%	19.8%	3.3%	5.4%		
Mangaung	25.3%	3.1%	17.9%	1.1%	7.0%	1.0%	8.2%	8.3%	13.9%	6.6%	7.7%
Airport/Estoire	45.3%	1.1%	11.0%	0.4%	11.3%	6.9%	2.6%	7.5%	10.3%	1.0%	2.5%
Naval Hill/Bayswater	35.4%	1.9%	16.4%	0.3%	7.3%	1.8%	13.8%	5.1%	10.8%	3.6%	3.7%
Tempe/Dan Pienaar	42.2%	1.8%	9.2%		14.4%	2.4%	8.5%	9.7%	9.7%		2.1%
Langenhoven Park/Woodlands	37.3%	0.8%	5.4%	0.3%	5.5%	2.0%	10.3%	8.0%	9.4%	10.5%	10.7%
Universitas	37.5%	1.1%	11.5%	0.2%	8.5%	1.4%	32.4%	3.0%	2.7%	1.7%	
Pellissier/Fichardt-Ehrlich Park	43.0%	2.7%	10.4%		16.3%	2.0%	5.7%	5.8%	7.1%	5.3%	1.6%
Thaba Nchu	24.1%	2.1%	24.7%	0.5%	11.7%	0.4%	1.6%	9.0%	15.5%	9.3%	1.1%
Botshabelo	11.6%	0.8%	35.3%	0.2%	13.0%	0.2%	3.3%	10.0%	18.5%	5.5%	1.6%
N-E Rural	34.3%	3.8%	26.2%	3.4%	6.9%	3.3%	0.6%	2.5%	2.9%		16.0%
N-W Rural	28.9%	11.2%	33.2%		9.8%	2.4%	1.6%	1.9%	7.3%	0.9%	2.7%
S-W Rural	38.6%	6.4%	16.3%	1.0%	7.2%	4.2%	1.2%	3.0%	14.8%	3.2%	4.1%
S-E Rural	36.5%	0.5%	17.7%	2.0%	5.5%	4.1%	1.2%	7.5%	16.7%	5.7%	2.7%
Naledi	20.4%	10.7%	21.9%	2.1%	9.6%	2.5%	0.9%	14.2%	11.3%	3.5%	2.9%
Mangaung Municipality	24.9%	3.1%	22.8%	0.7%	9.7%	1.3%	5.8%	8.0%	13.9%	5.6%	4.3%

Figure 7-2 displays the occupational status of those who are 15 years or older. Of this group, 40 per cent work full time and a further 5 per cent part time. More than a third is unable to work. The very small proportion of homemakers (2%) is noteworthy.

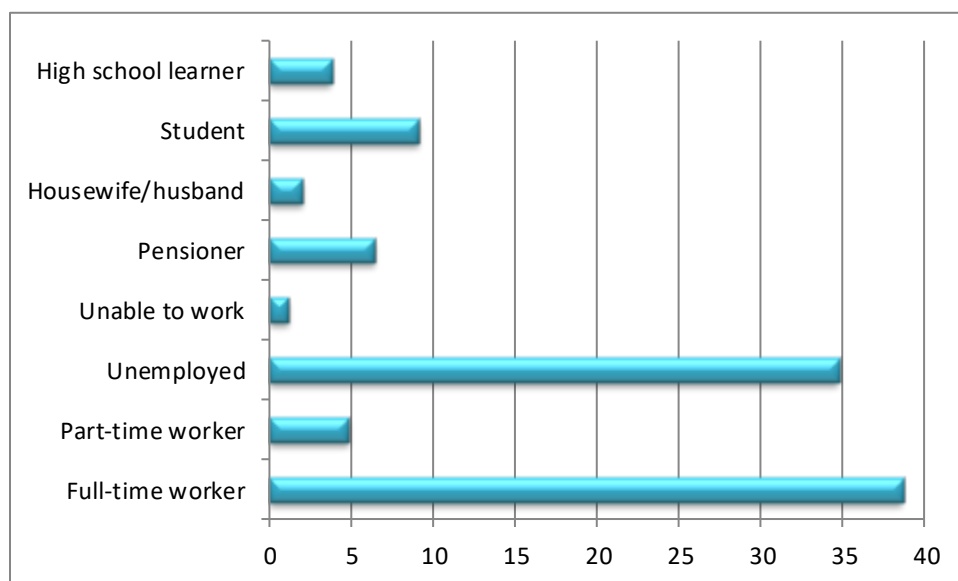


Figure 7-2: Occupational status of those 15 years and older

7.5 Possession of a driver's licence

Possession of a driver's licence and the different types are listed in Table 7-5. In the municipality, two per cent have a motorcycle licence, five per cent have a heavy vehicle licence and 22 per cent a motor vehicle licence – in total 28 per cent of those 18 years and over, have a driver's licence of some sort. The areas where more than 70 per cent have a driver's licence (Tempe/Dan Pienaar, Langenhoven Park/Woodlands and Pellissier/Fichardt-Ehrlich Park) are also the areas where car ownership is over 80 per cent.

Table 7-5: Possession of a driver's licence among people 18 years and over

Reporting Zone	Percentage of persons 18 years and over			
	Driver's licence	Motorcycle licence	Passenger vehicle	Heavy vehicle
Central	37.5%		31.2%	6.3%
Oranjesig	52.6%		42.5%	11.1%
Mangaung	23.0%	0.1%	20.5%	2.7%
Airport/Estoire	72.9%	4.7%	48.9%	24.7%
Naval Hill/Bayswater	64.6%	6.6%	51.8%	10.5%
Tempe/Dan Pienaar	76.9%	3.9%	64.9%	13.0%
Langenhoven Park/Woodlands	79.4%	2.3%	70.8%	8.3%
Universitas	57.2%	3.9%	46.9%	7.3%
Pellissier/Fichardt-Ehrlich Park	76.5%	4.3%	62.8%	11.4%
Thaba Nchu	15.6%	4.1%	7.3%	4.0%
Botshabelo	7.5%	0.8%	5.0%	1.7%
N-E Rural	27.3%	1.6%	22.3%	6.8%
N-W Rural	27.6%	1.3%	23.2%	5.4%
S-W Rural	45.4%	2.1%	30.0%	14.1%
S-E Rural	49.7%	3.9%	43.1%	5.4%
Naledi	23.2%		14.6%	8.6%
Mangaung Municipality	28.0%	1.6%	22.3%	4.9%

7.6 People with Categories of Special Needs

The Department of Transport in South Africa recognizes and emphasise the accommodation of people with categories of special needs. The following groups are recognised as people with categories of special needs:

- **People with disabilities:** defined in the Act as people with a physical, sensory or mental disability; which may be permanent or temporary.
- **The aged:** or elderly people. People over the age of 55 usually fall in this category.
- **Pregnant women:** usually taken as women in their last three months of pregnancy.
- **Young children:** this is usually defined as children between the ages of 0-14.
- **Those who are limited in their movements by children:** men and women accompanying young children.
- **Signage passengers:** People who are unable to read or who are unable to understand the language used on the signage. Tourists are also included as signage passengers.
- **Female passengers:** whilst safety and security affect all passenger groups and both genders, it should be noted that female passengers (together with People with Disabilities) are particularly at risk of crime and abuse.
- **Load carrying passengers:** people carrying bags, luggage, or goods of a size that means that they benefit from accessibility features. This is important to people on low incomes in South Africa. People travelling with bicycles are generally also included in this category.

In this section of the report detail is provided pertaining to information obtained as part of the household travel survey pertaining to “people with disabilities”. Given the accepted norm of a sample size of 1% of the population for household travel surveys, it is acknowledge that additional surveys are required to attain accurate information related to people with special categories of need that need to inform the design of the integrated transport system of MMM.

Acknowledging the aforementioned, Census 2011 reported that 15% of the population could be regarded as young adults (119 336) and 44% is of working age (338 032), which means that a large number of people will be dependent on public transport to get to and from work and/or educational facilities each day.

Table 7-6 to Table 7-8 reflect the people with disabilities which could have a bearing on the provision of public transport are:

- Persons with degrees of walking and climbing difficulties are reported to be in the order of 11 746 people (3% of population).
- Persons with assistive devices and medication (e.g. walking stick/frame) equals 8324 people (2% of population).
- Persons with assistive devices and medication (e.g. wheelchair) equals 5904 people (2% of population).

Table 7-6: Mangaung MM: Persons with Walking or Climbing Difficulties, Census 2011

Reporting Zones	No difficulty	Some difficulty	A lot of difficulty	Cannot do at all	Other	Total
Phase 1: Priority area	302,936	7,690	2,405	1,651	29,748	344,430
Bloemfontein Remaining	98,078	2,632	644	374	18,433	120,161
Botshabelo /Thaba Nchu	235,352	7,017	2,120	1,481	18,017	263,987
Rural	37,477	1,243	394	237	3,804	43,155
Mangaung MM	673,843	18,582	5,563	3,743	70,002	771,733
Reporting Zones	No difficulty %	Some difficulty %	A lot of difficulty %	Cannot do at all %	Other %	Total %
Phase 1: Priority area	88%	2%	1%	0%	9%	100%
Bloemfontein Remaining	82%	2%	1%	0%	15%	100%
Botshabelo /Thaba Nchu	89%	3%	1%	1%	7%	100%
Rural	87%	3%	1%	1%	9%	100%
Mangaung MM	87%	2%	1%	0%	9%	100%

Note: Other includes: Do not know, Undetermined, Unspecified, Not Applicable

Note: Other includes: Do not know, Undetermined, Unspecified, Not Applicable

Table 7-7: Mangaung MM: Persons with Assistive Devices and Medication – Walking Stick or Frame, Census 2011

Reporting Zones	Yes	No	Other	Total
Phase 1: Priority area	8,324	317,637	18,468	344,429
Bloemfontein Remaining	4,317	98,183	17,664	120,164
Botshabelo /Thaba Nchu	7,786	248,977	7,228	263,991
Rural	1,683	38,992	2,474	43,149
Mangaung MM	22,110	703,789	45,834	771,733
Reporting Zones	Yes %	No %	Other %	Total %
Phase 1: Priority area	2%	92%	5%	100%
Bloemfontein Remaining	4%	82%	15%	100%
Botshabelo /Thaba Nchu	3%	94%	3%	100%
Rural	4%	90%	6%	100%
Mangaung MM	3%	91%	6%	100%

Note: Other includes: Do not know, Unspecified, Not Applicable

Table 7-8: Mangaung MM: Persons with Assistive Devices and Medication – Wheelchair, Census 2011

Reporting Zones	Yes	No	Other	Total
Phase 1: Priority area	5,904	319,073	19,450	344,427
Bloemfontein Remaining	3,177	99,274	17,708	120,159
Botshabelo /Thaba Nchu	4,313	252,218	7,463	263,994
Rural	1,002	39,643	2,509	43,154
Mangaung MM	14,396	710,208	47,130	771,734
Reporting Zones	Yes %	No %	Other %	Total %
Phase 1: Priority area	2%	93%	6%	100%
Bloemfontein Remaining	3%	83%	15%	100%
Botshabelo /Thaba Nchu	2%	96%	3%	100%
Rural	2%	92%	6%	100%
Mangaung MM	2%	92%	6%	100%

Note: Other includes: Do not know, Unspecified, Not Applicable

Given the above, less than one per cent of the population (7 000 people) reported that they have a challenge, problem or disability that limit their ability to travel stemming from the household travel survey. It is noted that this percentage is low in comparison to the Community Survey 2016 where 11% of population recorded disability prevalence. This difference between the Census 2011, Community Survey 2016 and the Household travel Survey responses call for focus group surveys to attain the barriers to entry to the public transport system.

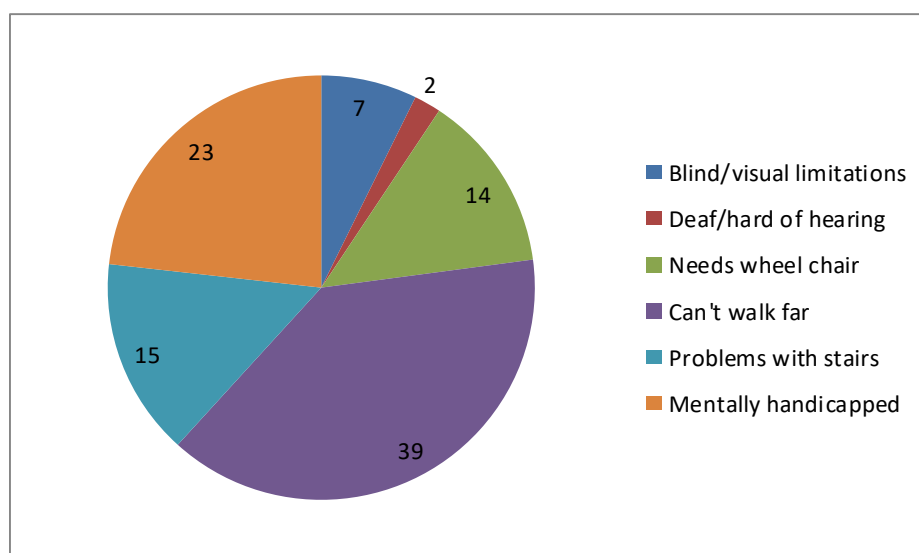


Figure 7-3: Percentage of disabilities/problems

Acknowledging the short coming of the data the HTS survey reported the major problem seems to be an inability to walk far, followed by being mentally handicapped.

Only one per cent of the households have a vehicle that has been adapted for disability, but seven per cent of households have at least one wheel chair or other walking aid in the house.

The main respondent in each household was asked how important a number of problems are for the mobility of people with disabilities in their area – a rating of 1 being not important at all and a 10 being extremely important.

Table 7-9 provides the answer to that question. Unfortunately, when presented with a list of problems, respondents are inclined to rate everything as important. The column on the right of the table shows that the combination of ratings between 8 and 10 range between 49 and 56, which is not a significant difference.

Table 7-9: Ratings of problems

Problem	Percentage of respondents										
	1	2	3	4	5	6	7	8	9	10	8-10
Uneven or broken surfaces	9.9	3.5	4.7	4.5	7.2	8.7	6.9	11.8	11.9	30.9	54.6
Absence of pavements	10.0	5.7	5.4	5.6	7.4	6.0	9.3	10.6	11.3	28.8	50.7
High kerbs/deep stormwater drains	8.7	5.4	4.8	5.2	9.8	7.3	8.1	10.4	11.3	29.0	50.7
Danger from traffic	9.0	4.4	4.6	5.5	7.6	7.3	9.3	12.1	11.0	29.2	52.3
Inaccessible transport vehicles	9.6	4.8	6.5	6.3	6.2	6.9	8.2	12.6	10.2	28.9	51.7
Lack of door-to-door services	9.0	5.4	7.7	5.2	7.1	7.1	9.6	9.9	9.8	29.1	48.8
Cost of public transport	9.4	6.3	5.5	4.3	8.2	6.1	8.6	9.8	11.4	30.4	51.6
Availability of public transport in general	8.8	5.3	4.6	4.8	7.8	7.5	10.2	10.4	10.4	30.2	51.1
Attitude of drivers and staff	10.5	5.3	5.6	6.4	7.6	6.6	7.8	11.9	9.9	28.4	50.2
Lack of information	9.4	4.1	5.3	5.4	7.8	7.9	7.8	11.5	9.2	31.6	52.3
Lack of audible and visible information	8.8	4.2	4.7	5.8	8.1	7.8	8.2	10.8	11.9	29.7	52.4
Overcrowding of vehicles and terminals	8.9	4.0	3.9	5.7	7.5	7.2	7.1	10.8	11.9	33.2	55.8

Table 7-10 provides insight into the importance ratings of respondents in the different zones. It is evident that the residents of Thaba Nchu consistently gave all the problems higher importance ratings than the average for the municipality.

Table 7-10: Ratings of between 8 and 10

Reporting Zone	Percentage of respondents rating the problem between 8 and 10											
	Uneven or broken road surfaces	Absence of pavements	High kerbs/deep drains	Danger from traffic	Inaccessible vehicles	Lack of door-to-door services	Cost of public transport	Availability of public transport	Attitude of drivers and staff	Lack of information	Lack of audible and visible information	Crowded vehicles and terminals
Central	26.2%	13.2%	10.7%	25.1%	18.4%	16.3%	15.3%	19.1%	19.0%	25.5%	34.3%	14.9%
Oranjesig	32.3%	37.6%	26.4%	27.8%	28.7%	32.0%	28.4%	35.7%	30.9%	39.9%	19.3%	39.4%
Mangaung	56.6%	53.5%	53.7%	55.4%	53.5%	50.1%	54.4%	52.2%	51.7%	53.8%	57.5%	56.7%
Airport/Estoire	58.8%	56.8%	53.8%	54.2%	57.7%	50.7%	47.9%	52.4%	47.5%	47.1%	53.3%	56.0%
Naval Hill/Bayswater	46.6%	44.3%	41.1%	43.3%	41.4%	44.7%	44.0%	40.9%	40.6%	48.8%	46.7%	48.3%
Tempe/Dan Pienaar	53.8%	46.9%	45.8%	45.3%	46.9%	42.7%	46.1%	49.3%	44.1%	46.1%	46.6%	52.5%
Langenhoven Park/Woodlands	46.7%	46.7%	46.9%	54.0%	56.7%	48.6%	43.8%	46.0%	48.5%	47.6%	48.1%	53.6%
Universitas	40.4%	37.5%	37.1%	37.1%	34.1%	36.7%	34.9%	36.3%	37.5%	41.3%	33.5%	48.5%
Pellissier/Fichardt-Ehrlich Park	38.9%	38.1%	36.9%	33.5%	32.4%	33.2%	40.4%	36.6%	32.8%	37.8%	36.0%	37.6%
Thaba Nchu	71.6%	68.5%	68.3%	71.0%	75.1%	70.7%	69.6%	68.0%	71.2%	75.5%	73.3%	73.0%
Botshabelo	48.8%	40.5%	45.7%	48.9%	46.2%	43.9%	46.7%	47.3%	48.4%	49.7%	46.8%	51.0%
N-E Rural	60.1%	57.0%	54.0%	56.3%	50.5%	57.2%	63.5%	66.2%	54.5%	69.0%	54.0%	57.8%
N-W Rural	63.0%	61.0%	53.3%	51.6%	54.5%	49.5%	57.9%	57.5%	45.9%	54.0%	48.5%	60.1%
S-W Rural	52.7%	61.4%	52.1%	49.0%	45.3%	45.8%	49.9%	52.4%	46.6%	33.5%	48.2%	59.4%
S-E Rural	53.8%	50.1%	50.2%	47.8%	57.3%	47.4%	44.1%	42.2%	46.7%	46.8%	43.1%	51.9%
Naledi	52.7%	43.3%	42.3%	44.7%	46.1%	44.5%	44.9%	49.2%	46.3%	44.0%	46.5%	59.4%
Mangaung Municipality	54.6%	50.7%	50.7%	52.3%	51.7%	48.8%	51.6%	51.1%	50.2%	52.3%	52.4%	55.8%

7.7 Mode usage during previous 7 days

Respondents of all ages were asked how many times they had used the different modes of transport during the preceding 7 days. It appears that some interviewers did not record '0' trips, and left the space blank, which resulted in 'missing values' of between 40 and over 90 per cent. The decision was made to treat the 'missing values' as '0s'.

Fr

Please note that the numbers in Table 7-11 are based on the assumption that blanks equalled zeroes and should therefore be interpreted as approximations.

The following are noteworthy:

- Fewer trips by all modes are made over weekends
- Most trips are made on foot
- Most motorised trips are made by minibus taxi, followed by car driver trips
- If car driver and car passenger trips are combined, however, and minibus taxi and bus trips, the numbers are relatively close
- During the course of the week (Monday to Friday) 1,3 million trips are made by minibus taxi and bus on the one hand and 1,4 million by private car. Over the weekend the difference is more marked, with 190 000 by public transport and 310 000 by car.

Table 7-11: Number of trips by different modes during the previous seven days

Trip mode	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Walk	559 000	530 000	531 000	545 000	488 000	197 000	207 000
Bus	50 000	44 000	46 000	51 000	57 000	22 000	17 000
School bus	73 000	71 000	72 000	75 000	70 000	2 000	3 000
Minibus taxi	236 000	215 000	229 000	216 000	225 000	76 000	72 000
Sedan taxi	10 000	7 000	6 000	9 000	7 000	8 000	6 000
Bakkie taxi	5 000	4 000	4 000	4 000	6 000	3 000	3 000
Car as driver	210 000	198 000	204 000	198 000	204 000	112 000	102 000
Car as passenger	83 000	82 000	86 000	78 000	85 000	43 000	57 000
Lift club	21 000	20 000	20 000	21 000	20 000	4 000	5 000
Company transport	15 000	15 000	16 000	15 000	13 000	4 000	2 000
Metered taxi	1 000	1 000	1 000	2 000	1 000	1 000	0
Motor cycle	1 000	1 000	2 000	1 000	1 000	2 000	0
Bicycle	5 000	33 000	11 000	11 000	11 000	8 000	1 000
Other modes	0	0	0	0	2 000	1 000	0

8. Employment

8.1 Number of employed per household

Table 8-1 provides information about the number of employed persons per household. Close to half of the households have nobody in employment (and in Botshabelo almost 70 per cent) and on the other hand, only 14 per cent of the households have two or more income-earners – in Langenhoven-Park/Woodlands almost a third of the households have more than one income earner.

Table 8-1: Number of employed persons per household

Reporting Zone	% of households		
	0	1	2+
Central	55.6%	33.7%	10.7%
Oranjesig	53.6%	43.0%	3.4%
Mangaung	39.6%	39.1%	21.3%
Airport/Estoire	28.1%	57.8%	14.1%
Naval Hill/Bayswater	44.1%	35.4%	20.5%
Tempe/Dan Pienaar	34.2%	51.5%	14.2%
Langenhoven Park/Woodlands	25.7%	44.3%	30.0%
Universitas	48.2%	40.5%	11.3%
Pellissier/Fichardt-Ehrlich Park	30.5%	49.1%	20.4%
Thaba Nchu	55.6%	37.5%	6.9%
Botshabelo	68.9%	26.1%	5.0%
N-E Rural	32.5%	64.1%	3.4%
N-W Rural	41.7%	45.8%	12.5%
S-W Rural	19.4%	65.5%	15.2%
S-E Rural	30.3%	45.5%	24.3%
Naledi	58.2%	38.3%	3.5%
Mangaung Municipality	46.8%	39.0%	14.2%

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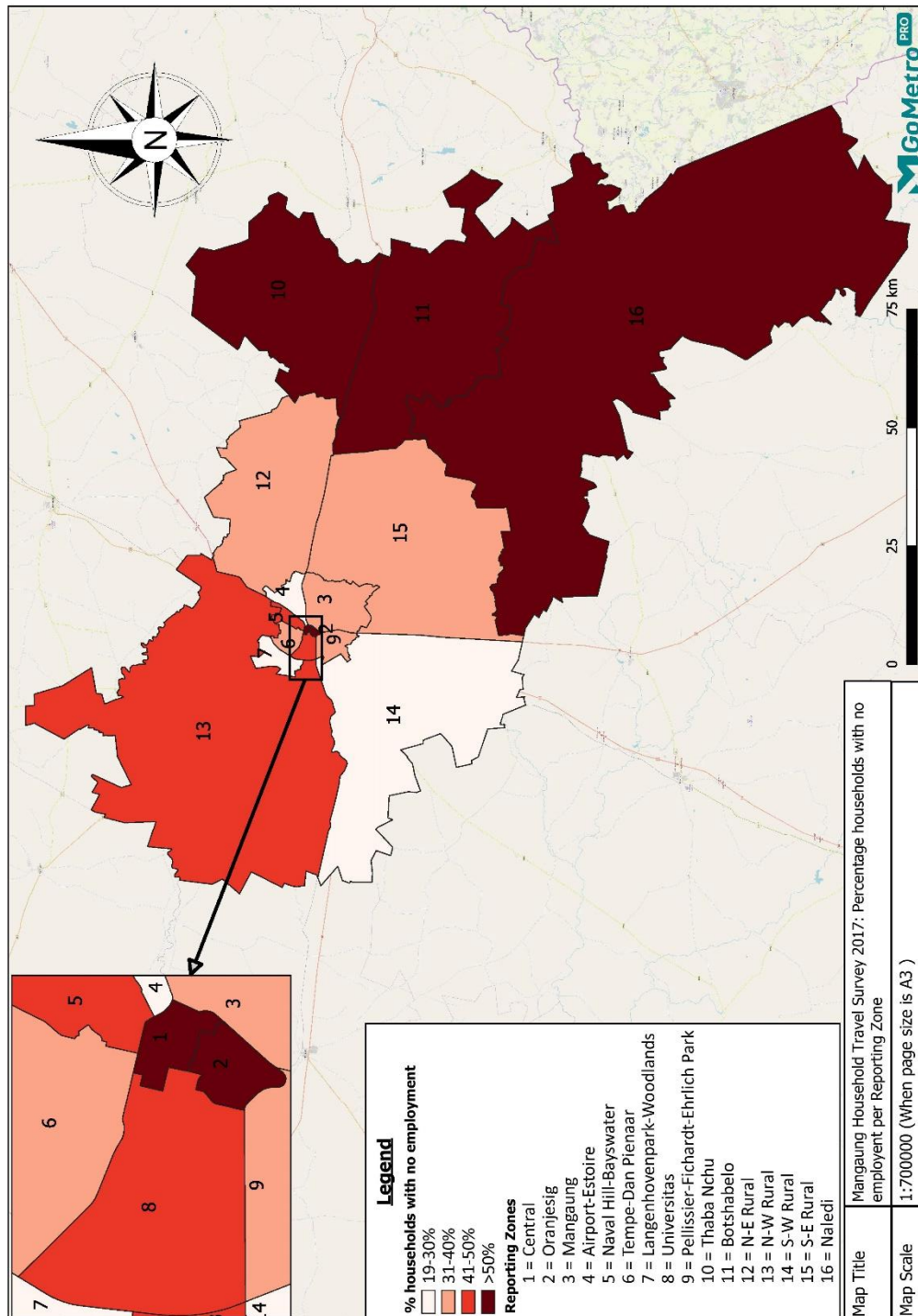


Figure 8-1 indicates the zones where more than half of the households have nobody in employment – Thaba Nchu, Botshabelo, Naledi to the East and Oranjesig and Central and Oranjesig in the centre of the city.

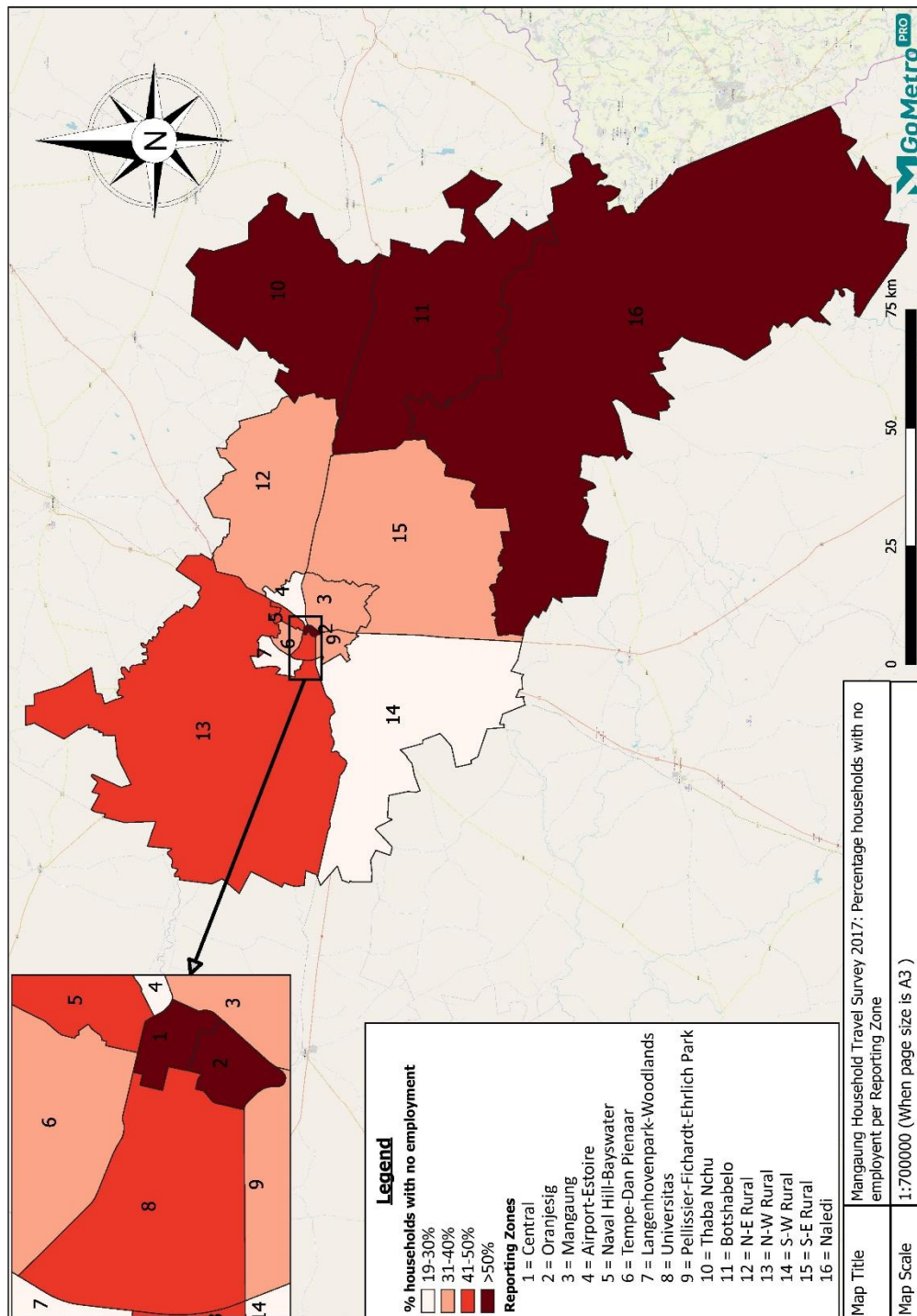


Figure 8-1: Percentage of households with no income earner

8.2 Unemployment

Another way of looking at unemployment is to do so at the relationship between the employed and the unemployed as a group. Figure 8-2 portrays the proportions of people in full-time employment, part-time employment and unemployment. The graph shows that in general, the employed outnumber the unemployed (albeit in by a very small margin in some areas) in the municipality as a whole and also in all the zones with the exception of Botshabelo. It also shows that only a small proportion of the group work part time (6% overall) with the only significant part-time employment occurring in Oranjesig and Naledi, and to a lesser extent in the western rural areas.

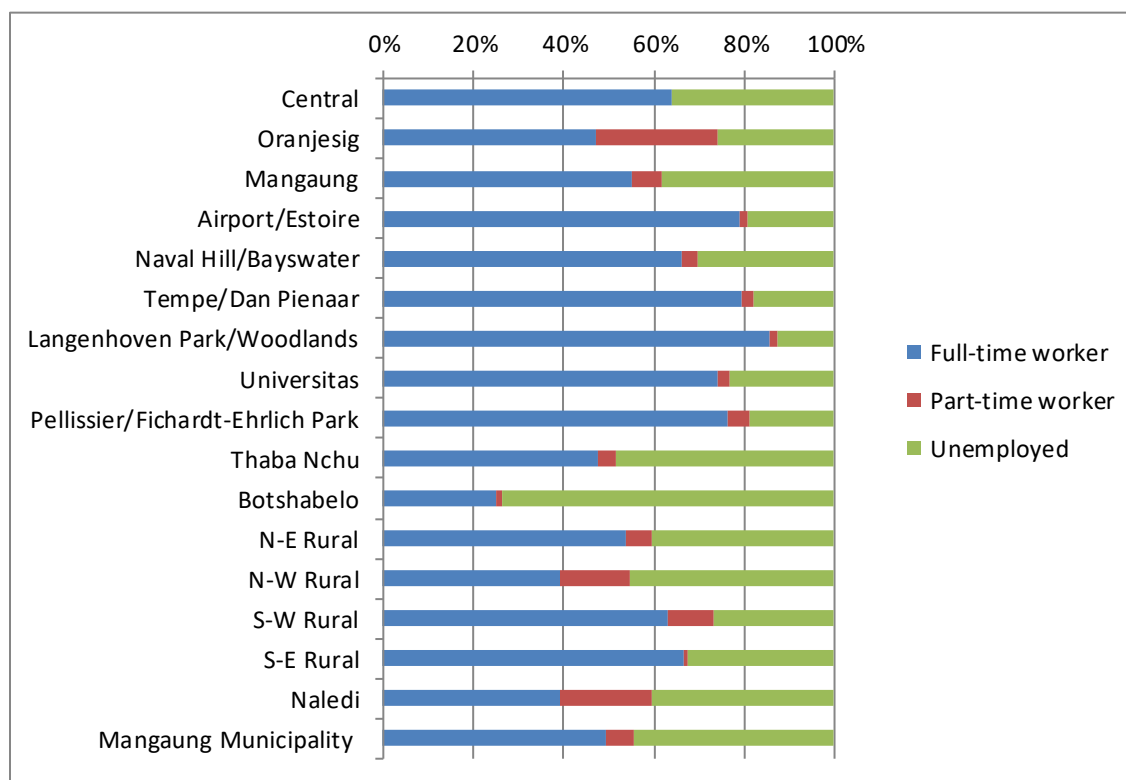


Figure 8-2: Relationship between the employed (full-time and part-time) and the unemployed

Figure 8-3 shows clearly that the higher the educational level, the higher the level of employment. The one anomaly is the group with no education, where more are employed than unemployed.

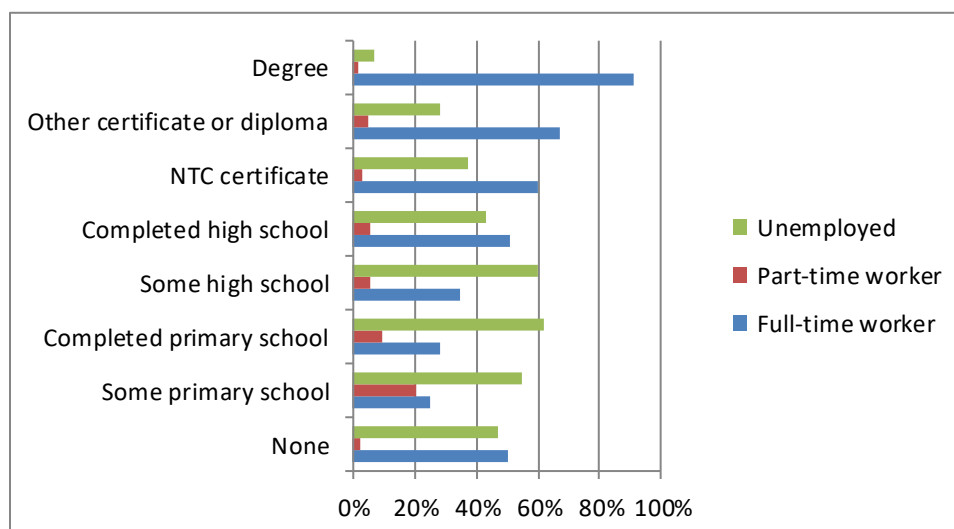


Figure 8-3: Relationship between education and employment

8.3 Employment in the formal and informal sectors

As Table 8-2 indicates, the vast majority of the workers in the municipality work in the formal sector. That is also the case in most of the zones, with the exception of S-W Rural, where informal workers are in the majority.

Table 8-2: Employed survey respondents in the formal and informal sectors

Reporting Zone	% of employed	
	Formal sector	Informal sector
Central	62.1%	37.9%
Oranjesig	100.0%	
Mangaung	89.2%	10.8%
Airport/Estoire	95.6%	4.4%
Naval Hill/Bayswater	92.9%	7.1%
Tempe/Dan Pienaar	89.4%	10.6%
Langenhoven Park/Woodlands	85.4%	14.6%
Universitas	96.5%	3.5%
Pellissier/Fichardt-Ehrlich Park	87.8%	12.2%
Thaba Nchu	81.6%	18.4%
Botshabelo	90.3%	9.7%
N-E Rural	79.7%	20.3%
N-W Rural	56.5%	43.5%
S-W Rural	41.4%	58.6%
S-E Rural	74.6%	25.4%
Naledi	89.9%	10.1%
Mangaung Municipality	82.0%	18.0%

8.4 Employment sectors and occupation type

Workers are often not aware of the industrial sector in which they are working, nor of their occupational type. Furthermore, interviewers alike find it difficult to place the information given to them in the correct category.

However, Table 8-3 and Table 8-4 provide information about these variables according to the information given by the respondents and interpreted by the interviewers. Twenty five per cent of the employed work in the 'Other services' sector, followed by education and public administration (8% each), and Wholesale and retail and Agriculture (7% each).

Table 8-3: Employment industry

Industry	% of employed
Agriculture	6.5
Mining	1.3
Manufacturing	3.9
Electricity, gas and steam	3.3
Water supply	1.8
Construction	5.3
Wholesale and retail	7.0
Transport, storage and communication	4.3
Accommodation and food	3.8
Information and communication	1.8
Financial and insurance services	2.8
Real estate	0.8
Professional , scientific and technical	3.4
Admin support services	3.3
Public administration	8.2
Education	8.4
Human health and and social work	6.0
Arts and entertainment	0.4
Other service activities	24.8
Activities of households as employers	2.1
Activities of foreign organisations	0.8

Almost a quarter of the working population work as labourers, and almost the same number were classified as other, underscoring the difficulty of categorising this variable. Some 15 per cent work as professionals, 13 per cent as sales workers and ten per cent as managers.

Table 8-4: Occupation type

Occupation type	% of employed
Managers	9.6
Professionals	15.1
Technicians	3.5
Machine operators	1.3
Sales workers	13.3
Labourers	24.6
Community and personal service workers	5.9
Clerical and administrative workers	3.9
Other	22.8

8.5 Employment characteristics and conditions of work

Table 8-5 provides information about the worker's employer, work location and whether they have flexible working hours. The table shows that only a tenth of the workers are self-employed, only nine per cent work from home but that almost a quarter enjoy flexible working hours. These proportions obviously differ from area – in the Central zone 28 per cent of workers are self-employed, in the Naval Hill/Bayswater area 22 per cent work from home and the S-W rural zone the majority enjoy flexible working hours.

Table 8-5: Employment characteristics of all workers

Reporting zone	Percentage of employed		
	Self employed	Work from home	Flexible working hours
Central	28.2%	11.2%	31.2%
Oranjesig	6.2%	7.3%	38.2%
Mangaung	9.5%	5.0%	16.1%
Airport/Estoire	8.3%	5.8%	11.9%
Naval Hill/Bayswater	18.7%	21.6%	24.2%
Tempe/Dan Pienaar	20.7%	16.4%	28.9%
Langenhoven Park/Woodlands	20.8%	18.8%	28.5%
Universitas	4.6%	8.5%	17.5%
Pellissier/Fichardt-Ehrlich Park	16.4%	12.4%	18.9%
Thaba Nchu	7.2%	8.2%	16.6%
Botshabelo	3.8%	3.1%	18.5%
N-E Rural	13.1%	7.4%	38.5%
N-W Rural	8.9%	13.9%	33.5%
S-W Rural	12.8%	14.0%	52.5%
S-E Rural	11.2%	12.5%	31.1%
Naledi	10.9%	10.0%	31.0%
Mangaung Municipality	10.3%	8.8%	23.3%

Other points worth noting are:

- 84 per cent work 5 days a week, eight per cent 6 days, four per cent 3 days a week, three per cent 4 days a week and one per cent two days a week;
- 36 per cent drive to work and *of those*, about half need their car at work, 13 per cent need to pick up passengers on their way to work and ten per cent need to drop off passengers on their way home from work;
- Only three per cent receive a travel allowance, ranging in value from R450 to R5 000 a month, with a mean of R2 500 per month.

8.6 Worker income

Unfortunately, as with household income, a large proportion of workers (42%) refused to give any information about their salaries. This obviously differs from zone to zone, ranging between a low of seven and a high of 82 per cent.

The reported salaries are between R600 and R30 000 per month, with almost half of the reported incomes being lower than R6 000 per month.

9. Results: Trips

Respondents six years and older were asked:

- Where they were at 3 am on the designated travel day;
- Whether they had left those premises any time on that day to go somewhere else, such as going to work, home school or shops or to visit a friend; and
- The reasons for not doing so if they had not travelled.

Virtually all (99%) reported that they were at home at that time and only 16 per cent said that they had not left the house.

The main reasons for not travelling are provided in Table 9-1 below. It is clear that over 90 per cent simply had no need to travel and 5 per cent were unwell. Less than three per cent of the non-travellers were prevented from travelling by transport-related reasons.

Table 9-1: Reasons for not travelling

Reasons for not travelling	% of those who did not travel
Did not need to travel	91.7
Usual transport not available	0.7
No available public transport	0.1
Disabled - transport inaccessible	0.1
Public transport too expensive	1.3
Public transport too far	0.2
Strike action/conflict in transport sector	0.3
Unwell	5.6

9.1 All reported trips

Respondents were asked to provide information about all the trips that they had made on the travel day. The results are described in the sections below.

9.1.1 Trip purpose

Table 9-2 lists the purpose of all trips. It makes sense that half of the trips were trips back to homes. The majority of outward trips were trips to education, followed by work trips. Eight per cent of all trips were shopping trips.

Table 9-2: Trip purpose – all trips

Trip purpose	% of all trips
Work at usual workplace	13.7
In the course of work	0.4
Visiting friends/relatives	3.0
Giving someone a ride	0.6
Educational	17.5
Shopping	8.4
Looking for work	1.1
Medical/health purposes	3.6
Visit Traditional healer	0.0
Visit welfare offices	0.1
Recreational	0.1
To go home	49.8
Worship	1.5
Other	0.2

9.1.2 Mode of travel

Table 9-3 lists the mode combinations of all trips. Transfers were made in less than one per cent of trips. Unfortunately, the walks sections to, between and after motorised trips were not consistently recorded and are therefore omitted from the mode combination list.

Table 9-3: Mode combinations

Mode combination	% of all trips
Walk all the way	22.6
Minibus-taxi	39.6
Bus	4.5
School bus	5.6
Company transport	1.1
Car driver	15.3
Car passenger	7.5
Lift club	2.8
Taxi-Taxi	0.1
Taxi-Bus	0.0
Bus-taxi	0.0
Bus-Bus	0.0
Other	0.9

Table 9-4 provides information at zone level about the main mode of transport of all trips. Minibus taxi is the mode used most often for trips in the Mangaung Municipality, followed by car and walking trips. Only ten per cent of the trips in the municipality are made by bus. The highest bus usage is by people living in Botshabelo, the highest taxi usage for people living in Mangaung and Thaba Nchu and the highest car usage by people living in Oranjesig, Tempe/Dan Pienaar and Pellissier/Fichardt-Ehrlich Park. The biggest proportion of walking trips per zone is made by Naledi residents.

Table 9-4: Main mode of transport – all trips

Reporting Zone	Percentage of all trips						
	Bus	Taxi	Company transport	Lift Club	Car	Walk all the way	Other
Central	5.6%	21.5%		0.6%	29.0%	42.1%	1.2%
Oranjesig	1.0%	7.5%		1.8%	73.6%	16.1%	
Mangaung	6.8%	54.7%	0.7%	4.3%	14.1%	18.6%	0.7%
Airport/Estoire	9.8%	19.2%	2.3%	1.8%	64.0%	2.5%	0.3%
Naval Hill/Bayswater	1.7%	13.9%	1.4%	2.6%	54.9%	25.0%	0.5%
Tempe/Dan Pienaar	6.3%	5.7%	1.5%	0.9%	78.0%	7.0%	0.6%
Langenhoven Park/Woodlands	12.7%	8.7%	0.5%	1.5%	71.1%	3.9%	1.6%
Universitas	3.6%	18.4%	0.2%		50.4%	26.6%	0.7%
Pellissier/Fichardt-Ehrlich Park	3.5%	8.9%	0.8%	2.0%	71.9%	10.8%	2.1%
Thaba Nchu	14.7%	60.0%	0.4%	3.7%	8.0%	12.8%	0.3%
Botshabelo	19.1%	35.9%	1.9%	1.6%	9.0%	31.6%	0.9%
N-E Rural	1.2%	23.0%	3.6%	3.6%	37.4%	30.1%	1.0%
N-W Rural	7.2%	29.1%	2.7%	0.8%	26.7%	33.5%	
S-W Rural	2.5%	22.2%	0.6%	4.2%	52.4%	17.0%	1.1%
S-E Rural	9.0%	28.3%		1.7%	39.5%	18.0%	3.5%
Naledi	5.9%	19.3%	0.6%	0.8%	17.7%	52.4%	3.3%
Mangaung Municipality	10.1%	39.6%	1.1%	2.8%	22.8%	22.6%	0.9%

Figure 9-1 provides a picture of the breakdown between trips made by public transport, private transport and walking all the way. About half of all trips made by residents of the Mangaung Municipality are made by public transport, twenty seven per cent by all the private transport modes combined, and 23 per cent by walking.

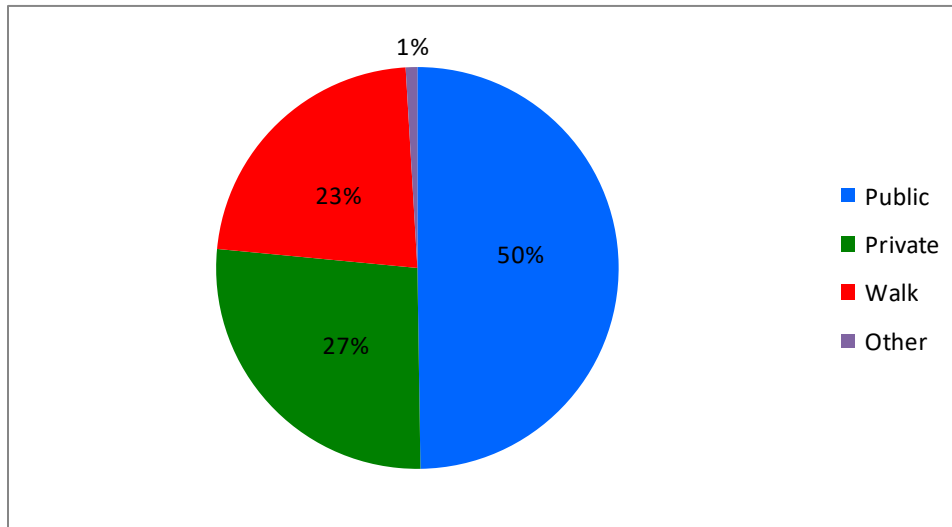


Figure 9-1: Mode of transport in the Mangaung Municipality – all trips

The pie charts in each of the zones in

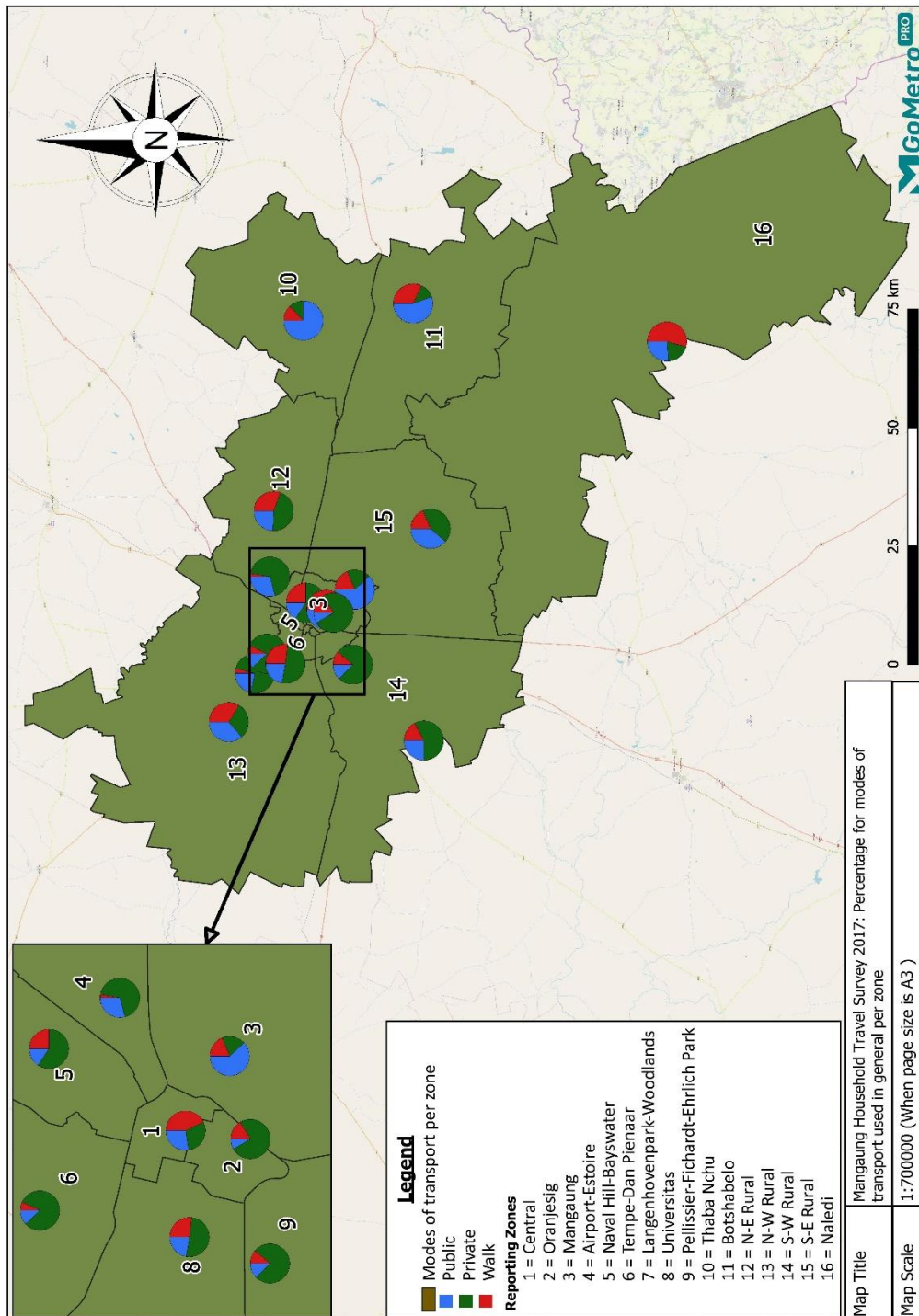


Figure 9-2 shows the same breakdown per zone. Private transport (large green slices) dominates in the central areas with the exception of the Central zone, public transport (blue slices) dominates in Mangaung and Thaba Nchu and walking (red slices) in Naledi and the Central zone.

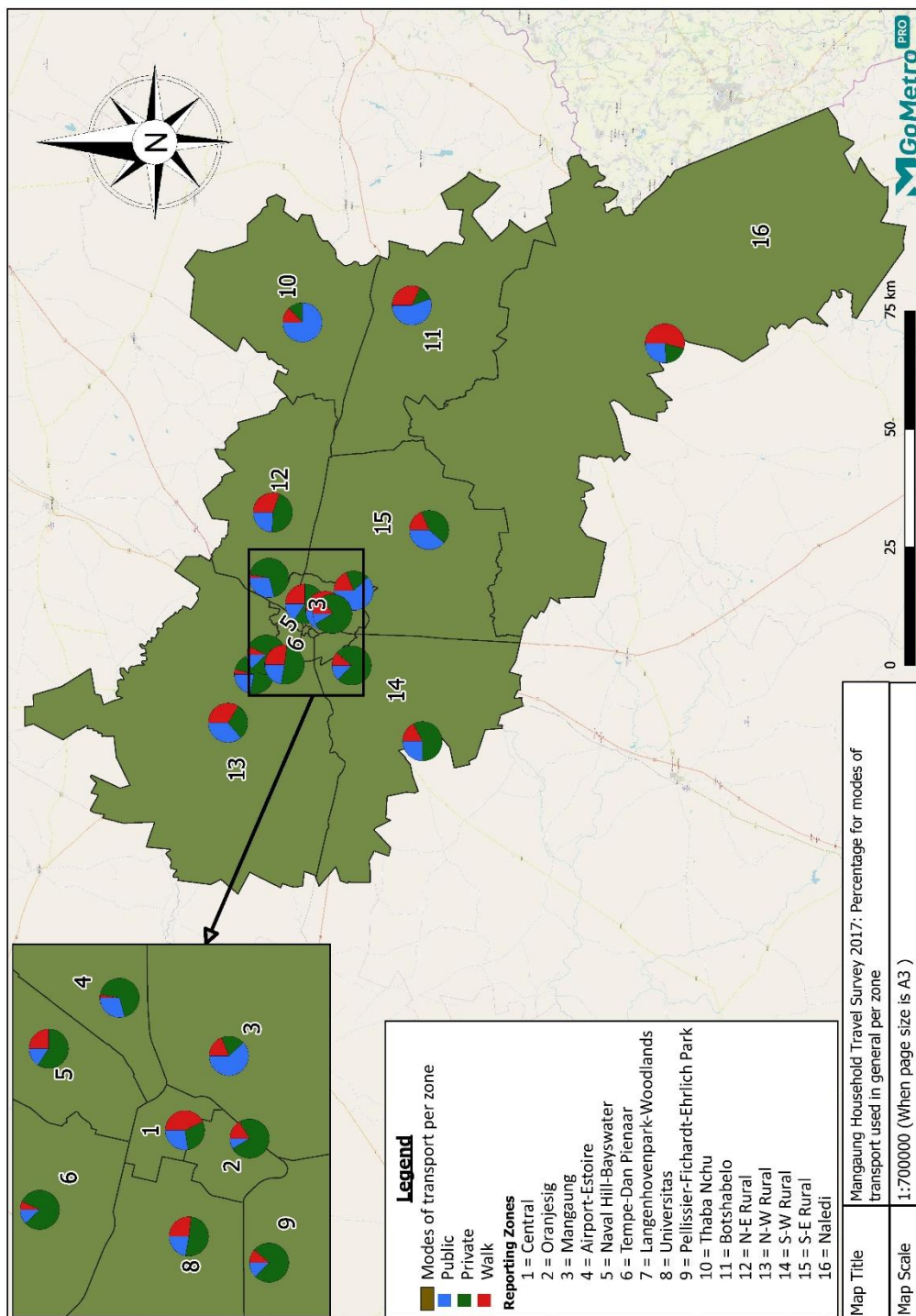


Figure 9-2: Mode of transport by zone – all trips

9.1.3 Travel time – all trips

The travel time categories for each zone are shown in Table 9-5. The largest proportion of the trips undertaken by people living in the Mangaung Municipality takes between 16 and 30 minutes, a third of the trips take longer than 30 minutes and the rest are trips shorter than 16 minutes. Not surprisingly, the Central zone and Oranjesig have the largest proportion of short trips.

Table 9-5: Travel time by zone – all trips

Reporting Zone	Percentage of all trips				
	5 - 15 mins	16 - 30 mins	31-45 mins	46 - 60 mins	61 mins+
Central	47.4%	40.7%	5.7%	6.2%	
Oranjesig	46.7%	47.7%	1.9%	3.7%	
Mangaung	20.4%	50.0%	16.1%	9.7%	3.8%
Airport/Estoire	28.8%	58.0%	8.3%	5.0%	
Naval Hill/Bayswater	42.1%	45.2%	5.2%	6.9%	0.6%
Tempe/Dan Pienaar	52.5%	33.7%	5.1%	7.0%	1.7%
Langenhoven Park/Woodlands	29.0%	48.8%	12.5%	8.3%	1.4%
Universitas	34.6%	49.7%	12.0%	2.5%	1.1%
Pellissier/Fichardt-Ehrlich Park	45.8%	35.9%	10.2%	7.5%	0.7%
Thaba Nchu	13.4%	35.7%	19.9%	18.1%	13.0%
Botshabelo	17.3%	44.8%	12.7%	15.6%	9.6%
N-E Rural	29.2%	52.8%	7.6%	6.4%	3.9%
N-W Rural	19.0%	36.9%	15.4%	13.6%	15.1%
S-W Rural	23.4%	34.6%	23.1%	10.0%	8.8%
S-E Rural	13.7%	48.7%	21.1%	11.9%	4.6%
Naledi	28.0%	34.4%	9.6%	11.4%	16.6%
Mangaung Municipality	22.1%	44.2%	14.8%	11.8%	7.1%

Figure 9-3 shows the mean travel times by zone. Not surprisingly, the travel times are longer in the distant areas and shorter in the central areas. The mean travel time for all recorded trips is 32 minutes.

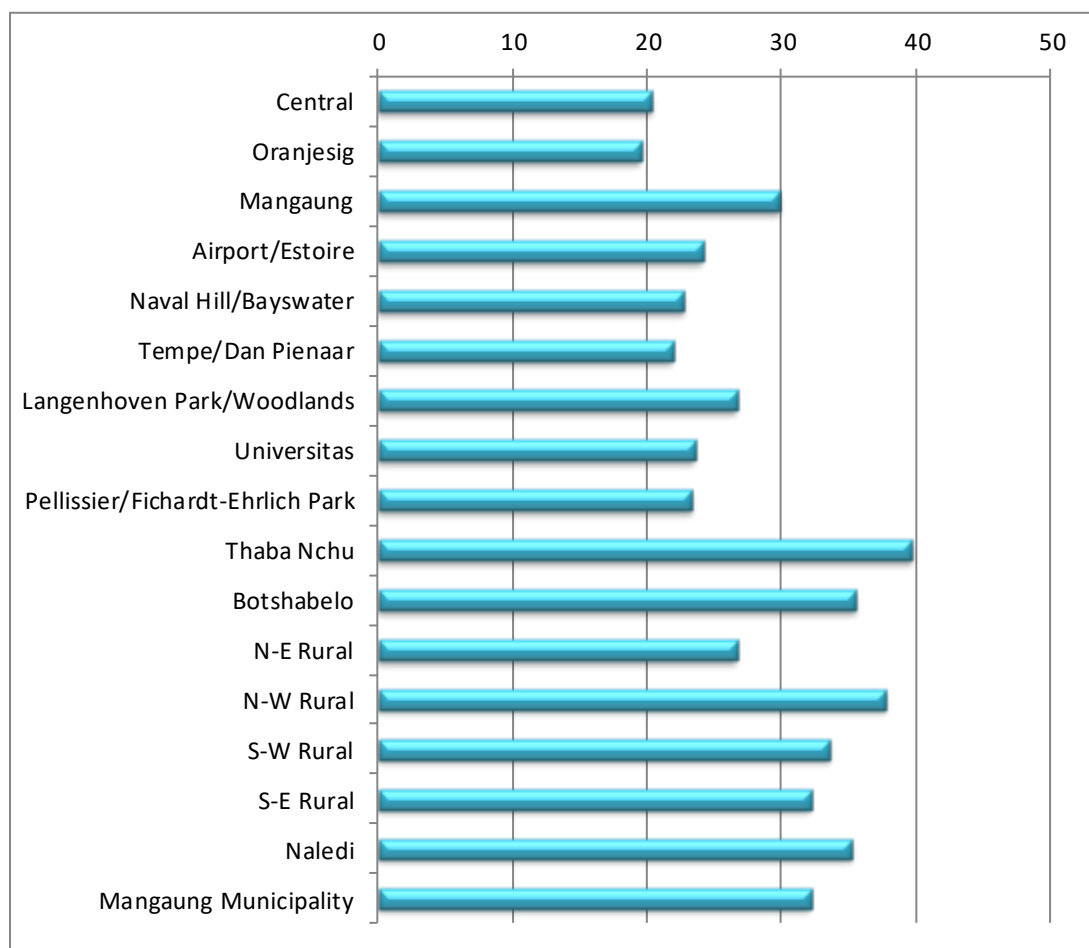


Figure 9-3: Mean travel time by zone – all trips

Table 9-6 provides information about travel times for trips made by the different modes. The highest proportion of long trips are made by bus and company transport and the highest proportion of trips shorter than 16 minutes are made on foot and by private transport.

Table 9-6: Travel time by main mode - all trips

Main mode	Percentage of all trips				
	5 - 15 mins	16 - 30 mins	31-45 mins	46 - 60 mins	61 mins+
Bus	8.5%	37.5%	16.9%	18.0%	19.1%
Taxi	8.9%	45.9%	21.6%	15.9%	7.7%
Company transport	11.8%	31.8%	23.7%	20.7%	12.1%
Lift Club	27.2%	64.0%	4.5%	4.0%	0.3%
Car	33.8%	44.7%	11.1%	8.0%	2.4%
Walk all the way	39.7%	41.7%	6.7%	5.9%	6.0%
Other	12.5%	47.7%	11.4%	23.0%	5.5%

Figure 9-4 provides the mean travel times and mirrors the information in Table 9-6 – the mean travel times are shortest for trips made by lift club (22 minutes) and longest for bus trips (43 minutes).

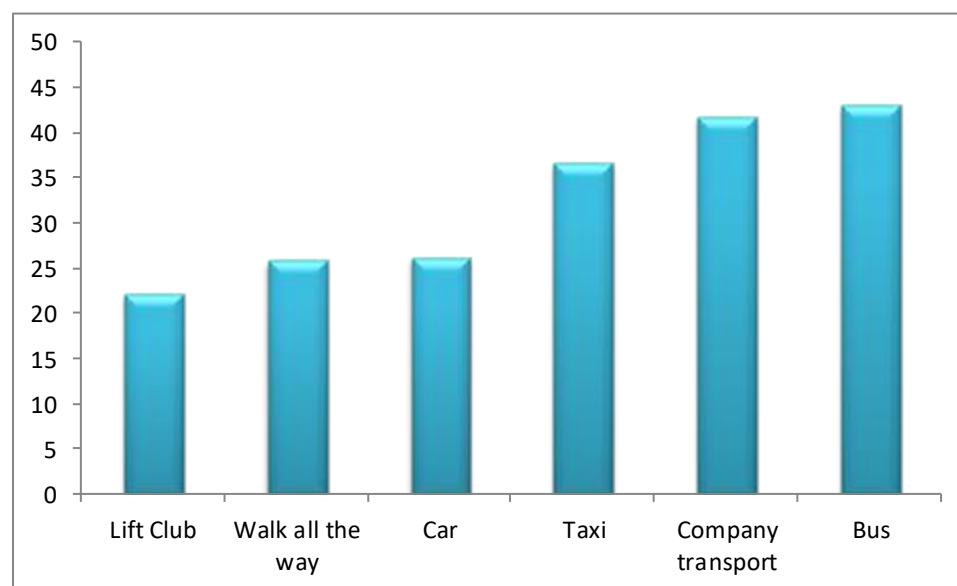


Figure 9-4: Mean travel time by mode – all trips

9.1.4 Walking time to and from modes

The proportions of walking times to public transport modes is provided in Figure 9-5 and those of the walking times from the public transport modes in Figure 9-6. It is clear in both graphs that a larger proportion of walks to taxi (about 65%) fall in the five minutes group, than to bus (44%). The walks from the modes to destinations follow the same pattern, with 70 per cent of walks from taxis being five minute trips and 47 per cent of walks from buses. At the other side of the spectrum, with walks of 15 minutes and longer, the reverse is true.

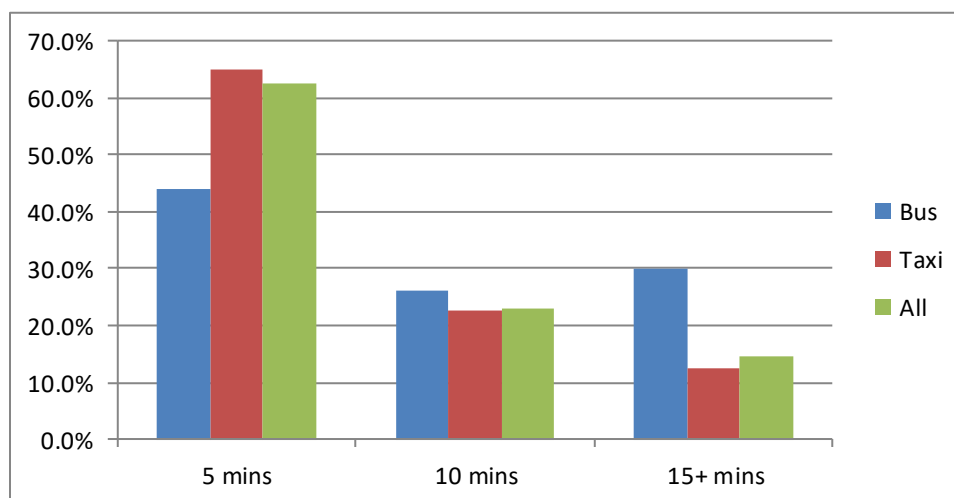


Figure 9-5: Walking times to public transport – all trips

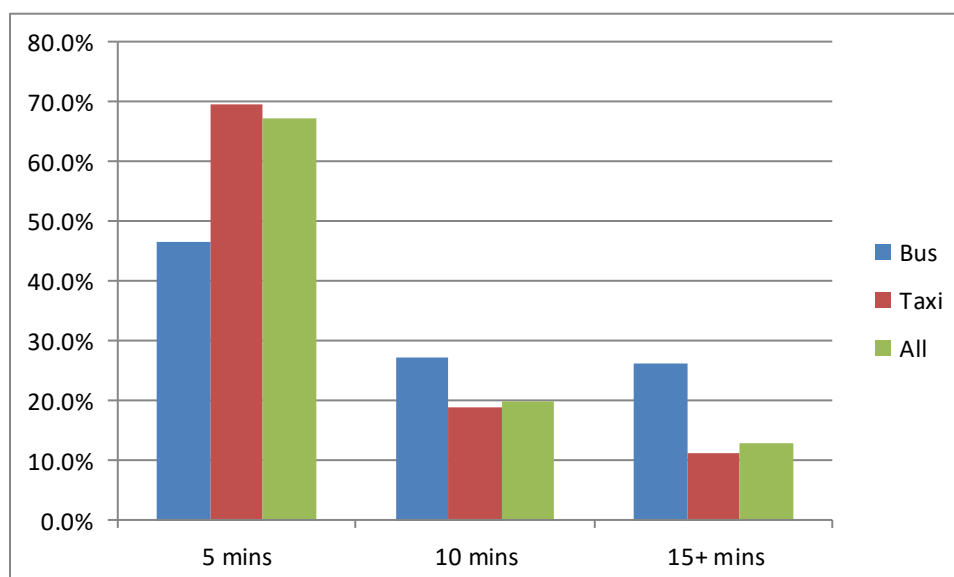


Figure 9-6: Walking times from public transport to destination – all trips

9.2 Trips to work

The tables and figures in this section provide information about work trips.

9.2.1 Main mode of trips to work

Table 9-7 provides information about the main mode of work. In the case of work trips, the proportion of taxi and car trips are almost equal, and a smaller proportion of trips on foot. Car trips dominate in the central areas and in the southern rural areas, but are over 25 per cent in all zones with the exception of Thaba Nchu and Botshabelo where the proportion of car trips is below ten per cent. Taxi trips dominate in Mangaung, Thaba Nchu and Botshabelo. In the latter two areas, high proportions of work trips by bus were made. In Naledi and the N-W rural zone, walk trips dominate and in the N-E rural zone, the work trips are almost equally spread between taxi, car and walk trips.

Table 9-7: Main mode of work trips

Reporting Zone	Percentage of work trips						
	Bus	Taxi	Company transport	Lift Club	Car	Walk all the way	Other
Central	5.0%	12.3%			47.5%	35.2%	
Oranjesig		6.4%			84.6%	9.0%	
Mangaung	1.2%	61.4%	2.6%	1.1%	27.0%	6.4%	0.3%
Airport/Estoire	0.8%	21.7%	6.9%		62.4%	7.1%	1.1%
Naval Hill/Bayswater		17.4%	4.7%		70.7%	6.4%	0.8%
Tempe/Dan Pienaar	0.3%	5.0%	4.4%		87.4%	3.0%	
Langenhoven Park/Woodlands		2.6%	1.7%	0.7%	93.9%	1.1%	
Universitas	1.7%	9.9%	0.7%		77.5%	9.2%	1.0%
Pellissier/Fichardt-Ehrlich Park		8.7%	1.9%	2.1%	84.6%	1.2%	1.5%
Thaba Nchu	29.2%	51.5%	1.6%	2.2%	9.9%	5.6%	
Botshabelo	33.2%	38.3%	11.2%		6.9%	10.4%	
N-E Rural		30.8%	7.2%	0.9%	30.3%	30.9%	
N-W Rural	4.9%	14.0%	6.1%		24.4%	50.6%	
S-W Rural		22.6%	1.5%	5.8%	48.4%	21.0%	0.8%
S-E Rural	4.9%	21.5%		0.6%	59.4%	1.4%	12.2%
Naledi	0.9%	8.1%	0.5%		37.1%	46.3%	7.0%
Mangaung Municipality	9.0%	37.5%	4.0%	1.1%	34.2%	13.3%	0.9%

Figure 9-7 portrays the split between public, private and walk for work trips. Almost half of the work trips are made by public transport and only 13 per cent on foot.

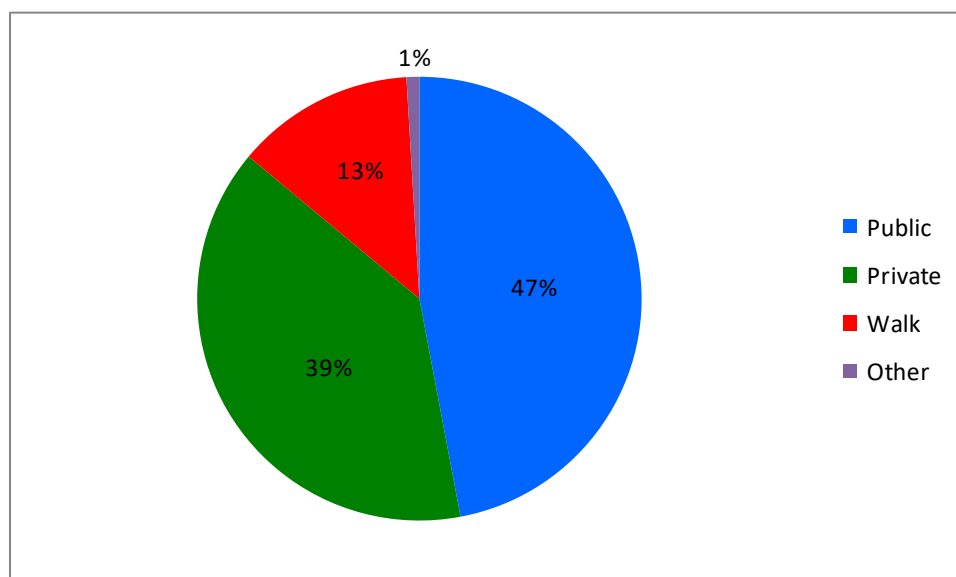


Figure 9-7: Mode of transport in Mangaung Municipality – work trips

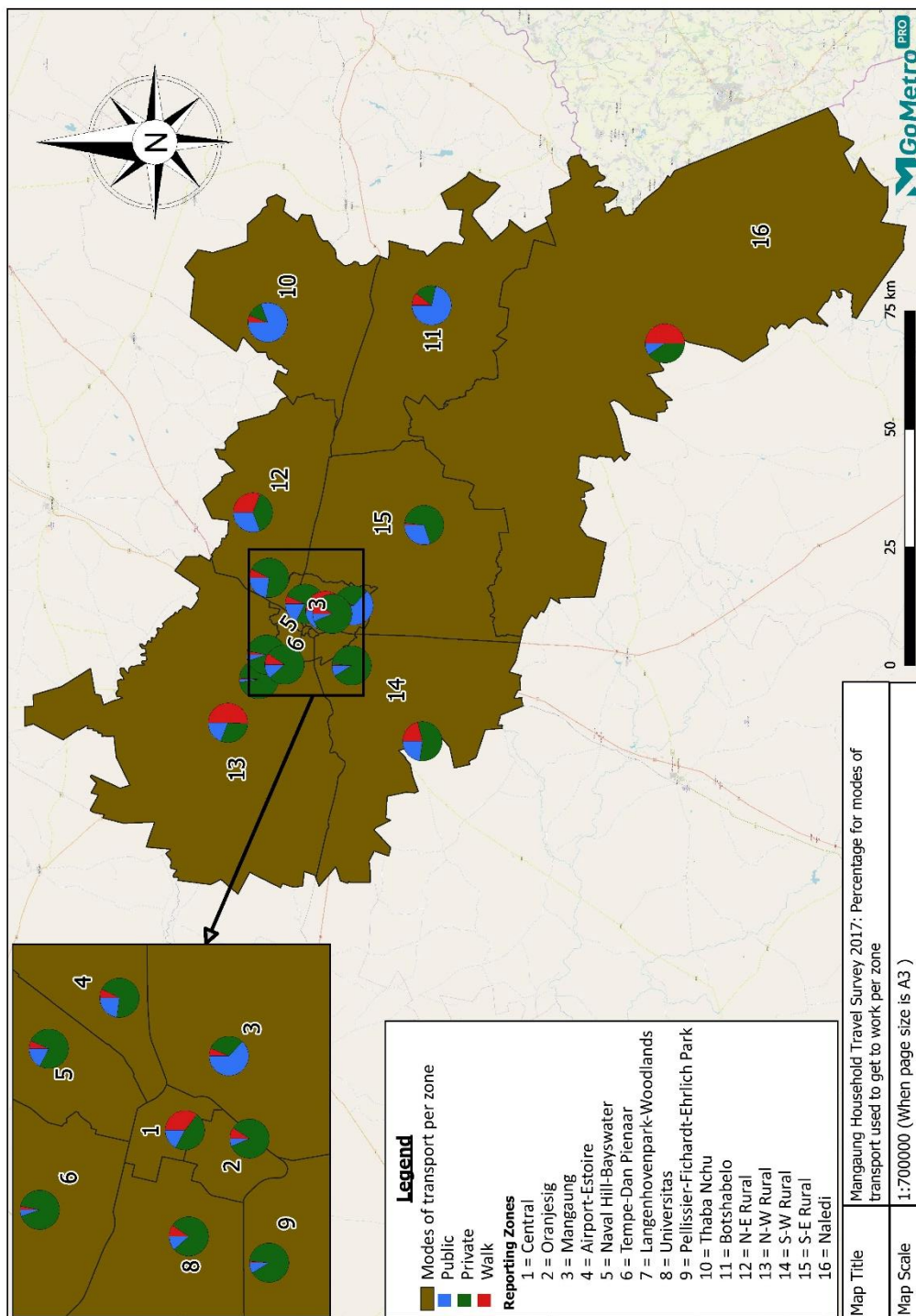


Figure 9-8 shows the modal split between public, private and walking modes for work trips by people living in the different zones. Once again, the blue slices indicate public transport, the green slices private transport and the red slices walk trips. It is easy to see at a glance where the different modes dominate.

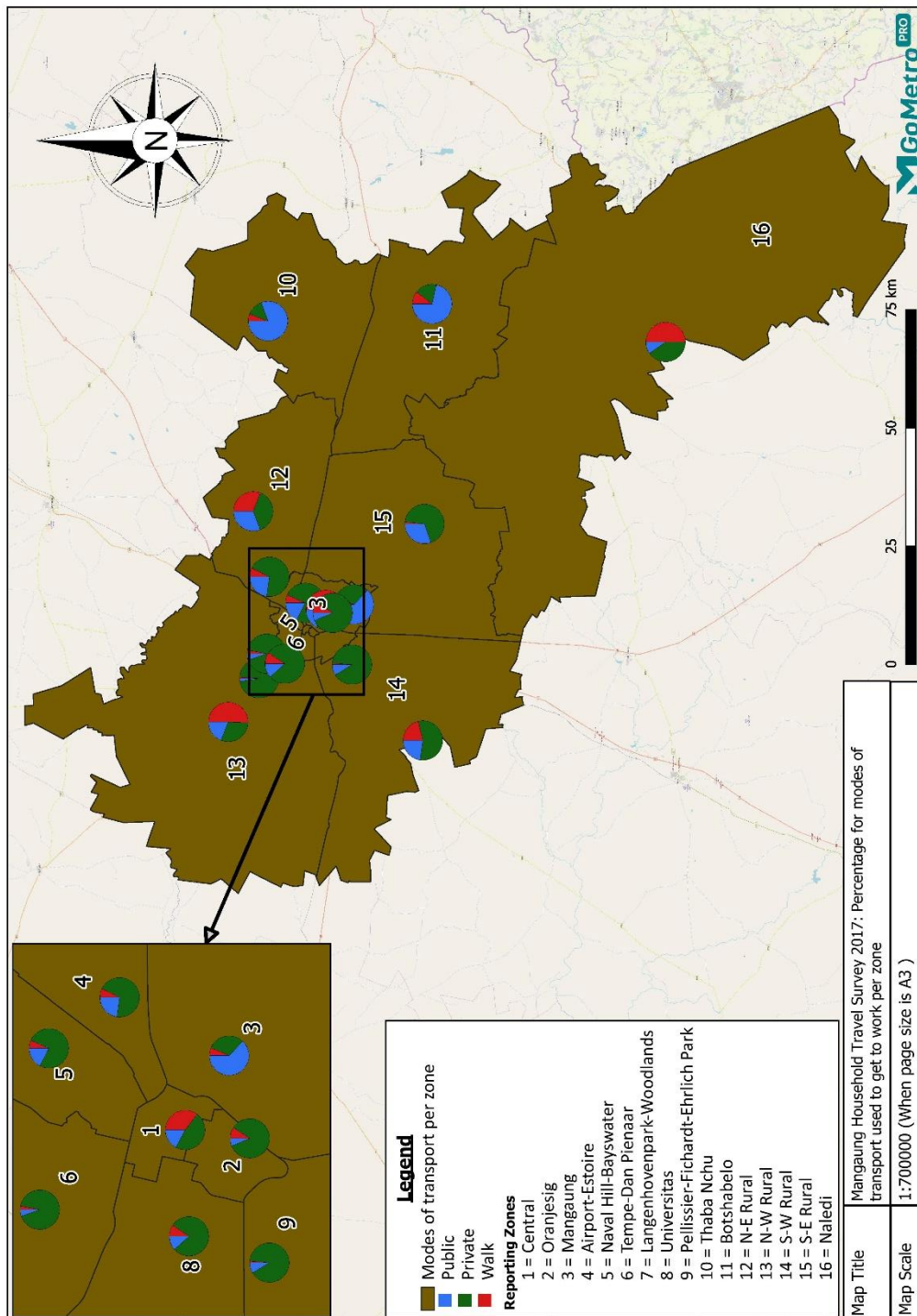


Figure 9-8: Mode of transport by zone – work trips

9.2.2 Travel time to work

Table 9-8 lists the travel time in categories for trips to work. The table shows that the largest proportion of work trips take between 16 and 30 minutes and only ten per cent take longer than an hour. Zones with the largest proportions of long travel times are Thaba Nchu and Botshabelo. On the other hand, the largest proportions of short travel times are found in Oranjesig, N-E Rural and Naledi.

Table 9-8: Travel time to work by zone

Reporting Zone	Percentage of work trips				
	5 - 15 mins	16 - 30 mins	31-45 mins	46 - 60 mins	61 mins+
Central	41.6%	51.5%	3.2%	3.7%	
Oranjesig	52.9%	42.6%	1.4%	3.1%	
Mangaung	9.7%	50.0%	18.5%	17.1%	4.8%
Airport/Estoire	32.4%	44.8%	14.9%	7.8%	
Naval Hill/Bayswater	34.0%	35.6%	3.1%	24.5%	2.7%
Tempe/Dan Pienaar	33.7%	35.2%	7.0%	22.7%	1.5%
Langenhoven Park/Woodlands	21.4%	60.5%	3.5%	14.6%	
Universitas	22.4%	60.8%	7.9%	8.2%	0.7%
Pellissier/Fichardt-Ehrlich Park	23.4%	54.2%	6.4%	13.9%	2.1%
Thaba Nchu	10.2%	21.9%	28.1%	18.6%	21.2%
Botshabelo	1.3%	27.1%	17.7%	29.5%	24.4%
N-E Rural	44.1%	29.6%	4.6%	8.5%	13.1%
N-W Rural	16.2%	44.1%	13.0%	14.6%	12.0%
S-W Rural	26.8%	26.2%	25.3%	11.9%	9.9%
S-E Rural	8.6%	45.6%	28.4%	14.7%	2.8%
Naledi	30.9%	25.2%	4.9%	20.7%	18.3%
Mangaung Municipality	14.7%	40.1%	16.7%	18.1%	10.4%

Figure 9-9 displays the mean travel times of work trips by zone and it clearly shows where the longer than average and shorter than average travelling times are. The mean travel time for all work trips starting in the municipality, is 38 minutes.

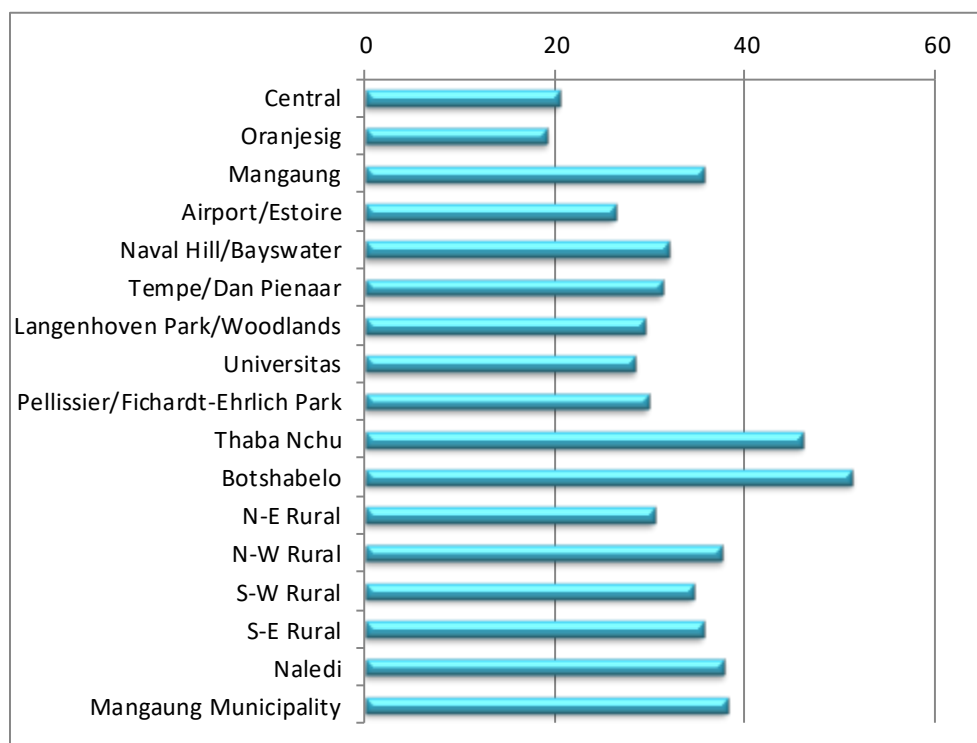


Figure 9-9: Mean travel time by zone – work trips

Table 9-9 provides information about the travel time to work by the main modes. Not surprisingly, more than 40 per cent of work trips on foot take 15 minutes or less. On the other hand, more or less the same proportion of work trips takes longer than an hour.

Table 9-9: Travel time to work by main mode

Main mode	Percentage of work trips				
	5 - 15 mins	16 - 30 mins	31-45 mins	46 - 60 mins	61 mins+
Bus	0.8%	11.4%	16.0%	26.3%	45.5%
Taxi	4.5%	37.9%	24.0%	22.9%	10.8%
Company transport	9.8%	27.9%	25.4%	31.5%	5.4%
Lift Club	7.9%	44.8%	27.7%	14.6%	5.0%
Car	19.8%	51.1%	10.9%	14.7%	3.5%
Walk all the way	42.2%	37.9%	8.3%	5.7%	5.8%
Other	7.3%	82.0%	10.6%		

Figure 9-10 shows the mean travel times for work trips by the different modes, ranging from 22 minutes for work trips on foot to 62 minutes for work trips by bus.

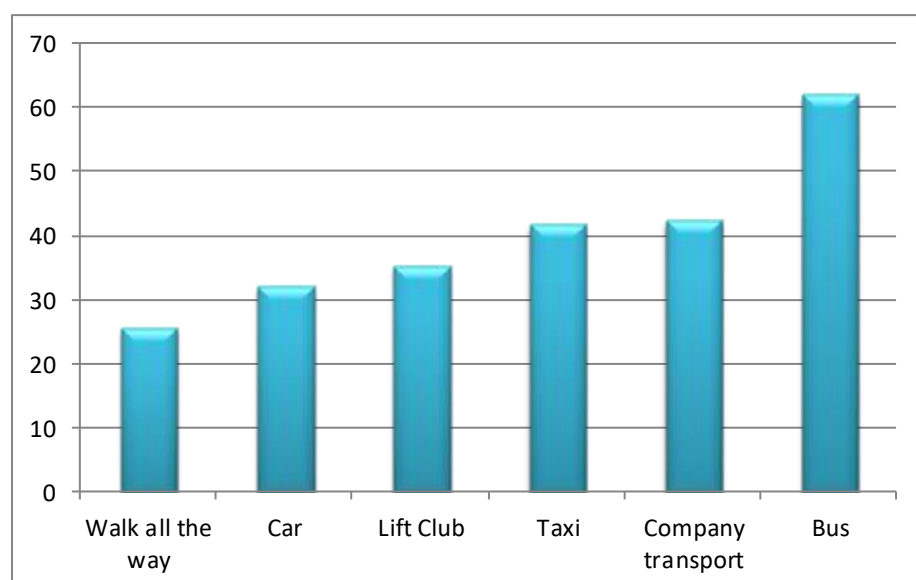


Figure 9-10: Mean travel time by main mode – work trips

9.2.3 Work trip destinations.

Table 9-10 shows that 45 per cent of work trips have destinations within the same reporting zone and 55 per cent in a different zone. In most zones, the minority of work trips are made to destinations within the same zone. Thaba Nchu, North West Rural and Naledi, where 85 per cent of work trips are made internally, are exceptions to this rule.

Table 9-10: Destination type for work trips

Reporting Zone	% of work trips	
	Internal	External
Central	28.4%	71.6%
Oranjesig	26.6%	73.4%
Mangaung	40.8%	59.2%
Airport/Estoire	38.3%	61.7%
Naval Hill/Bayswater	13.8%	86.2%
Tempe/Dan Pienaar	50.2%	49.8%
Langenhoven Park/Woodlands	16.1%	83.9%
Universitas	19.2%	80.8%
Pellissier/Fichardt-Ehrlich Park	14.4%	85.6%
Thaba Nchu	62.5%	37.5%
Botshabelo	52.3%	47.7%
N-E Rural	55.5%	44.5%
N-W Rural	71.9%	28.1%
S-W Rural	40.4%	59.6%
S-E Rural	3.0%	97.0%
Naledi	85.2%	14.8%
Mangaung Municipality	45.4%	54.6%

9.3 Trips to education

9.3.1 Main mode to education

Table 9-11 provides information about the modes used for trips to educational institutions. Overall, 38 per cent of these trips were made on foot, and in Naledi, as many as 74 per cent. Taxis account for 30 per cent of trips to education and in Thaba Nchu for almost half. School buses play an important role in scholar transport in the Mangaung Municipality, providing transport for 16 per cent of trips in the survey area, and in the Airport/Estoire area for 40 per cent of the trips. Car is significant in the central, higher car-owning zones, but also, and especially in the N-E rural zone. Lift clubs feature quite prominently in Thaba Nchu and the N-E Rural zone.

Table 9-11: Main mode to educational institutions

Reporting Zone	Percentage of educational trips						
	School bus	Bus	Taxi	Lift Club	Car	Walk all the way	Other
Central	10.3%		29.3%	1.4%	9.1%	46.9%	3.0%
Oranjesig	3.6%		11.8%	6.7%	36.4%	41.6%	
Mangaung	15.1%	1.0%	39.4%	9.4%	5.9%	29.1%	
Airport/Estoire	40.0%		9.7%	8.5%	41.7%		
Naval Hill/Bayswater	5.2%		16.6%	8.9%	37.6%	31.8%	
Tempe/Dan Pienaar	24.0%		14.9%	4.1%	42.4%	11.8%	2.7%
Langenhoven Park/Woodlands	33.3%	0.8%	9.1%	3.5%	52.4%	0.9%	
Universitas	6.9%	2.3%	26.5%		18.0%	46.3%	
Pellissier/Fichardt-Ehrlich Park	13.6%	1.1%	9.4%	2.2%	40.6%	30.3%	2.7%
Thaba Nchu	9.0%	10.5%	47.0%	16.3%		17.2%	
Botshabelo	17.4%	3.8%	23.9%	1.0%	1.6%	52.2%	
N-E Rural	7.9%	11.0%		17.0%	64.1%		
N-W Rural	21.5%		26.3%	3.6%	1.8%	46.7%	
S-W Rural	10.8%		18.9%	8.1%	29.7%	32.5%	
S-E Rural	23.1%	2.3%	22.1%	4.9%	26.8%	20.8%	
Naledi	16.8%	1.6%	5.5%		1.9%	74.2%	
Mangaung Municipality	16.0%	2.5%	29.5%	5.7%	8.6%	37.5%	0.1%

Figure 9-11 shows the split between trips made by public and private transport and on foot. Private transport plays a relatively small role in travel for educational purposes.

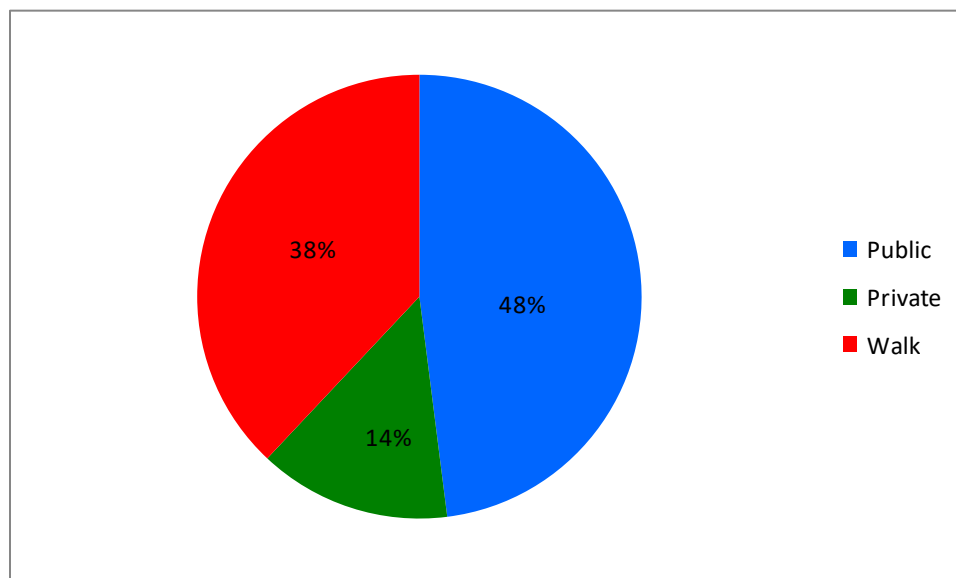


Figure 9-11: Mode of transport to education in Mangaung Municipality

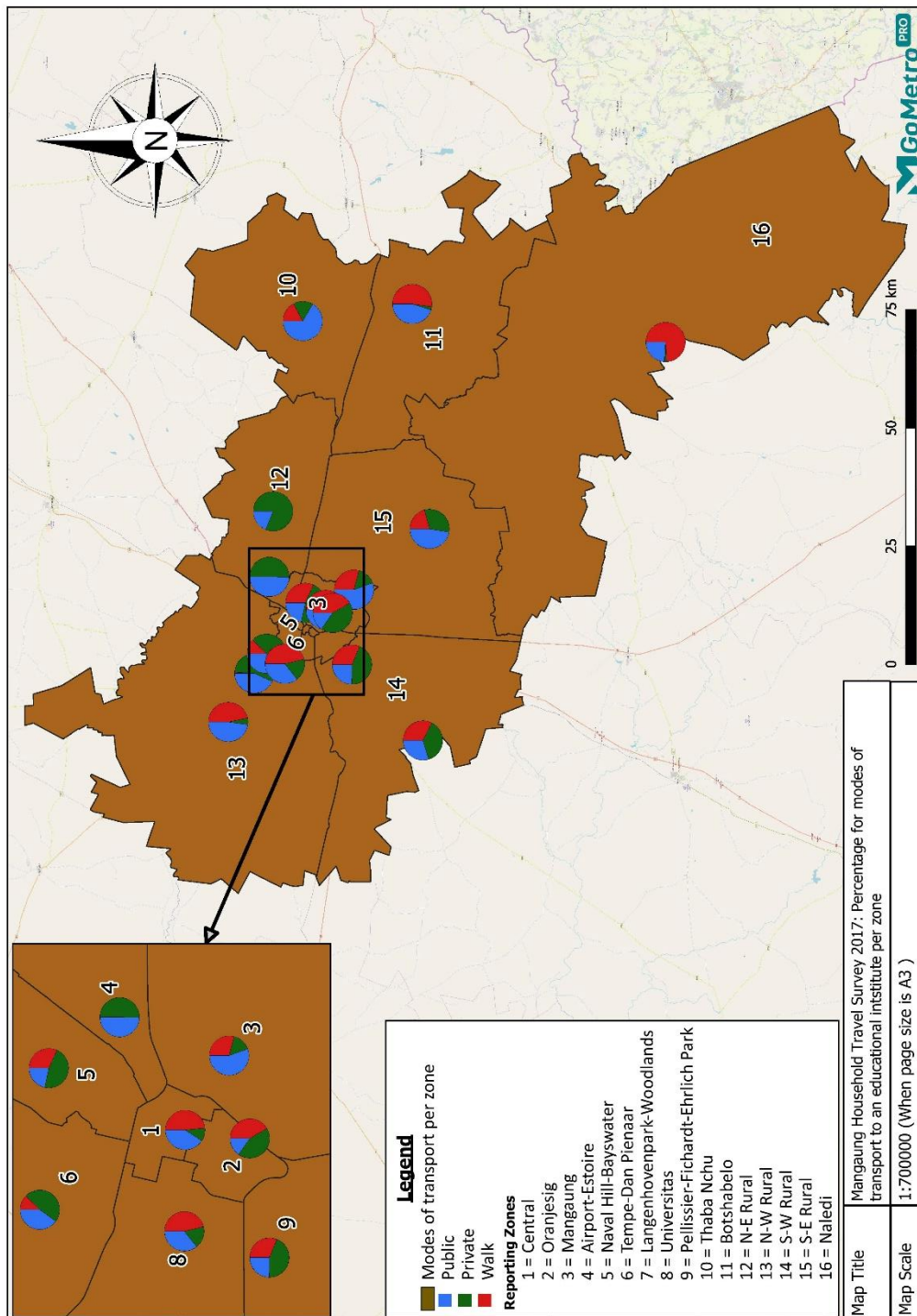


Figure 9-12 displays the public-private-walk breakdown for each zone. It shows the dominance of trips on foot (red slices) in areas such as Naledi and Botshabelo on the one hand and on the other, the dominance of private transport (green slices) in N-E rural and the Airport/Estoire zone.

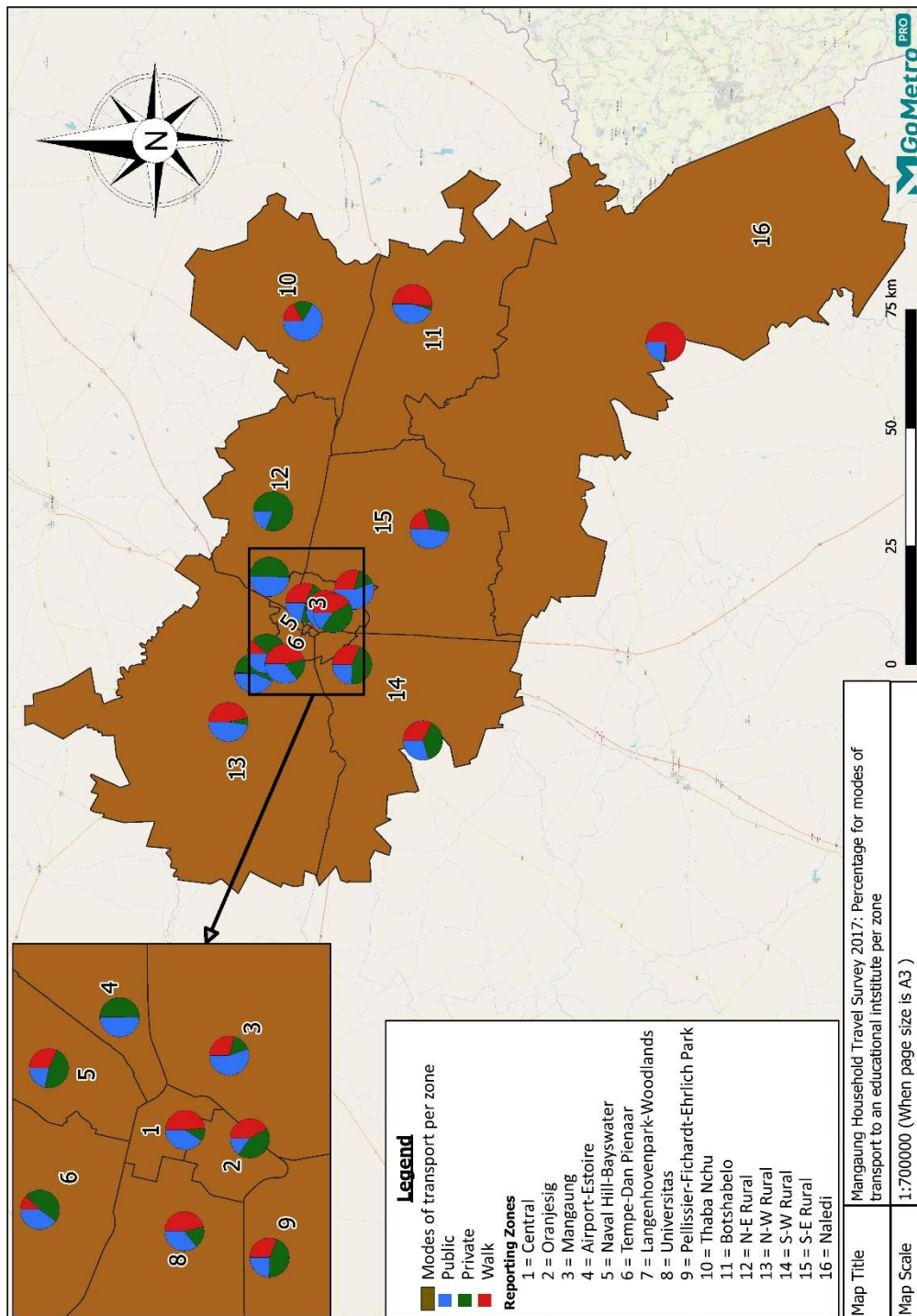


Figure 9-12: Mode to education by zone

9.3.2 Travel time to education

Table 9-12 lists the travel time breakdown by zone. Overall, almost half of the trips took between 16 and 30 minutes and 11 per cent longer than an hour. Unfortunately a large proportion of very long trips occur in a few zones, such as N-W rural, Naledi and especially in S-W rural.

Table 9-12: Travel time to educational institutions

Reporting Zone	Percentage of educational trips				
	5 - 15 mins	16 - 30 mins	31-45 mins	46 - 60 mins	61 mins+
Central	58.6%	30.4%	5.5%	5.5%	
Oranjesig	42.4%	41.7%	1.3%	14.6%	
Mangaung	27.1%	51.2%	11.8%	6.0%	3.9%
Airport/Estoire	18.5%	60.4%	5.3%	15.8%	
Naval Hill/Bayswater	39.3%	45.7%	7.1%	7.9%	
Tempe/Dan Pienaar	41.3%	46.5%	1.9%	10.0%	0.2%
Langenhoven Park/Woodlands	22.6%	48.7%	13.7%	12.4%	2.6%
Universitas	39.2%	49.7%	9.2%	1.9%	
Pellissier/Fichardt-Ehrlich Park	61.6%	27.8%	6.2%	4.4%	
Thaba Nchu	15.9%	60.1%	8.6%	7.1%	8.4%
Botshabelo	14.9%	46.7%	7.9%	14.2%	16.4%
N-E Rural		56.2%	43.8%		
N-W Rural	21.7%	29.7%	19.5%	3.0%	26.1%
S-W Rural	5.4%	50.2%	1.8%		42.6%
S-E Rural	8.3%	45.9%	27.2%	9.5%	9.1%
Naledi	10.4%	38.9%	5.1%	14.6%	31.1%
Mangaung Municipality	22.1%	48.2%	9.9%	9.0%	10.7%

Figure 9-13 displays the mean travel time in the different zones. The times range between a short of 18 minutes in the Central zone and a long of 49 minutes in Naledi, with the mean travel time for the municipality at 32 minutes.

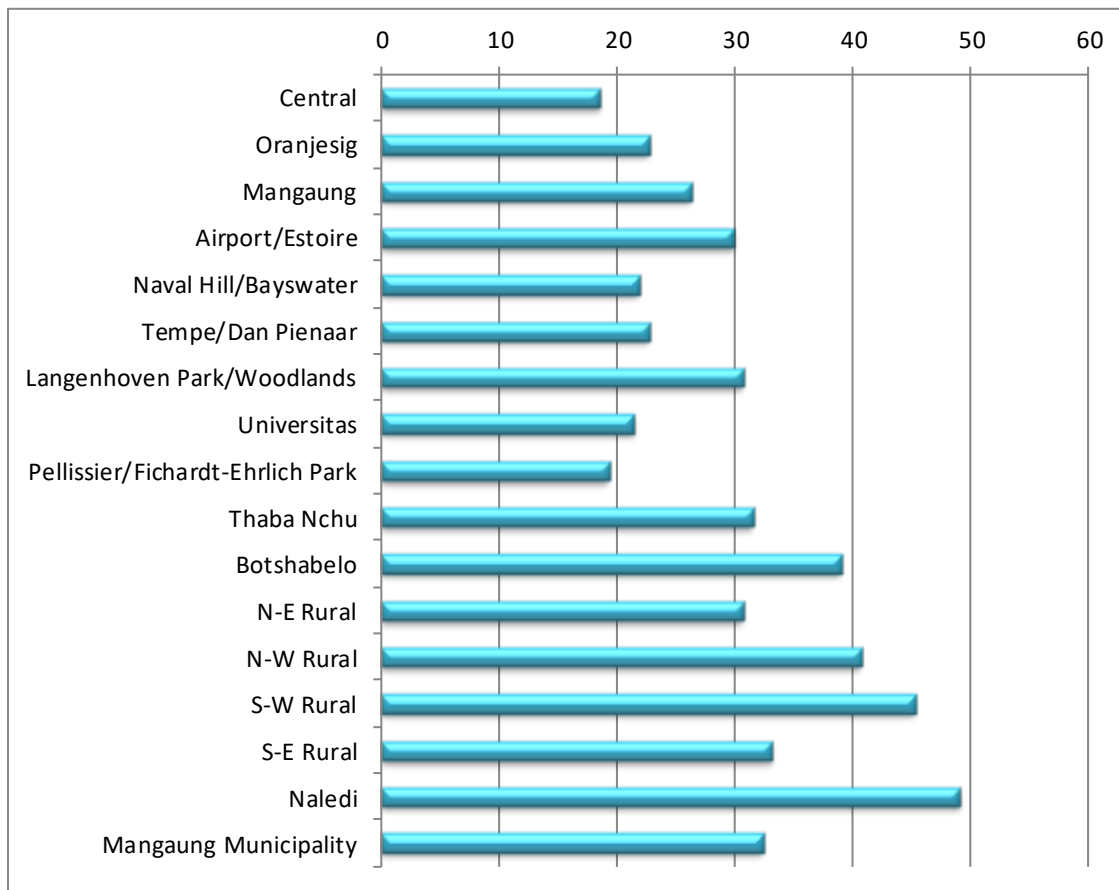


Figure 9-13: Mean travel time to education

Considering the travel times of walking trips to education, Table 9-13 reveals that 16 per cent of these trips take longer than an hour and a further 16 per cent between 46 minutes and an hour. The implication is that quite a large proportion of those who walk to school spend at more than 90 minutes a day walking to and from school. Rough estimates are that there are some 28 000 in this unfortunate situation – more than 20 000 in Botshabelo alone.

Table 9-13: Walking times to education

Reporting Zone	Percentage of walking trips to education				
	5 - 15 mins	16 - 30 mins	31-45 mins	46 - 60 mins	61 mins+
Central	96.6%	3.4%			
Oranjesig	39.0%	61.0%			
Mangaung	68.1%	31.9%			
Airport/Estoire					
Naval Hill/Bayswater	39.8%	60.2%			
Tempe/Dan Pienaar	66.2%	31.8%		2.0%	
Langenhoven Park/Woodlands		100.0%			
Universitas	36.3%	59.0%	4.6%		
Pellissier/Fichardt-Ehrlich Park	91.6%	8.4%			
Thaba Nchu		83.7%	3.4%		12.9%
Botshabelo	16.4%	41.3%	6.8%	12.3%	23.2%
N-E Rural					
N-W Rural	39.6%	26.1%			34.3%
S-W Rural	16.7%				83.3%
S-E Rural		100.0%			
Naledi	12.9%	48.1%	0.8%	16.1%	22.1%
Mangaung Municipality	34.6%	39.1%	3.5%	6.8%	16.0%

10. Use and attitudes to public transport

The attitudinal section of the questionnaire was filled in by one adult in the household (preferably an adult in employment) and weighted to the number of households in the area - therefore the results are not representative of all adults, rather of a view at household level.

10.1 Bus usage

The proportion of respondents, who reported that they had used a bus service at least once in the preceding month, is tabled below. Table 10-1 reveals that on average, less than 20 per cent of respondents had used a bus. The only significant bus usage was in Thaba Nchu and Botshabelo, with a decreased usage of between ten and twenty per cent in Mangaung and the southern and northern rural areas, petering out to an insignificant minority in Naledi and the urban areas.

Table 10-1: Bus usage in the preceding month

Reporting Zone	% of respondents
Central	3.5%
Oranjesig	2.0%
Mangaung	10.2%
Airport/Estoire	3.6%
Naval Hill/Bayswater	2.1%
Tempe/Dan Pienaar	6.1%
Langenhoven Park/Woodlands	7.6%
Universitas	8.3%
Pellissier/Fichardt-Ehrlich Park	8.2%
Thaba Nchu	42.7%
Botshabelo	28.3%
N-E Rural	13.6%
N-W Rural	16.7%
S-W Rural	14.3%
S-E Rural	17.4%
Naledi	4.0%
Mangaung Municipality	17.5%

The respondents who were not bus users were required by the questionnaire to provide the reasons for not using the bus service. Unfortunately, this section appears to have been skipped by most interviewers and only two per cent of the non-users provided an answer. Of those, the majority (76%) gave the reason that there were no buses available and the rest that buses were not available often enough. There is therefore no information about other service-related issues that may discourage residents from using the bus service.

10.2 Satisfaction with and importance of attributes of bus service

Bus users were asked to rate their satisfaction with attributes of the bus service as very satisfied, satisfied, neither, dissatisfied and very dissatisfied. Similarly, they were asked to rate the importance of the attributes as very important, important and not important. The results are listed in Table 10-2 and graphed in Figure 10-1.

Table 10-2: Importance of and satisfaction with attributes of the bus service

Attributes of bus service	Percentage of bus users					
	Very important	Important	Total important	Dis-satisfied	Very dis-satisfied	Total dis-satisfied
Distance of bus stop from home	45.2	34.5	79.7	26.2	18.4	44.6
Distance of bus stop from work	47.9	37.3	85.2	27.2	19.5	46.7
Travel time in the bus	49.5	32.7	82.2	28.5	15.9	44.5
Security on walk to bus	42.6	44.3	86.9	27.8	15.5	43.3
Security at the bus rank or bus stops	46.3	38.8	85.1	23.7	14.6	38.3
Security on the bus	48.3	36.3	84.6	26.8	14.3	41.1
Level of crowding in the bus	46.3	36.6	82.9	28.2	19.8	48.0
Safety from accidents	50.2	35.9	86.1	28.2	20.2	48.4
Peak-period frequency of buses	48.3	36.9	85.2	23.1	18.9	42.0
Off-peak frequency of buses	47.4	40.2	87.7	29.6	21.3	50.9
Punctuality of buses	48.0	38.9	87.0	21.1	18.8	39.9
Bus fares	44.7	43.6	88.4	21.2	29.1	50.4
Facilities at bus ranks or bus stops	45.4	34.7	80.1	22.8	24.7	47.5
Roadworthiness of buses	48.9	35.6	84.5	24.1	22.3	46.5
Behaviour of bus drivers	46.7	37.9	84.7	22.3	14.9	37.2
Reliability of bus service	44.3	36.4	80.6	22.3	14.9	37.2
Bus service overall	40.3	39.6	79.9	21.4	20.5	41.9

The table shows that there are only very small differences between the importance and satisfaction ratings of the different attributes, ranging between 44 and 50 per cent very important and 33 and 44 per cent important. The combination of very important and important has a range of between 80 and 88 per cent.

The three highest very important scores are:

- Safety from accidents (50.2%)
- Travel time in the bus (49.5%)
- Roadworthiness of buses (48.3%)

The three highest *combined* importance scores are:

- Bus fares (88.4%)
- Off-peak frequency of buses (87.7%)

- Punctuality of buses (87.0%)

The satisfaction ratings show a similar spread between 38 and 50 per cent dissatisfied. Attributes with the highest dissatisfaction are:

- Off-peak frequency of buses (50.4%)
- Bus fares (50.4% dissatisfied)
- Safety from accidents (48.4%)

The figure, with the attributes ordered from least important to most important at the bottom, shows how similar the ratings are. It is interesting to note that the attributes with the highest importance ratings, also shows the highest proportion of dissatisfied customers. Forty per cent of the bus-using respondents expressed dissatisfaction with the bus service overall and the major issues seem to be bus fares, the off-peak frequency of buses and the safety from accidents.

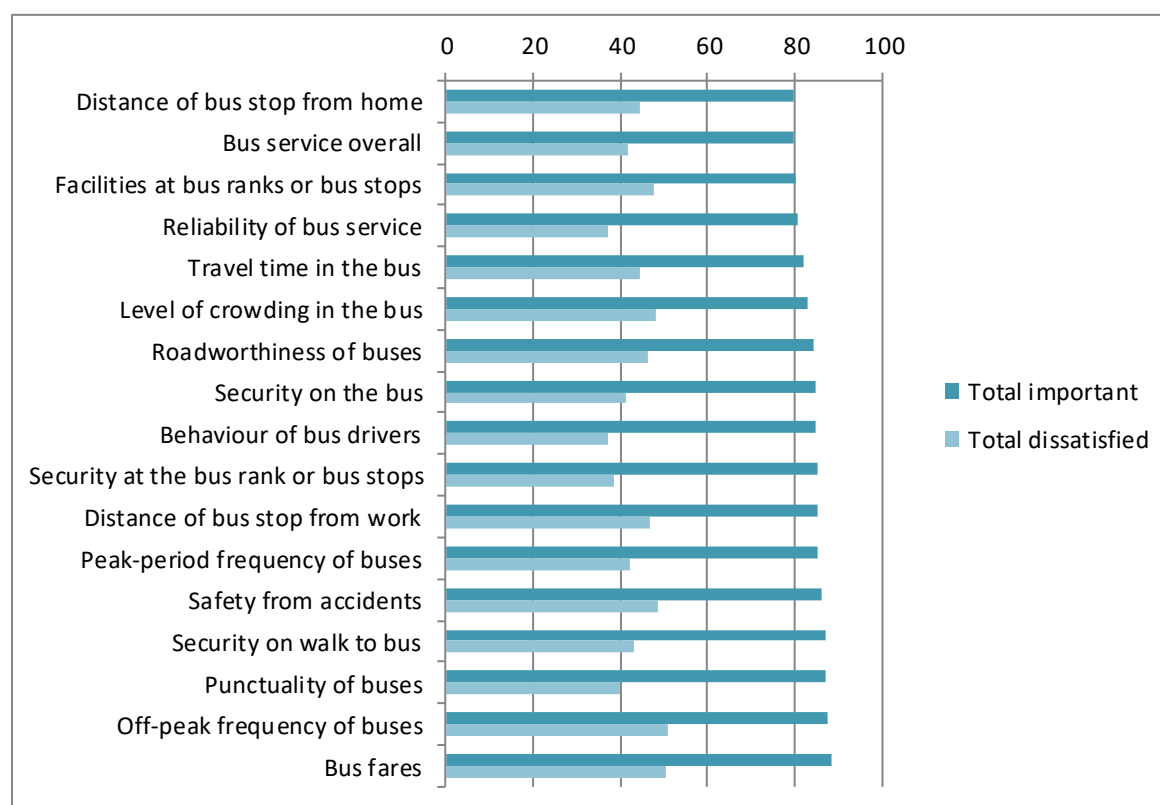


Figure 10-1: Importance of and satisfaction with attributes of the bus service

10.3 Taxi usage

The proportion of respondents reporting that they had used the taxi service in the previous month is listed in Table 10-3 below. It is obvious that that taxi usage in Mangaung is much higher than bus usage, with 75 per cent of the respondents in Mangaung municipality being taxi users. In Mangaung and Botshabelo, the proportion is over 90 per cent and in Thaba Nchu just under and even in Oranjesig and Tempe/Dan Pienaar almost 20 per cent.

As was the case with non-bus users, the respondents who did not use taxis, were (or should have been) asked about the reasons for not using taxis. Answers were, however, only obtained from 22 per cent of the non-users of which 56 per cent cited that there were no taxis available and the remaining 44 per cent that there were not enough taxis available.

Table 10-3: Taxi usage in the previous month

Reporting Zone	% of respondents
Central	32.2%
Oranjesig	18.2%
Mangaung	92.9%
Airport/Estoire	35.4%
Naval Hill/Bayswater	35.0%
Tempe/Dan Pienaar	18.9%
Langenhoven Park/Woodlands	25.7%
Universitas	40.1%
Pellissier/Fichardt-Ehrlich Park	28.0%
Thaba Nchu	87.8%
Botshabelo	94.3%
N-E Rural	44.2%
N-W Rural	65.7%
S-W Rural	48.7%
S-E Rural	51.5%
Naledi	68.4%
Mangaung Municipality	76.1%

10.4 Satisfaction with and importance of attributes of taxi service

Similar to bus users, taxi users were asked to rate their satisfaction with attributes of the taxi service as very satisfied, satisfied, neither, dissatisfied and very dissatisfied. Similarly, they were asked to rate the importance of the attributes as very important, important and not important. The results are listed in Table 10-4 and graphed in Figure 10-2.

Once again, the table shows that there are small differences between the importance and satisfaction ratings of the different attributes, ranging between 41 and 48 per cent very important and 35 and 43 per cent important. The combination of very important and important has a range of between 80 and 88 per cent.

The three highest very important scores are:

- Waiting time for taxis (48.4%)
- Reliability of taxi service (46.9%)
- Safety from accidents (46.3%)

The three highest *combined* importance scores are:

- Reliability of taxi service (84.4%)
- Peak period frequency of taxis (83.7%)
- Waiting time for taxis (83.6%)

Once again, the satisfaction ratings show a similar spread between 33 and 41 per cent dissatisfied. Attributes with the highest dissatisfaction are:

- Roadworthiness of taxis (41.0%)
- Waiting time for taxis (39.5% dissatisfied)
- Safety from accidents (48.4%)

Table 10-4: Importance and satisfaction with attributes of the taxi service

Attributes of bus service	Percentage of taxi users					
	Very important	Important	Total Important	Dis-satisfied	Very dis-satisfied	Total dis-satisfied
Distance of taxi service from home	43.9	37.6	81.5	20.4	15.4	35.9
Distance of taxi service from work	42.5	37.6	80.0	17.1	15.6	32.7
Travel time in the taxi	41.4	40.8	82.2	18.1	16.1	34.1
Security on walk to taxi	46.8	34.8	81.6	20.7	14.0	34.7
Security at ranks/stops	46.0	36.9	82.9	23.5	15.3	38.9
Security in the taxi	43.9	36.9	80.8	20.5	14.1	34.6
Level of crowding in the taxi	42.3	38.0	80.3	20.2	16.5	36.7
Safety from accidents when traveling	46.3	36.5	82.8	22.4	14.7	37.1
Peak-period frequency of taxis	40.3	43.4	83.7	21.1	15.6	36.6
Off-peak frequency of taxis	39.3	43.2	82.5	21.4	14.8	36.2
Waiting time for taxis	48.4	35.2	83.6	22.8	16.7	39.5
Taxi fares	44.8	35.9	80.7	21.3	15.7	37.0
Facilities at taxi ranks	42.0	37.5	79.5	21.2	16.7	37.9
Roadworthiness of taxis	45.5	37.3	82.8	23.1	18.0	41.0
Behaviour of taxi drivers	42.3	38.9	81.2	23.8	15.6	39.3
Reliability of taxi service	46.9	37.5	84.4	21.7	12.4	34.2
Taxi service overall	41.7	39.9	81.6	21.3	16.7	38.0

The figure, with the attributes ordered from least important to most important at the bottom, shows how similar the ratings are, especially in terms of importance. The attributes attracting the most dissatisfaction were not necessarily those with the highest importance rating, but at least 80 per cent of the respondents regarded them as important. Close to forty per cent of the taxi-using respondents expressed dissatisfaction with the taxi service overall.

In general, the bus users are slightly more dissatisfied than the bus users.

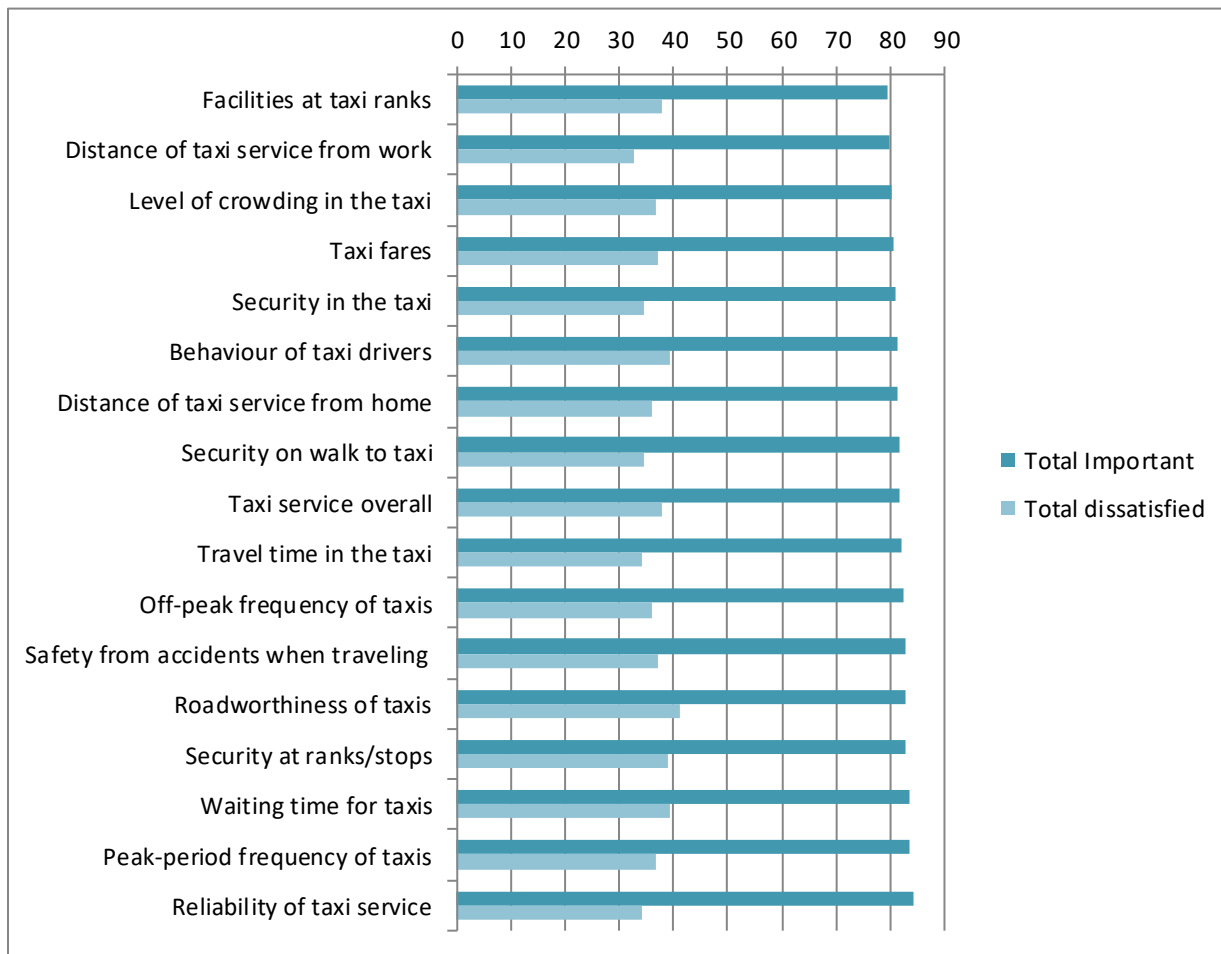


Figure 10-2: Importance and satisfaction ratings

11. Conclusion

Although the paucity of income information prevented the inclusion of valuable income-related cross tabulations and calculations, the survey has produced valuable information about the demographic characteristics, travel-related problems, travel behaviour and attitudes and perceptions of the residents of the Mangaung Municipality.