

# ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED MONAVONI X 51

Part of the Remainder of Portion 5 of the Farm Mooiplaats  
355-JR and Part of Portion 2 of the Farm Swartkop 383  
JR

GAUT: 002/13-14/E0032

SEPTEMBER 2015



## BOKAMOSO

LANDSCAPE ARCHITECTS AND ENVIRONMENTAL CONSULTANTS

Part 2 of 2

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BH No	Colluvium	RESIDUUM				BEDROCK		Bedrock type/IRC	Collar elevation (m amsl)/ Water strike	Water rest level after 24hr (m) Rest level (mamsl)	Remark (NS; RPT)
		Wad	Clay/Silt	Chert	Silt/Sand (Syenite)	Weathered/ boulders	Sound				
					13-15						
GMV 77		0-6D			6-11		11-12D 14-15D	12-14D 15-21##	Dolomite/6	1446/-15m	-
GMV 78	0-2S				2-14			14-20##	Dolomite/3a	1442/-	-

NOTES: S=Sand; si=Silt; ch=Chert; sl=Slate; sy=Syenite; sh=Shale; D=dolomite; ?=Uncertain; NS=no samples; RPT=rapid penetration times; ##=end of hole  
IRC=Inherent Risk Characterisation; \* =Included in previous report (F3051.1).

PERCUSSION BOREHOLES  
(MONAYONI EXTENSION 50: RMS - 2009)

Project: MONAVONI EXTENSION 50.

Hole No. 50/01

Machine: Thor(15 Bar)

Logged: es Date: 29/05/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: -5,5m (1436mamsl)

Date: 05/05/2009

Date: 07/05/09 Job No: 09117monX50

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<15	0'15"	1		Reddish brown, silty, fine SAND with traces of white, highly weathered, chert fragments, dark brown, manganese nodules and milky white quartz; colluvium.
	0'20"	2		
Y -5,5m	0'43"	3		Light khaki, silty, fine SAND with occasional light olive speckled white, syenite fragments; residual syenite.
	0'40"	4		
	1'07"	5		
	0'53"	6		
	0'55"	7		
	1'07"	8		
	1'31"	9		
	1'10"	10		
	0'57"	11		
	0'52"	12		
	0'26"	13		
	0'37"	14		
<3	0'25"	15		Olive, sandy SILT with traces of chocolate brown, "Blocky" wed and highly weathered, brown, syenite fragments; residual syenite (contact zone).
	2'31"	16		
	3'16"	17		
	3'43"	18		
	4'10"	19		
	4'17"	20		
	4'21"	21		
<10	4'15'	22		Grey to light grey, weathered to highly weathered, Fractured(?), hard rock DOLOMITE.
EOH				
				<p><b>NOTES:</b></p> <p>1) Hole stopped at 22m after penetrating 6m of solid bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Water rest level at -5,5m when hole backfilled a few days later.</p>

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1442m amsl

Coords: Y (29) 91 382 X: 2 861 798  
(Hand-held GPS - wgs84)

Project: MONAVONI EXTENSION 50.

Hole No. 50/02

Machine: Thor(15 Bar)

Logged: es Date: 04/06/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: -7,0m (1435mamsl)

Date: 06/05/2009

Date: 07/05/09 Job No: 09117monX50

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<5	0'12"	1		Brown to dark brown, sandy <b>SILT</b> with traces of dark brown almost black, manganese nodules; colluvium.
<20	0'15"	2		Chocolate brown to almost black, slightly clayey <b>SILT (wad)</b> with traces of fine dark brown, manganese nodules; residual dolomite.
	0'16"	3		
<5	0'21"	4		
	0'39"	5		Khaki, silty <b>SAND</b> with scattered fine, olive speckled white, highly weathered, syenite fragments; residual syenite. Some wad between 4m and 5m.
	0'39"	6		
	0'35"	7		
	0'23"	8		
	0'25"	9		
	0'54"	10		Light olive, silty <b>SAND</b> with scattered, olive grey speckled white, highly weathered, syenite fragments; residual syenite.
<3	0'42"	11		
	0'43"	12		
	0'24"	13		
	0'28"	14		
	0'29"	15		
	0'50"	16		
	0'39"	17		
	1'22"	18		Grey to dark grey, weathered to highly weathered, <b>DOLOMITE</b> fragments in a minor matrix of olive, silty sand and occasional syenite fragments; residual dolomite (inclusion in intrusion).
	1'52"	19		
	3'49"	20		Dark grey speckled white, weathered to slightly weathered, hard rock <b>SYENITE</b> .
<10	4'10"	21		
	4'17"	22		
	4'10"	23		
	3'34"	24		
EOH	3'29"	25		Grey to dark grey, weathered to slightly weathered, hard rock <b>DOLOMITE</b> .
				<p>NOTES:</p> <p>1) Hole stopped at 25m after penetrating 6m of solid bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Water rest level at -7,0m when hole backfilled a few days later.</p>

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1442m amsl

Coords: Y (29)91 145 X: 2 861 832  
(Hand-held GPS - wgs84)

Project: MONAVONI EXTENSION 50.

Hole No. 50/03

Machine: Thor(15 Bar)

Logged: es Date: 29/05/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: Dry

Date: 06/05/2009

Date: 07/05/09 Job No: 09117monX50

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<5	0'25"	1		Dark brown, silty SAND with scattered fine, dark brown, manganese nodules; colluvium.
	2'30"	2		Dark grey, weathered to slightly weathered, hard rock DOLOMITE.
	0'53"	3		Dark grey, weathered, DOLOMITE fragments and milky white VEIN QUARTZ fragments in a trace matrix of brown, sandy silt; residual dolomite.
<10	1'49"	4		Grey, weathered, closely fractured, hard rock, DOLOMITE in a trace matrix of greyish brown, sandy silt; residual dolomite
	1'47"	5		(interpreted as closely fractured bedrock).
	1'23"	6		Lenses of soft rock siliceous shale between 5m and 6m.
<15	1'09"	7		
	1'42"	8		
<10	1'19"	9		Grey to dark grey, weathered to slightly weathered, hard rock DOLOMITE.
	2'13"	10		
	3'32"	11		
	3'27"	12		
<15	3'39"	13		
	3'43"	14		
EOH	3'49"	15		
				<p>NOTES:</p> <ol style="list-style-type: none"> <li>Hole stopped at 15m after penetrating 6m of solid, dolomite bedrock (as instructed).</li> <li>Ground water not encountered during drilling operations.</li> <li>Hole dry when backfilled a few days later.</li> </ol>

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1440m amsl

Coords: Y (29) 90 905 X: 2 861 887  
(Hand-held GPS - wgs84)







Project: MONAVONI EXTENSION 50.

Hole No. 50/04

Machine: Thor(15 Bar)

Logged: es Date: 03/06/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: -9,0m (1435mamsl)

Date: 06/05/2009

Date: 07/05/09 Job No: 09117monX50

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description	
	0'14"	1		Brown, silty SAND with scattered fine, manganese nodules and some quartz grains; colluvium.	
	1'15"	2		Light khaki, sandy SILT with occasional fins, highly weathered, olive khaki, syenite fragments; residual syenite.	
	1'40"	3			
<5	1'55"	4			
	1'50"	5			
	1'30"	6			
	0'48"	7			
<15	0'49"	8			As above but with minor olive grey, weathered to highly weathered, syenite fragments; residual syenite (possibly as very soft rock in situ).
<20 ▼ -9m	0'35"	9			Brown to dark brown, sandy SILT with brown, highly weathered dolomite and syenite fragments and traces of brown silt(wad); residual dolomite. (Interpreted as inclusion in syenite).
	0'37"	10			Olive khaki, silty SAND with traces of greyish olive, highly weathered, syenite fragments; residual syenite.
<5	3'47"	11			
	4'25"	12			Grey to dark grey, slightly weathered, hard rock SYENITE.
	3'49"	13			
	0'28"	14			olive, silty SAND with traces of highly weathered, syenite fragments; residual syenite.
	1'34"	15			
	1'36"	16			Light grey stained light brown, weathered, closely fractured, slightly graphitic, hard rock DOLOMITE.
	1'55"	17			
<10	2'14"	18			
	3'18"	19			
	3'21"	20			Grey to dark grey, weathered to slightly weathered, hard rock, slightly "shaly" DOLOMITE.
	3'39"	21			
	3'33"	22			
EOH	3'41"	23			
		24			
				NOTES:	
				1) Hole stopped at 24m after penetrating 6m of solid, dolomite bedrock (as instructed).	
				2) Ground water not encountered during drilling operations.	
				3) Water rest level at -9,0m when hole backfilled a few days later.	

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Call: 082 551 6034

Collar Elevation: 1444m amsl

Coords: Y (29) 91 212 X: 2 861 902  
(Hand-held GPS - wgs84)

Project: MONAVONT EXTENSION 50.

Hole No. 50/05

Machine: Thor(15 Bar)

Logged: es Date: 05/06/2009

Contractor: J K DEVELOPMENTS CC

Rest Level: -8,0m (1437mamsl)

Date: 05/05/2009

Date: 07/05/09 Job No: 09117monX50

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<10	0'33"	1		Brown to dark brown, clayey SAND with scattered fine, dark brown, manganese nodules and translucent quartz; colluvium.
	1'41"	2		Olive to light olive, silty, fine SAND with occasional fine, olive, highly weathered, syenite fragments; residual syenite.
	1'22"	3		
<3	1'41"	4		
	1'49"	5		
	1'38"	6		
<5	1'36"	7		Dark chocolate brown, slightly clayey SILT(WAD) with traces of grey stained brown, dolomite fragments; residual dolomite.
	1'07"	8		Grey and light brown, weathered to highly weathered, DOLOMITE fragments in a trace matrix of grayish brown, "powdery" silt; residual dolomite (interpreted as closely fractured bedrock).
▼ -8,0m	1'13"	9		
	2'10"	10		Grey, weathered, closely fractured(?), hard rock DOLOMITE.
<10	1'52"	11		
	1'56"	12		Some altered dolomite fragments below 11m.
	0'56"	13		Olive, silty SAND with traces of olive speckled grey and white, highly weathered, syenite fragments; residual syenite.
<5	0'52"	14		
	3'06"	15		Grey to dark grey speckled white, weathered to slightly weathered, hard rock SYENITE.
	3'47"	16		
	3'33"	17		
	3'42"	18		
▲ -18m	3'09"	19		Grey mottled light grey and white in places, weathered, closely fractured(?), hard rock, "altered" DOLOMITE.
<10	1'33"	20		
	1'48"	21		Dark grey, weathered to slightly weathered, graphitic in places, hard rock DOLOMITE.
	2'57"	22		
	3'13"	23		
	3'17"	24		
	3'29"	25		
<15	3'03"	26		Black, slightly weathered, hard rock SLATE with occasional, grey, dolomite fragments.
EOH	3'14"	27		
				NOTES: 1) Hole stopped at 27m after penetrating 6m of solid bedrock (as instructed). 2) Ground water strike at -18m during drilling operations. 3) Water rest level at -8,0m when hole backfilled a few days later.

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1445m amsl

Coords: Y (29) 91 352 X: 2 061 878  
(Hand-held GPS - wgs84)

Project: MONAVONI EXTENSION 50.

Hole No. 50/06

Machine: Thor(15 Bar)

Logged: es Date: 28/05/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: Dry

Date: 06/05/2009

Date: 07/05/09 Job No: 09117monX50

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description	
<10	0'43"	1		Dark brown, slightly clayey, sandy <b>SILT</b> with traces of dark brown, manganese nodules and dark grey, dolomite fragments; colluvium.	
	1'06"	2		Dark chocolate brown <b>SILT (wad)</b> with traces of dark brown, "blocky" wad fragments; residual dolomite.	
<5	0'30"	3			
	0'43"	4			
<10	0'35"	5			Dark brown, slightly clayey <b>SILT</b> with traces of grey, highly weathered, shale fragments and traces of chocolate brown silt(wad); residual dolomite.
	0'53"	6			Traces of light brown, highly weathered, syenite fragments between 5m and 6m.
<5	0'15"	7			Dark brown to chocolate brown, slightly clayey <b>SILT</b> with traces of dark brown clay(wad) and light grey, highly weathered, shale fragments; residual dolomite. (Interpreted as shale beds within original dolomite).
	0'16"	8			
	1'19"	9			
	0'52"	10			Dark grey, weathered, <b>DOLomite</b> fragments in an abundant matrix of dark brown, clayey silt and traces of brown silt(wad); residual dolomite. (Interpreted as dolomite boulders in a waddy matrix).
	2'40"	11			Dark grey, weathered, hard rock <b>DOLomite</b> in a trace matrix of dark brown silt(wad).
	3'23"	12			
<10	3'37"	13			
	3'39"	14			
	3'42"	15			
	3'46"	16			
<b>EOH</b>	3'37"	17			
				<p><b>NOTES:</b></p> <p>1) Hole stopped at 17m after penetrating 6m of solid, dolomite bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Hole dry when backfilled a few days later.</p>	

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1445m amsl

Coords: Y (29) 90 979 X: 2 8612 022  
(Hand-held GPS - wgs84)

Project: MONAVONI EXTENSION 50.

Hole No. 50/07

Machine: Thor(15 Bar)

Logged: as Date: 30/05/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: -14m (1434mamsl)

Date: 07/05/2009

Date: 11/05/09 Job No: 09117monX50

Chips Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<10	0'20"	1		Brown, slightly clayey, silty, fine SAND with traces of brown manganese and ferricrete nodules and some milky white quartz and occasional grey dolomite fragments; colluvium.
	1'17"	2		
	1'35"	3		Light brown khaki to olive khaki, silty, fine SAND with scattered fine olive and khaki speckled white highly weathered syenite fragments; residual syenite (possibly as very soft rock in pieces).
	1'22"	4		
	1'39"	5		
<3	0'50"	6		
	1'13"	7		
	1'11"	8		
	1'35"	9		
<10	0'58"	10		Dark chocolate brown, sandy SILT (WAD) with minor, grey, highly weathered to weathered, dolomite fragments and dark brown, "blocky", wad fragments; residual dolomite (inclusion in syenite).
	1'07"	11		
<5	0'43"	12		Light olive, silty SAND with traces of olive grey, weathered, very soft rock to soft rock, syenite fragments; residual syenite (very soft rock in situ).
	1'06"	13		
▼ -14m	3'27"	14		Dark grey, weathered to slightly weathered, hard rock SYENITE.
	3'39"	15		
	1'27"	16		Light grey and grey, weathered to highly weathered, hard rock DOLOMITE in a trace matrix of greyish brown, silty sand. (fractured bedrock).
	3'26"	17		Light grey becoming dark grey with depth, weathered to slightly weathered, hard rock DOLOMITE.
	3'17"	18		
<10	3'19"	19		
	3'14"	20		
	3'21"	21		
EOH	3'24"	22		
				<p>NOTES:</p> <p>1) Hole stopped at 22m after penetrating 5m of solid, dolomite bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Water rest level at -14,0m when hole backfilled a few days later.</p>

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Call: 082 551 6034

Collar Elevation: 1448m amsl

Coords: Y (29)91 095 X: 2 862 062  
(Hand-held GPS - wgs84)

Project: MONAVONI EXTENSION 50.

Hole No. 50/08

Machine: Thor(15 Bar)

Logged: es Date: 28/05/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: -4m (1446mamsl)

Date: 07/05/2009

Date: 11/05/09 Job No: 09117/monX50

Chips Size(mm)	Pen. Speed	Depth (m)	Profile	Description	
<15	0'12"	1		Dark brown, sandy SILT with abundant, dark brown, manganese nodules; colluvium.	
<10	0'51"	2		Dark chocolate brown to almost black SILT (WAD) with abundant, dark chocolate brown, "blocky", wad fragments; residual dolomite.	
	0'39"	3		Khaki to olive grey, silty, fine SAND with traces of grey to olive speckled white, highly weathered, syenite fragments; residual syenite (possibly very soft rock in places).	
-4m <5	1'17"	4			
	1'00"	5			
<3	1'07"	6			
	1'13"	7			
	1'47"	8			
<10	1'51"	9		Grey to dark grey, weathered to slightly weathered, hard rock, slightly shaly DOLOMITE.	
	2'45"	10			
	3'09"	11			
	3'12"	12			
	3'15"	13			
EOH	3'13"	14			Tends to "slaty" dolomite below 14m.
	3'17"	15			
					<p><b>NOTES:</b></p> <p>1) Hole stopped at 15m after penetrating 6m of solid, dolomite bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Water rest level at -4,0m when hole backfilled a few days later.</p>

Prepared by: R.M.B P O Box 32107, GLENSTANTIA 0010

Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1450m amsl

Coords: Y (29)91 284  
(hand-held GPS - wgs84)

X: 2 852 094

Project: MONAVONI EXTENSION 50.

Hole No. 50/09

Machine: Thor(15 Bar)

Logged: es Date: 05/06/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: -5m (1445mamsl)

Date: 07/05/2009

Date: 11/05/09 Job No: 09117monX50

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<10	0'20"	1		Light brown, silty SAND with traces of brown, ferricrete nodules and milky white, quartz fragments; colluvium.
<5	0'44"	2		Light khaki, sandy SILT with scattered, translucent, quartz grains; residual syenite,
0	1'26"	3		
0	1'08"	4		
▼ -5m <5	0'58"	5		Dark brown, slightly sandy SILT (WAD) with traces of brown, chert and "blocky", wad fragments; dolomite; residual dolomite (inclusion within syenite).
	0'11"	6		Khaki olive to olive, silty SAND with scattered, fine, olive speckled white, highly weathered, syenite fragments; residual syenite.
	0'18"	7		
	0'58"	8		
<3	0'15"	9		
	0'43"	10		
	0'47"	11		Abrupt contact between syenite and dolomite.
	1'22"	12		Light grey becoming grey with depth, weathered, closely fractured, hard rock DOLOMITE.
	1'32"	13		
	1'27"	14		
	1'30"	15		
	1'38"	16		Becoming dark grey below 15m.
<10	2'08"	17		Dark grey, weathered to slightly weathered, hard rock DOLOMITE.
	3'07"	18		
	3'11"	19		
	3'16"	20		
	3'12"	21		
ECH	3'27"	22		
				<p>NOTES:</p> <p>1) Hole stopped at 22m after penetrating 6m of solid, dolomite bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Water rest level at -5,0m when hole backfilled a few days later.</p>

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1450m amsl

Coords: Y (29) 91 158 X: 2 862 111  
(Hand-held GPS - wgs84)

Project: MONAVONI EXTENSION 50.

Hole No. 50/10

Machine: Thor(15 Bar)

Logged: es Date: 28/05/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: Dry

Date: 07/05/2009

Date: 07/05/09 Job No: 09117monX50

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<10	0'22"	1		Dark brown to brown, sandy SILT with abundant, dark brown, manganocretic nodules; colluvium.
	0'34"	2		Dark chocolate brown to black SILT(WAD) with traces of dark brown, "blocky", wad fragments; residual dolomite.
<5	0'37"	3		Scattered grey highly weathered dolomite fragments below lm.
	0'21"	4		
<10	0'40"	5		Dark chocolate brown, slightly sandy SILT(WAD) with traces of grey stained brown, highly weathered, dolomite fragments; residual dolomite (possibly occasional boulders).
	0'35"	6		Grey, slightly sandy SILT with minor, grey, highly weathered, slightly siliceous, shale fragments; residual dolomite (shale horizon within dolomite).
	0'26"	7		Grey, weathered, SHALE fragments and grey stained light brown, weathered, DOLOMITE fragments in a trace matrix of greyish brown, sandy silt and traces of brown silt(wad); residual dolomite.
	0'30"	8		
	1'37"	9		
	1'12"	10		Light grey, weathered, hard rock, slightly shaly DOLOMITE.
	2'10"	11		
	3'32"	12		
	3'28"	13		
	3'31"	14		Grey, weathered to slightly weathered, hard rock DOLOMITE.
EQH	3'28"	15		
	3'32"	16		
				<p>NOTES:</p> <p>1) Hole stopped at 16m after penetrating 6m of solid, dolomite bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Hole dry when backfilled a few days later.</p>

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1446m amsl

Coords: Y (29)90 934 X: 2 862 128  
(Hand-held GPS - wgs84)

Project: MONAVONI EXTENSION 50.

Hole No. 50/11

Machine: Thor(15 Bar)

Logged: es Date: 30/05/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: -7m (1446mamsl)

Date: 07/05/2009

Date: 11 /05/09 Job No: 09117monX50

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<10	0'18"	1		Brown to dark brown, silty SAND/sandy SILT with abundant, light and dark brown, manganese nodules; manganese(?).
	1'30"	2		
<5	1'16"	3		Light olive khaki, slightly clayey, silty, fine SAND with scattered, fine, khaki, highly weathered, syenite fragments; residual syenite.
	1'51"	4		
	1'09"	5		
	1'02"	6		
▼ -7m	1'51"	7		Grey weathered brown, weathered to highly weathered, fractured(?), hard rock DOLOMITE.
	2'16"	8		
	3'09"	9		
<10	1'05"	10		Dark grey, weathered to slightly weathered, slightly graphitic, hard rock DOLOMITE.
	2'11"	11		
	3'31"	12		
	3'03"	13		
	3'12"	14		
EOM	3'10"	15		
	3'15"	16		
				<p>NOTES:</p> <p>1) Hole stopped at 16m after penetrating 6m of solid, dolomite bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Water rest level at -7,0m when hole backfilled a few days later.</p>

Prepared by: R.M.S P O Box 32107, GLENSTAMMIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1453m amsl

Coords: Y (29)91 285 X: 2 862 243  
(Hand-held GPS - wgs84)



Project: MONAVONI EXTENSION 50.

Hole No. 50/12

Machine: Thor (15 Bar)

Logged: es Date: 30/05/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: -5m (1444mamsl)

Date: 07/05/2009

Date: 11/07/09 Job No: 09117monX50

Chp Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<10	0'16"	1		Dark brown, silty SAND/sandy SILT with traces of dark brown, manganocrete nodules and milky white, quartz fragments; colluvium. Some grey silt below 1m suggests shale fragments.
	1'47"	2		
<5	1'34"	3		Dark chocolate brown to dark brown, slightly sandy SILT with minor, chocolate brown silt(wad); residual dolomite.
	0'29"	4		Dark brown to chocolate brown, sandy SILT(WAD) with scattered, fine, chocolate brown, wad fragments; residual dolomite.
<15 ▼ -5m	1'14"	5		Grey and grey weathered brown in places, weathered, fractured(?), hard rock, DOLOMITE fragments in a trace matrix of grey, silty sand; residual dolomite (probably as very closely fractured bedrock).
	1'35"	6		
	1'03"	7		
	1'01"	8		Grey to dark grey, weathered, fractured(?), hard rock DOLOMITE.
	1'50"	9		
<10	2'42"	10		Dark grey, weathered to slightly weathered, slightly shaly, hard rock DOLOMITE.
	3'28"	11		
	3'30"	12		
	3'17"	13		
	3'10"	14		Graphitic below 13m.
EOH	3'21"	15		
				<p>NOTES:</p> <p>1) Hole stopped at 15m after penetrating 6m of solid, dolomite bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Water rest level at -5,0m when hole backfilled a few days later.</p>

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Call: 082 551 6034

Collar Elevation: 1449m amsl

Coords: Y (29) 90 365 X: 2 862 247  
(Hand-held GPS - wgs84)

Project: MONAVONI EXTENSION 50.

Hole No. 50/13

Machine: Thor(15 Bar)

Logged: es Date: 29/05/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: -5m (1450mamsl)

Date: 03/05/2009

Date: 11/07/09 Job No: 09117monX50

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<10	0'36"	1		Dark brown, silty SAND with minor, dark brown, manganese nodules; colluvium.
<15	1'14"	2		Dark grey, weathered, fractured(?), hard rock DOLOMITE in a trace matrix of dark brown silt(wad).
	1'36"	3		
	2'02"	4		
	3'03"	5		
▼ -5m	1'06"	6		Grey weathered brown, weathered to highly weathered, hard rock DOLOMITE in a trace matrix of brown, silty sand; residual dolomite. (Interpreted as very closely fractured bedrock).
	0'52"	7		
	0'58"	8		
	1'43"	9		
<10	1'48"	10		
	1'34"	11		Dark grey, slightly weathered, hard rock DOLOMITE.
	2'45"	12		
	3'17"	13		
	3'24"	14		
	3'29"	15		
	3'33"	16		
EOH	3'25"	17		
				<p><b>NOTES:</b></p> <p>1) Hole stopped at 17m after penetrating 6m of solid, dolomite bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Water rest level at -5,0m when hole backfilled a few days later.</p>

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010

Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1433m amsl

Coords: Y (29) 91 245

X: 2 862 348

(Hand-held GPS - wgs84)

Project: MONAVONI EXTENSION 50.

Hole No. 50/14

Machine: Thor (15 Bar)

Logged: es Date: 05/06/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: -7m (1435mamsl)

Date: 06/05/2009

Date: 07/05/09 Job No: 09117monX50

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<10	0'20"	1		Brown, silty SAND with minor, dark brown, manganese concretions and milky white, quartz fragments; colluvium.
	1'02"	2		
<3	1'32"	3		Light khaki becoming olive khaki with depth, silty, fine SAND with scattered, light olive, highly weathered, syenite fragments; residual syenite.
	1'42"	4		
	1'05"	5		
	1'23"	6		
-7m	1'39"	7		Dark olive brown, slightly clayey SILT (WAD) with traces of dark brown, "blocky", wad fragments and occasional grey, weathered, dolomite fragments; residual dolomite.
	0'39"	8		
<10	1'22"	9		Grey stained light brown, highly weathered to weathered, fractured(?), hard rock DOLOMITE.
	1'19"	10		
	1'02"	11		
<15 Water added below 13m <10	0'09"	12		Dark chocolate brown, silty CLAY (WAD) with traces of chocolate brown, "blocky", wad fragments and dark brown, highly weathered, "flaky", chert fragments and occasional grey, weathered, dolomite fragments; residual dolomite.
	0'11"	13		
	1'38"	14		
<15	1'39"	15		Possibly closely fractured bedrock below 13m but samples highly contaminated from above.
	1'38"	16		
	1'47"	17		
	1'33"	18		
<10	1'44"	19		Interpreted as solid dolomite bedrock below 19m but samples highly contaminated due to addition of water.
	2'39"	20		
	3'18"	21		
<15	3'29"	22		
	3'22"	23		
	3'33"	24		
EOH	3'45"	25		

NOTES:

- 1) Hole stopped at 26m after penetrating 6m of "assumed" solid, dolomite bedrock (as instructed).
- 2) Ground water not encountered during drilling operations.
- 3) Water rest level at -7,0m when hole backfilled a few days later.

Prepared by: R.M.S P O Box 32107, GLENSTANTLA 0010 Tel/Fax 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1442m amsl

Coords: Y (29:51 029 X: 2 861 871  
(Hand-held GPS - wgs84)

PREVIOUSLY DRILLED BOREHOLES  
(MONAVONI EXT 51: RMS - 2009)

Project: MONAVONI EXTENSION 51.

Hole No. 51/01

Machine: Thor(15 Bar)

Logged: es Date: 03/06/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: Dry

Date: 13/05/2009

Date: 15/05/09 Job No: 09117monX51

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<3	0'23"	1		Reddish brown, silty SAND with fine quartz grains and occasional dark grey, dolomite fragments; colluvium.
	0'29"	2		
<5	0'43"	3		Brown to reddish brown, sandy SILT with traces of dark brown, manganese nodules and scattered milky white, quartz fragments; residual dolomite(?).
	1'08"	4		
	0'55"	5		
	0'33"	6		
<15	0'09"	7		Brown, sandy SILT (WAD) with traces of dark brown, manganese nodules; residual dolomite.
	0'15"	8		
	0'50"	9		
	1'28"	10		
	2'05"	11		
	1'45"	12		
<10	1'38"	13		Grey to dark grey, weathered, fractured(?), hard rock DOLOMITE.
	1'16"	14		
	1'51"	15		
	2'33"	16		
	3'09"	17		
	3'25"	18		
	3'34"	19		
	3'41"	20		
EOH	3'39"	21		
				<p>NOTES:</p> <p>1) Hole stopped at 21m after penetrating 6m of solid dolomite bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Hole dry when backfilled a few days later.</p>

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1433m amsl

Coords: Y (29) 90 361 X: 2 861 049  
(Hand-held GPS - wgs84)

Machine: Thor(15 Bar)

Logged: es Date: 30/05/2009

Contractor: J K DEVELOPMENTS CC

Rest Level: -14m (1418mamsl)

Date: 18/05/2009

Date: 15/05/09 Job No: 09117monX51

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
0	0'20"	1		Reddish brown, silty, fine SAND; colluvium.
	0'45"	2		Light khaki olive, silty, fine SAND with occasional fine, olive speckled white, highly weathered, syenite fragments; residual syenite.
	1'47"	3		
	1'39"	4		
<3	1'30"	5		Khaki olive, silty SAND with traces of olive speckled white, highly weathered, syenite fragments; residual syenite (possibly tends to very soft rock in places).
	1'54"	6		
	1'41"	7		
	1'51"	8		
<10	1'34"	9		Olive and olive grey, weathered, closely fractured(?), soft rock to hard rock SYENITE in a minor matrix of olive silt.
	1'50"	10		
<5	1'47"	11		Olive, silty SAND with scattered, fine, olive speckled white, highly weathered, syenite fragments; residual syenite.
	1'53"	12		
	1'36"	13		
▼ -14m	2'39"	14		Grey to dark grey, weathered to slightly weathered, slightly shaly, hard rock DOLOMITE.
<10	3'24"	15		
	3'19"	16		
	3'21"	17		
	3'32"	18		
EOH	3'27"	19		
				<p>NOTES:</p> <p>1) Hole stopped at 19m after penetrating 6m of solid dolomite bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Water rest level at -14m when hole backfilled a few days later.</p>

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1432m amsl

Coords: Y (29)90 921 X: 2 861 141  
(Hand-held GPS - wgs84)

Project: MONAVONI EXTENSION 51.

Hole No. 51/03

Machine: Thor (15 Bar)

Logged: es Date: 27/05/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: Dry

Date: 14/05/2009

Date: 15/05/09 Job No: 09117monX51

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<5	0'13"	1		Brown to dark brown, sandy SILT with occasional fine, manganese nodules; colluvium.
<10	0'18"	2		Dark brown, sandy SILT with minor, dark brown, manganese nodules and traces of dark brown silt(wadi); residual dolomite.
	0'54"	3		Some khaki silt below 2m.
<3	1'53"	4		Light olive khaki, silty, fine SAND; residual syenite.
	1'48"	5		
<5	0'38"	6		Light khaki olive, silty SAND with minor olive speckled white, highly weathered, syenite fragments; residual syenite (probably as very soft rock in situ).
	0'46"	7		
<10	0'39"	8		
	1'50"	9		
	3'40"	10		Dark grey, weathered to slightly weathered, hard rock SYENITE.
<15	4'06"	11		
	4'10"	12		
	4'14"	13		
<10	4'18"	14		
	EOH	3'43"	15	Grey mottled light grey, weathered to slightly weathered, slightly "altered", hard rock DOLOMITE.
				<p>NOTES:</p> <p>1) Hole stopped at 15m after penetrating 6m of solid bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Hole dry when backfilled a few days later.</p>

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1430m amsl

Coords: Y (29) 90 042 X: 2 861 200  
(Hand-held GPS - wgs84)

Project: MONAVONI EXTENSION 51.

Hole No. 51/04

Machine: Thor(15 Bar)

Logged: es Date: 03/06/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: -7m (1418mamsl)

Date: 12/05/2009

Date: 13/05/09 Job No: 09117monX51

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<5	0'28"	1		Dark brown, slightly clayey, silty SAND with traces of brown and dark brown, manganese nodules and translucent, quartz fragments; colluvium.
	0'45"	2		
	1'45"	3		Light khaki to khaki, silty SAND; residual oyanite.
	1'38"	4		
	1'46"	5		
	1'49"	6		
-7m <10	0'19"	7		
	0'11"	8		Dark grey, slightly weathered, hard rock, DOLOMITE fragments in a minor matrix of chocolate brown, "powdery", silt(wad); residual dolomite (possibly as boulders in a soil matrix).
	1'37"	9		
<15	0'14"	10		Dark chocolate brown almost black, "powdery" SILT(WAD) with scattered, dark grey, weathered, dolomite fragments and completely weathered, "flaky", chert fragments; residual dolomite (scattered small boulders in wad matrix).
	0'14"	11		
	0'09"	12		
	0'07"	13		
	0'16"	14		Some brown, highly weathered, dolomite fragments below 13m.
	2'55"	15		Grey, weathered to slightly weathered, hard rock DOLOMITE in a trace matrix of brown silt (wad).
<10	3'24"	16		
	3'16"	17		
	3'21"	18		
0 EOH	3'34"	19		No samples recovered below 18m. Interpreted as solid dolomite bedrock below 18m.
	3'26"	20		
				<p>NOTES:</p> <p>1) Hole stopped at 20 after penetrating 6m of "assumed", solid dolomite bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Water rest level at -7m when hole backfilled a few days later.</p>

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1425m amsl

Coords: Y (29)90 690 X: 2 061 318  
(Hand-held GPS - wgs84)



Project: MONAVONI EXTENSION 51.

Hole No. 51/05

Machine: Thor(15 Bar)

Logged: es Date: 26/05/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: Dry

Date: 11/05/2009

Date: 12/05/09 Job No: 09117monX51

Chip Size(mm)	Pos. Speed	Depth (m)	Profile	Description		
<10	Ø18"	1		Dark brown, sandy SILT with minor, dark brown, manganese nodule; colluvium (manganese gravel).		
	Ø10"	2		Dark chocolate brown, slightly clayey, sandy SILT(WAD) with traces of dark brown, manganese nodule; residual dolomite.		
Ø11"	3	Dark grey, slightly weathered, hard rock DOLOMITE.				
Ø55"	4					
<15	2'17"	5	Dark grey, slightly weathered, hard rock DOLOMITE.			
	3'02"	6				
<10	3'33"	7				
<15	3'29"	8				
<10	3'32"	9				
	3'41"	10				
	3'37"	11				
FOH						

**NOTES:**

- 1) Hole stopped at 11m after penetrating 6m of solid, dolomite bedrock (as instructed).
- 2) Ground water not encountered during drilling operations.
- 3) Hole dry when backfilled a few days later.

Prepared by: R.M.S P O Box 32107, GLENSTANTLA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1430m amsl

Coords: Y (29)90 902 X: 2 061 320  
(Hand-held GPS - wgs84)

Project: MONAVONI EXTENSTON 51.

Hole No. 51/06

Machine: Thor (15 Bar)

Logged: es Date: 27/05/2009

Contractor: J K DEVELOPMENTS cc

Rest Level: Dry

Date: 12/05/2009

Date: 13/05/09 Job No: 09117morX51

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<5	0'51"	1		Dark brown, slightly sandy, clayey SILT with scattered, fine, dark brown, manganese nodules; colluvium.
	0'43"	2		Dark brown, slightly clayey, sandy SILT with minor, dark brown, manganese nodules and traces of dark brown, silt(wad); residual dolomite.
	0'41"	3		
	0'51"	4		Dark brown to chocolate brown, clayey SILT with traces of dark brown silt(wad) and occasional, fine, manganese nodules; residual dolomite.
	0'23"	5		
<10	2'08"	6		Grey to dark grey, weathered to slightly weathered, hard rock, slightly graphitic DOLOMITE.
	3'18"	7		
	3'27"	8		
	1'37"	9		Fracture zone within dolomite bedrock.
	1'57"	10		
	2'27"	11		
	3'33"	12		
	3'32"	13		
	3'36"	14		
	3'42"	15		
EOH	3'49"	16		
				<p>NOTES:</p> <ol style="list-style-type: none"> <li>Hole stopped at 16m after penetrating 6m of solid, dolomite bedrock (as instructed).</li> <li>Ground water not encountered during drilling operations.</li> <li>Hole dry when backfilled a few days later.</li> </ol>

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1434m amsl

Coords: Y (29) 91 078 X: 2 861 291  
(Hand-held GPS - vgs84)

**Project:** MONAVONI EXTENSION 51.

**Hole No.** 51/07

**Machine:** Thor(15 Bar)

**Logged:** es **Date:** 26/05/2009

**Contractor:** J K DEVELOPMENTS cc

**Rest Level:** Dry

**Date:** 11/05/2009

**Date:** 15/05/09 **Job No:** 09137monX51

Chip Size(mm)	Pull Speed	Depth (m)	Profile	Description
<5	0'19"	1		Dark brown, sandy SILT with traces of dark brown, manganocrete nodules and scattered grey, shale fragments; colluvium.
<10	0'16"	2		Dark chocolate brown SILT (WAD) with minor, dark brown, manganocrete nodules; residual dolomite.
<5	0'13"	3		Dark brown SILT (WAD) with occasional, fine, manganocrete nodules; residual dolomite.
	0'10"	4		
<10	0'25"	5		Some dolomite fragments below 4m.
	1'58"	6		Dark grey and light grey, weathered, hard rock DOLOMITE.
	0'22"	7		Highly fractured zone between 6m and 7m.
	2'57"	8		
	3'21"	9		
<15	4'15"	10		Dark grey speckled light grey, slightly weathered, hard rock SYENITE.
	4'12"	11		
	3'41"	12		
	3'45"	13		
EOH	4'09"	14		

**NOTES:**

- Hole stopped at 14m after penetrating 6m of solid bedrock (as instructed).
- Ground water not encountered during drilling operations.
- Hole dry when backfilled a few days later.
- Very abrupt contact between dolomite and syenite at 9m.

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Call: 082 551 6034

**Collar Elevation:** 1430m amsl

**Coords:** Y (29) 90 901 X: 2 861 439  
(hand-held GPS - wgs84)

Project: MONAVONI EXTENSION 51.

Hole No. 51/08

Machine: Thor(15 Bar)

Logged: es Date: 26/05/2009

Contractor: J K DEVELOPMENTS cc

Resf Level: Dry

Date: 11/05/2009

Date: 12/05/09 Job No: 09117monX51

Chp Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<10	0'10"	1		Dark brown, sandy SILT with abundant, dark brown, manganese nodules; colluvium (manganese gravel).
	1'16"	2		Grey to dark grey, slightly weathered, hard rock DOLOMITE.
<15	3'01"	3		Fractured between 1m and 2m.
<10	3'27"	4		
	3'28"	5		
<15	3'25"	6		
	3'18"	7		
<10	3'32"	8		
	3'41"	9		
EOH	3'39"	10		
				<p>NOTES:</p> <ol style="list-style-type: none"> <li>Hole stopped at 10m after penetrating 6m of solid, dolomite bedrock (as instructed).</li> <li>Ground water not encountered during drilling operations.</li> <li>Hole dry when backfilled a few days later.</li> </ol>

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1436m asl

Coords: Y (29) 91 152 X: 2 861 361  
(Hand held GPS - wgs84)

**Borehole Profile**

Hole No. 51/09

Project: MONAVONI EXTENSION 51.

Logged: es Date: 26/05/2009

Machine: Thor(15 Bar)

Rest Level: Dry

Contractor: J K DEVELOPMENTS cc

Date: 12/05/09 Job No: 09117monX51

Date: 11/05/2009

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<10	0'20"	1		Dark brown, sandy SILT with traces of dark brown, manganese concretions and grey, weathered, dolomite fragments; residual dolomite (possibly boulders).
<15	0'28"	2		Dark chocolate brown SILT (WAD) with grey, weathered, dolomite fragments; residual dolomite (boulders in waddy matrix). Dolomite fragments abundant below 2m.
<10	0'24"	3		Khaki olive, silty SAND; residual syenite.
<3	0'33"	4		
	3'06"	5		Grey speckled light grey, slightly weathered, hard rock SYENITE.
	1'18"	6		
<10	3'38"	7		
	4'06"	8		
<15	4'32"	9		
	4'29"	10		
<10	4'36"	11		
ECH	4'47"	12		

**NOTES:**

- 1) Hole stopped at 12m after penetrating 6m of solid syenite bedrock (as instructed).
- 2) Ground water not encountered during drilling operations.
- 3) Hole dry when backfilled a few days later.

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

Collar Elevation: 1434m AMSL

Coords: Y (29) 90 962 X: 2 861 559  
(Hand-held GPS - wgs84)

**Borehole Profile**

**Project:** MONAVONT EXTENSION 51.  
**Machine:** Thor (15 Bar)  
**Contractor:** J K DEVELOPMENTS CC  
**Date:** 08/05/2009

**Hole No.** 51/10

**Logged:** es    **Date:** 04/06/2009  
**Rest Level:** -10m (1421m amsl)  
**Date:** 11/05/09    **Job No:** 09117monX51

Chip Size (mm)	Pen. Speed	Depth (m)	Profile	Description
<5	0'12"	1		Dark chocolate brown to almost black, slightly clayey SILT (WAD) with minor, dark brown, "blocky", wad fragments; residual dolomite (from surface).
	0'18"	2		
	0'14"	3		Scattered syenite and chert fragments throughout.
	0'17"	4		
	0'18"	5		
	0'19"	6		
Y -10m  <3	0'58"	7		Light olive khaki, silty, fine SAND with traces of olive speckled white, highly weathered, syenite fragments; residual syenite.
	0'32"	8		Traces of translucent quartz between 7m and 8m.
	0'22"	9		
	0'27"	10		
	0'36"	11		
	0'49"	12		
	0'43"	13		
	0'27"	14		
	0'31"	15		
	0'42"	16		
0'38"	17		Light grey, weathered, fractured(?), hard rock, DOLOMITE fragments in a minor matrix of olive, silty sand; residual dolomite (contact zone).	
<10	2'11"	18		Dark grey, weathered to slightly weathered, hard rock DOLOMITE.
	3'37"	19		
	3'29"	20		
	3'25"	21		
	3'22"	22		
	3'19"	23		
	3'19"	24		
	3'24"	25		
EOH				

**NOTES:**

- 1) Hole stopped at 25m after penetrating 6m of solid, dolomite bedrock (as instructed).
- 2) Ground water not encountered during drilling operations.
- 3) Water rest level at -10m when hole backfilled a few days later.

Prepared By: R.M.S P O Box 32107, GLENSTANTIA 0010    Tel: 012 993 2049    Cell: 082 551 6034

**Collar Elevation:** 1431m amsl

**Coords:** Y {29} 90 692    X: 2 861 590  
 (Hand-held GPS - wgs84)

# Borehole Profile

**Project:** MONAVONI EXTENSION 51.

**Hole No.** 51/11

**Machine:** Thor (15 Bar)

**Logged:** es      **Date:** 01/06/2009

**Contractor:** J K DEVELOPMENTS cc

**Rest Level:** -6m (1427m amsl)

**Date:** 08/05/2009

**Date:** 11/05/09      **Job No:** 09117monX51

Chip Size (mm)	Pen. Speed	Depth (m)	Profile	Description
<20	0'19"	1		Dark brown, slightly clayey, sandy <b>SILT</b> with traces of dark brown, manganese nodules and traces of chocolate brown, clayey silt (wad); residual dolomite.
<5	0'22"	2		
<15	0'32"	3		Dark grey weathered dark brown, weathered to highly weathered, hard rock, <b>DOLOMITE</b> fragments in a minor matrix of chocolate brown silt (wad); residual dolomite (interpreted as floaters [slabs] of rock).
	0'58"	4		
	0'46"	5		
	0'54"	6		
<10	2'20"	7		Grey to dark grey, weathered, hard rock <b>DOLOMITE</b> .  Some grey weathered brown, dolomite fragments below 10m suggests contact zone.  Dark grey speckled white in places, weathered to slightly weathered, hard rock <b>SYENITE</b> .
	3'37"	8		
	3'29"	9		
	3'34"	10		
	1'50"	11		
	1'13"	12		
	2'07"	13		
	3'28"	14		
	4'19"	15		
	4'27"	16		
	4'25"	17		
4'19"	18			
EOH	4'10"	19		
<b>NOTES:</b>				
				1) Hole stopped at 19m after penetrating 6m of solid syenite bedrock (as instructed).
				2) Ground water not encountered during drilling operations.
				3) Water rest level at -6m when hole backfilled a few days later.

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010      Tel: 012 993 2049      Cell: 082 551 6034

**Collar Elevation:** 1433m amsl

**Coords:** Y (29) 90 840      X: 2 861 650  
(Hand-held GPS - wgs84)

# Borehole Profile

**Project:** MONAVONI EXTENSION 51.

**Hole No.** 51/12

**Machine:** Thor (15 Bar)

**Logged:** es      **Date:** 26/05/2009

**Contractor:** J K DEVELOPMENTS cc

**Rest Level:** -12m (1424mamsl)

**Date:** 11/05/2009

**Date:** 12/05/09      **Job No:** 09117monX51

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<20	0'15"	1	-	Light khaki brown, silty SAND with grey, weathered, dolomite fragments and scattered, highly weathered, syenite fragments; colluvium. Khaki olive, silty SAND with scattered, fine, olive speckled white, highly weathered, syenite fragments; residual syenite.
	0'34"	2	-	
	0'24"	3	-	
	0'20"	4	-	
	0'22"	5	-	
	0'18"	6	-	
	0'20"	7	-	
<3	1'19"	8	VVVVV	Dark grey speckled white, weathered to slightly weathered, hard rock SYENITE.
	3'10"	9	VVVVV	
	3'52"	10	VVVVV	
▽ -12m	3'35"	11	VVVVV	Grey, weathered SYENITE and light grey, slightly weathered, DOLOMITE fragments in an abundant matrix of grey, silty sand; residual dolomite (contact zone).
	3'19"	12	VVVVV	
EOH	3'11"	13	VVVVV	Light grey mottled grey, slightly weathered, slightly "altered", hard rock DOLOMITE.
	3'13"	14	VVVVV	
	-	15	VVVVV	
<b>NOTES:</b>				
1) Hole stopped at 15m after penetrating 6m of solid bedrock (as instructed).				
2) Ground water not encountered during drilling operations.				
3) Water rest level at -12m when hole backfilled a few days later.				

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010      Tel: 012 993 2049      Cell: 082 551 6034

**Collar Elevation:** 1436m AMSL

**Coords:** Y (29)91 046      X: 2 861 651  
(Hand-held GPS - wgs84)
























# Borehole Profile

**Project:** MONAVONI EXTENSION 51.  
**Machine:** Thor (15 Bar)  
**Contractor:** J K DEVELOPMENTS cc  
**Date:** 08/05/2009

**Hole No.** 51/13

**Logged:** es    **Date:** 01/06/2009  
**Rest Level:** -7m (1429mamsl)  
**Date:** 12/05/09    **Job No:** 09117monX51

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<10	3'16"	1		Dark brown, silty SAND with minor, dark brown, manganese nodules; colluvium.
<5	0'48"	2		Brown to light brown, sandy SILT with scattered, brown, highly weathered, syenite fragments; residual syenite.
	1'11"	3		Dark chocolate brown, sandy SILT (WAD) with clayey wed below 3m.
	0'43"	4		
<10	1'46"	5		Dark grey to grey weathered brown, weathered to highly weathered, fractured(?), hard rock DOLOMITE. (Interpreted as solid dolomite).
	2'10"	6		
	1'00"	7		
<15	0'25"	8		Grey weathered brown, highly weathered to weathered, DOLOMITE fragments in a minor matrix of dark brown clay(wad) and "blocky", wad fragments; residual dolomite (boulders in waddy matrix).
	0'31"	9		Some olive speckling in matrix suggests contact with syenite.
	0'47"	10		Olive to light olive, silty SAND with scattered, fine, highly weathered, syenite fragments; residual syenite.
<3	0'42"	11		
	1'05"	12		
	1'04"	13		
	0'47"	14		
	0'55"	15		
	2'23"	16		Dark grey to grey, weathered to slightly weathered, hard rock DOLOMITE.
<10	3'13"	17		
	3'21"	18		
	3'16"	19		
	3'15"	20		
	EOH	3'17"	21	
NOTES:				
1) Hole stopped at 21m after penetrating 6m of solid dolomite bedrock (as instructed).				
2) Ground water not encountered during drilling operations.				
3) Water rest level at -7m when hole backfilled a few days later.				

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010    Tel: 012 993 2049    Cell: 082 551 6034

**Collar Elevation:** 1436m amsl

**Coords:** Y (29) 90 901    X: 2 861 741  
 (Hand-held GPS - wgs84)

# Borehole Profile

**Project:** MONAVONI EXTENSION 51.

**Hole No.** 51/14

**Machine:** Thor(15 Bar)

**Logged:** es      **Date:** 01/06/2009

**Contractor:** J K DEVELOPMENTS cc

**Rest Level:** Dry

**Date:** 08/05/2009

**Date:** 11/05/09      **Job No:** 09117monX51

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description	
<13	0'20"	1	-	Dark chocolate brown, slightly sandy SILT with scattered, dark brown, manganese nodules and "blocky", wad fragments; residual dolomite.	
	0'26"	2			
<5	1'29"	3	-	Olive khaki, silty, fine SAND with occasional, olive, highly weathered to completely weathered, syenite fragments; residual syenite (possibly as very soft rock in places)	
	1'47"	4			
	1'34"	5			
	1'40"	6			
	1'47"	7			
	1'54"	8			
	1'44"	9			
	1'27"	10			
<10	1'51"	11	-	Grey weathered brown, highly weathered to weathered, DOLOMITE fragments in a trace matrix of brown to greyish brown, sandy silt and minor dark brown silt(wad); residual dolomite (possibly boulders).	
	1'43"	12			
	1'46"	13		-	Interpreted as solid dolomite below 14m.
	1'19"	14			
	2'10"	15			
	3'14"	16			
	3'10"	17			
	3'07"	18			
EOH	3'19"	19	-	Tends to "slaty" dolomite below 16m.	
	3'11"	20			
				<p><b>NOTES:</b></p> <p>1) Hole stopped at 20m after penetrating 6m of solid dolomite bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Hole dry when backfilled a few days later.</p>	

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010      Tel: 012 993 2049      Cell: 082 551 6034

**Collar Elevation:** 1435m amsl.

**Coords:** Y (29) 01 721      X: 2 861 771  
(Hand-held GPS - wgs84)

# Borehole Profile

**Project:** MONAVONI EXTENSION 51.

**Hole No.** 51/15

**Machine:** Thor (15 Bar)

**Logged:** es      **Date:** 30/05/2009

**Contractor:** J K DEVELOPMENTS cc

**Rest Level:** -5m (1427mams1)

**Date:** 08/05/2009

**Date:** 11/05/09      **Job No:** 09117monX51

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description	
<10	0'16"	1	[Profile]	Dark brown, silty SAND with traces of dark brown, manganocrete nodules; colluvium (manganocrete?)	
	1'01"	2	[Profile]	Dark grey to grey, weathered, fractured(?), hard rock, graphitic DOLOMITE (almost shaly in places).	
	1'54"	3	[Profile]	Some waddy fragments between 1m and 2m.	
	1'14"	4	[Profile]		
	1'29"	5	[Profile]		
	▼ -5m	1'25"	6	[Profile]	
		2'14"	7	[Profile]	
		3'18"	8	[Profile]	
		3'13"	9	[Profile]	
		3'10"	10	[Profile]	
<15	3'16"	11	[Profile]	Dark grey, slightly weathered, hard rock, graphitic DOLOMITE with occasional lenses of dark grey, "shaly" DOLOMITE between 11m and 13m.	
	1'05"	12	[Profile]		
	1'36"	13	[Profile]		
	2'07"	14	[Profile]		
	3'03"	15	[Profile]		
	3'19"	16	[Profile]		
	3'15"	17	[Profile]		
	3'17"	18	[Profile]	Grey, weathered to slightly weathered, hard rock DOLOMITE.	
	3'21"	19	[Profile]		
	EOH	3'18"	20	[Profile]	
<b>NOTES:</b>					
				1) Hole stopped at 20m after penetrating 6m of solid, dolomite bedrock (as instructed).	
				2) Ground water not encountered during drilling operations.	
				3) Water rest level at -5m when hole backfilled a few days later.	

Prepared by: R.M.S P O Box 32107, GLENSTANFLA 0010      Tel: 012 993 2049      Cell: 082 551 6034

**Collar Elevation:** 1432m amsl

**Coords:** Y (29) 90 480      X: 2 861 740  
(Hand-held GPS - wgs84)

# Borehole Profile

**Project:** MONAVONI EXTENSION 51.

**Hole No.** 51/16

**Machine:** Thor (15 Bar)

**Logged:** es      **Date:** 04/06/2009

**Contractor:** J K DEVELOPMENTS cc

**Rest Level:** -8,4m (1426mamsl)

**Date:** 12/05/2009

**Date:** 13/05/09      **Job No:** 09117monX51

Chip Size(mm)	Pun. Speed	Depth (m)	Profile	Description
<5	0'14"	1	[Profile Diagram]	Brown to dark brown, sandy SILT with traces of fine dark brown, manganese nodules and some quartz grains; colluvium.
	0'14"	2		Dark brown, slightly clayey, sandy SILT with minor, dark brown, manganese nodules and traces of chocolate brown silt(wad); residual dolomite.
	0'11"	3		
<10	0'16"	4	[Profile Diagram]	Dark chocolate brown, clayey SILT(WAD) with traces of dark brown, manganese nodules; residual dolomite.
	0'19"	5		
	0'16"	6		
	0'12"	7		Nodules scattered below 6m.
	0'10"	8		
<3 ▼ -8,4m	0'13"	9	[Profile Diagram]	
	0'11"	10		
<5	0'10"	11	[Profile Diagram]	
	0'15"	12		
	1'47"	13		Dark grey, weathered, hard rock, DOLOMITE fragments in an abundant matrix of chocolate brown, clayey silt(wad); residual dolomite.
<15	2'53"	14	[Profile Diagram]	Dark grey to light grey, weathered, slightly "altered", hard rock DOLOMITE.
	3'27"	15		
	3'31"	16		
	4'16"	17		Light grey, weathered to slightly weathered, slightly "altered", hard rock SYENITE.
	4'07"	18		
<10 EOH	3'52"	19	[Profile Diagram]	
	3'47"	20		
	<p><b>NOTES:</b></p> <p>1) Hole stopped at 20m after penetrating 6m of solid bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Water rest level at -8,4m when hole backfilled a few days later.</p>			

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010      Tel: 012 993 2049      Cell: 082 551 6034

**Collar Elevation:** 1434m amsl

**Coords:** Y (29) 91 079      X: 2 361 470  
(Hand-held GPS - wgs84)

# Borehole Profile

**Project:** MONAVONI EXTENSION 51.

**Hole No.** 51/17

**Machine:** Thor (15 Bar)

**Logged:** es      **Date:** 01/06/2009

**Contractor:** J K DEVELOPMENTS cc.

**Rest Level:** Dry

**Date:** 14/05/2009

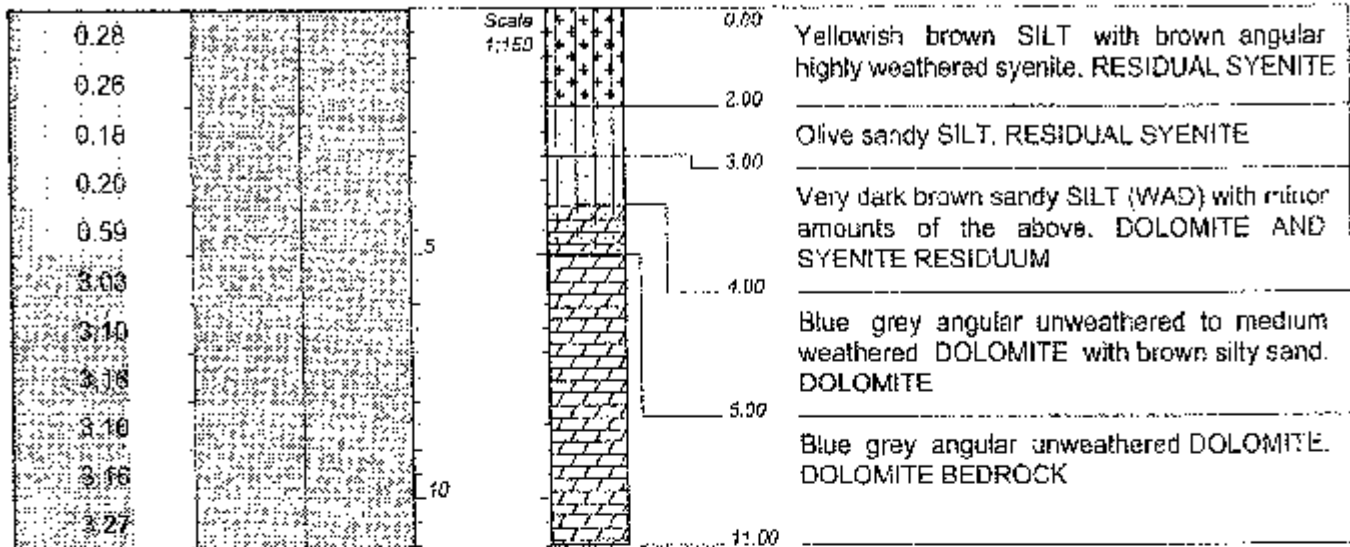
**Date:** 15/05/09      **Job No:** 09117monX51

Chip Size (mm)	Pen. Speed	Depth (m)	Profile	Description
<5	0'21"	1	[Profile Diagram]	Dark reddish brown, sandy SILT with fine dark brown, manganese nodules and subordinate quartz grains; colluvium.
	0'51"	2		
	1'34"	3		Possibly with lenses of manganese below 2m.
<3	3'41"	4	[Profile Diagram]	Reddish brown, slightly sandy SILT with occasional fine quartz grains; residual syenite(?).
	3'16"	5		
	0'28"	6		Dark chocolate brown SILT (WAD) with traces of dark chocolate brown, "blocky", wad fragments; residual dolomite.
	0'18"	7		Scattered grey, highly weathered, shale fragments between 6m and 7m.
	0'17"	8		
	0'10"	9		
	0'14"	10		
	0'11"	11		
	0'21"	12		Dark grey stained brown, weathered to highly weathered, DOLOMITE fragments in a minor matrix of chocolate brown silt (wad); residual dolomite.
	1'31"	13		
	1'57"	14		Dark grey, weathered to slightly weathered, hard rock SYENITE.
	3'14"	15		
	4'26"	16		
	4'34"	17		
	3'49"	18		
	3'35"	19		
	3'40"	20		
EOH				
<p><b>NOTES:</b></p> <p>1) Hole stopped at 20m after penetrating 6m of solid, syenite bedrock (as instructed).</p> <p>2) Ground water not encountered during drilling operations.</p> <p>3) Hole dry when backfilled a few days later.</p>				
<p>Prepared by: K.M.S P O Box 32107, GLENSTANTIA 0010.      Tel: 012 993 2049      Cell: 082 551 6034</p>				

**Collar Elevation:** 1428m AMSL

**Coords:** Y (29) 90 728      X: 2 961 138  
(Hand-held GPS - wgs84)

PREVIOUSLY DRILLED BOREHOLES  
(MONAVONI EXT 23: VGI- 2006)



NOTES

- 1) No waterstrikes recorded.
- 2) No water added.

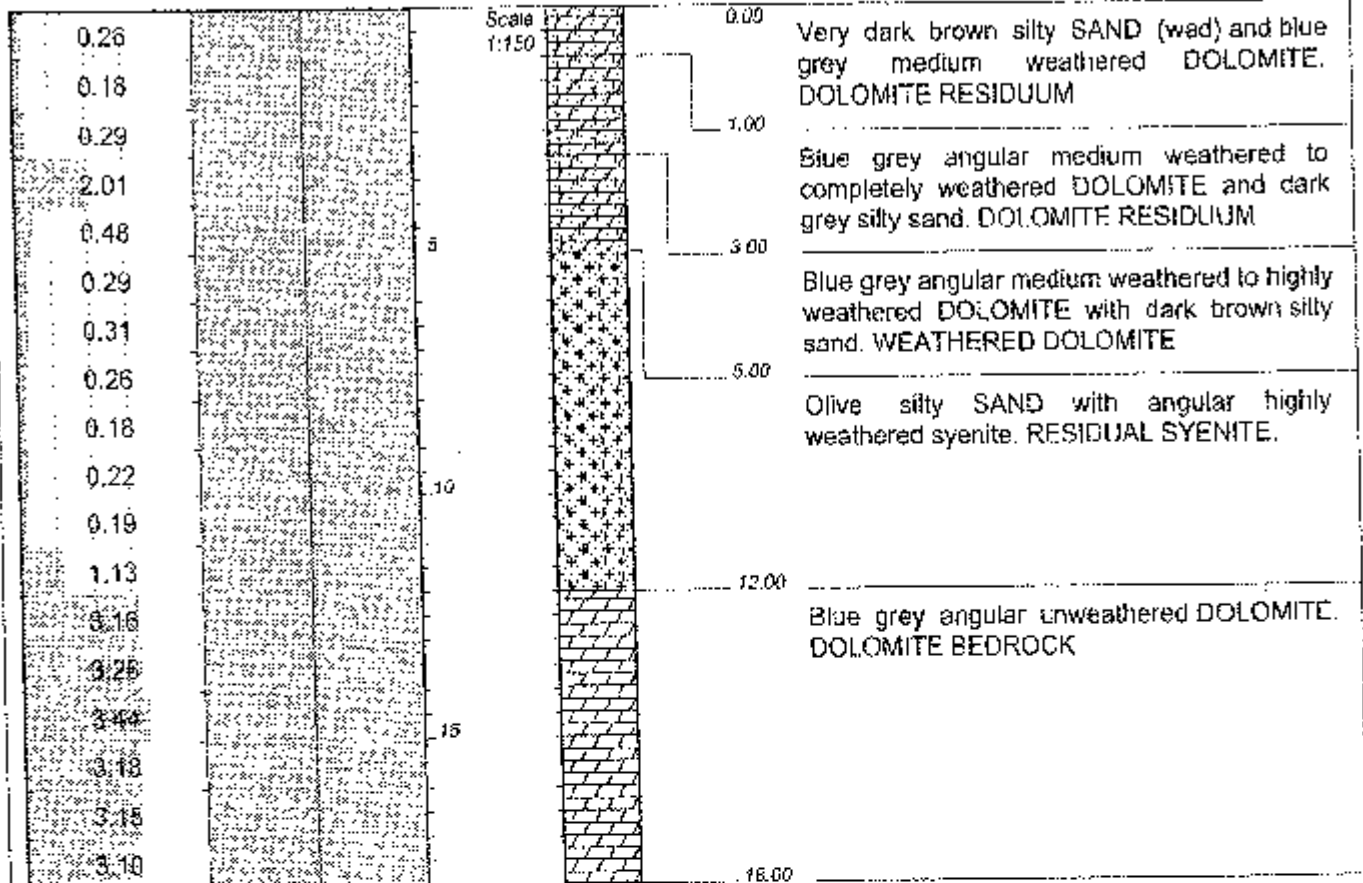
1.	2.	3.
Penetr time min/s/m	Air return	Sample recover

CONTRACTOR : HENNIE ERWEE DRILLING  
 MACHINE : 16 Bar, 800 cfm  
 DRILLED BY : WILLIAM  
 PROFILED BY : H MUDAU  
 TYPE SET BY : A GERBER  
 SETUP FILE : PERCUSLSEY

INCLINATION : 90 DEGREES  
 DIAM : 165 mm  
 DATE : 2006/03/30  
 DATE : 2006/04/05  
 DATE : 31/07/06 12:22  
 TEXT : \_BACKGR-F1200607-4.TXT

ELEVATION : 1429.5mamsl  
 X-COORD : -90304.00  
 Y-COORD : -2861736.96

HOLE No: MT/MV23/47



NOTES

- 1) No waterstrikes recorded.
- 2) No water added.

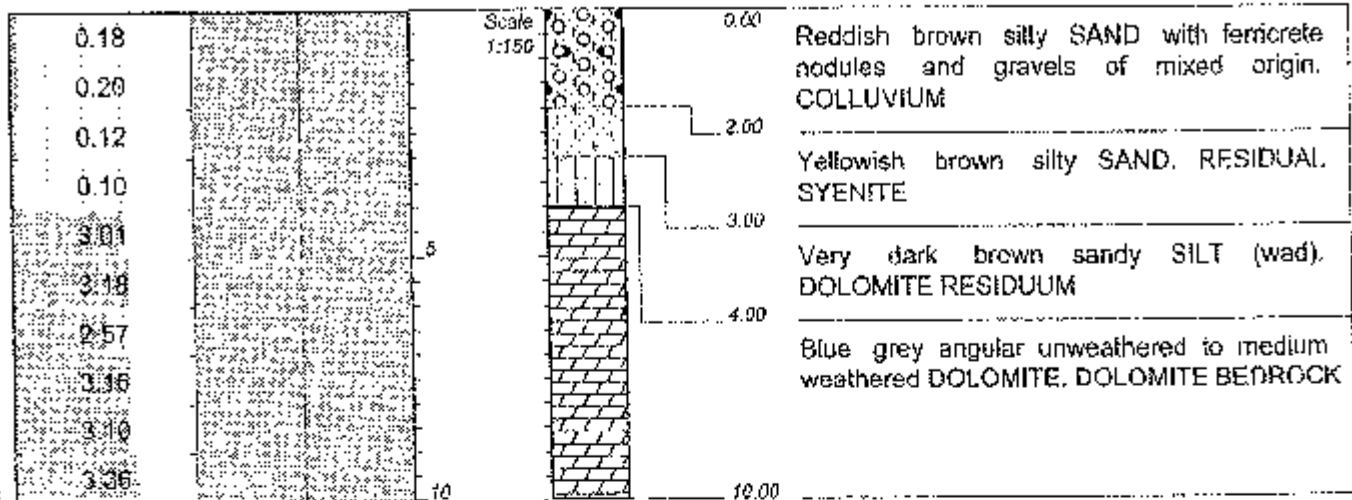
1	2	3
Penetr time	Air return	Sample recov
min:sm		

CONTRACTOR : HENNIE ERWEE DRILLING INCLINATION : 90 DEGREES  
 MACHINE : 16 Bar; 800 cfm DIAM : 165 mm  
 DRILLED BY : WILLIAM DATE : 2006/03/30  
 PROFILED BY : H MUDAU DATE : 2006/04/05  
 TYPE SET BY : A GERBER DATE : 31/07/06 12:22  
 SETUP FILE : PERCUSI.SET TEXT : ..\BACKGR-11200607-4.TXT

ELEVATION : 1429.0mamsl  
 X-COORD : -90372.17  
 Y-COORD : -2861680.48

HOLE No: MT/MV23/48





NOTES

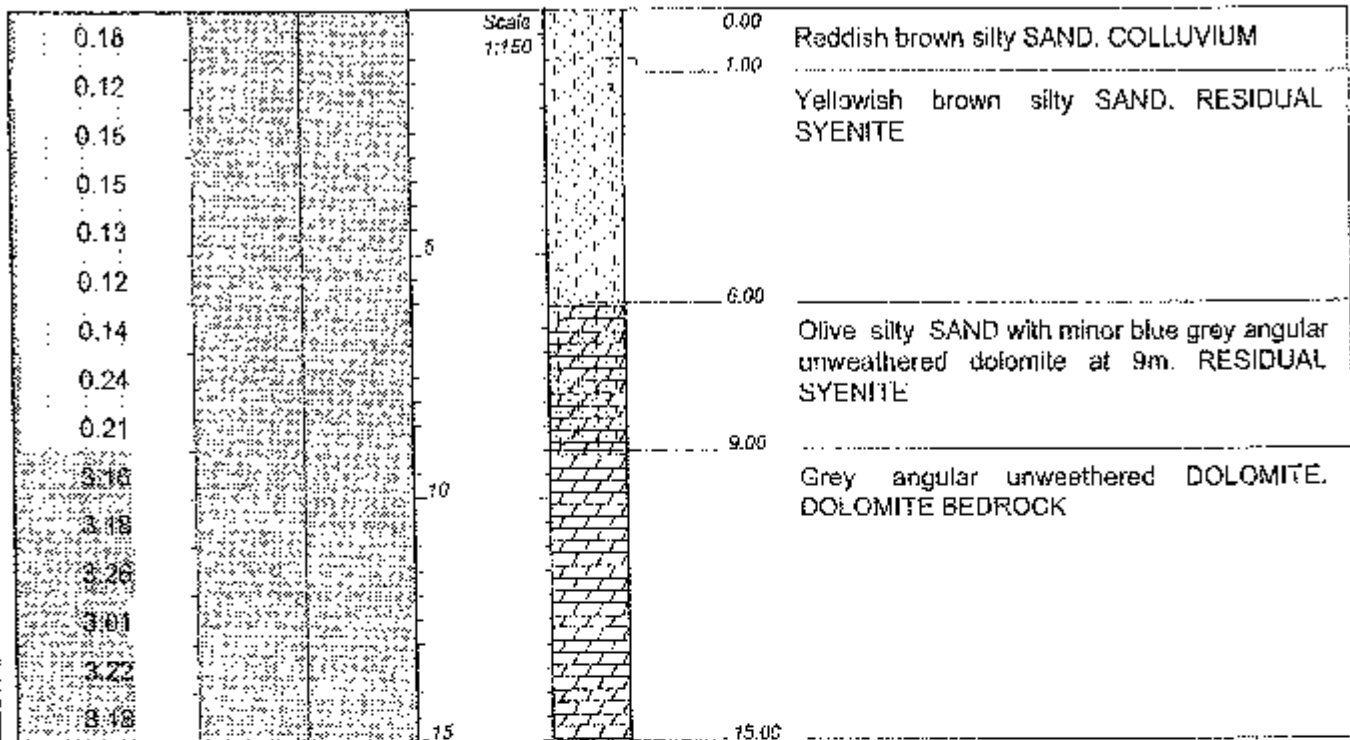
- 1) No waterstrikes recorded.
- 2) No water added.

1	2	3
Penetr time min:sec	Air return	Sample recov

CONTRACTOR: HENNIE ERWEE DRILLING INCLINATION: 90 DEGREES  
 MACHINE: 16 Bar, 800 cfm DIAM: 165 mm  
 DRILLED BY: WILLIAM DATE: 2006/03/30  
 PROFILED BY: H MUDAU DATE: 2006/04/05  
 TYPE SET BY: A GERBER DATE: 31/07/08 12:22  
 SETUP FILE: PERCUSI.SET TEXT: \_BACKGR-11200607-4.TXT

ELEVATION: 1428.0mamsl  
 X-COORD: -90396.12  
 Y-COORD: -2861625.45

HOLE No: MT/MV23/49



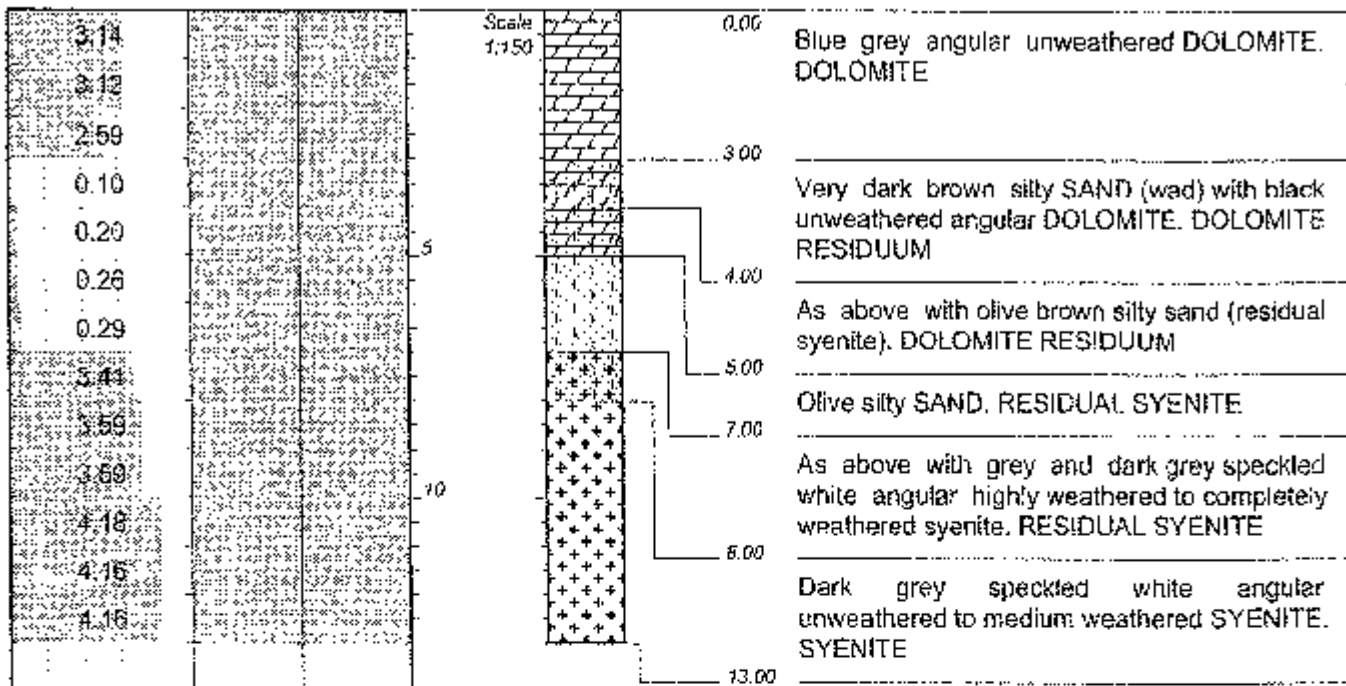
NOTES

- 1) No waterstrikes recorded.
- 2) No water added.

CONTRACTOR : HENNIE ERWEE DRILLING    INCLINATION : 90 DEGREES  
 MACHINE : 16 Bar; 800 cfm    DIAM : 166 mm  
 DRILLED BY : WILLIAM    DATE : 2006/03/30  
 PROFILED BY : H MUDAU    DATE : 2006/04/05  
 TYPE SET BY : A GERBER    DATE : 31/07/06 12:22  
 SETUP FILE : PERCUSI.SET    TEXT : ..\BACKGR-11200607-4.TXT

ELEVATION : 1428.5mamsl  
 X-COORD : -90448.33  
 Y-COORD : -2861605.66

HOLE No: MT/MV23/50

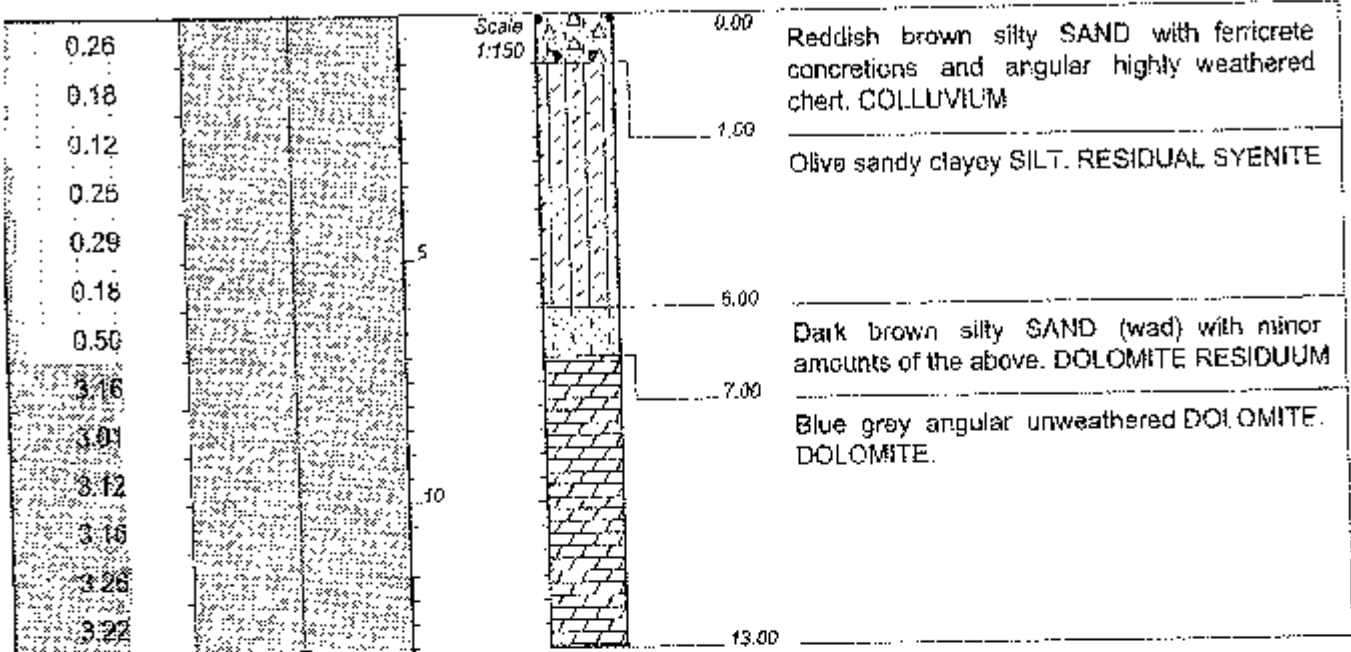


NOTES

- 1) No waterstrikes recorded.
- 2) No water added.

1	2	3
Penetr time min:sec	Air return	Sample recov

CONTRACTOR : HENNIE ERWEE DRILLING	INCLINATION : 90 DEGREES	ELEVATION : 1427.0mamsl
MACHINE : 16 Bar, 800 cfm	DIAM : 165 mm	X-COORD : -90480.25
DRILLED BY : WILLIAM	DATE : 2006/03/31	Y-COORD : -2861532.27
PROFILED BY : H MUDAU	DATE : 2006/04/05	
TYPE SET BY : A GERBER	DATE : 31/07/06 12:22	
SETUP FILE : PERCUSI.SET	TEXT : \\BACKGR-1\200607-4.TXT	



NOTES

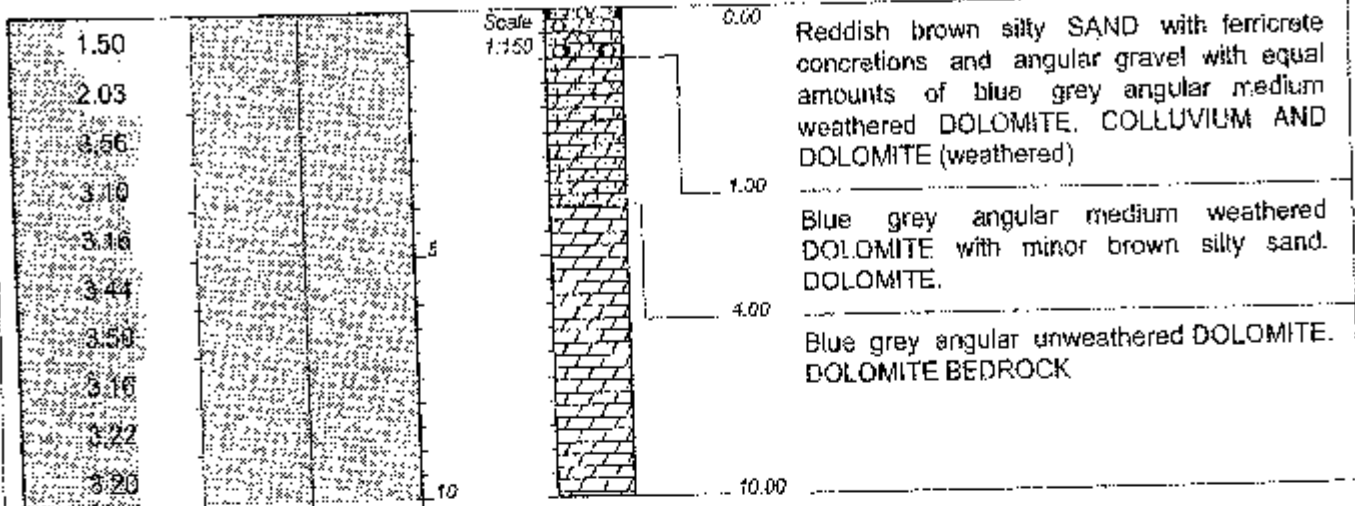
- 1) No waterstrikes recorded.
- 2) No water added.

1	2	3
Penetr time min:s/m	Air return	Sample recov

CONTRACTOR: HENNIE ERWEE DRILLING  
MACHINE: 16 Bar; 800 cfm  
DRILLED BY: WILLIAM  
PROFILED BY: H MUDAU  
TYPE SET BY: A GERBER  
SETUP FILE: PERCUSI.SET

INCLINATION: 90 DEGREES  
DIAM: 165 mm  
DATE: 2006/03/31  
DATE: 2006/04/05  
DATE: 31/07/06 12:23  
TEXT: ...BACKGR-1200607-4.TXT

ELEVATION: 1430.5mamsl  
X-COORD: -90374.34  
Y-COORD: -2861725.63



NOTES

- 1) No waterstrikes recorded.
- 2) No water added.

1	2	3
Penetr time min./m	Air return	Sample recov

CONTRACTOR : HENNIE ERWEE DRILLING  
MACHINE : 16 Bar, 800 cfm  
DRILLED BY : WILLIAM  
PROFILED BY : H MUDAU  
TYPE SET BY : A GERBER  
SETUP FILE : PERCUSS.SET

INCLINATION : 90 DEGREES  
DIAM : 165 mm  
DATE : 2006/03/31  
DATE : 2006/04/05  
DATE : 31/07/06 12:29  
TEXT : ..\BACKGR-11200607-4.TXT

ELEVATION : 1431.0mamsl  
X-COORD : -90376.50  
Y-COORD : -2861770.77

PREVIOUSLY DRILLED BOREHOLES  
(MONAVONI EXT 26: RMS - 2007)

# Borehole Profile

**Project:** MONOVANI EXT. 26

**Hole No.** 28

**Machine:** SUPER ROCK (15Bar; 800cfm)



**Logged:** es      **Date:** 22/04/2007

**Contractor:** JK Developments cc

**Rest Level:** Dry

**Date:** 13/04/2007

**Date:** 25/04/07      **Job No:** 06148Mon26

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<20	0'19"	1		Brown to chocolate brown, sandy SILT(WAD) with traces of dark brown, manganese nodules, some quartz and completely weathered, dolomite fragments; residual dolomite.
	0'27"	2		
<10	0'30"	3		Grey stained brown and brown, weathered to highly weathered, DOLOMITE fragments in a minor matrix of chocolate brown to greyish brown, "powdery" silt(wad); residual dolomite.
	1'23"	4		
	1'25"	5		
	1'42"	6		
	1'43"	7		
	1'46"	8		
	1'10"	9		
	1'02"	10		
	1'34"	11		
	1'14"	12		
	2'11"	13		
	3'17"	14		
	3'23"	15		
	3'29"	16		
	3'33"	17		
	EOH	3'30"		18
NOTES:				
				1) Hole stopped at 13m after penetrating about 6m of solid dolomite bedrock (as instructed).
				2) Ground water not encountered during drilling operations.
				3) Hole dry when backfilled a few days later

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0910      Tel: 012 993 2049      Cell: 082 551 6034

**Collar Elevation:** 1431m amsl

**Coords: Y:** (29) 90 960      **X:** 2 862 340  
(Hand-held GPS - wgs84)

# Borehole Profile

**Project:** MONOVANI EXT. 26  
**Machine:** SUPER ROCK (15Bar; 800cfm)  
**Contractor:** JK Developments cc  
**Date:** 13/04/2007

**Hole No.** 29  
**Logged:** es **Date:** 24/04/2007  
**Rest Level:** -28m (1424m amsl.)  
**Date:** 25/04/07 **Job No:** 06148Mon26

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<5	0'18"	1		Brown, sandy SILT with scattered, dark orange brown, manganese concrete nodules and translucent, quartz fragments; colluvium.
	0'32"	2		Light khaki brown, silty SAND with occasional, completely weathered, syenite fragments; residual syenite.
	0'52"	3		Dark brown almost black SILT (WAD) with traces of dark chocolate brown, "blocky", wad fragments; residual dolomite.
	0'24"	4		
	0'21"	5		
<10	1'04"	6		Grey and brown, highly weathered to weathered, closely fractured(?), slightly altered, DOLOMITE fragments in a trace matrix of greyish brown, "powdery" silt; residual dolomite.
	1'09"	7		Dark chocolate brown SILT (WAD) with traces of brown to chocolate brown, "blocky", wad fragments and brown, highly weathered, dolomite fragments; residual dolomite (contact zone).
<15	0'54"	8		Grey and brown, highly weathered to weathered, closely fractured(?), slightly altered DOLOMITE fragments in a trace matrix of greyish brown, "powdery" silt; residual dolomite.
	1'26"	9		Greyish olive, silty, fine SAND with scattered, fine, olive speckled light grey, highly weathered, syenite fragments; residual syenite (possibly tends to very soft rock syenite in places).
	0'34"	10		
<3	0'30"	11		
	0'28"	12		
	0'29"	13		
	0'22"	14		
	0'26"	15		
	0'26"	16		
	0'31"	17		
<10	0'26"	18		
	0'28"	19		
<15	1'07"	20		Grey and brown, highly weathered, DOLOMITE fragments in an abundant matrix of grey to olive grey, "powdery" silt; residual dolomite (contact zone).
	1'09"	21		
	1'22"	22		Grey, weathered, closely fractured(?), hard rock, slightly altered DOLOMITE with lenses of "shaly (graphitic)" dolomite.
	1'27"	23		
	1'55"	24		
	1'50"	25		
	1'25"	26		
	1'29"	27		
	1'41"	28		Becoming dark grey, weathered DOLOMITE below 27m.
	1'38"	29		
Water strike @ 29m	1'59"	30		

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Call: 082 561 6034

**Collar Elevation:** 1452m amsl

**Coords: Y:** (29) 91 051 **X:** 2 962 29#  
 (Hand-held GPS - wgs84)



# Borehole Profile

**Project:** MONOVANI EXT. 26

**Hole No.** 29 (Contd.)

**Machine:** SUPER ROCK (158bar; 800cfm)

**Logged:** es      **Date:** 24/04/2007


















**Contractor:** JK Developments cc

**Rest Level:**

**Date:** 13/04/2007

**Date:**

**Job No:** 06148Mon26

Clip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
	1'50"	31		Grey, weathered, closely fractured(?), hard rock, slightly altered DOLOMITE with lenses of "shaly (graphitic)" dolomite.
	1'15"	32		
	1'19"	33		Dark grey almost black, slightly weathered, hard rock SLATE with intercalated lenses of dark grey, slightly altered dolomite.
	1'31"	34		
	1'29"	35		
	1'58"	36		Dark grey, weathered to slightly weathered, hard rock DOLOMITE with lenses of black, slightly weathered slate.
	1'48"	37		
	1'40"	38		
<15	1'51"	39		
	1'49"	40		Dark grey, weathered to slightly weathered, fractured(?), hard rock DOLOMITE with occasional, "shaly", dolomite lenses.
	1'50"	41		
	2'17"	42		
	3'21"	43		Becoming dark grey, weathered to slightly weathered, hard rock DOLOMITE (no significant change in rock except possibly absence of "shaly" lenses).
	3'34"	44		
	3'39"	45		
	3'42"	46		
EOH	3'40"	47		
<p><b>NOTES:</b></p> <ol style="list-style-type: none"> <li>1) Hole stopped at 47m after penetrating about 6m of solid dolomite bedrock (as instructed).</li> <li>2) Ground water encountered between 29m and 33m during drilling operations.</li> <li>3) Water rest level at ~28m when backfilled a few days later.</li> </ol>				

# Borehole Profile

**Project:** MONAVONI EXT. 26

**Hole No.** 30

**Machine:** SUPER ROCK (15Bar; 800cfm)

**Logged:** as      **Date:** 22/04/2007

**Contractor:** JK Developments cc

**Rest Level:** -29m (1424mamsl)

**Date:** 13/04/2007

**Date:** 25/04/07      **Job No:** 05148Mon26

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<10	0'30"	1		Brown, silty SAND with traces of orange brown and dark brown, manganoccrete nodules; colluvium.
<5	0'44"	2		Brownish khaki, sandy SILT with occasional, fine, highly weathered, syenite fragments; residual syenite.
	0'50"	3		
	1'05"	4		
	1'18"	5		
<3	0'43"	6		
	0'45"	7		
	0'40"	8		
	0'30"	9		
<5	0'28"	10		Scattered pinkish beige highly weathered syenite fragments below 9m.
	0'40"	11		Brown, sandy SILT with minor, grey, weathered, dolomite fragments and trace amounts of brown silt(wad); residual dolomite. (Interpreted as inclusion within syenite).
<10	0'37"	12		Olive khaki, sandy SILT with occasional, fine, olive speckled white, highly weathered, syenite fragments; residual syenite.
<5	0'24"	13		
	0'50"	14		Grey, weathered, hard rock SYENITE.
	3'38"	15		Greyish olive, silty SAND with scattered, grey, hard rock, syenite fragments; residual syenite (contact zone).
	0'40"	16		
	1'25"	17		Light grey to grey, weathered, fractured(?), hard rock DOLOMITE with occasional lenses of grey. "shaly" dolomite.
	1'44"	18		
	1'09"	19		
	1'01"	20		Some grey stained brown, highly weathered, dolomite fragments between 19m and 20m.
	1'19"	21		
	1'09"	22		Dark grey, weathered, hard rock DOLOMITE with intercalated lenses of black SLATE.
<10	0'43"	23		
	1'07"	24		Tends to black SLATE between 23m and 24m.
	1'27"	25		
	1'40"	26		
	2'06"	27		Grey, slightly weathered, hard rock DOLOMITE.
	3'20"	28		
	3'35"	29		
▽ -29m	3'30"	30		1) Hole stopped at 32m after penetrating about 6m of solid dolomite bedrock (as instructed).
▲ Water @ 30m	3'34"	31		2) Ground water struck between 30m and 31m during drilling operations.
EOH	3'31"	32		3) Water rest level at -29m when backfilled a few days later.

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010 Tel: 012 993 2049 Cell: 082 551 6034

**Collar Elevation:** 1453m amsl.

**Coords: Y:** (29) 91 156      **X:** 2 862 281  
(Hand-held GPS - wgs84)

# Borehole Profile

**Project:** MONAVONI EXT. 26

**Hole No.** 38

**Machine:** SUPER ROCK (15Bar; 800cfm)






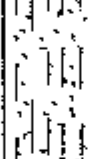
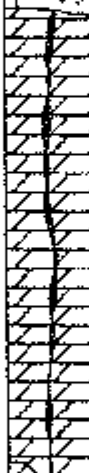
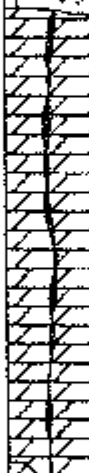
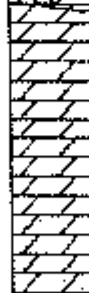
**Logged:** es     **Date:** 31/05/2007

**Contractor:** JK Developments cc

**Rest Level:** Dry

**Date:** 24/05/2007

**Date:** 29/05/07     **Job No:** 06148Mon26

Chip Size(mm)	Pen. Speed	Depth (m)	Profile	Description
<3	0'29"	1		Brown, silty SAND with scattered, fine, manganese nodules; colluvium.
	0'56"	2		Light brown, sandy SILT; residual syenite.
<10	0'52"	3		Dark grey, weathered, hard rock, DOLOMITE fragments and subordinate brown, "blocky", WAD fragments in a trace matrix of dark brown, clayey silt(wad); residual dolomite (interpreted as boulders in a waddy matrix).
	1'29"	4		
	0'52"	5		
<15	0'44"	6		
	1'40"	7		
<10	0'53"	8		Light olive, silty SAND with traces of fine, olive speckled white, highly weathered, syenite fragments; residual syenite.
<3	0'33"	9		
	0'46"	10		
	0'44"	11		
	0'46"	12		
	0'41"	13		
	1'49"	14		
<10	1'56"	15		
	1'29"	16		
	1'37"	17		
	1'57"	18		
	1'23"	19		Some black slate below 18m.
	1'07"	20		
	1'09"	21		
	1'34"	22		
	2'16"	23		Dark grey, slightly weathered, hard rock DOLOMITE.
	3'47"	24		
EOH	3'14"	25		
	3'13"	26		
	3'18"	27		
	3'15"	28		
				<p><b>NOTES:</b></p> <p>1) Hole stopped at 28m after penetrating about 6m of solid dolomite bedrock (as instructed).</p> <p>2) Ground water strike between 21m and 22m during drilling operations.</p> <p>3) Hole dry when backfilled a few days later.</p>

Prepared by: R.M.S P O Box 32107, GLENSTANTIA 0010     Tel: 012 993 2049     Cell: 082 551 6034

**Collar Elevation:** 1453m amsl

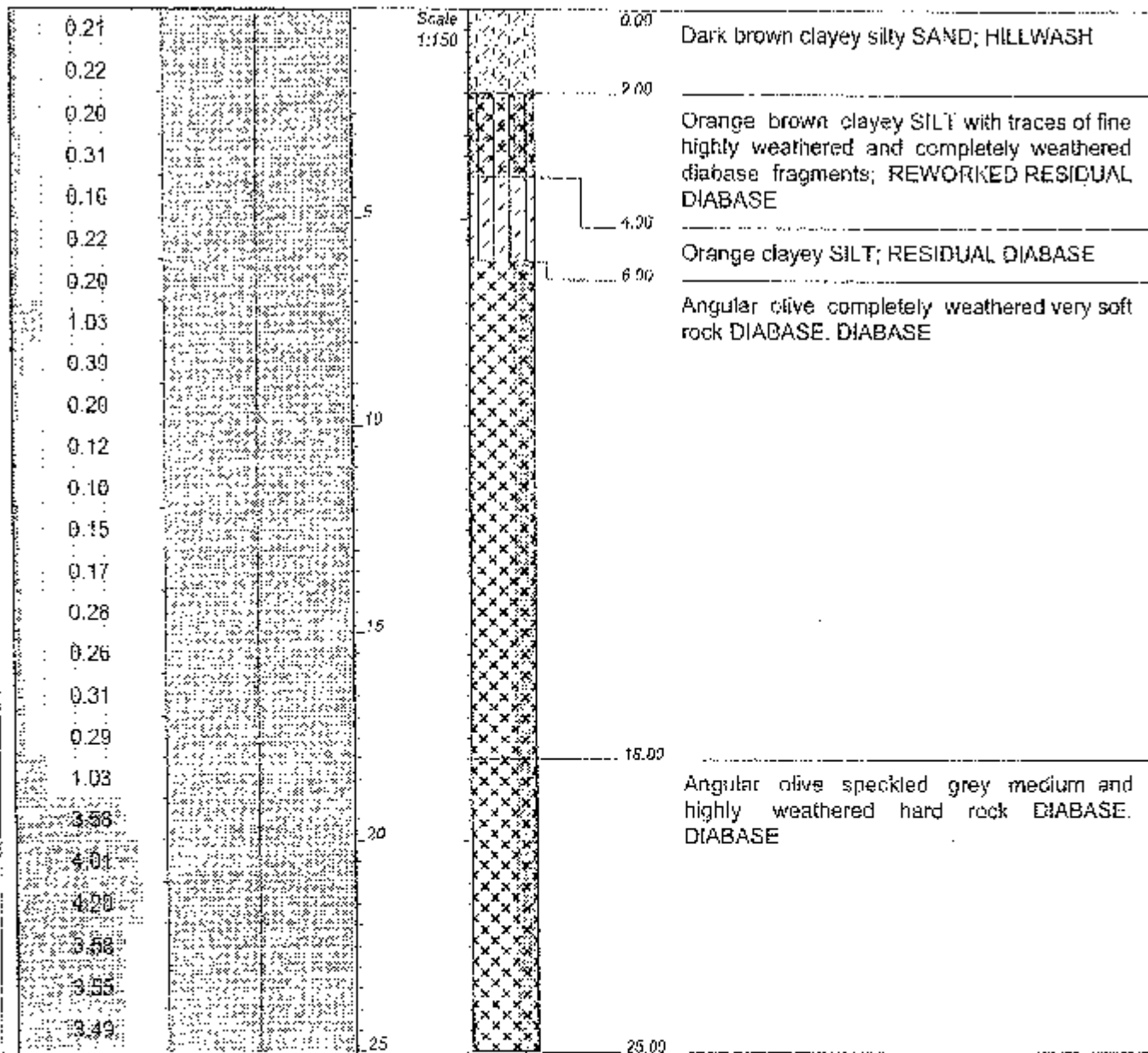
**Coords: Y:** (29) 91 090     **X:** 2 862 321  
(Hand-held GPS - wgs84)

PREVIOUSLY DRILLED BOREHOLES  
(GREATER MONAVONI AREA: VGI- 2006)

M & T DEVELOPMENT  
MONAVONI GREATER AREA 2

HOLE No: MT/GMV/34  
Sheet 1 of 1

JOB NUMBER: VGI 3065



NOTES

- 1) No water strikes noticed.
- 2) No air losses noticed.

1	2	3
Penetr time min. / cm	Air return	Sample recov

CONTRACTOR: HENNIE ERWEE DRILLING INCLINATION: 90 DEGREES  
 MACHINE: 16 Bar, 8000fm DIAM: 165 mm  
 DRILLED BY: JOSIAS DATE: 25/04/2006  
 PROFILED BY: B BOLINGO DATE: 22/05/2006  
 TYPE SET BY: A GERBER DATE: 11/07/06 17:24  
 SETUP FILE: PERCUSI.SET TEXT: ..VGI306-31290601-2.TXT

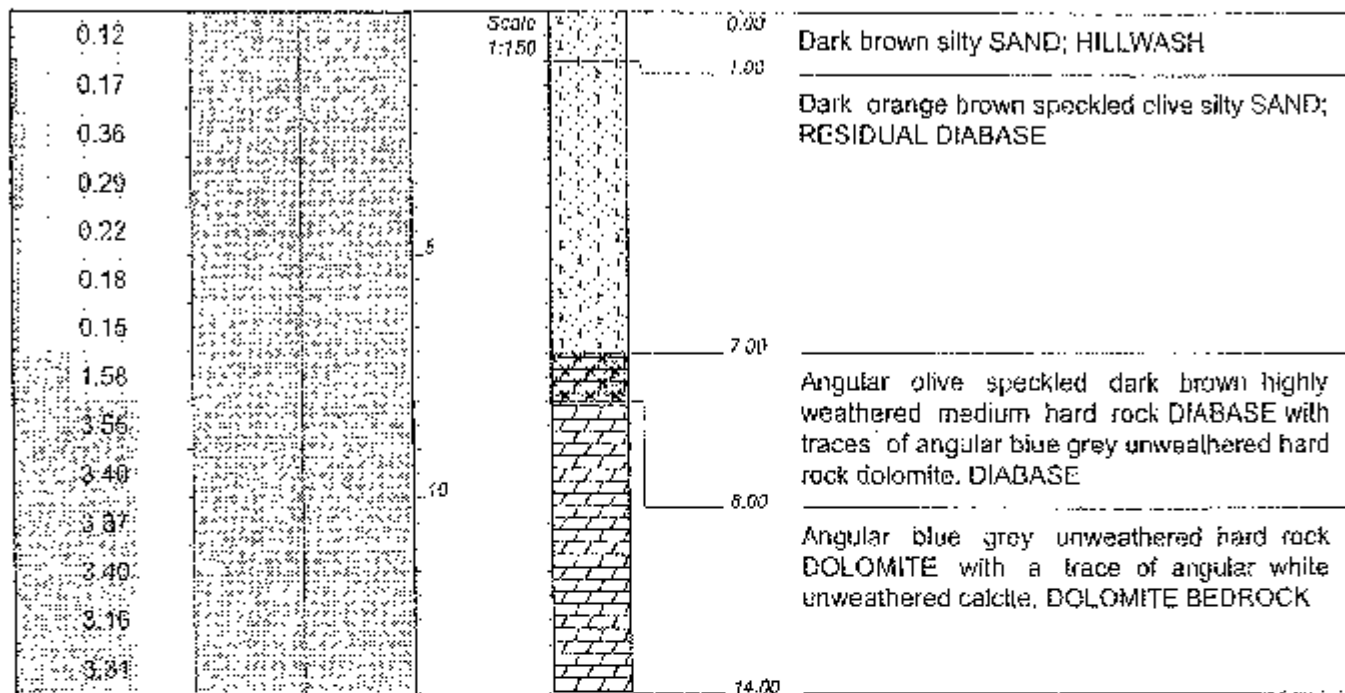
ELEVATION: namsl  
 X COORD:  
 Y COORD:

HOLE No: MT/GMV/34

M & T DEVELOPMENT  
MONAVONI GREATER AREA 2

HOLE No: MT/GMV/35  
Sheet 1 of 1

JOB NUMBER: VGI 3065



NOTES

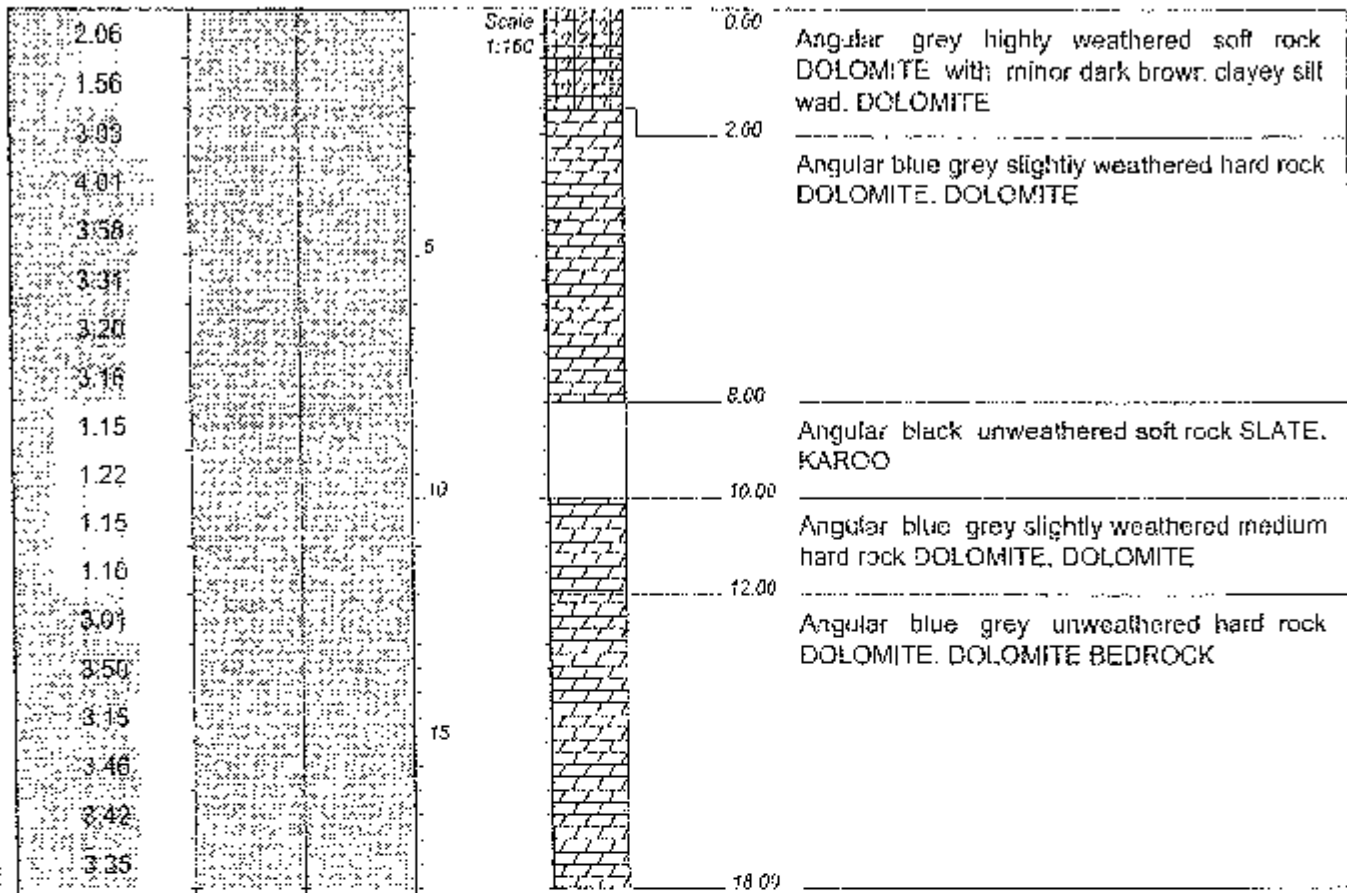
- 1) No water strikes noticed.
- 2) No air losses noticed.

CONTRACTOR : HENNIE ERWEE DRILLING  
MACHINE : 16 Bar; 8000ft  
DRILLED BY : JOSIAS  
PROFILED BY : R BOLITHO

INCLINATION : 90 DEGREES  
DIAM : 105 mm  
DATE : 25/04/2006  
DATE : 2006/05/18

ELEVATION : mamsl  
X-COORD :  
Y-COORD :

HOLE No: MT/GMV/35



NOTES

- 1) No water strikes noticed.
- 2) No air losses noticed.

Penetr lime min./m	Air return	Sample recov
2.3		

CONTRACTOR: HENNIE ERWEE DRILLING INCLINATION: 90 DEGREES  
 MACHINE: 16 Bar; 8000fm DIAM: 165 mm  
 DRILLED BY: JOSIAS DATE: 25/04/2006  
 PROFILED BY: B BGLITHO DATE: 2006/05/20  
 TYPE SET BY: A GERBER DATE: 11/07/08 17:24  
 SETUP FILE: PERCUSI SET TEXT: JVG1300-31200837-2.TXT

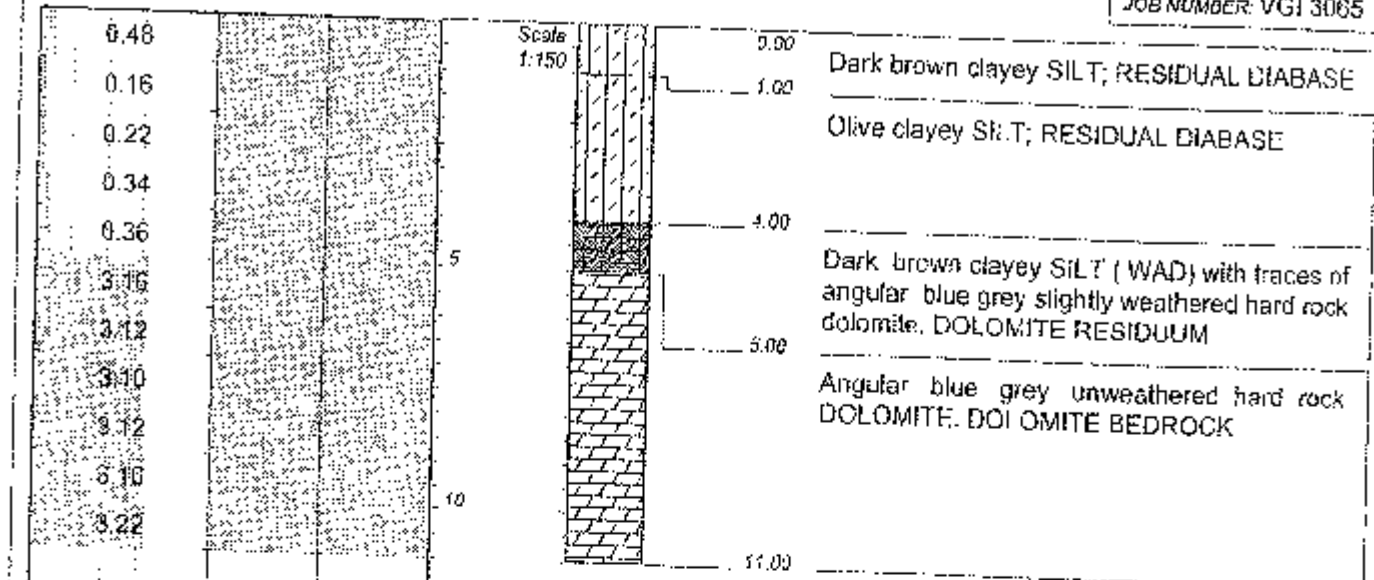
ELEVATION: mamsl  
 X-COORD:  
 Y-COORD:

HOLE No: MT/GMV/37

M & T DEVELOPMENT  
MONAVONI GREATER AREA 2

HOLE No: MTIGMV/38  
Sheet 1 of 1

JOB NUMBER: VGI 3065



NOTES

- 1) No water strikes noticed.
- 2) No air losses noticed.

1	2	3
Penetr time min/s/m	Air return	Sample recov

CONTRACTOR: HENNIE ERWEE DRILLING  
MACHINE: 16 Bar; 8000fm  
DRILLED BY: JOSIAS  
PROFILED BY: B BOLITHO  
TYPE SET BY: A GERBER  
SETUP FILE: PERCUSI.SET

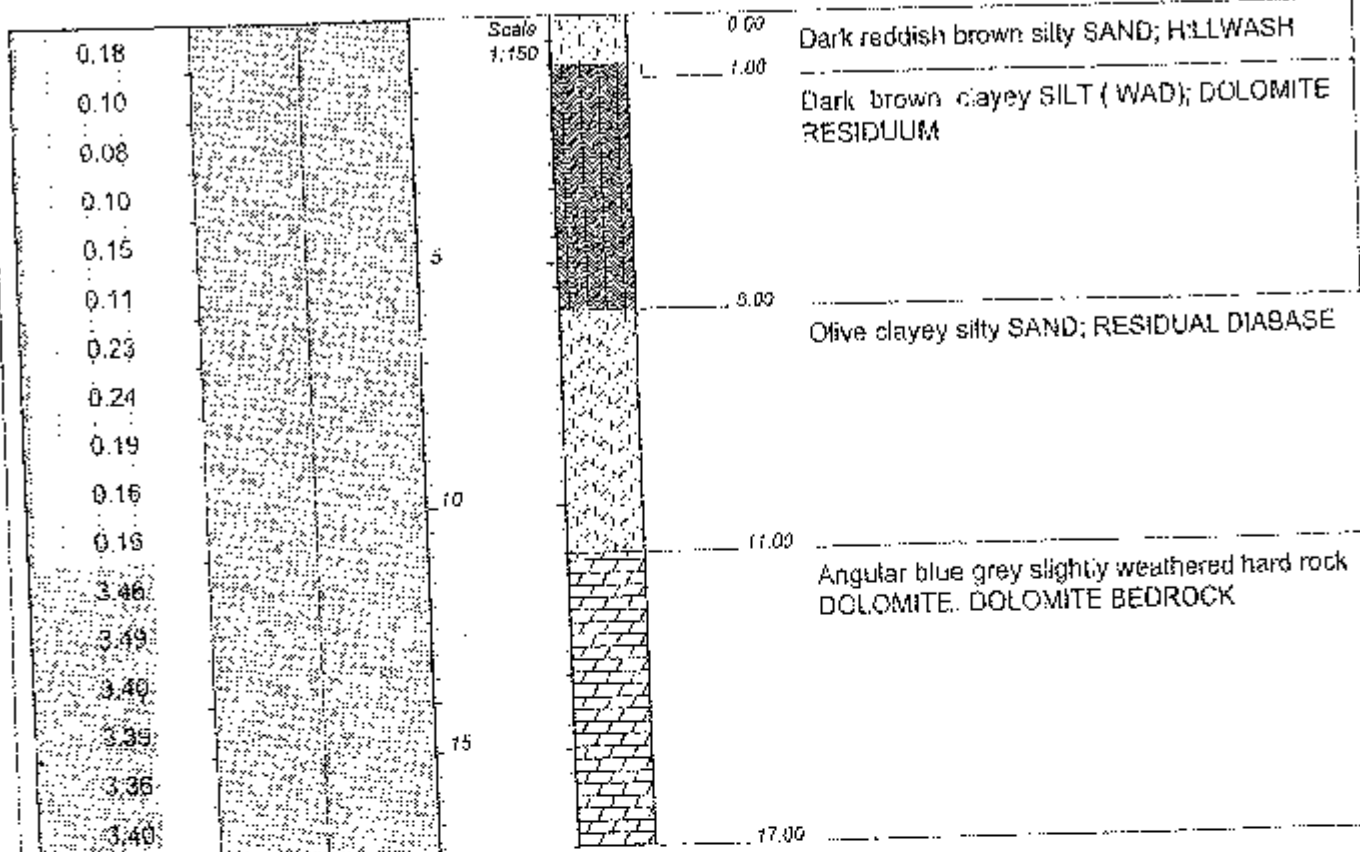
INCLINATION: 90 DEGREES  
DIAM: 165 mm  
DATE: 25/04/2006  
DATE: 2006/05/19

ELEVATION: mamsl  
X-COORD:  
Y-COORD:

DATE: 11/07/06 17:24  
TEXT: \\VGI\306-3\200607-2.TXT

HOLE No: MTIGMV/38





NOTES

- 1) No water strikes noticed.
- 2) No air losses noticed.

1	2	3
Penetr time min:sec	Air return	Sample recov

CONTRACTOR : HENNIE ERWEE DRILLING  
MACHINE : 16 Bar, 8000fm  
DRILLED BY : JOSIAS  
PROFILED BY : B BOLITHO  
TYPE SET BY : A GERSEK  
SETUP FILE : PERCUSI.SET

INCLINATION : 90 DEGREES  
DIAM : 165 mm  
DATE : 25/04/2006  
DATE : 2006/05/20  
DATE : 11/07/06 17:24  
TEXT : WGI306-31200607-2 1XY

ELEVATION : mamsi  
X-COORD :  
Y-COORD :

HOLE No: MT/GMV/39



# **Annexure G(iii)**

Fauna and Flora Report



# **GALAGO ENVIRONMENTAL**



**Fauna and Flora Specialists**

PO Box 886

Irene, 0062

Tel: 012-345 4891

Fax: 086 675 6136

Email: [Vanessam@lantic.net](mailto:Vanessam@lantic.net)

## ***Flora and Fauna Habitat Assessment***

*of*

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### **MONAVONI EXTENSION 51**

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**January 2009**

**GDACE reference number: Gaut:002/08-09/N0590**

**Report Compiled and edited by:** Ms. Vanessa Marais of Galago Environmental  
**Report authors:** Dr. I.L. Rautenbach (Pri.Sci. Nat: Ph.D, T.H.E.D.),  
Mr. W.D. Haacke (Pri. Sci. Nat: M.Sc), Mr. R.F.  
Geyser, Mrs. P. Lemmer (Cert. Sci. Nat: B.Sc.)  
**Report verified/reviewed by:** Dr. I.L. Rautenbach (Pri.Sci. Nat.)

## EXECUTIVE SUMMARY

Galago Environmental CC was appointed to undertake a mammal, bird, reptile, amphibian and plant survey for Monavoni Extension 51 on Part of Portion 5 of the farm Mooiplaats 355 JR and part of Portion 2 of the farm Zwartkop 383 JR (elsewhere referred to as the study site), scheduled for residential development.

The study site lies in the quarter degree grid square 2528CC (Centurion). Mucina and Rutherford (2006) classified the area as Carltonville Dolomite Grassland. The study site is 21.64 ha in extent and lies on both sides of Mimosa Avenue in the centre of portion 5 of the farm Mooiplaats 355-JR. A small triangle of the site projects into portion 2 of the farm Zwartkop 383-JR. The study site is surrounded by undeveloped grasslands on the future Monavoni X 52 to the north, and the future Monavoni X 50 to the southwest. To the northwest are smallholdings along Lochner Road. The south-eastern most portion of the site has a servitude for an access road, for a planned security village.

Three **plant communities** were identified on or within 200 meters of the study site:

- Natural primary grassland;
- Old cultivated fields; and
- Excavated area vegetation.

From the **vegetation** study it was found that No Red-listed plant species were found, however the Orange-listed *Hypoxis hemerocallidea* (African potato) was found sparsely scattered in the Natural primary grassland. These plants should be relocated to a safe, suitable area approved by GDACE. The Natural primary grassland on the site was deemed sensitive. Corridors of Natural primary grassland that have not been disturbed by services trenches should be excluded in all the planned new townships of Monavoni and on the neighbouring sites that are to be developed together with these sites. These corridors should be connected to the rocky outcrops on the various portions that are being developed and to the *Acacia karroo* vegetation in the eastern part of the Monavoni area to facilitate connectivity. These areas must be properly managed throughout the lifespan of the project in terms of fire, eradication of exotics etc. to ensure continuous biodiversity.

The **mammals** study found that most, if not all the terrestrial species listed as potential occupants of the site, will be displaced as a result of the proposed development. This will have no effect on the global conservation status of most of the species. However, the loss of the three Red Listed species is regrettable, although when expressing the magnitude of the loss in statistical terms it would most probably be negligible.

The **avifauna** study found that the open grassland habitat on site offers suboptimal habitat for the Melodious Larks. This species has however been removed from GDACE list of priority species. The development should not have a negative affect on any of the other Red Data bird species listed above due to the high level of human disturbance on site. In addition, there is a lack of sufficient breeding, foraging and breeding habitat for the mentioned Red Data bird species.

The **herpetological** study found that the site appears suitable for a relatively limited number of amphibian and reptile species. Although shallow pools of rain water were present it was not possible to confirm the presence of the near endangered frog. A

specimen of the Striped Harlequin Snake (*Homoroselaps dorsalis*), a Red Data Species, has been recorded from the farm Swartkop 383 JR (Jacobsen, 1995), in this quarter degree grid cell. This proves the presence of this species in this area but it is practically impossible to confirm this record as occurring on this site. As this snake tends to live underground in burrows or tunnels, where it feeds exclusively on Thread Snakes (*Leptotyphlops* spp.), it is usually only found accidentally when dead termitaria are destroyed. To attempt to confirm the presence of this species in an area, it would be necessary to destroy a large number of dead termitaria, which would reduce the suitability of the area for the survival of this snake and other reptiles. Since it appears that this species occurs in relatively low densities it is impossible to suggest conservation measures.

Mitigation proposed is that corridors of natural vegetation be conserved and that connectivity be established between the rocky outcrop, natural grassland and the Acacia karoo vegetation to the east. Numerous specific mitigation measures are recommended for the construction phase of the proposed development.

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## **1. INTRODUCTION**

Galago Environmental CC was appointed to undertake a mammal, bird, reptile, amphibian and plant survey for Monavoni Extension 51 on Part of Portion 5 of the farm Mooiplaats 355 JR and part of Portion 2 of the farm Zwartkop 383 JR (elsewhere referred to as the study site), scheduled for residential development.

The objective was to determine which species might still reside on the site. Special attention had to be given to the habitat requirements of all the Red Data species, which may occur in the area. This survey focuses on the current status of threatened vertebrate and plant species occurring, or which are likely to occur on the proposed development site, and a description of the available and sensitive habitats on the site.

## **2. OBJECTIVES OF THE HABITAT STUDY**

- To assess the current status of the habitat component and current general conservation status of the property;
- To list the perceptible flora of the site and to recommend steps to be taken should endangered, vulnerable or rare species be found;
- To provide lists of mammals, birds, reptiles, and amphibians which occur or might occur, and to identify species of conservation importance;
- To highlight potential impacts of the development on the fauna and flora of the study site; and
- To provide management recommendations to mitigate negative and enhance positive impacts should the proposed development be approved.

## **3. SCOPE OF STUDY**

This report:

- Lists the more noticeable trees, shrubs, suffrutices, herbs, geophytes and grasses observed during the study;
- Indicates medicinal plants recorded and lists alien species;
- Comments on connectivity with natural vegetation on adjacent sites;
- Is a mammal, bird, reptile and amphibian survey based on sightings and literature, with comments on preferred habitats;
- Comments on ecological sensitive areas;
- Evaluates the conservation importance and significance of the site with special emphasis on the current status of resident threatened species;
- Offers recommendations to reduce or minimise impacts, should the proposed development be approved.



## 4. STUDY AREA

The study site lies in the quarter degree grid square 2528CC (Centurion). Mucina and Rutherford (2006) classified the area as Carletonville Dolomite Grassland, a species-rich grassland with shallow soil and slightly undulating plains on dolomite dissected by prominent rocky chert ridges. This grassland falls within a warm-temperate summer-rainfall region with high summer temperatures and severe frequent winter frosts.

This vegetation unit is considered vulnerable. Its conservation target is 24%. Small parts of this unit are conserved in statutory reserves and a few private conservation areas. Almost a quarter of the unit is already transformed by cultivation, urbanization, mining and the building of two dams.

The study site is 21.64 ha in extent and lies on both sides of Mimosa Avenue in the centre of portion 5 of the farm Mooiplaats 355-JR. A small triangle of the site projects into portion 2 of the farm Zwartkop 383-JR. The study site is surrounded by undeveloped grasslands on the future Monavoni X 52 to the north, and the future Monavoni X 50 to the southwest. To the northwest are smallholdings along Lochner Road. The south-eastern most portion of the site has a servitude for an access road, for a planned security village.

The major portion of the site is undeveloped *albeit* ecologically disturbed. Aerial photo images suggest that portions of the site have been tilled in the distant past, but have been left fallow for a considerable period of time allowing a degree of ecological succession to take place. It is clear that annual veld fires have taken its toll on the quality of the basal cover, and consequently on biodiversity. The site is not utilized at present. The substrate is a reddish sandy soil with exposed dolomite, and termitaria have been recorded.

GPS coordinates 25° 51.6095'S; 28° 05.7173'E.

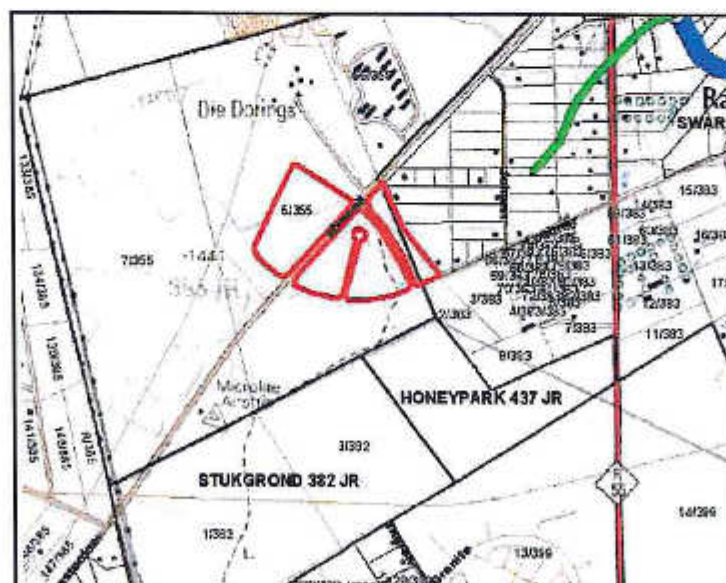


Figure 1: Locality map of the study area

## **5. METHODS**

### **5.1 Vegetation survey**

Information about the Red Data species that occur in the area was obtained from GDACE. The Guidelines issued by GDACE to plant specialists were consulted to ascertain the habitat of the Red Data species concerned.

The PRECIS list of plants recorded in the 2528CC quarter degree grid square was obtained from SANBI. This list was consulted to verify the record of occurrence of the plant species seen in the study site. The vegetation map published in Mucina and Rutherford (2006) was consulted about the composition of Carltonville Dolomite Grassland. A desktop study of the habitats of the red-listed and orange-listed species known to occur in the area was done before the site visits.

The study area was first visited in February 2005, the vegetation communities identified and the plants in each vegetation community recorded. On 29 December 2007, the area was revisited to determine whether any changes took place since the previous site visit. On 11 December 2008, the present demarcation of the site was visited and the vegetation communities identified (see Figure 2). From each vegetation community one or more plots (depending on the size and composition of the vegetation community) were selected at random for detailed study. Each plot, which measured about 10m x 10m, was surveyed in a random crisscross fashion and the plants recorded. The entire site was searched in a random crisscross manner for the presence of the red data species known to occur in the quarter degree grid square. (The names of the Red- and Orange-listed species that occur in the quarter degree grid square appear in Appendix B.). Suitable habitat for red-listed species on the neighbouring properties was examined to a distance of 200 m from the boundaries of the site for the presence of the red-listed plants.

The adjoining agricultural holdings were not surveyed, as their habitat was clearly not suitable for any red-listed or orange-listed species.

### **5.2 Fauna survey**

A site visit was conducted on 15 November 2008. During a four-hour visit the observed and derived presence of fauna associated with the recognised habitat types of the study site, were recorded. This was done with due regard to the well-recorded global distributions of Southern African fauna.

The 500 meters of adjoining properties were scanned for important fauna habitats.

#### **5.2.1 Field Surveys**

During the site visit mammals, birds, reptiles, and amphibians were identified by visual sightings through random transect walks. In addition, mammals were also identified by means of spoor, droppings or roosting sites. Possible burrows or reptile habitats (stumps or rocks) were inspected for any inhabitants. Amphibians were also identified

by their vocalisations. No trapping or mist netting was conducted, as the terms of reference did not require such intensive work.

Birds were identified visually using a 10X42 Bushnell Legend binocular and a 20X-60X Pentax spotting scope and by call and where necessary verified from *Sasol Birds of Southern Africa* (Sinclair *et al.*, 2005) and *Southern African Bird Sounds* (Gibbon, 1991). All sightings of bird species on site were plotted on a PDA using Cyber Tracker as a database, which is connected to an external GPS mouse via blue tooth. Birds were also identified by means of their calls and other signs such as nests and feathers.

Three criteria were used to assess the probability of occurrence of Red Data and other bird species on the study site that will most probably make use of the site and surrounding area for breeding or feeding purposes. These criteria include known distribution range, habitat preference and the presence of suitable habitat on site as well as the presence of food.

### 5.2.2 Desktop Surveys

As the majority of mammals, reptiles and amphibians are secretive, nocturnal and/or poikilothermic or seasonal, distributional ranges and the presence of suitable habitats were used to deduce the presence or absence of these species based on authoritative tomes, scientific literature, field guides, atlases and databases. This can be done irrespective of season.

The probability of occurrences of **mammal** species was based on their respective geographical distributional ranges and the suitability of on-site habitat. In other words, *high* probability would be applicable to a species with a distributional range overlying the study site as well as the presence of prime habitat occurring on the study site. Another consideration for inclusion in this category is the inclination of a species to be common, i.e. normally occurring at high population densities.

*Medium* probability pertains to a mammal species with its distributional range peripherally overlapping the study site, or required habitat on the site being sub-optimal. The size of the site as it relates to its likelihood to sustain a viable breeding population, as well as its geographical isolation is also taken into consideration. Species categorised as *medium* normally do not occur at high population numbers, but cannot be deemed as rare. A *low* probability of occurrence will mean that the species' distributional range is peripheral to the study site and habitat is sub-optimal. Furthermore, some mammals categorised as *low* are generally deemed rare.

The occurrence of some key bird species was verified according to the distribution record obtained during the Southern African Bird Atlas period from 1981 to 1993 (Harrison *et al* 1997) as well as records from 1974 to 1987 according to Tarboton *et al* (1987).

The occurrence and historic distribution of these birds, including all Red Data bird species for the 2528CC quarter-degree grid cell were all verified according to Harrison *et al* (1997) and Tarboton *et al* (1987). The reporting rate was scored between 0 – 100% and is calculated as follows: Total number of cards on which a species was reported during the Southern African Bird Atlas period X 100 ÷ total number of cards for a particular quarter degree grid cell. The colour codes for each species are represented as

follows: YELLOW = VERY LOW, LIGHT ORANGE = LOW, DARK ORANGE = MEDIUM AND RED = HIGH with reference to the specific habitat systems found on site. It is important to note that a quarter-degree grid cell covers a large area. A quarter-degree square, for example 2528CC, covers an area of  $\pm 27 \times 25$  kilometres ( $\pm 693 \text{ km}^2$ ) and it is possible that suitable habitat will exist for a certain Red Data species within this general and surrounding area. However, the specific habitat found on site will not suit the particular Red Data species although it was recorded for the quarter-degree grid cell. For example, Cape Vulture occurs along the Magaliesberg but will not favour the habitat found within the Pretoria CBD, which are both in the same quarter-degree grid cell. Red Data bird species were categorised according to Barnes (2000).

The biodiversity index gives an indication of which habitat will hold the richest bird diversity on site. This is calculated on the sum of the probability of occurrence: 5 = present on site, 4 = not observed on site but has a high probability of occurring on site, 3 = medium, 2 = low, 1 = very low and 0 = not likely to occur, of bird species within a specific habitat system on site.

Based on the impressions gathered during this visit and records in the Transvaal Museum, as well as the documentation of the herpetofauna of the then Transvaal by Dr N. H. G. Jacobsen (Unpublished Ph.D. thesis, University of Pretoria, 1989) and his internal report for the Gauteng Province (1995), as well as the "Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland" (Minter, *et al*, 2004) the list of herpetofauna species which may occur on this study site was compiled. The latest taxonomic nomenclature is being used. The vegetation type was analysed according to the standard handbook by Mucina and Rutherford (eds) (2006).

### 5.2.3 Specific Requirements

During the visit the site was surveyed and assessed for the potential occurrence of Red Data or wetland-associated species such as:

- Juliana's golden mole (*Neamblosomus juliana*)
- Rough-haired golden mole (*Chrysospalax villosus*)
- African marsh rat (*Dasymys incomtus*)
- Angoni vlei rat (*Otomys angoniensis*)
- Vlei rat (*Otomys irroratus*)
- African clawless otter (*Aonyx capensis*)
- Spotted-necked otter (*Lutra maculicollis*)
- Marsh mongoose (*Atilax paludinosus*)
- Forest shrew (*Myosorex varius*)
- White tailed rat (*Mystromys albicaudatus*)
- Highveld golden mole (*Amblysomus septentrionalis*)
- Giant Bullfrogs (*Pyxicephalus adspersus*);
- Cape Vulture (*Gyps coprotheres*)

- Blue Crane (*Anthropoides paradiseus*)
- Lesser Kestrel (*Falco naumanni*)
- African Grass-Owl (*Tyto capensis*)
- African Marsh-Harrier (*Circus ranivorus*)
- White-backed Night-Heron (*Gorsachius leuconotus*)
- White-bellied Korhaan (*Eupodotis senegalensis*)
- Martial Eagle (*Polemaetus bellicosus*)
- African Finfoot (*Podica senegalensis*)
- Lesser Flamingo (*Phoenicopterus minor*)
- Secretarybird (*Sagittarius serpentarius*)
- Black Stork (*Ciconia nigra*)
- Half-collared Kingfisher (*Alcedo semitorquata*)
- Greater Flamingo (*Phoenicopterus ruber*)

#### 5.2.4 Participating Specialists

This investigation was conducted by the following:

Specialists	Aspect Investigated	Qualifications	Prof. Registration	Date of Field Survey
Rautenbach, I.L.	Mammalogy review	Ph.D., T.H.E.D.	Pr. Nat. Sci.	15 November 2008
Haacke, W.D.	Herpetology	M.Sc. (Zoology)	Pr. Nat. Sci.	15 November 2008
Lemmer, P.	Botany	B.Sc. (Botany)	Cert. Sci. Nat.	11 December 2008
Geyser, R.	Avifauna		Pending	15 November 2008
Marais, V.	Environmental Impacts and maps	BL Landscape Architecture		15 November 2008

## 6. RESULTS

### 6.1 Vegetation survey:

#### 6.1.1 Vegetation communities

Three plant communities were identified on or within 200 meters of the study site:

- Natural primary grassland;
- Old cultivated fields; and
- Excavated area vegetation.

Tables 3 to 5 list the trees, shrubs, geophytes, herbs and grasses actually found on each of the surveyed areas on the site.

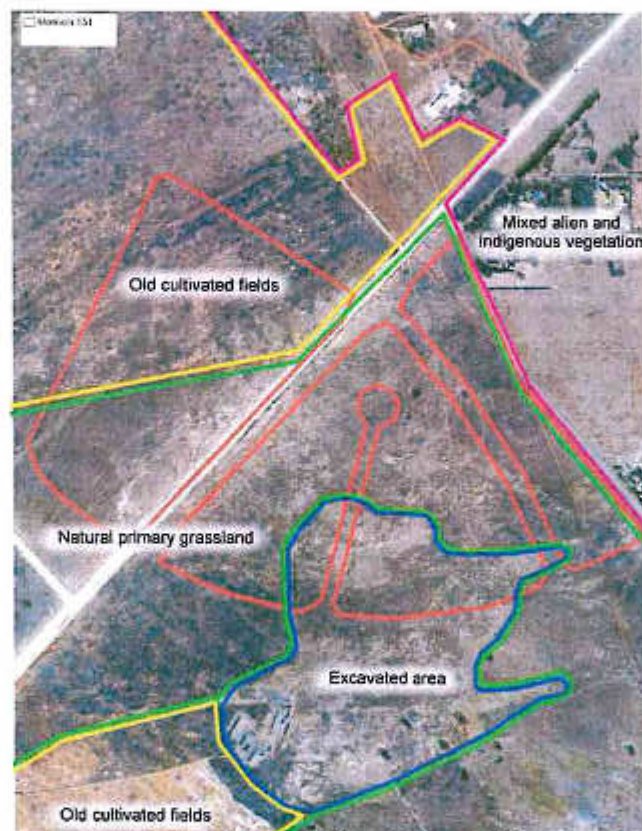


Figure 2: Vegetation communities

#### 6.1.2 Medicinal plants

The names of known medicinal plants are marked with numbers to footnotes in Tables 3 to 5 and the footnotes themselves appear at the end of the last table. Of the 179 plant species recorded on the site, 29 species with medicinal properties were found. Their distribution in the various vegetation communities is as follows:

**Table 1:** Number of medicinal species in the various vegetation communities

VEGETATION COMMUNITY	TOTAL NO OF SPECIES IN VEGETATION COMMUNITY	NO OF MEDICINAL SPECIES IN VEGETATION COMMUNITY
Natural primary grassland	149	29
Old cultivated fields	44	5
Excavated area vegetation	37	4

### 6.1.3 Alien plants

Alien plants are not listed separately, but are included in the lists as they form part of each particular vegetation group. Their names are marked with an asterisk in Tables 3 to 5. Thirteen alien plant species, of which two were Category 1 Declared weeds, were recorded on the study site. The number of alien species in each vegetation community is reflected in table 2.

**Table 2:** Number of Alien species in each vegetation community

VEGETATION COMMUNITY	NO. OF ALIEN SPECIES	CAT 1	NOT DECLARED
Natural primary grassland	2	1	1
Old cultivated fields	9	0	9
Excavated area vegetation	4	2	2

The alien plant names printed in **bold** in the plant tables are those of Category 1 Declared Weeds and the removal of these plants is **compulsory** in terms of the regulations formulated under "The Conservation of Agricultural Resources Act" (Act No. 43 of 1983), as amended. Category 2 Declared invaders should likewise be controlled.

### 6.1.4 Orange-listed species

The habitat of the Natural primary grassland was suitable for the Orange-listed *Hypoxis hemerocallidea* (African potato). This species was found sparsely scattered in this vegetation community. These plants should be relocated to a safe, suitable area approved by GDACE.

### 6.1.5 Red-listed species

The subsurface dolomite areas in the Natural primary grassland of the site were suitable for the Red-listed legume species known to occur within 5 km of the study site. However, this species was not found. (See Appendix B for a list of the Red- and Orange-listed species known to occur in the quarter degree grid square.)

### 6.1.6 Natural primary grassland

#### 6.1.6.1 Compositional aspects and connectivity

The Natural primary grassland was dominated by *Themeda triandra* (Red grass) on subsurface dolomite rock with patches of *Microchloa caffra* (Pincushion grass) and *Sporobolus stapfianus* (Fibrous dropseed) on the shallow soil areas. Pockets of red

Kalahari sand occurred sporadically. Connectivity with natural grassland on neighbouring portions existed to the south and southwest of the site. However, these neighbouring portions are also currently being considered for development.

The species diversity of the Natural primary grassland was high. Of the 149 species recorded, 147 were indigenous species, the life forms of which were as follows:

LIFE FORM	NUMBER OF SPECIES
Annual & perennial herbaceous species	79
Tree species	4
Shrubs and dwarf shrubs	4
Grasses	38
Geophytes	19
Sedges	1
Succulents	2
Total No of indigenous species	147

#### **6.1.6.2 Red – and orange-listed species**

The subsurface dolomite areas in the Natural primary grassland of the site were suitable for the Red-listed legume species known to occur within 5 km of the study site. However, this species was not found. The Orange-listed *Hypoxis hemerocallidea* (African potato) was found scattered in this vegetation community. (See Appendix B for a list of the Red- and Orange-listed species known to occur in the quarter degree grid square.)

#### **6.1.6.3 Medicinal and alien species**

The 28 medicinal species recorded on the site were all found in the Natural primary grassland. Two alien species were recorded, one of which was the Category 1 Declared weed, *Campuloclinium macrocephalum* (Pom pom weed) that occurred sparsely scattered in this vegetation community.

#### **6.1.6.4 Sensitivity**

Because this vegetation community was deemed natural primary grassland, it was considered sensitive.





**Photo 1: *Themeda triandra*-dominated Natural primary grassland along Lochner Street**

**Table 3: Plants recorded in the Natural primary grassland**

SCIENTIFIC NAME	COMMON NAME
<i>Acacia karroo</i> <sup>1,2</sup>	Sweet thorn / Soetdoring
<i>Acalypha angustata</i>	Copper leaf / Katpisbossie
<i>Albuca setosa</i>	Slymuintjie
<i>Alloteropsis semialata</i> subsp <i>eckloniana</i>	
<i>Aloe greatheadii</i> var <i>davyana</i> <sup>1,2</sup>	Kleinaalwyn
<i>Andropogon schirensis</i>	Stab grass / Tweevingergras
<i>Anthospermum rigidum</i> subsp <i>rigidum</i>	
<i>Aristida adscensionis</i>	Annual three-awn / Eenjarige steekgras
<i>Aristida canescens</i> subsp <i>canescens</i>	Pale three-awn / Vaalsteekgras
<i>Aristida congesta</i> subsp <i>barbicollis</i>	Spreading three-awn grass / Witsteekgras
<i>Aristida congesta</i> subsp <i>congesta</i>	Tassle three-awn grass / Katstertsteekgras
<i>Aristida stipitata</i> subsp <i>graciliflora</i>	Long awned three-awn / Langnaaldsteekgras
<i>Asclepias</i> sp	
<i>Asparagus cooperi</i>	
<i>Asparagus transvaalensis</i>	
<i>Babiana bainesii</i>	Bobbejaanuintjie
<i>Barleria macrostegia</i>	
<i>Becium obovatum</i> subsp <i>obovatum</i> var <i>obovatum</i> <sup>2,3</sup>	Cat's whiskers / Katsnor
<i>Bewsia biflora</i>	False love grass / Vals eragrostis
<i>Blepharis squarrosa</i>	
<i>Brachiaria serrata</i>	Velvet grass / Fluweelgras
<b><i>Campuloclinium macrocephalum</i>*</b>	<b>Pom pom weed / Pompombossie</b>
<i>Celtis africana</i>	White stinkwood / Witstinkhout
<i>Cephalaria zeyheriana</i>	Mock scabious
<i>Chaetacanthus costatus</i>	
<i>Chamaecrista capensis</i> var. <i>capensis</i>	
<i>Chamaecrista comosa</i> var <i>capricornia</i>	
<i>Chascanum hederaceum</i> var <i>hederaceum</i>	
<i>Chascanum pinnatifidum</i> var <i>pinnatifidum</i>	
<i>Cheilanthes viridis</i> var. <i>glauca</i>	Blue cliff brake / Blou kransruigtevaring

SCIENTIFIC NAME	COMMON NAME
<i>Chlorophytum fasciculatum</i>	
<i>Clematis brachiata</i> <sup>2</sup>	Traveler's joy / Klimop
<i>Cleome monophylla</i>	
<i>Conyza podocephala</i>	
<i>Crabbaea angustifolia</i> <sup>2</sup>	
<i>Crinum graminicola</i>	Graslelie
<i>Cucumis hirsutus</i>	Wild cucumber / Suurkomkommer
<i>Cucumis zeyheri</i>	Wild cucumber / Wilde agurkie
<i>Cymbopogon excavatus</i>	Broadleaved turpentine grass / Breëblaar terpentyngras
<i>Cymbopogon pospischilii</i>	Turpentine grass / Terpentyngras
<i>Cynodon dactylon</i>	Couch grass / Kweek
<i>Cynoglossum hispidum</i>	Hound's tongue / Ossetongblaar
<i>Cyperus semitrifidus</i>	
<i>Dicoma anomala subsp gerrardii</i> <sup>2</sup>	Maagbitterwortel
<i>Dicoma macrocephala</i>	
<i>Digitaria eriantha</i>	Finger grass / Vingergras
<i>Diheteropogon amplexans</i>	Broadleaved bluestem / Breëblaar blougras
<i>Dipcadi viride</i>	Slymuintjie
<i>Drimia elata</i> <sup>2</sup>	Jeukbol
<i>Elephantorrhiza elephantina</i> <sup>1,2,3</sup>	Elephant's root / Olifantswortel
<i>Elionurus muticus</i>	
<i>Eragrostis capensis</i>	Heartseed love grass / Hartjiesgras
<i>Eragrostis chloromelas</i>	Curly leaf / Krulblaar
<i>Eragrostis gummiflua</i>	Gum grass / Gomgras
<i>Eragrostis nindensis</i>	Wether love grass / Hamelgras
<i>Eragrostis plana</i>	Tough love grass / Taaipoleragrostis
<i>Eragrostis racemosa</i>	Narrow heart love grass / Smallhartjiesgras
<i>Eragrostis superba</i>	
<i>Eriosema burkei var burkei</i>	
<i>Eriosema cordatum</i>	
<i>Euphorbia trichadenia var trichadenia</i>	Melkbol
<i>Eustachys paspaloides</i>	Fan grass / Bruin hoenderspoor
<i>Felicia muricata subsp muricata</i> <sup>1,2,3</sup>	White felicia
<i>Gazania krebsiana subsp serrulata</i> <sup>3</sup>	
<i>Geigeria burkei subsp burkei var intermedia</i>	Vermeersiektebossie
<i>Gladiolus permeabilis subsp edulis</i>	
<i>Gnidia capitata</i> <sup>1,2</sup>	
<i>Gnidia microcephala</i>	Besembossie
<i>Gnidia sericocephala</i>	
<i>Grewia flava</i> <sup>2</sup>	
<i>Helichrysum caespitium</i>	Speelwonderboom
<i>Helichrysum callicomum</i>	
<i>Helichrysum chionosphaerum</i>	
<i>Helichrysum dasymallum</i>	
<i>Helichrysum nudifolium var nudifolium</i> <sup>1,2</sup>	Hottentot's tea / Hottentotstee
<i>Helichrysum paronychioides</i>	
<i>Helichrysum rugulosum</i> <sup>2,3</sup>	
<i>Hermannia cordata</i>	
<i>Hermannia depressa</i> <sup>2,3</sup>	Creeping red Hermannia / Rooiopslag
<i>Heteropogon contortus</i>	Spear grass / Assegaaigras
<i>Hibiscus microcarpus</i>	

SCIENTIFIC NAME	COMMON NAME
<i>Hyparrhenia hirta</i>	Common thatching grass / Dekgras
<i>Hypoxis hemerocallidea</i> <sup>1,2,3</sup>	Star flower / Gifbol
<i>Hypoxis obtusa</i>	
<i>Hypoxis rigidula</i> var <i>rigidula</i>	Silverleaved star flower / Wilde tulp
<i>Indigofera daleoides</i> var <i>daleoides</i>	
<i>Indigofera hedyantha</i>	
<i>Ipomoea bathycolpos</i>	
<i>Ipomoea oblongata</i> <sup>2</sup>	
<i>Ipomoea ommaneyi</i> <sup>2</sup>	Beespatat
<i>Justicia anagalloides</i>	
<i>Kohautia caespitosa</i> subsp <i>brachyloba</i>	
<i>Lactuca inermis</i>	Wild lettuce
<i>Ledebouria marginata</i>	
<i>Ledebouria revoluta</i> <sup>3</sup>	Common ledebouria
<i>Lotononis laxa</i>	
<i>Melinis repens</i> subsp <i>repens</i>	Red top grass
<i>Microchloa caffra</i>	Pincushion grass / Elsgras
<i>Nemesia fruticans</i>	Wilde leeubekkie
<i>Nidorella hottentotica</i>	
<i>Ornithogalum tenuifolium</i> subsp <i>tenuifolium</i>	Bosui
<i>Osteospermum muricatum</i> subsp <i>muricatum</i>	
<i>Pachycarpus schinzianus</i> <sup>2</sup>	Bitterwortel
<i>Pelargonium dolomiticum</i>	
<i>Pelargonium luridum</i> <sup>1,2</sup>	Stalkflowered pelargonium / Wildemalva
<i>Pentanisia angustifolia</i>	Wild verbena / Sooi-brandbossie
<i>Polygala amatymbica</i>	Dwarf polygala
<i>Polygala hottentotta</i> <sup>2,3</sup>	Small purple broom
<i>Polygala rehmannii</i>	
<i>Pygmaeothamnus chamaedendrum</i> var <i>chamaedendrum</i>	Sand apple / Goorappel
<i>Raphanus raphanistrum</i> *	Wild radish / Wilderadys
<i>Raphionacme hirsuta</i> <sup>2</sup>	Khadi root / Khadiwortel
<i>Rothea hirsuta</i>	Small violet bush
<i>Scabiosa columbaria</i> <sup>1,2,3</sup>	Wild scabiosa / Bitterbos
<i>Schizachyrium sanguineum</i>	Red autumn grass / Rooi herfsgras
<i>Searsia lancea</i>	Karee / Karee
<i>Searsia pyroides</i> var <i>pyroides</i> <sup>4</sup>	Common wild currant / Taaibos
<i>Sebaea grandis</i>	
<i>Selago densiflora</i>	Koningstapyt
<i>Senecio coronatus</i>	Sybossie
<i>Senecio inornatus</i>	
<i>Senecio venosus</i>	Besembossie
<i>Setaria nigrirostris</i>	Black seed bristle grass / Swartsaadmannagras
<i>Setaria pumila</i>	Garden bristle grass / Tuin mannagras
<i>Setaria sphacelata</i> var <i>torta</i>	Creeping bristle grass / Kruipmannagras
<i>Solanum panduriforme</i>	Poison apple / Gifappel
<i>Sonchus nanus</i>	
<i>Sphenostylis angustifolius</i>	Wild swetpea bush / Wilde ertjie
<i>Sporobolus centrifugus</i>	Olive dropseed / Olyf-fynsaad
<i>Sporobolus discosporus</i>	
<i>Sporobolus stapfianus</i>	Fibrous dropseed / Veselfynsaadgras

SCIENTIFIC NAME	COMMON NAME
<i>Striga asiatica</i>	
<i>Themeda triandra</i>	Red grass / Rooigras
<i>Thesium</i> sp	Besembossie
<i>Tolpis capensis</i>	
<i>Trachyandra saltii</i> var <i>saltii</i>	
<i>Trachypogon spicatus</i>	Giant spear grass / Bokbaardgras
<i>Trichoneura grandiglumis</i>	Small rolling grass / Klein rolgras
<i>Tripogon minimus</i>	
<i>Triraphis andropogonoides</i>	Broom needle grass / Perdegras
<i>Triumfetta sonderi</i>	Maagbossie
<i>Tylosema esculentum</i>	Gemsbok bean / Gemsbokboontjie
<i>Vernonia oligocephala</i> <sup>1,2</sup>	Cape vernonia / Blounaaldetee bossie
<i>Vigna unguiculata</i> subsp <i>stenophylla</i>	
<i>Vigna vexillata</i> var <i>vexillata</i> <sup>3</sup>	Narrowleaved wild pea / Wildeertjie
<i>Wahlenbergia denticulata</i> var <i>transvaalensis</i>	
<i>Withania somnifera</i> <sup>1,2</sup>	Winter cherry / Geneesblaarbossie
<i>Ziziphus zeyheriana</i> <sup>2</sup>	Dwarf buffalothorn / Dwergblinkblaar-wag-'n-
<i>Zornia milneana</i>	

## 6.1.7 Old cultivated fields

### 6.1.8.1 Compositional aspects and connectivity

The Old cultivated fields vegetation community contained large areas covered by the indigenous invader species, *Pseudognaphalium oligandrum* and other indigenous plants that tolerate poor soil, such as *Cynodon dactylon* (Couch grass) and *Conyza podocephala*.

Connectivity with natural grassland existed to the south, although these portions are also currently being considered for development. The species diversity was low. Of the 44 species recorded, 35 were indigenous species, the life forms of which were as follows:

LIFE FORM	NUMBER OF SPECIES
Annual & perennial herbaceous species	17
Grasses	16
Geophytes	1
Sedges	1
Total No of indigenous species	35

### 6.1.8.2 Red – and orange-listed species

The habitat was not suitable for the Red-listed species known to occur within 5 km of the site or for the orange-listed *Hypoxis hemerocallidea* (African potato) that occurred on neighbouring portions of this development area.

### 6.1.8.3 Medicinal and alien species and sensitivity

Five medicinal species were recorded in this vegetation community. Nine alien species were recorded, none of which were Declared invader species. The Old cultivated fields vegetation community was not considered sensitive.

**Table 4:** Plants recorded in the Old cultivated fields

SCIENTIFIC NAME	COMMON NAME
<i>Aristida canescens subsp canescens</i>	Pale three-awn / Vaalsteekgras
<i>Aristida congesta subsp barbicollis</i>	Spreading three-awn grass / Witsteekgras
<i>Aristida congesta subsp congesta</i>	Tassle three-awn grass / Katstertsteekgras
<i>Asparagus cooperi</i>	
<i>Bidens bipinnata*</i>	Spanish blackjack / Spaanse knapsekêrel
<i>Bidens pilosa*</i>	Blackjack / Knapsekêrel
<i>Brachiaria serrata</i>	Velvet grass / Fluweelgras
<i>Chaetochloa costatus</i>	
<i>Chamaecrista capensis var. capensis</i>	
<i>Cleome monophylla</i>	
<i>Commelina benghalensis*</i>	Blouselblommetjie
<i>Commelina livingstonii</i>	
<i>Conyza podocephala</i>	
<i>Cymbopogon pospischilii</i>	Turpentine grass / Terpentyngras
<i>Cynodon dactylon</i>	Couch grass / Kweek
<i>Cyperus esculentus var esculentus</i>	Yellow nutsedge / Geeluintjie
<i>Digitaria eriantha</i>	Finger grass / Vingergras
<i>Eragrostis chlorometas</i>	Curly leaf / Krulblaar
<i>Eragrostis curvula</i>	Weeping love grass / Oulandsgras
<i>Eragrostis lehmanniana var lehmanniana</i>	Lehmann's love grass / Krietjiesgras
<i>Eragrostis patentipilosa</i>	Footpath love grass / Voetpad eragrostis
<i>Eragrostis rigidior</i>	Broadleaved curly leaf / Breëkrulgras
<i>Felicia muricata subsp muricata<sup>1,2,3</sup></i>	White felicia
<i>Helichrysum nudifolium var nudifolium<sup>1,2</sup></i>	Hottentot's tea / Hottentotstee
<i>Helichrysum rugulosum<sup>2,3</sup></i>	
<i>Hibiscus trionum*</i>	Bladder hibiscus / Terblansbossie
<i>Hyparrhenia hirta</i>	Common thatching grass / Dekgras
<i>Indigofera suffruticosa*</i>	
<i>Lepidium bonariense*</i>	Pepper weed / Peperbossie
<i>Melinis repens subsp repens</i>	Red top grass
<i>Monsonia angustifolia</i>	Crane's bill / Angelbossie
<i>Nemesia fruticans</i>	Wilde leuebekkie
<i>Nidorella hottentotica</i>	
<i>Paspalum dilatatum*</i>	Common paspalum / Gewone paspalum
<i>Pogonarthria squarrosa</i>	Herring bone grass / Sekelgras
<i>Pseudognaphalium oligandrum</i>	
<i>Senecio venosus</i>	Besembossie
<i>Sida dregei</i>	Spider-leg
<i>Solanum panduriforme</i>	Poison apple / Gifappel
<i>Tagetes minuta*</i>	Khaki weed / Kakiebos
<i>Urochloa mosambicensis</i>	Bushveld signal grass / Bosveldsinjaalgras
<i>Vernonia oligocephala<sup>1,2</sup></i>	Cape vernonia / Blounaaldetee bossie
<i>Withania somnifera<sup>1,2</sup></i>	Winter cherry / Geneesblaarbossie
<i>Zinnia peruviana*</i>	Redstar zinnia / Wildejakobgop

## 6.1.8 Excavated area vegetation

### 6.1.9.1 Compositional aspects and connectivity

Most of the topsoil of this vegetation community had been removed in the past and the dolomite exposed. The species diversity was low. Of the 37 species recorded, 33 were indigenous species, with those that tolerate poor soil, such as *Cynodon dactylon* (Couch grass) and *Conyza podocephala* occurring in large numbers. The life forms of the indigenous species were as follows:

LIFE FORM	NUMBER OF SPECIES
Annual & perennial herbaceous species	14
Grasses	15
Geophytes	3
Sedges	1
Total No of indigenous species	33

### 6.1.9.2 Red – and orange-listed species

The habitat was not suitable for the red-listed or the orange-listed species known to occur in the area.

### 6.1.9.3 Medicinal and alien species and sensitivity

Four medicinal species and four alien species were recorded in this vegetation community. Of the alien species, two were Category 1 Declared weeds. This vegetation community was not considered sensitive.



**Photo 2: Vegetation of the excavated area showing exposed dolomite and dense stands of both alien and indigenous invader plants**

**Table 5:** Plants recorded in the Excavated area vegetation

SCIENTIFIC NAME	COMMON NAME
<i>Acalypha angustata</i>	Copper leaf / Katpisbossie
<b><i>Achyranthus aspera</i>*</b>	<b>Chaff flower / Langklits</b>
<i>Alternanthera pungens</i> *	Paper thorns / Kakie dubbeltjie
<i>Aristida adscensionis</i>	Annual three-awn / Eenjarige steekgras
<i>Aristida canescens</i> subsp <i>canescens</i>	Pale three-awn / Vaalsteekgras
<i>Aristida congesta</i> subsp <i>barbicollis</i>	Spreading three-awn grass / Witsteekgras
<i>Aristida congesta</i> subsp <i>congesta</i>	Tassle three-awn grass / Katstertsteekgras
<b><i>Campuloclinium macrocephalum</i>*</b>	<b>Pom pom weed / Pompombossie</b>
<i>Chamaecrista comosa</i> var <i>capricornia</i>	
<i>Chloris virgata</i>	Feathertop chloris / Witpluim chloris
<i>Coryza podocephala</i>	
<i>Crotalaria sphaerocarpa</i> subsp <i>sphaerocarpa</i>	Mealie crotolaria / Mielie crotolaria
<i>Cucumis zeyheri</i>	Wild cucumber / Wilde agurkie
<i>Cynodon dactylon</i>	Couch grass / Kweek
<i>Cyperus esculentus</i> var <i>esculentus</i>	Yellow nutsedge / Geeluintjie
<i>Eragrostis lehmanniana</i> var <i>lehmanniana</i>	Lehmann's love grass / Knietjiesgras
<i>Eragrostis plana</i>	Tough love grass / Taaipoleragrostis
<i>Eragrostis superba</i>	
<i>Felicia muricata</i> subsp <i>muricata</i> <sup>1,2,3</sup>	White felicia
<i>Helichrysum nudifolium</i> var <i>nudifolium</i> <sup>1,2</sup>	Hottentot's tea / Hottentotstee
<i>Helichrysum rugulosum</i> <sup>2,3</sup>	
<i>Hermannia cordata</i>	
<i>Heteropogon contortus</i>	Spear grass / Assegaaigras
<i>Hyparrhenia hirta</i>	Common thatching grass / Dekgras
<i>Hypoxis obtusa</i>	
<i>Melinis repens</i> subsp <i>repens</i>	Red top grass
<i>Osteospermum muricatum</i> subsp <i>muricatum</i>	
<i>Paspalum dilatatum</i> *	Common paspalum / Gewone paspalum
<i>Pogonarthria squarrosa</i>	Herring bone grass / Sekelgras
<i>Pollichia campestris</i>	Waxberry / Teesuikerbossie
<i>Solanum lichtensteinii</i>	Giant bitter apple / Bitterappel
<i>Solanum panduriforme</i>	Poison apple / Gifappel
<i>Sonchus dregeanus</i>	
<i>Tephrosia semiglabra</i>	
<i>Tragus berteronianus</i>	Common carrot-seed grass / Gewone wortelsaadgras
<i>Urochloa panicoides</i>	Garden signal grass / Tuin beesgras
<i>Vernonia oligocephala</i> <sup>1,2</sup>	Cape vernonia / Blounaaldetee bossie

<sup>1</sup> Van Wyk, B.-E., Van Oudtshoorn, B. & Gerlicke, N. 2002.

<sup>2</sup> Watt, J.M. & Breyer-Brandwijk, M.G. 1962.

<sup>3</sup> Pooley, E. 1998.

<sup>4</sup> Van Wyk, B. & Van Wyk P. 1997.

## 6.2 Mammals:

The local occurrences of mammals are closely dependent on broadly defined habitat types, in particular terrestrial, arboreal (tree-living), rupicolous (rock-dwelling) and wetland-associated vegetation cover. It is thus possible to deduce the presence or absence of mammal species by evaluating the habitat types within the context of global distribution ranges. Sight records and information from residents or knowledgeable locals audit such deductions.

From a mammal habitat perspective only one of the four major types are present on the site, namely terrestrial.

There are no outstanding randjies, rocky outcrops nor bat caves on the site.

### ***Observed and Expected Species Richness***

All large mammals have disappeared decades ago to benefit farming interests and latterly more intensive land-use practices. Recently many medium-sized mammals have thus also succumbed such as the black-backed jackal and aardvark.

Considering the absence of arboreal, rupicolous and wetland habitats, those mammals closely reliant on these were *a priori* excluded from the list of potential occurrences (Table 6). Range management was geared to cattle farming with little or no consideration to wildlife conservation, hence the low species diversity relative to that of historical times.

Of the 28 mammal species expected to occur on the study site (Table 6), only three species were confirmed during the site visit (Table 7).

Table 7 lists the mammals that were observed or deduced to occupy the site, or to be occasional visitors. All feral mammal species expected to occur on the study site (e.g. house mice, house rats, dogs and cats) were omitted from the assessment since these species normally associate with human settlements.

All but three of the species of the resident diversity (Table 7) are generalists / opportunists with wide habitat tolerances and are thus common and widespread in SA.

The vesper bats listed are very common, widespread and ecologically resilient. Given daytime roosts in the form of crevices in structures of civilization in the general area, these animals can be expected to hunt for aerial insects during summer dusks.

### ***Mammal Habitat Assessment***

From a mammal perspective, the terrestrial habitat is in poor condition due to intensive cattle grazing in the past. The site has suffered from fires during the recent dry season, and basal cover was sprouting during the site visit. As such, it was low and presented poor refuge against predation. Fires are a catastrophic event in the seasonal cycles of small mammal populations and were curtailed for the sake of grazing prior to the removal of cattle herds. Prime terrestrial habitat for small terrestrial mammals is directly linked to good cover rather than the species composition of the vegetative ground cover.



Seasonal fires are therefore concluded to have a severe impact on population densities, and possibly mammal diversity.

The 500 meters of adjoining properties: To the south-west and south-east are small holdings where the natural environment was subjected to small-farming practices. The areas to the north and east consist of open grassland which is in a similar state of ecological disrepair and although there is a high degree of connectivity, the fact that only three Red Listed species are recognized on the site, relegates this ecological mechanism to a low level of importance.

**Table 6:** The mammals which were observed or deduced to occupy the site

	SCIENTIFIC NAME	ENGLISH NAME
√	<i>Lepus saxatilis</i>	Scrub hare
√	<i>Cryptomys hottentotus</i>	African mole rat
*	<i>Rhabdomys pumilio</i>	Four-striped grass mouse
*	<i>Mus minutoides</i>	Pygmy mouse
*	<i>Mastomys natalensis</i>	Natal multimammate mouse
*	<i>Mastomys coucha</i>	Southern multimammate mouse
*	<i>Aethomys ineptus</i>	Tete veld rat
*	<i>Tatera brantsii</i>	Highveld gerbil
?	<i>Saccostomus campestris</i>	Pouched mouse
?	<i>Dendromus melanotis</i>	Grey pygmy climbing mouse
?	<i>Dendromus mesomelas</i>	Brants' climbing mouse
?	<i>Dendromus mystacalis</i>	Chestnut climbing mouse
DD?	<i>Suncus lixus</i>	Greater dwarf shrew
DD?	<i>Suncus infinitesimus</i>	Least dwarf shrew
*	<i>Crocidura cyanea</i>	Reddish-grey musk shrew
*	<i>Crocidura hirta</i>	Lesser red musk shrew
NT?	<i>Atelerix frontalis</i>	Southern African hedgehog
*	<i>Neoromicia capensis</i>	Cape serotine bat
*	<i>Scotophilus dinganii</i>	African yellow house bat
*	<i>Scotophilus viridis</i>	Greenish yellow house bat
?	<i>Genetta genetta</i>	Small-spotted genet
?	<i>Genetta tigrina</i>	SA large-spotted genet
√	<i>Cynictis penicillata</i>	Yellow mongoose
*	<i>Galerella sanguinea</i>	Slender mongoose
?	<i>Canis mesomelas</i>	Black-backed jackal
?	<i>Ictonyx striatus</i>	Striped polecat
?	<i>Sylvicapra grimmia</i>	Common duiker
?	<i>Raphicerus campestris</i>	Steenbok

√ Definitely there or has a high probability to occur;

\* Medium probability to occur based on ecological and distributional parameters;

? Low probability to occur.

Red Data species rankings as defined in Friedmann and Daly's S.A. Red Data Book / IUCN (World Conservation Union) (2004) are indicated in the first column: CR= Critically Endangered, En = Endangered, Vu = Vulnerable, LR/cd = Lower risk conservation dependent, LR/lnt = Lower Risk near threatened, DD = Data Deficient. All other species are deemed of Least Concern.

**Table 7:** Mammal species positively confirmed from the study site.

SCIENTIFIC NAME	ENGLISH NAME	OBSERVATION INDICATOR	HABITAT
<i>L. saxatilis</i>	Scrub hare	Faecal pellets	Short grass
<i>C. hottentotus</i>	African mole rat	Tunnel system	Wide tolerance
<i>C. penicillata</i>	Yellow mongoose	Grassland	Wide tolerance

All three species are widespread and common and justifiably called opportunistic generalists. With their proven wide habitat tolerance and/or reticent behaviour patterns, they display a remarkable ability to co-exist in the close proximity of human activities.

#### ***Threatened and Red Listed Mammal Species***

The two dwarf shrew species are listed as potential occupants. They have a tendency to use dead termite mounds as refuges, and these structures are used as a coarse indicator of their presence. Their assigned "Data Deficient" Red Listed conservation status is, however, indicative of a dearth of field data to ascertain their true global conservation status. Under natural conditions, hedgehogs have no problem with surviving and their "Near Threatened" conservation status is the direct result of human predation. Considering the extent of the site and surrounding undeveloped areas, some individuals must have managed to survive.

It is submitted that no other Endangered species could have survived the ravages of farming and urbanization: the white-tailed rat is extremely sensitive to habitat conditions which are not met on this site, while habitat requirements for rough-haired golden moles or any other golden moles are absent. Other Red Data or sensitive species are deemed absent from the site since the site is too disturbed, falls outside the distributional ranges of some species, or does not offer suitable habitat(s).

## **6.2 Avifauna:**

### ***Avifaunal Habitat Assessment:***

The study site is situated within the Dry Highveld Grassland Bioregion of the Grassland Biome and more specifically within the Carletonville Dolomite Grassland vegetation type according to Mucina and Rutherford (2006). Egoli Granite Grassland runs past the southern edge of the study site and the grassland on the study site can probably be described as a transition area between the two grassland vegetation types.

Within this vegetation type one distinct bird habitat system was identified.

#### **Open grassland:**

The entire study site consists of open natural grassland (either primary or secondary) with a few scattered trees and shrubs. Open grassland is the most important habitat type for South Africa's threatened bird species in the region with a proportional importance of 27% (Barnes 2000). The highest diversity of threatened bird species occurs within this grassland habitat of which many are in the highest category of threat (Barnes 2000). The presence and abundance of bird species in this habitat will vary from season to season being lush and green in summer after summer rains and dry and brown or burnt during winter. The area will favour ground living bird species such as lap-

wings, francolins, pipits, long claws, larks and chats that either hunt for insects or breed on the ground, in burrows in the ground or between the grass. Weavers and widow-birds will make use of this area for feeding (seeds) during late summer and early winter when the grass is not burnt. Widow-birds and cisticolas will also breed in the tall grass during summer. Aerial feeding birds such as martins, swifts and swallows will hunt for insects over the grasslands.

### **Observed and Expected Species Richness**

Of the 314 bird species recorded for the 2528CC q.d.g.c 101 (32.16%) are likely to occur on the study site and 32 (31.6%) of these bird species were actually observed on the study site (Table 8).

The bird species listed in Table 8 are in species order according to *Roberts - Birds of Southern Africa* VII th edition (Hockey *et al.*, 2005). These were actually observed on site (**in bold**) or are likely to occur within the specific habitat found on site. This does not include overflying birds or rare vagrants. The reporting rate (%) is according to Harrison *et al.* (1997). The habitat preference, **OG = Open Grassland** is indicated next to the reporting rate with their possibility of occurrence in these specific habitats on site rated as 5 = present, 4 = High, 3 = Medium, 2 = Low, 1 = Very low, and 0 = Not likely to occur.

**Table 8:** Bird species observed and that are likely to occur on the study site.

SCIENTIFIC NAME	ENGLISH NAME	R RATE (%) <sup>*</sup> 2528CC	HABITAT PREFERENCE
			OG
<i>Peliperdix coqui</i>	Coqui Francolin	4	4
<i>Scleroptila levaillantoides</i>	Orange River Francolin	1	1
<b><i>Pternistis swainsonii</i></b>	<b>Swainson's Spurfowl</b>	21	5
<i>Coturnix coturnix</i>	Common Quail	1	4
<b><i>Numida meleagris</i></b>	<b>Helmeted Guineafowl</b>	53	5
<i>Jynx ruficollis</i>	Red-throated Wryneck	20	4
<i>Upupa africana</i>	African Hoopoe	76	4
<i>Merops apiaster</i>	European Bee-eater	12	4
<i>Colius striatus</i>	Speckled Mousebird	72	3
<i>Urocolius indicus</i>	Red-faced Mousebird	38	4
<b><i>Chrysococcyx caprius</i></b>	<b>Diderick Cuckoo</b>	26	5
<b><i>Cypsiurus parvus</i></b>	<b>African Palm-Swift</b>	23	5
<i>Apus affinis</i>	Little Swift	39	4
<b><i>Apus caffer</i></b>	<b>White-rumped Swift</b>	19	5
<i>Corythaixoides concolor</i>	Grey Go-away-bird	44	2
<i>Tyto alba</i>	Barn Owl	6	3
<i>Bubo africanus</i>	Spotted Eagle-Owl	4	3
<i>Columba livia</i>	Rock Dove	27	4
<i>Columba guinea</i>	Speckled Pigeon	42	4
<b><i>Streptopelia senegalensis</i></b>	<b>Laughing Dove</b>	94	5
<b><i>Streptopelia capicola</i></b>	<b>Cape Turtle-Dove</b>	81	4
<b><i>Streptopelia semitorquata</i></b>	<b>Red-eyed Dove</b>	32	5
<b><i>Afrotis afraoides</i></b>	<b>Northern Black Korhaan</b>	13	5
<i>Eupodotis senegalensis</i>	White-bellied Korhaan (VU)	<1	2

SCIENTIFIC NAME	ENGLISH NAME	R RATE (%)* 2528CC	HABITAT PREFERENCE
			OG
<i>Burhinus capensis</i>	Spotted Thick-knee	36	4
<i>Vanellus armatus</i>	Blacksmith Lapwing	39	3
<i>Vanellus senegallus</i>	African Wattled Lapwing	16	4
<b><i>Vanellus coronatus</i></b>	<b>Crowned Lapwing</b>	74	5
<i>Cursorius temminckii</i>	Temminck's Courser	<1	2
<i>Elanus caeruleus</i>	Black-shouldered Kite	47	4
<i>Milvus migrans</i>	Black Kite	14	2
<i>Buteo vulpinus</i>	Steppe Buzzard	5	4
<i>Falco naumanni</i>	Lesser Kestrel (VU)	1	2
<i>Falco rupicolus</i>	Rock Kestrel	<1	1
<i>Falco rupicoloides</i>	Greater Kestrel	5	4
<i>Falco amurensis</i>	Amur Falcon	1	4
<b><i>Ardea melanocephala</i></b>	<b>Black-headed Heron</b>	40	5
<b><i>Bubulcus ibis</i></b>	<b>Cattle Egret</b>	71	5
<b><i>Bostrychia hagedash</i></b>	<b>Hadeda Ibis</b>	86	4
<i>Ciconia ciconia</i>	White Stork	2	2
<i>Telophorus zeylonus</i>	Bokmakierie	64	4
<b><i>Corvus albus</i></b>	<b>Pied Crow</b>	64	5
<i>Lanius collurio</i>	Red-backed Shrike	1	1
<i>Lanius minor</i>	Lesser Grey Shrike	1	1
<b><i>Lanius collaris</i></b>	<b>Common Fiscal</b>	90	5
<b><i>Riparia cincta</i></b>	<b>Banded Martin</b>	1	5
<b><i>Hirundo rustica</i></b>	<b>Barn Swallow</b>	28	5
<i>Hirundo albigularis</i>	White-throated Swallow	22	4
<b><i>Hirundo cucullata</i></b>	<b>Greater Striped Swallow</b>	34	5
<i>Hirundo abyssinica</i>	Lesser Striped Swallow	20	4
<i>Hirundo spilodera</i>	South African Cliff-Swallow	10	4
<i>Hirundo fuligula</i>	Rock Martin	18	4
<i>Delichon urbicum</i>	Common House-Martin	5	1
<b><i>Pycnonotus tricolor</i></b>	<b>Dark-capped Bulbul</b>	89	4
<i>Cisticola tinniens</i>	Levaillant's Cisticola	10	2
<i>Cisticola fulvicapilla</i>	Neddicky	16	4
<b><i>Cisticola juncidis</i></b>	<b>Zitting Cisticola</b>	11	5
<b><i>Cisticola aridulus</i></b>	<b>Desert Cisticola</b>	3	5
<b><i>Cisticola textrix</i></b>	<b>Cloud Cisticola</b>	3	5
<i>Cisticola ayresii</i>	Wing-snapping Cisticola	1	3
<i>Prinia subflava</i>	Tawny-flanked Prinia	22	4
<b><i>Prinia flavicans</i></b>	<b>Black-chested Prinia</b>	22	5
<b><i>Mirafra cheniana</i></b>	<b>Melodious Lark (NT)</b>	<1	5
<i>Mirafra africana</i>	Rufous-naped Lark	21	4
<b><i>Mirafra fasciolata</i></b>	<b>Eastern Clapper Lark</b>	5	5
<i>Chersomanes albofasciata</i>	Spike-heeled Lark	2	4
<i>Calandrella cinerea</i>	Red-capped Lark	4	3
<i>Saxicola torquatus</i>	African Stonechat	15	4

SCIENTIFIC NAME	ENGLISH NAME	R RATE (%) 2528CC	HABITAT PREFERENCE
			OG
<i>Oenanthe pileata</i>	Capped Wheatear	3	4
<i>Cercomela familiaris</i>	Familiar Chat	2	2
<i>Myrmecocichla formicivora</i>	Ant-eating Chat	8	2
<i>Onychognathus morio</i>	Red-winged Starling	23	0
<b><i>Lamprotornis nitens</i></b>	<b>Cape Glossy Starling</b>	46	4
<i>Spreo bicolor</i>	Pied Starling	9	2
<i>Creatophora cinerea</i>	Wattled Starling	1	1
<i>Acridotheres tristis</i>	Common Myna (INT)	46	4
<i>Chalcomitra amethystina</i>	Amethyst Sunbird	32	3
<i>Cinnyris talatala</i>	White-bellied Sunbird	37	2
<i>Ploceus capensis</i>	Cape Weaver	22	2
<b><i>Ploceus velatus</i></b>	<b>Southern Masked-Weaver</b>	73	5
<i>Quelea quelea</i>	Red-billed Quelea	5	3
<i>Euplectes afer</i>	Yellow-crowned Bishop	5	4
<i>Euplectes orix</i>	Southern Red Bishop	38	4
<i>Euplectes albonotatus</i>	White-winged Widowbird	10	4
<b><i>Euplectes ardens</i></b>	<b>Red-collared Widowbird</b>	9	5
<i>Euplectes progne</i>	Long-tailed Widowbird	25	4
<i>Ortygospiza atricollis</i>	African Quailfinch	7	4
<i>Amadina erythrocephala</i>	Red-headed Finch	3	3
<i>Estrilda astrild</i>	Common Waxbill	10	4
<i>Vidua macroura</i>	Pin-tailed Whydah	18	4
<b><i>Passer melanurus</i></b>	<b>Cape Sparrow</b>	91	5
<i>Passer diffusus</i>	Southern Grey-headed Sparrow	24	4
<i>Motacilla capensis</i>	Cape Wagtail	70	3
<b><i>Macronyx capensis</i></b>	<b>Cape Longclaw</b>	19	5
<b><i>Anthus cinnamomeus</i></b>	<b>African Pipit</b>	14	5
<i>Anthus leucophrys</i>	Plain-backed Pipit	<1	2
<i>Anthus vaalensis</i>	Buffy Pipit	<1	2
<i>Crithagra mozambicus</i>	Yellow-fronted Canary	7	2
<i>Crithagra atrogularis</i>	Black-throated Canary	28	4
<i>Crithagra gularis</i>	Streaky-headed Seedeater	13	4
<i>Emberiza tahapisi</i>	Cinnamon-breasted Bunting	3	3
Biodiversity Index:			368

\*The reporting rate is calculated as follows: Total number of cards on which a species was reported X 100 ÷ total number of cards for a particular quarter degree grid cell. INT = Introduced or alien birds species to Southern Africa.

**Red Data Species Categories for the birds** (Barnes, 2000)

RE = Regionally extinct, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near-threatened.

### **Threatened and Red Listed Bird Species**

The following Red Data bird species were recorded for the 2528CC quarter degree grid cell (q.d.g.c) according to Harrison *et al.* (1997) and Tarboton *et al.* (1987) (Table 9).

**Table 9:** Red Data bird species recorded for the 2528CC q.d.g.c.

SCIENTIFIC NAME	ENGLISH NAME	R RATE (%)* 2528CC CENTURION
<i>Nettapus auritus</i>	African Pygmy-Goose (NT)	(T)
<i>Alcedo semitorquata</i>	Half-collared Kingfisher (NT)	1(T)
<i>Tyto capensis</i>	African Grass-Owl (VU)	2(Tb)
<i>Neotis denhami</i>	Denham's Bustard (VU)	(T)
<i>Eupodotis caerulescens</i>	Blue Korhaan (NT)	(Tb)
<i>Eupodotis senegalensis</i>	White-bellied Korhaan (VU)	<1(T)
<i>Anthropoides paradiseus</i>	Blue Crane (VU)	3(Tb)
<i>Podica senegalensis</i>	African Finfoot (VU)	<1(T)
<i>Crex crex</i>	Corn Crane (VU)	(T)
<i>Rostratula benghalensis</i>	Greater Painted-snipe (NT)	(T)
<i>Glareola nordmanni</i>	Black-winged Pratincole (NT)	(T)
<i>Gyps coprotheres</i>	Cape Vulture (VU)	<1(T)
<i>Aegypius tracheliotus</i>	Lappet-faced Vulture (VU)	(T)
<i>Circus ranivorus</i>	African Marsh-Harrier (VU)	<1(Tb)
<i>Circus macrourus</i>	Pallid Harrier (NT)	(T)
<i>Aquila ayresii</i>	Ayres's Hawk-Eagle (NT)	<1(T)
<i>Polemaetus bellicosus</i>	Martial Eagle (VU)	<1(T)
<i>Sagittarius serpentarius</i>	Secretarybird (NT)	(Tb)
<i>Falco naumanni</i>	Lesser Kestrel (VU)	1(T)
<i>Falco biarmicus</i>	Lanner Falcon (NT)	1(Tb)
<i>Gorsachius leuconotus</i>	White-backed Night-Heron (VU)	(T)
<i>Pelecanus onocrotalus</i>	Great White Pelican (NT)	(T)
<i>Pelecanus rufescens</i>	Pink-backed Pelican (VU)	(T)
<i>Mycteria ibis</i>	Yellow-billed Stork (NT)	<1(T)
<i>Ciconia nigra</i>	Black Stork (NT)	<1(T)
<i>Mirafra cheniana</i>	Melodious Lark (NT)	<1(T)
	Very Low :	12
	Low :	2
	Medium :	0
	High :	0
	TOTAL :	14
	Tarboton :	20
	Tarboton breeding:	6
		26

\*The reporting rate is calculated as follows: Total number of cards on which a species was reported X 100 ÷ total number of cards for a particular quarter degree grid cell.

Red Data Species Categories for the birds (Barnes, 2000)

RE = Regionally extinct, CR = Critically Endangered EN = Endangered, VU = Vulnerable, NT = Near-threatened.

Twenty-six Red Data bird species have been recorded within the 2528CC q.d.g.c (Table 9). Thirteen of these have disappeared from the area or were not recorded for this quarter degree grid cell during the time of the southern African Bird Atlas project. It is unlikely that they will ever be seen in this region again except maybe on rare occasions in protected areas. Six of these species used to breed within the said q.d.g.c (Tarboton, 1987) and only one, the African Grass-Owl, has been recorded as a breeding species for the q.d.g.c. during the period of the Southern African bird atlas project. This decline in

breeding species is probably due to the large extent of development that took place during a short space in time. As with the African Grass-Owl, the Blue Crane also show a low reporting rate but the habitat on site and the level of disturbance will not favour the Blue Crane. The rest of the Red Data species that have been recorded shows a very low reporting rate and will more than likely only move through the area on rare occasions.

**Summary of the Red Data bird species of the occurrence of Red Data bird species on the study site.**

Table 10 provides a list of the Red Data bird species recorded for the 2528CC q.d.g.c according to Harrison *et al.* (1997) and an indication of the likelihood of occurring on the study site based on habitat and food availability on site.

**Table 10: Red Data bird species assessment.**

SCIENTIFIC NAME	PRESENCE OF SUITABLE HABITAT	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
<i>Alcedo semitorquata</i> (Half-collared Kingfisher) (NT)	None, prefers clear fast-flowing rivers fringed with riparian growth.	Highly unlikely
<i>Tyto capensis</i> (African Grass-Owl) (VU)	None, prefers rank moist grassland bordering vleis.	Highly unlikely
<i>Eupodotis senegalensis</i> (White-bellied Korhaan) (VU)	None, prefers tall vegetation, typically fairly dense grassland in either open or lightly wooded regions and seems abundant in hilly areas (Barnes, 2000).	Unlikely
<i>Anthropoides paradiseus</i> (Blue Crane) (VU)	None. Prefers more open grassland and Karroid grassland. Might on occasion just move over the area.	Highly unlikely
<i>Podica senegalensis</i> (African Finfoot) (VU)	None, prefers clear, perennial rivers and streams, lined with reeds, overhanging trees and shrubs.	Highly unlikely.
<i>Gyps coprotheres</i> (Cape Vulture) (VU)	None. Their presence is dependent on the availability of food otherwise, they are only likely to move over the area on rare occasions.	Highly unlikely.
<i>Circus ranivorus</i> (African Marsh-Harrier) (VU)	None. Dependent on large permanent wetlands for breeding, roosting and foraging.	Highly unlikely
<i>Aquila ayresii</i> (Ayres's Hawk-Eagle) (NT)	None.	Highly unlikely
<i>Polemaetus bellicosus</i> (Martial Eagle) (VU)	None. It is found in flat country and rarely in suburbia. Rare visitor to the region.	Highly unlikely
<i>Falco naumanni</i> (Lesser Kestrel) (VU)	None. Palaeartic migrant. Prefers open country such as pristine open grassland and	Unlikely. Only on rare occasions

SCIENTIFIC NAME	PRESENCE OF SUITABLE HABITAT	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
	pastures for foraging purposes.	
<i>Falco biarmicus</i> (Lanner Falcon) (NT)	None.	Highly unlikely.
<i>Mycteria ibis</i> (Yellow-billed Stork) (NT)	None. Prefers extensive systems of wetland, notably pans, marshes, lakes and floodplains	Highly unlikely
<i>Ciconia nigra</i> Black Stork (NT)	None. Prefers shallow waterbodies such as estuaries and rivers.	Highly unlikely
<i>Mirafra cheniana</i> Melodious Lark (NT)	<b>Yes:</b> Prefers dry open climax grassland dominated by <i>Themeda triandra</i> grass.	Observed on site

### 6.3 Reptiles and Amphibians:

During the inspection, the site was evaluated for the potential occurrence of Red Data and Near Threatened species, such as the Striped Harlequin Snake, Duerden's Stiletto Snake and the Giant Bullfrog. The two Red Data snake species have not been recorded in this quarter degree grid cell. As only a few active termitaria were noticed along the edge of the site, they are not expected to occur here. The Giant Bullfrog has been recorded from the adjacent quarter degree grid cell to the east, of which the edge is very close to this site (Minter *et al*, 2004). This frog is well known from the general area and although not verified, may very well be present on this site.

**Table 11:** The Reptiles and Amphibians that could occur on the site

SCIENTIFIC NAME	ENGLISH NAME	PROBABILITY OF OCCURRENCE
<b>CLASS: AMPHIBIA</b>	<b>AMPHIBIANS</b>	
<b>Order: ANURA</b>	<b>FROGS</b>	
<b>Family: Bufonidae</b>	<b>Toads</b>	
<i>Bufo gutturalis</i>	Guttural Toad	Low
<i>Bufo rangeri</i>	Ranger's Toad	Low
<b>Family: Ranidae</b>	<b>Common Frogs</b>	
<i>Pyxicephalus adspersus</i>	Giant Bullfrog	?
<b>CLASS: REPTILIA</b>	<b>REPTILES</b>	
<b>ORDER: SQUAMATA</b>	<b>SCALE-BEARING REPTILES</b>	
<b>Suborder: LACERTILIA</b>	<b>LIZARDS</b>	
<b>Family: Gekkonidae</b>	<b>Geckos</b>	
<i>Pachydactylus affinis</i>	Transvaal Thick-toed Gecko	Low
<i>Pachydactylus capensis</i>	Cape Thick-toed Gecko	Low
<b>Family: Agamidae</b>	<b>Agamids</b>	
<i>Agama aculeata distanti</i>	Distant's Ground Agama	Low



SCIENTIFIC NAME	ENGLISH NAME	PROBABILITY OF OCCURRENCE
<b>Family: Scincidae</b>	<b>Skinks</b>	
<i>Panaspis wahlbergii</i>	Wahlberg's Snake-eyed Skink	Low
<i>Acontias percivali occidentalis</i>	Percival's Legless Skink	Low
<i>Trachylepis punctatissimus</i>	Speckled Skink	Medium
<b>Suborder: SERPENTES</b>	<b>SNAKES</b>	
<b>Family: Typhlopidae</b>	<b>Blind Snakes</b>	
<i>Typhlops bibronii</i>	Bibron's Blind Snake	Low
<b>Family: Leptotyphlopidae</b>	<b>Thread Snakes</b>	
<i>Leptotyphlops scutifrons</i>	Peters' Thread Snake	Medium
<i>Leptotyphlops incognitus</i>	?	Low
<b>Family: Atractaspididae</b>	<b>African Burrowing Snakes</b>	
<i>Atractaspis bibronii</i>	Bibron's Stiletto Snake	Low
<i>Aparallactus capensis</i>	Cape Centipede-eater	Low
<b>Family: Colubridae</b>	<b>Typical Snakes</b>	
<i>Lamprophis aurora</i>	Aurora Snake	Low
<i>Lamprophis capensis</i> (= <i>fuliginosus</i> )	Brown House Snake	Low
<i>Lycophidion capense</i>	Cape Wolf Snake	Low
<i>Prosymna sundevallii</i>	Sundevall's Shovel-snout	Medium
<i>Dasypeltis scabra</i>	Rhombic Egg-eater	Low
<b>Family: Elapidae</b>	<b>Cobras, Mambas, other Elapids</b>	
<i>Hemachatus haemachatus</i>	Rinkhals	Low
<i>Homoroselaps dorsalis</i>	Striped Harlequin Snake	Low

## 7. FINDINGS AND POTENTIAL IMPLICATIONS

### 7.1 Flora

The Orange-listed *Hypoxis hemerocallidea* (African potato) was found sparsely scattered in the Natural primary grassland. These plants should be relocated to a safe, suitable area approved by GDACE.

During the most recent visit, the study site was found to be unchanged except for a deep services trench that ran along the eastern boundary of the site (Lochner Road). Division of the large area of Natural primary grassland into small townships without corridors of natural vegetation to facilitate connectivity will result in destruction of the natural plant species diversity of the area.

## 7.2 Fauna

### 7.2.1 Mammals

The proposed development will not result in a loss of ecological sensitive and important habitat units, ecosystem function (e.g. reduction in water quality, soil pollution), loss of faunal habitat, nor of notable loss/displacement of threatened or protected fauna.

### 7.2.2 Avifauna

The open grassland on site offers ideal habitat conditions for Melodious Larks for both breeding and foraging purposes. Several displaying male Melodious Larks were observed on the study site.

#### **The Melodious Lark (*Mirafra cheniana*)**

The Melodious Lark is listed in the *Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland* (Barnes 2000) but has been removed from GDACE's list of priority species.

The Melodious Lark is a southern Africa endemic and is an uncommon resident bird species of which their numbers and range have been greatly reduced due to habitat destruction. It appears to be sensitive to overgrazing (Barnes 2000) and land-use changes in the grasslands may severely impact this species (Stattersfield *et al.* 1998).

This species has a very low reporting rate (<1%) for the 2528CC quarter degree square grid cell as well as most of the central Gauteng area according to Harrison *et al.* (1997). Despite the low reporting rate, several individual male Melodious Larks were observed displaying over the open grassland during this bird habitat survey.

Particular references were made to the possible occurrence of White-bellied Korhaan (*Eupodotis senegalensis*) on the study site:

#### **White-bellied Korhaan (*Eupodotis senegalensis*)**

Criteria for IUCN threatened category: A1c; A2c; C1. Status: Vulnerable

Habitat: According to Barnes (2000) it inhabits relatively tall vegetation, typically fairly dense grassland in either open or lightly wooded regions. It seems to be most abundant in hilly areas at the interface between the grassland and savanna biomes (Tarboton *et al.* 1987). They occur in low abundance in severely grazed and recently burnt sites (Barnes 2000).

Threats: Within Gauteng habitat loss through crop farming, overgrazing, burning and high human densities are the main reasons for the population decline of this species. Even where suitable habitat exists, it is often modified by inappropriate fire regimes and grazing practices (Barnes 2000). The genetic integrity of this species may be threatened because of severely fragmented distribution (Barnes 2000).

On site conclusion: The habitat on the study site is disturbed by human presence. Humans move over the area to the squatter camp that is situated to the north of the study site and a network of human track crisscross most parts of the study site. Although

the habitat could still favour White-bellied Korhaan, it is doubtful if they will make use of the open grassland on site due to the human presence.

### 7.2.3 Reptiles and Amphibians

This study site was originally covered by Carletonville Dolomite Grassland (Mucina *et al*, 2006) on a fairly homogeneous clayey to stony substrate of the Timeball Hill Formation. Apart from a few isolated trees, only low shrubs represent woody plants. These shrubs were removed from the areas which appear to have been ploughed on parts of the section north of Mimosa road. Dolomite does not weather in a way that provides cracks suitable as retreats for reptiles and amphibians. Therefore, this environment has a limited number of niches but conditions are slightly improved by the presence of termitaria which are present. In moribund state suitable retreats for small animals, including dry-land amphibians and reptiles, become available. Species diversity and population densities are not expected to be high.

Although the 'Near Threatened' Giant Bullfrog (*Pyxicephalus adspersus*) has been recorded from this quarter degree grid cell (Minter *et al*, 2004), the terrain on this site does not appear suitable as dispersal area as the substrate is not suitable for burrowing. Odd individuals from adjacent areas may occasionally occur but the terrain on site is not suitable to form shallow breeding ponds for the full lifecycle. The intensive development in the general area precludes the future presence of the Giant Bullfrog. The Striped Harlequin Snake (*Homoroselaps dorsalis*), a very rarely recorded species (Only 12 recorded for Gauteng, Jacobsen, 1995) and consequently a Red Data species, has been recorded from Farm Swartkop 383JR in this quarter degree grid cell, so may be expected to be present on this site..

## 8. LIMITATIONS, ASSUMPTIONS AND GAPS IN KNOWLEDGE

None

## 9. RECOMMENDED MITIGATION MEASURES

Mitigation measures proposed by the specialists

- Should hedgehogs be encountered during the construction and operational phase of the development, these should be relocated to natural grassland areas in the vicinity.
- The contractor must ensure that no fauna species are disturbed, trapped, hunted or killed during the construction phase. Conservation-orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance.
- It is important to note that the trenches for the water pipeline and even those for sewage lines do not need to be wide, which means that the environmental damage caused by the actual digging can be reduced to a minimum. However, while they are open their presence will mean that wildlife of any size may fall into them, from where it will be difficult to escape and death may be caused by drowning, excessive exposure to the sun or by being buried alive during the final construction work.
- Environmental damage caused by these trenches may be kept to a minimum by good forward planning and thereby reducing the actual length of time that they

are open. Possible damage to wildlife is in direct proportion to the time that these trenches are open and may destroy amphibian and reptilian species.

- The design of the stormwater lines is not known. If large diameter cement pipes are used and the trenches are closed again, potential danger become reduced by filling in the trenches. Open stormwater channels are dangerous, as they will continuously contribute to wildlife destruction.

The following mitigation measures were developed by GDACE (Directorate of Nature Conservation, GDACE, 2008) and are applicable to the study site.

- All areas designated as sensitive in a sensitivity mapping exercise (see *Sensitivity Mapping Rules for Biodiversity Assessments*) should be incorporated into an open space system and registered against the title deeds as a conservation servitude. Development should be located on the areas of lowest sensitivity.\*
- Development structures should be clustered as close as possible to existing development.\*
- An independent suitably qualified individual registered in accordance with the Natural Scientific Professions Act (No. 27 of 2003) should act as the environmental control officer.\*
- An appropriate management authority (e.g. the body corporate) that is contractually bound to implement the Environmental Management Plan (EMP) and Record Of Decision (ROD) during the operational phase of the development should be identified.\*
- An ecological management plan for the open space system should be compiled by a specialist registered in accordance with the Natural Scientific Professions Act (No. 27 of 2003) in the fields of Botanical / Ecological / Zoological Science. This ecological management plan should form part of the EMP.\*
- The ecological management plan should:
  - include a fire management programme to ensure persistence of grassland\*
  - include an ongoing monitoring and eradication programme for all non-indigenous species, with specific emphasis on invasive and weedy species\*
  - ensure the persistence of all Red and Orange List species\*
  - include a monitoring programme for all Red and Orange List species\*
  - facilitate/augment natural ecological processes\*
  - provide for the habitat and life history needs of important pollinators\*
  - minimize artificial edge effects (e.g. water runoff from developed areas & application of chemicals)\*
  - include management recommendations for neighbouring land, especially where correct management on adjacent land is crucial for the long-term persistence of sensitive species present on the development site\*
  - result in a report back to the Directorate of Nature Conservation on an annual basis\*
  - investigate and advise on appropriate legislative tools (e.g. the NEMA: Protected Areas Act 57 of 2003) for formally protecting the area (as well as adjacent land where it is crucial for the long-term persistence of sensitive species present on the development site)\*
- A copy of the ecological management plan should be provided to all neighbouring landowners.\*
- A funding mechanism that will cover the cost of implementing the ecological management plan should be established.\*

- All areas earmarked for development should be fenced off from the open space system prior to construction commencing (including site clearing and pegging). All construction-related impacts (including service roads, temporary housing, temporary ablution, disturbance of natural habitat, storing of equipment/building materials/vehicles or any other activity) should be contained within the fenced-off development areas. Access of vehicles to the open space system should be prevented and access of people should be controlled, both during the construction and operational phases. Movement of all indigenous fauna should however be allowed (i.e. no solid walls, e.g. through the erection of palisade fencing), unless otherwise specified in another condition.\*
- Compacting of soil should be avoided in areas to be included in the open space system.\*
- Connectivity between the open space system and adjacent natural vegetation / open space systems should be ensured.\*
- Only species indigenous to South Africa should be used for landscaping / gardens within 200m of the open space system. Plant species indigenous to the natural vegetation of the area are preferred. As far as possible, plants naturally growing on the development site, but would otherwise be destroyed during clearing for development purposes, should be incorporated into landscaped areas. Forage and host plants required by pollinators should also be planted in landscaped areas.\*

#### **General mitigatory measures:**

- Where possible, trees naturally growing on the site should be retained as part of the landscaping, with specific emphasis on the following species: *Acacia erioloba*, *Boscia albitrunca*, *Combretum imberbe*, *Pittosporum viridiflorum*, *Prunus africana*, *Sclerocarya birrea* subsp. *caffra*. Measures to ensure that these trees survive the physical disturbance from the development should be implemented. A tree surgeon should be consulted in this regard. \*
- In order to minimize artificially generated surface storm water runoff, total sealing of paved areas such as parking lots, driveways, pavements and walkways should not be permitted. Permeable material should rather be utilized for these purposes.\*

#### **Red Listed Birds**

When Red Listed birds occur or potentially occur on site, the following mitigatory measures are recommended:

- Construction activities should be timed to coincide with the period when the Red Listed bird species that could potentially occur on site are unlikely to be breeding.\*

#### **Non-Sensitive Sites**

When sensitive areas are **not** present on the proposed development site, the following mitigatory measures are recommended:

- A rescue operation for medicinal plants should be undertaken. The Gauteng Directorate of Nature Conservation (Head: Bioregional Planning; Michele.Pfab@gauteng.gov.za) should be contacted with regard to the co-ordination of such an operation.\*
- A surface runoff and stormwater management plan should be compiled.\*

### **Roads Pipelines / Powerlines**

- The appropriate agency should implement an ongoing monitoring and eradication programme for all invasive and weedy plant species growing within the servitude.\*
- Any post-development re-vegetation or landscaping exercise may only use species indigenous to South Africa. Plant species locally indigenous to the area are preferred. As far as possible, plants naturally growing along the route, but would otherwise be destroyed during construction, should be used for re-vegetation / landscaping purposes.\*
- Where a road / railway / pipeline/ power line is to traverse a wetland, measures are required to ensure that the road / railway / pipeline/ power line has minimal effect on the flow of water through the wetland, e.g. by using a high level clear-span bridge or box culverts rather than pipes.\*
- Prior to construction, fences should be erected in such a manner to prevent access and damage to any sensitive areas identified in a sensitivity mapping exercise (see *Sensitivity Mapping Rules for Biodiversity Assessments*).\*
- Sealing of surfaces under a bridge or gabion construction should be avoided.\*

The following recommended mitigatory measures only apply to **roads**:

- Appropriate road design and traffic control measures are recommended to reduce air pollution and animal mortality.\*
- All storm water structures should be designed so as to block amphibian and reptile access to the road surface.\*
- Suitable terrestrial underpasses should be provided to facilitate safe movement of animals, specifically where roads traverse ridges or habitat suitable for any Red/Orange List amphibian/ reptile/ mammal species. The number and spacing of underpasses will need to be determined by a specialist registered in accordance with the Natural Scientific Professions Act (No. 27 of 2003) in the fields of Ecological / Zoological Science. All underpasses should be dressed with a layer of sand (minimum 10cm) and should be a minimum of 1.5m x 1.0m so as to facilitate maintenance access. Underpasses should be accessible to maintenance staff and should be cleared of accumulated material at least at the start of each rainy season.\*
- Where roads are associated with power lines and telephone lines (these provide an attraction for species that hunt from perches), road margins should be mowed and/or burned regularly to prevent the accumulation of grass cover that could provide refuge for small mammals.\*
- A comprehensive surface runoff and storm water management plan should be compiled, indicating how all surface runoff generated as a result of the road development (during both the construction and operational phases) will be managed (e.g. artificial wetlands / storm water and flood retention ponds) prior to entering any natural drainage system or wetland and how surface runoff will be retained outside of any demarcated buffer/flood zones and subsequently released to simulate natural hydrological conditions. This plan should form part of the EMP.\*

The following recommended mitigatory measures only apply to **power lines / telephone lines / communication masts / cell phone towers**:

- Where communication masts / cell phone towers / overhead lines (power lines or telephone lines) are to be constructed within/adjacent to urban open space systems or within rural areas, the Eskom-EWT strategic partnership should advise on appropriate mitigatory measures.\*
- The design (including mitigation measures) and location of any proposed power lines (whether new alignments or refurbishment/upgrading of existing lines) should be endorsed by the bird conservation experts of the Eskom-EWT strategic partnership.\*

## 10. CONCLUSIONS

### Flora:

No Red-listed plant species were found, however the Orange-listed *Hypoxis hemerocallidea* (African potato) was found sparsely scattered in the Natural primary grassland. These plants should be relocated to a safe, suitable area approved by GDACE. The Natural primary grassland on the site was deemed sensitive. Corridors of Natural primary grassland that have not been disturbed by services trenches should be excluded in all the planned new townships of Monavoni and on the neighbouring sites that are to be developed together with these sites. These corridors should be connected to the rocky outcrops on the various portions that are being developed and to the *Acacia karroo* vegetation in the eastern part of the Monavoni area to facilitate connectivity. These areas must be properly managed throughout the lifespan of the project in terms of fire, eradication of exotics etc. to ensure continuous biodiversity.

### Mammals:

Most, if not all the terrestrial species listed as potential occupants of the site, will be displaced as a result of the proposed development. This will have no effect on the global conservation status of most of the species. However, the loss of the three Red Listed species is regrettable, although when expressing the magnitude of the loss in statistical terms it would most probably be negligible.

### Birds:

The open grassland habitat on site offers suboptimal habitat for the Melodious Lark. This species has however been removed from GDACE list of priority species.

The development should not have a negative affect on any of the other Red Data bird species listed above due to the high level of human disturbance on site. In addition, there is a lack of sufficient breeding, foraging and breeding habitat for the mentioned Red Data bird species.

### Reptiles and Amphibians:

The site appears suitable for a relatively limited number of amphibian and reptile species. Although shallow pools of rain water were present it was not possible to confirm the presence of the near endangered frog. A specimen of the Striped Harlequin Snake (*Homoroselaps dorsalis*), a Red Data Species, has been recorded from the farm Swartkop 383 JR (Jacobsen, 1995), in this quarter degree grid cell. This proves the presence of this species in this area but it is practically impossible to confirm this record as occurring on this site. As this snake tends to live underground in burrows or tunnels,

where it feeds exclusively on Thread Snakes (*Leptotyphlops* spp.), it is usually only found accidentally when dead termitaria are destroyed. To attempt to confirm the presence of this species in an area, it would be necessary to destroy a large number of dead termitaria, which would reduce the suitability of the area for the survival of this snake and other reptiles. Since it appears that this species occurs in relatively low densities it is impossible to suggest conservation measures.

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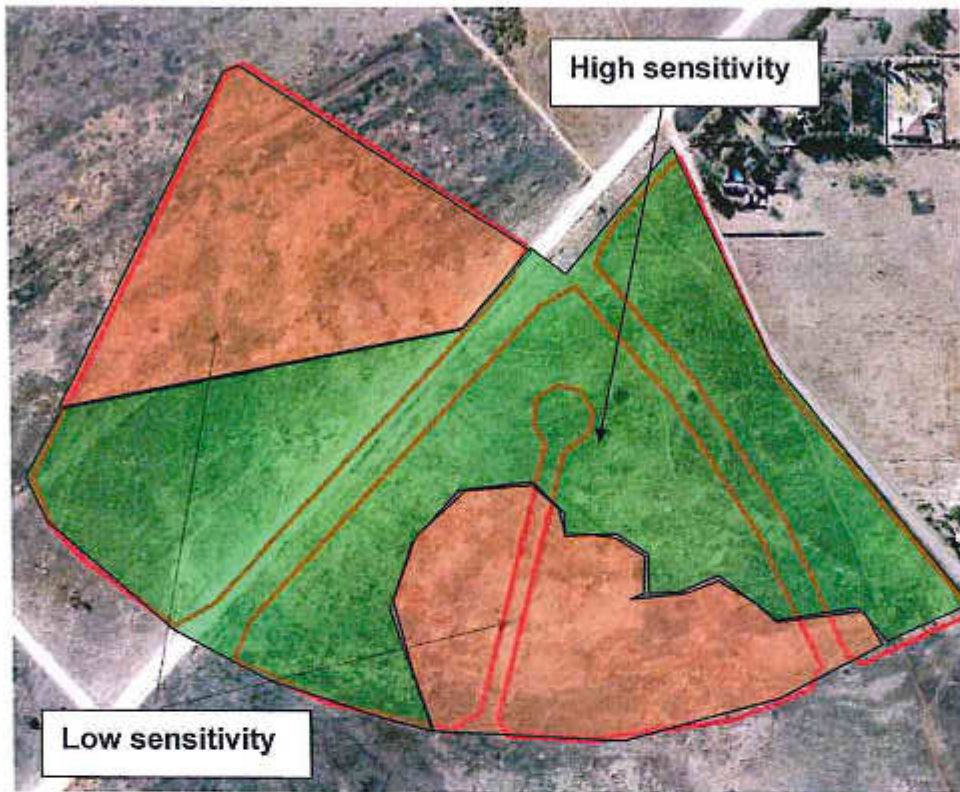


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## APPENDIX A: Sensitivity map



**APPENDIX B: Red and Orange-listed\* plants of the 2528CC  
q.d.g.s.**

Species	Flowering season	Suitable habitat	Priority grouping	Conservation status	PRESENCE ON SITE
<i>Bonatea speciosa</i> var. <i>speciosa</i>	Jan-Mar	Savanna.	-	Declining <sup>2</sup>	Habitat not suitable
<i>Bowiea volubilis</i>	Sep-Apr	Shady places, steep rocky slopes and in open woodland, under large boulders in bush or low forest.	-	Declining <sup>2</sup>	Habitat not suitable
<i>Ceropegia decidua</i> subsp. <i>pretoriensis</i>	Nov-Apr	Direct sunshine or shaded situations, rocky outcrops of the quartzitic Magaliesberg mountain series, in pockets of soil among rocks, in shade of shrubs and low trees, can be seen twining around grass spikes.	A1	Vulnerable <sup>1</sup>	Habitat not suitable
<i>Cheilanthes deltoidea</i>	Feb-Jun	Sheltered rock crevices predominantly on granite or gneiss rock formations; on chert outcrops.	A2	Data Deficient <sup>1</sup>	Habitat not suitable
<i>Cleome conrathii</i>	Mar-May	On stony slopes, usually on sandy soil, open to closed deciduous woodland, quartzites, red sandy soil, all aspects, 1515m.	A3	Near Threatened <sup>1</sup>	Habitat not suitable
<i>Eucomis autumnalis</i> subsp. <i>clavata</i>	Nov-Apr	Open grassland, marshes.	-	Declining <sup>2</sup>	Habitat not suitable
<i>Habenaria barbertoni</i>	Feb-Mar	In grassland on rocky hillsides.	A2	Vulnerable <sup>1</sup>	Habitat not suitable
<i>Habenaria kraenzliniana</i>	Feb-Apr	Terrestrial in stony, grassy hillsides, recorded from 1000 to 1400m.	A3	Near Threatened <sup>1</sup>	Habitat not suitable
<i>Habenaria mossii</i>	Mar-Apr	Open grassland on dolomite or in black sandy soil.	A1	Endangered <sup>1</sup>	Habitat not suitable
<i>Holothrix randii</i>	Sep-Jan	Grassy slopes & rocky ledges.	B	Near Threatened <sup>2</sup>	Habitat not suitable
<i>Hypoxis hemerocallidea</i>	Sep-Mar	Grassland and mixed woodland.	-	Declining <sup>2</sup>	<b>FOUND</b>
<i>Melolobium subspicatum</i>	Oct-May	Grassland.	A1	Vulnerable <sup>1</sup>	Habitat suitable

<sup>1</sup> global status;

<sup>2</sup> national status;

\* Orange listed plants have no priority grouping and are designated 'N/A'.



# **Annexure G(iv)**

HERITAGE IMPACT  
ASSESSMENT



**Heritage impact survey report for the  
PROPOSED DEVELOPMENT ON VARIOUS HOLDINGS OF  
THE MONAVONI AGRICULTURAL HOLDINGS AREA OF THE  
PRETORIA MAGISTERIAL DISTRICT, GAUTENG**

**THE PROJECT:**

Development of urban housing and a filling station.

**THIS REPORT:**

HERITAGE IMPACT SURVEY REPORT FOR THE PROPOSED DEVELOPMENT  
ON VARIOUS HOLDINGS OF THE MONAVONI AGRICULTURAL HOLDINGS  
AREA OF THE PRETORIA MAGISTERIAL DISTRICT, GAUTENG

**Report No:** 2009/JvS/005  
**Status:** Final  
**Revision No:** 0  
**Date:** January 2008

**Prepared for:**

Bokamoso Landscape Architects  
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## EXECUTIVE SUMMARY

### **HERITAGE IMPACT SURVEY REPORT FOR THE PROPOSED DEVELOPMENT ON VARIOUS HOLDINGS OF THE MONAVONI AGRICULTURAL HOLDINGS AREA OF THE PRETORIA MAGISTERIAL DISTRICT, GAUTENG**

Development is planned for various Holdings in the Monavoni Agricultural Holdings on Portions of the farms Mooiplaats 355JR and Stukgrond 382JR southwest of Pretoria. This involves the building of a housing estate as well as a filling station.

An independent heritage consultant was appointed by **Bokamoso Landscape Architects** to conduct a survey to locate, identify, evaluate and document sites, objects and structures of cultural importance found within the boundaries of the area where the different types of development is to take place.

This HIA report forms part of the Environmental Impact Assessment (EIA) as required by the EIA Regulations in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and was done in accordance with Section 38 of the National Heritage Resources Act, No. 25 of 1999 and is intended for submission to the South African Heritage Resources Agency (SAHRA).

Very few sites are known to occur in the larger region, mostly informal cemeteries. No sites, features or objects of cultural significance were identified in the study area during the survey. Based on what was found and its evaluation, it is recommended that any development can continue, on condition of acceptance of the following recommendations:

- If construction takes place and archaeological sites are exposed, it should immediately be reported to a museum, preferably one at which an archaeologist is available, so that an investigation and evaluation of the finds can be made.



J A van Schalkwyk  
Heritage Consultant

**TECHNICAL SUMMARY**

<b>Property details</b>						
Province	Gauteng					
Magisterial district	Pretoria					
Topo-cadastral map	2828CC					
Closest town	Pretoria					
Farm name & no.	Mooiplaats 355JR, Stukgrond 382JR					
Portions/Holdings	Various					
Average altitude						
Coordinates	Centre point					
	No	Latitude	Longitude	No	Latitude	Longitude
	1	S 25.86870	E 28.09085			

<b>Development criteria in terms of Section 38(1) of the NHR Act</b>	Yes/No
Construction of road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length	
Construction of bridge or similar structure exceeding 50m in length	
Development exceeding 5000 sq m	Yes
Development involving three or more existing erven or subdivisions	
Development involving three or more erven or divisions that have been consolidated within past five years	
Rezoning of site exceeding 10 000 sq m	Yes
Any other development category, public open space, squares, parks, recreation grounds	

<b>Development</b>	
Description	Development of urban housing and a filling station
Project name	Monavoni

<b>Land use</b>	
Previous land use	Agriculture
Current land use	Vacant

<b>Heritage sites assessment</b>		
<i>Site type</i>	<i>Site significance</i>	<i>Site grading (Section 7 of NHRA)</i>
None		
<b>Impact assessment</b>		
<i>Impact</i>	<i>Mitigation</i>	<i>Permits required</i>
None		None

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## **GLOSSARY OF TERMS AND ABBREVIATIONS**

**Study area:** Refers to the entire study area as indicated by the client in the accompanying Fig. 1.

**Stone Age:** The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 3-2 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are found in most places in South Africa and elsewhere.

Early Stone Age	2 000 000 - 150 000 Before Present
Middle Stone Age	150 000 - 30 000 BP
Late Stone Age	30 000 - until c. AD 200

**Iron Age:** Period covering the last 1800 years, when new people brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and they herded cattle as well as sheep and goats. These people, according to archaeological evidence, spoke early variations of the Bantu Language. Because they produced their own iron tools, archaeologists call this the Iron Age.

Early Iron Age	AD 200 - AD 900
Middle Iron Age	AD 900 - AD 1300
Late Iron Age	AD 1300 - AD 1830

**Historical Period:** Since the arrival of the white settlers - c. AD 1840 - in this part of the country

## **LIST OF ABBREVIATIONS**

<b>ADRC</b>	Archaeological Data Recording Centre
<b>ASAPA</b>	Association of Southern African Professional Archaeologists
<b>EIA</b>	Early Iron Age
<b>ESA</b>	Early Stone Age
<b>LIA</b>	Late Iron Age
<b>LSA</b>	Later Stone Age
<b>MSA</b>	Middle Stone Age
<b>NHRA</b>	National Heritage Resources Act
<b>PHRA</b>	Provincial Heritage Resources Agency
<b>SAHRA</b>	South African Heritage Resources Agency

## HERITAGE IMPACT SURVEY REPORT FOR THE PROPOSED DEVELOPMENT ON VARIOUS HOLDINGS OF THE MONAVONI AGRICULTURAL HOLDINGS AREA OF THE PRETORIA MAGISTERIAL DISTRICT, GAUTENG

### 1. INTRODUCTION

Development is planned for various Holdings in the Monavoni Agricultural Holdings on Portions of the farms Mooiplaats 355JR and Stukgrond 382JR southwest of Pretoria. This involves the building of a housing estate as well as a filling station.

An independent heritage consultant was appointed by **Bokamoso Landscape Architects** to conduct a survey to locate, identify, evaluate and document sites, objects and structures of cultural importance found within the boundaries of the area where the different types of development is to take place.

This HIA report forms part of the Environmental Impact Assessment (EIA) as required by the EIA Regulations in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and was done in accordance with Section 38 of the National Heritage Resources Act, No. 25 of 1999 and is intended for submission to the South African Heritage Resources Agency (SAHRA).

### 2. TERMS OF REFERENCE

The scope of work consisted of conducting a Phase 1 archaeological survey of the site in accordance with the requirements of Section 38(3) of the National Heritage Resources Act (Act 25 of 1999).

This include:

- Conducting a desk-top investigation of the area
- A visit to the proposed development site

The objectives were to

- Identify possible archaeological, cultural and historic sites within the proposed development areas;
- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources;
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance.

### 3. DEFINITIONS AND ASSUMPTIONS

The following aspects have a direct bearing on the survey and the resulting report:

- *Cultural resources* are all non-physical and physical human-made occurrences, as well as natural occurrences that are associated with human activity. These include all sites, structures and artefacts of importance, either individually or in groups, in the history, architecture and archaeology of human (cultural) development.

- The *significance* of the sites and artefacts are determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.
- Sites regarded as having low significance have already been recorded in full and require no further mitigation. Sites with medium to high significance require further mitigation.
- The latitude and longitude of archaeological sites are to be treated as sensitive information by the developer and should not be disclosed to members of the public.

#### 4. STUDY APPROACH AND METHODOLOGY

##### 4.1 Extent of the Study

This survey and impact assessment covers the area as presented in Section 5 and as illustrated in Figure 1 - 3.

##### 4.2 Methodology

###### 4.2.1 Preliminary investigation

###### 4.2.1.1 Survey of the literature

A survey of the relevant literature was conducted with the aim of reviewing the previous research done and determining the potential of the area. In this regard, various anthropological, archaeological and historical sources were consulted - see the list of references below.

###### 4.2.1.2 Data bases

The *Heritage Atlas Database*, the *Environmental Potential Atlas* and the *National Archives of South Africa* were consulted.

###### 4.2.1.3 Other sources

Aerial photographs and topocadastral and other maps were also studied - see the list of references below.

###### 4.2.2 Field survey

The field survey was done according to generally accepted archaeological practices, and was aimed at locating all possible sites, objects and structures. The area that had to be investigated, was identified by **Bokamoso** by means of maps. The area was investigated by walking across it in a number of transects. Special attention was given to topographical occurrences such as trenches, holes, outcrops and clusters of trees were investigated.

###### 4.2.3 Documentation

All sites, objects and structures that are identified are documented according to the general minimum standards accepted by the archaeological profession. Coordinates of individual

localities are determined by means of the *Global Positioning System* (GPS)<sup>1</sup> and plotted on a map. This information is added to the description in order to facilitate the identification of each locality.

Map datum used: Hartebeeshoek 94 (WGS84).

#### 4.3 Limitations

In some areas the grass cover was high and very dense, which limited archaeological visibility to some extent.

### 5. DESCRIPTION OF THE AFFECTED ENVIRONMENT

#### 5.1 Site location

The study area covers various Portions of the farms Stukgrond 382JR and Mooiplaats 355JR, all in the Monavoni Agricultural Holdings area of the Pretoria magisterial district of Gauteng. For more detail please see the Technical Summary presented above.

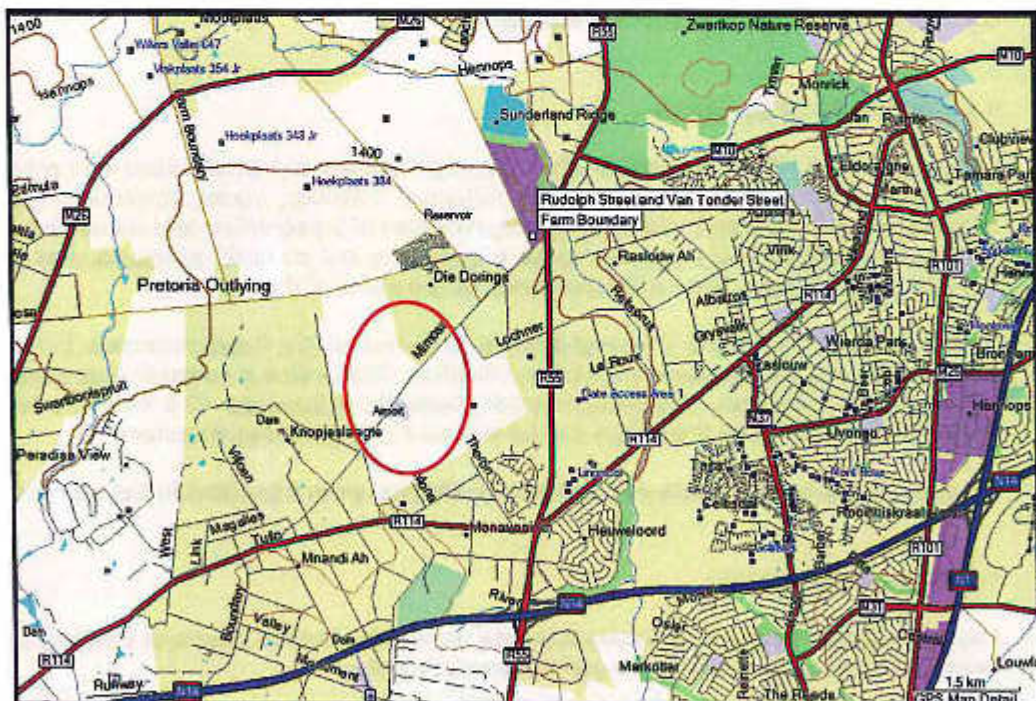


Fig. 1. Location of the study area indicated by the red oval.

<sup>1</sup> According to the manufacturer a certain deviation may be expected for each reading. Care was, however, taken to obtain as accurate a reading as possible, and then to correlate it with reference to the physical environment before plotting it on the map.

## 5.2 Site description

The geology is made up of dolomite and the original vegetation is classified as Rocky Highveld Grassland. Sections of the study area has been impacted on by the illegal dumping of building material. No features (e.g. hills, outcrops, streams or rock shelters) that usually drew people to settle in its vicinity, occurs in the study area.

## 5.3 Identified sites

### 5.3.1 Stone Age

No sites, features or objects dating to the Stone Age were identified.

### 5.3.2 Iron Age

No such sites, objects or features dating to the Iron Age were identified.

### 5.3.3 Historic period

No sites, objects or features dating to historic times were identified.

## 6. SITE SIGNIFICANCE AND ASSESSMENT

### 6.1 Statement of significance

According to the NHR Act, Section 2(vi), the **significance** of heritage sites and artefacts is determined by its aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

Sites regarded as having low significance are viewed as being recorded in full after identification and would require no further mitigation. Sites with a medium to high significance would require mitigation. Mitigation, in most cases the excavation of a site, is in essence destructive and therefore the impact can be viewed as high and as permanent.

**No sites, features or objects of cultural significance were identified in the study area.**

### 6.2 Impact assessment

Impact analysis of cultural heritage resources under threat of the proposed development, are based on the present understanding of the development.

- As no sites, features or object of cultural significance were identified in the study area, there would be no impact resulting from the proposed development.

## 7. IDENTIFICATION OF RISK SOURCES



A Heritage Impact Assessment is focused on two phases of a proposed development: **the construction and operation phases**. The following project actions may impact negatively on archaeological sites and other features of cultural importance. The actions are most likely to occur during the construction phase of a project.

**Construction phase:**

Possible Risks	Source of the risk
Actually identified risks	
- damage to sites	Construction work
Anticipated risks	
- looting of sites	Curious workers

**Operation phase:**

Possible Risks	Source of the risk
Actually identified risks	
- damage to sites	Not keeping to management plans
Anticipated risks	
- damage to sites	Unscheduled construction/developments
- looting of sites	Visitors removing objects as keepsakes

## 8. RECOMMENDED MANAGEMENT MEASURES

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon them is permanent and non-reversible. Those resources that cannot be avoided and that are directly impacted by the development can be excavated/recorded and a management plan can be developed for future action. Those sites that are not impacted on can be written into the management plan, whence they can be avoided or cared for in the future.

### 8.1 Objectives

- Protection of archaeological, historical and any other site or land considered being of cultural value within the project boundary against vandalism, destruction and theft.
- The preservation and appropriate management of new discoveries in accordance with the National Heritage Resources Act (Act No. 25 of 1999), should these be discovered during construction.

#### 8.2.1 Construction phase

General management objectives and commitments:

- To avoid disturbing sites of heritage importance; and
- To avoid disturbing burial sites.

The following shall apply:

- Known sites should be clearly marked in order that they can be avoided during construction activities.
- The contractors and workers should be notified that archaeological sites might be exposed during the construction work.

- Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible;
- All discoveries shall be reported immediately to a museum, preferably one at which an archaeologist is available, so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Control Officer will advise the necessary actions to be taken;
- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51. (1).

## 9. RECOMMENDATIONS

A survey was conducted to locate, identify, evaluate and document sites, features and objects of cultural significance found within the boundaries of an area in which it is proposed to develop a housing estate as well as a filling station.

Very few sites are known to occur in the larger region, mostly informal cemeteries. No sites, features or objects of cultural significance were identified in the study area during the survey. Based on what was found and its evaluation, it is recommended that any development can continue, on condition of acceptance of the following recommendations:

- If construction takes place and archaeological sites are exposed, it should immediately be reported to a museum, preferably one at which an archaeologist is available, so that an investigation and evaluation of the finds can be made.

## 10. REFERENCES

### 10.1 Data bases

Chief Surveyor General

Environmental Potential Atlas, Department of Environmental Affairs and Tourism.

Heritage Atlas Database, Pretoria.

National Archives of South Africa

### 10.2 Literature

Acocks, J.P.H. 1975. *Veld Types of South Africa*. Memoirs of the Botanical Survey of South Africa, No. 40. Pretoria: Botanical Research Institute.

Holm, S.E. 1966. *Bibliography of South African Pre- and Protohistoric archaeology*. Pretoria: J.L. van Schaik.

Horn, A.C. 1998. *Tshwane, Pretoria, Phelindaba: Structure-agency interaction and the transformation of a South African Region up to 1994, with prospects for the immediate future*. Unpublished D.Phil. Pretoria: University of Pretoria.

### 10.3 Maps

1: 50 000 Topocadastral maps – 2528CC

## APPENDIX 1: CONVENTIONS USED TO ASSESS THE IMPACT OF PROJECTS ON HERITAGE RESOURCES

### Significance

According to the NHRA, Section 2(vi) the **significance** of a heritage sites and artefacts is determined by it aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

Matrix used for assessing the significance of each identified site/feature

<b>1. Historic value</b>			
Is it important in the community, or pattern of history			
Does it have strong or special association with the life or work of a person, group or organisation of importance in history			
Does it have significance relating to the history of slavery			
<b>2. Aesthetic value</b>			
It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group			
<b>3. Scientific value</b>			
Does it have potential to yield information that will contribute to an understanding of natural or cultural heritage			
Is it important in demonstrating a high degree of creative or technical achievement at a particular period			
<b>4. Social value</b>			
Does it have strong or special association with a particular community or cultural group for social, cultural or spiritual reasons			
<b>5. Rarity</b>			
Does it possess uncommon, rare or endangered aspects of natural or cultural heritage			
<b>6. Representivity</b>			
Is it important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects			
Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class			
Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality.			
<b>7. Sphere of Significance</b>			
	High	Medium	Low
International			
National			
Provincial			
Regional			
Local			
Specific community			
<b>8. Significance rating of feature</b>			
1.	Low		
2.	Medium		
3.	High		

**Significance of impact:**

- low where the impact will not have an influence on or require to be significantly accommodated in the project design
- medium where the impact could have an influence which will require modification of the project design or alternative mitigation
- high where it would have a "no-go" implication on the project regardless of any mitigation

**Certainty of prediction:**

- Definite: More than 90% sure of a particular fact. Substantial supportive data to verify assessment
- Probable: More than 70% sure of a particular fact, or of the likelihood of that impact occurring
- Possible: Only more than 40% sure of a particular fact, or of the likelihood of an impact occurring
- Unsure: Less than 40% sure of a particular fact, or the likelihood of an impact occurring

**Recommended management action:**

For each impact, the recommended practically attainable mitigation actions which would result in a measurable reduction of the impact, must be identified. This is expressed according to the following:

- 1 = no further investigation/action necessary
- 2 = controlled sampling and/or mapping of the site necessary
- 3 = preserve site if possible, otherwise extensive salvage excavation and/or mapping necessary
- 4 = preserve site at all costs

**Legal requirements:**

Identify and list the specific legislation and permit requirements which potentially could be infringed upon by the proposed project, if mitigation is necessary.

## APPENDIX 2. RELEVANT LEGISLATION

All archaeological and palaeontological sites, and meteorites are protected by the National Heritage Resources Act (Act no 25 of 1999) as stated in Section 35:

(1) Subject to the provisions of section 8, the protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority: Provided that the protection of any wreck in the territorial waters and the maritime cultural zone shall be the responsibility of SAHRA.

(2) Subject to the provisions of subsection (8)(a), all archaeological objects, palaeontological material and meteorites are the property of the State. The responsible heritage authority must, on behalf of the State, at its discretion ensure that such objects are lodged with a museum or other public institution that has a collection policy acceptable to the heritage resources authority and may in so doing establish such terms and conditions as it sees fit for the conservation of such objects.

(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

(4) No person may, without a permit issued by the responsible heritage resources authority-

- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
- (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
- (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
- (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

In terms of cemeteries and graves the following (Section 36):

(1) Where it is not the responsibility of any other authority, SAHRA must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit.

(2) SAHRA must identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with the grave referred to in subsection (1), and must maintain such memorials.

(3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority-

- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
- (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
- (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

(4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.

The National Heritage Resources Act (Act no 25 of 1999) stipulates the assessment criteria and grading of archaeological sites. The following categories are distinguished in Section 7 of the Act:

- **Grade I:** Heritage resources with qualities so exceptional that they are of special national significance;
- **Grade II:** Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and
- **Grade III:** Other heritage resources worthy of conservation, and which prescribes heritage resources assessment criteria, consistent with the criteria set out in section 3(3), which must be used by a heritage resources authority or a local authority to assess the intrinsic, comparative and contextual significance of a heritage resource and the relative benefits and costs of its protection, so that the appropriate level of grading of the resource and the consequent responsibility for its management may be allocated in terms of section 8.

Presenting archaeological sites as part of tourism attraction requires, in terms 44 of the Act, a Conservation Management Plan as well as a permit from SAHRA.

(1) Heritage resources authorities and local authorities must, wherever appropriate, co-ordinate and promote the presentation and use of places of cultural significance and heritage resources which form part of the national estate and for which they are responsible in terms of section 5 for public enjoyment, education, research and tourism, including-

- (a) the erection of explanatory plaques and interpretive facilities, including interpretive centres and visitor facilities;
- (b) the training and provision of guides;
- (c) the mounting of exhibitions;
- (d) the erection of memorials; and
- (e) any other means necessary for the effective presentation of the national estate.

(2) Where a heritage resource which is formally protected in terms of Part I of this Chapter is to be presented, the person wishing to undertake such presentation must, at least 60 days prior to the institution of interpretive measures or manufacture of associated material, consult with the heritage resources authority which is responsible for the protection of such heritage resource regarding the contents of interpretive material or programmes.

(3) A person may only erect a plaque or other permanent display or structure associated with such presentation in the vicinity of a place protected in terms of this Act in consultation with the heritage resources authority responsible for the protection of the place.

### APPENDIX 3: SURVEY RESULTS

See Appendix 1 for an explanation of the conventions used in assessing the cultural remains.  
Map datum used: Hartebeeshoek 94 (WGS84).

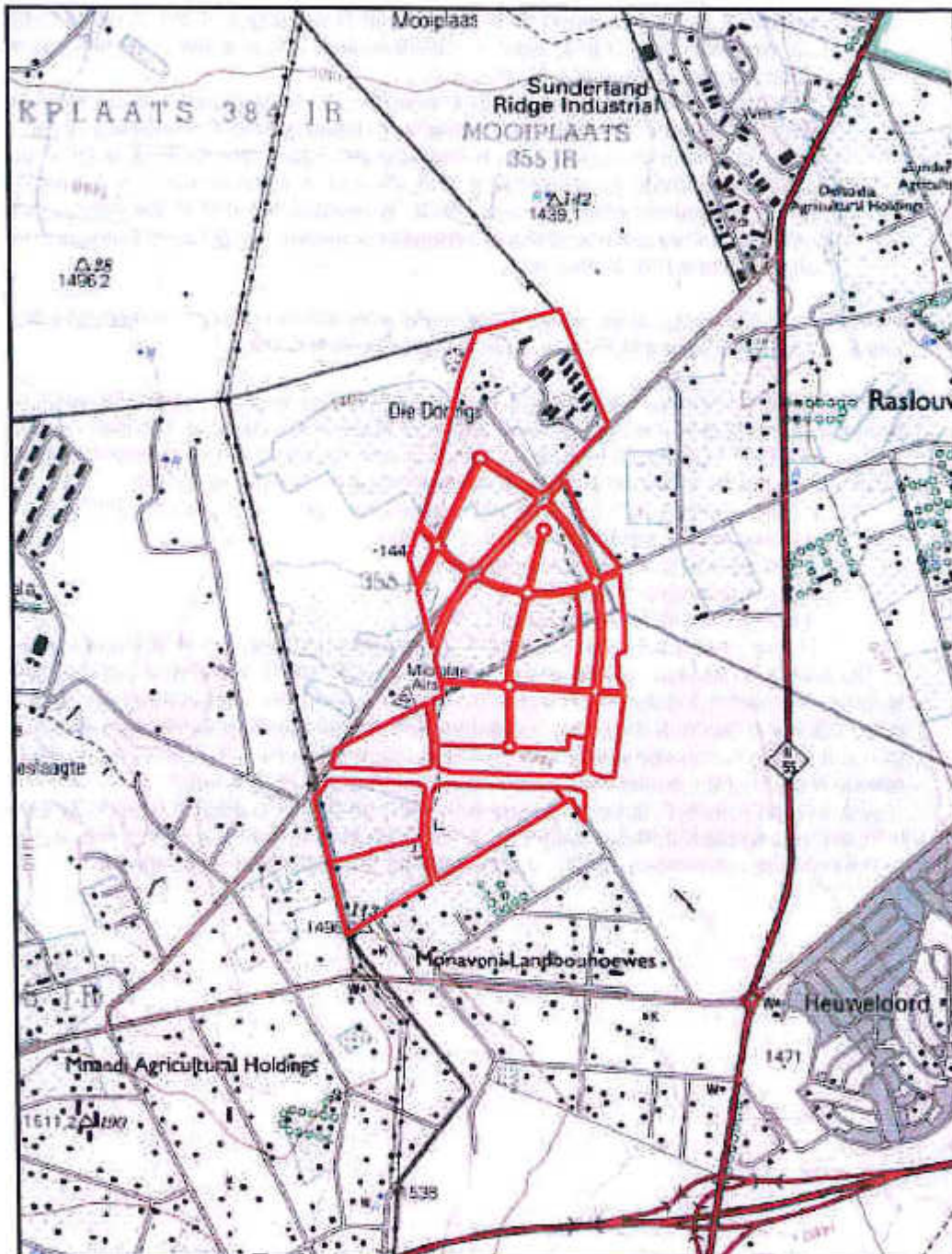


Fig. 2. The study area, showing the location of the identified sites.  
Map 2528CC: Chief Directorate Survey and Mapping.

Sites identified: Nil



**APPENDIX 4: ILLUSTRATIONS**



Fig. 3. View over the site, looking east.



Fig. 4. View across the site looking north,



# **Annexure G(v)**

Service Master Plan



30 March 2006

**CEs**  
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**COMMUNITY  
ENGINEERING  
SERVICES**

The Director : Water & Sanitation  
Tshwane Metropolitan Municipal Council  
P O Box 6338  
**PRETORIA**  
0001

Attention: Mr André Lochner

Dear Sir

## **DEVELOPMENT OF PROPOSED TOWNSHIP MONAVONI**

The request by Dekker & Gelderblom with regards to accommodation of the proposed development in the Centurion sewer network, refers.

This document should be read in conjunction with:

- Computer Analysis and Master Planning - Centurion Sewer System (CEs - June 2004)
- Ad-hoc Water Report - Development of Monavoni (CEs - 16 August 2005)

### **1. SEWER NETWORK**

#### **1.1 Drainage area**

The proposed development was taken into consideration for the recently completed (June 2005) master plan.

The development falls within the existing Rietspruit drainage area as indicated on Figure 2, showing the master plan items required for this drainage area.

The development is outside the Tshwane sewer priority area and the developer will have to install certain link services and make pro rata contributions for services provided by other developers.

#### **1.2 Sewer flow**

The estimated future PDDWF calculated in the master planning study for the proposed development was 3620 kℓ/d.

For this re-analysis, the PDDWF for the proposed development was calculated at 6726 kℓ/d.

Directors:  
L C Geustyn  
F J Haupt  
J E Kock  
L H Matlala



The following table indicates the anticipated flows for the sub-drainage system which drains towards the proposed development.

Development name		Anticipated Land use	Area (ha)	No. of Units	PDDWF (kl/d)	IPDWF (l/s)
Mona Vani Rezoning	Area A	MD Residential	9.9	99	78	1.5
Mona Vani Rezoning	Area B	MD Residential	128.1	1281	1013	18.7
Raslouw4 Rezoning	Area C	Industrial	21.4	107	245	4.2
Raslouw6 Rezoning	Area D	Mixed Landuse	18.3	146	164	2.5
Knopjeslaagte2 Rezoning	Area E	Business/Commercial	19.8	99	226	4.1
Knopjeslaagte2	Area F	Business/Commercial	34.6	173	395	7.5
Knopjeslaagte1	Area G	MD Residential	102.8	1028	813	15.7
Raslouw5	Area H	Industrial	25.1	126	287	5.1
Raslouw4 Rezoning	Area I	Industrial	29.4	147	336	5.8
Mona Vani Rezoning	Area J	MD Residential	54.6	546	432	8.0
Raslouw4 Rezoning	Area K	Industrial	4.3	21	49	0.8
Raslouw4 Rezoning	Area L	Industrial	11.7	59	134	2.3
Raslouw4 Rezoning	Area M	Industrial	28.4	142	325	5.6
Raslouw7 Rezoning	Area N	Mixed Landuse	22.0	176	197	3.5
Raslouw7 Rezoning	Area O	Mixed Landuse	23.5	188	210	3.7
Raslouw2	Area P	MD Residential	87.9	527	576	11.4
Raslouw1 Rezoning	Area Q	HD Residential	44.0	881	506	7.9
Raslouw2	Area R	MD Residential	25.7	154	168	3.3
Raslouw1 Rezoning	Area S	HD Residential	52.9	1057	607	9.5
Raslouw2	Area T	MD Residential	38.2	229	250	4.9
Raslouw6 Rezoning	Area U	Mixed Landuse	42.8	343	383	5.9
Raslouw6 Rezoning	Area V	Mixed Landuse	46.2	369	413	6.4
Monavani	Area 2	Cluster housing up to 40 units per hectare	7.1	282	183	2.9
Monavani	Area 3	Cluster housing up to 40 units per hectare	18.3	458	298	4.8
Monavani	Area 4	Cluster housing up to 40 units per hectare	29.0	726	472	7.6
Monavani	Area 5A	Cluster housing up to 40 units per hectare	36.0	900	585	9.4
Monavani	Area 5B	Cluster housing up to 20 units per hectare	29.7	447	407	6.7
Monavani	Area 7A	Cluster housing up to 40 units per hectare	25.5	637	414	6.7
Monavani	Area 7B	Cluster housing up to 40 units per hectare	11.6	463	301	4.8
Monavani	Area 7A1	Cluster housing up to 40 units per hectare	12.5	500	325	5.2
Monavani	Area 7B1	Cluster housing up to 60 units per hectare	4.9	293	172	2.7
Monavani	Area 11A	Cluster housing up to 20 units per hectare	26.6	399	363	6.0
Monavani	Area 11B	Cluster housing up to 40 units per hectare	33.2	830	540	8.7
Monavani	Area 12	Cluster housing up to 40 units per hectare	9.2	369	240	3.9
Monavani	Area 13	Cluster housing up to 20 units per hectare	19.3	290	264	4.3
Monavani	Area 14	Cluster housing up to 20 units per hectare	15.1	227	207	3.4
Monavani	Area 15	Cluster housing up to 40 units per hectare	1.8	72	47	0.8
Monavani	Area MV3	Large sized erf up to 1 500m <sup>2</sup>	46.6	327	402	8.0
Monavani	Area MV6	Cluster housing up to 20 units per hectare	50.5	757	689	11.3

Adjustments to the proposed master plan items are required to accommodate the development and other developments. The development will have a pro rata effect on the required items downstream of its connections as indicated.

Item	Description		IPDWF	Cost*
Item 1.1	200 mm Ø x	227 m new pipe	9 l/s	R 79,000
Item 1.2	200 mm Ø x	949 m new pipe	13 l/s	R 311,000
Item 1.3	200 mm Ø x	533 m new pipe	24 l/s	R 177,000
Item 1.4	250 mm Ø x	362 m new pipe	47 l/s	R 152,000
Item 1.5	300 mm Ø x	559 m new pipe	54 l/s	R 292,000
Item 1.6	300 mm Ø x	627 m new pipe	62 l/s	R 327,000
Item 1.7	375 mm Ø x	530 m new pipe	112 l/s	R 329,000
Item 1.8	450 mm Ø x	643 m new pipe	118 l/s	R 487,000
Item 1.9	450 mm Ø x	565 m new pipe	124 l/s	R 429,000
Item 2.0	250 mm Ø x	342 m new pipe	22 l/s	R 144,000
Item 3.1	160 mm Ø x	594 m new pipe	15 l/s	R 167,000
Item 3.2	250 mm Ø x	611 m new pipe	36 l/s	R 252,000
Item 3.3	250 mm Ø x	751 m new pipe	47 l/s	R 309,000
Item 4.1	200 mm Ø x	630 m new pipe	24 l/s	R 208,000
Item 4.2	250 mm Ø x	602 m new pipe	31 l/s	R 249,000
Item 5.0	160 mm Ø x	603 m new pipe	7 l/s	R 169,000
Item 6.1	160 mm Ø x	535 m new pipe	6 l/s	R 151,000
Item 6.2	160 mm Ø x	481 m new pipe	11 l/s	R 136,000
Item 7.1	160 mm Ø x	634 m new pipe	12 l/s	R 178,000
Item 7.2	200 mm Ø x	597 m new pipe	19 l/s	R 198,000
Item 3	900 mm Ø x	75 m parallel pipe	2023 l/s	R 46,000
RS_1.17	1,050 mm Ø x	389 m parallel pipe	2054 l/s	R 496,000
RS_1.18	1,200 mm Ø x	4000 m parallel pipe	2462 l/s	R 9,071,000

The Sunderland Ridge WCW is already operating beyond capacity and needs to be upgraded to accommodate this development.

(\* Excluding P & G Contingencies, Fees & VAT - Year 2005/06 Rand Value).

As an alternative to the implementation of Items 3, RS\_1.17 and RS\_1.18, the following items can be installed.

Item	Description		IPDWF	Cost*
Item 15	New diversion structure (65% - 35%)		1,287 l/s	R 100,000
Item 16	1,050 mm Ø x	900 m new pipe	1,287 l/s	R 2,172,600
HR_F14.1	1,050 mm Ø x	1,100 m new pipe	1,307 l/s	R 2,655,400
HR_F14.2	825 mm Ø x	700 m new pipe	1,326 l/s	R 1,220,100
HR_F14.3	1,050 mm Ø x	200 m new pipe	1,345 l/s	R 482,800
HR_F14.4	1,050 mm Ø x	900 m new pipe	1,351 l/s	R 2,172,600
HR_F14.5	1,050 mm Ø x	400 m new pipe	1,352 l/s	R 965,600

#### 1.4 Accommodation of the development in the present sewer system

Accommodation of the development in the present system, in the context of the sewer master plan, will require implementation of the following master plan items:

Item	Description		IPDWF	Cost*
Item 1.1	200 mm Ø x	227 m new pipe	9 l/s	R 79,000
Item 1.2	200 mm Ø x	949 m new pipe	13 l/s	R 311,000
Item 1.3	200 mm Ø x	533 m new pipe	24 l/s	R 177,000
Item 1.4	250 mm Ø x	362 m new pipe	47 l/s	R 152,000
Item 1.5	300 mm Ø x	559 m new pipe	54 l/s	R 292,000
Item 1.6	300 mm Ø x	627 m new pipe	62 l/s	R 327,000
Item 1.7	375 mm Ø x	530 m new pipe	112 l/s	R 329,000
Item 1.8	450 mm Ø x	643 m new pipe	118 l/s	R 487,000
Item 1.9	450 mm Ø x	565 m new pipe	124 l/s	R 429,000
Item 2.0	250 mm Ø x	342 m new pipe	22 l/s	R 144,000
Item 3.1	160 mm Ø x	594 m new pipe	15 l/s	R 167,000
Item 3.2	250 mm Ø x	611 m new pipe	36 l/s	R 252,000
Item 3.3	250 mm Ø x	751 m new pipe	47 l/s	R 309,000
Item 4.1	200 mm Ø x	630 m new pipe	24 l/s	R 208,000
Item 4.2	250 mm Ø x	602 m new pipe	31 l/s	R 249,000
Item 5.0	160 mm Ø x	603 m new pipe	7 l/s	R 169,000
Item 6.1	160 mm Ø x	535 m new pipe	6 l/s	R 151,000
Item 6.2	160 mm Ø x	481 m new pipe	11 l/s	R 136,000
Item 7.1	160 mm Ø x	634 m new pipe	12 l/s	R 178,000
Item 7.2	200 mm Ø x	597 m new pipe	19 l/s	R 198,000

Pipe sizes should be such that the Instantaneous Peak Dry Weather Flow (IPDWF) can be accommodated in the pipeline whilst flowing 70% or less full, the remaining 30% of the flow area is for the accommodation of stormwater ingress. The above IPDWF'S and the future pipe sizes as proposed in the June 2004 report were calculated with cognizance of all potential upstream future developments. Note that pipes in future development areas are still indicated schematically.

The Sunderland Ridge WCW is already operating beyond capacity and needs to be upgraded to accommodate this and other future developments. According to information, a phased upgrading is currently in progress.

## 2. PRO RATA LOADS ON THE FUTURE SEWER MASTER PLAN ITEMS

If required, the pro rata loads of the proposed development on the relevant master plan items can be calculated.

Yours sincerely  
 COMMUNITY ENGINEERING SERVICES  
 REG. NO.: 96/13328/07



Per: DR BF LOUBSER

16 August 2005

The Director : Water & Sanitation  
Tshwane Metropolitan Municipal Council  
Centurion Administration  
P O Box 6338  
PRETORIA  
0001

Attention: Mr Ansen Lamprecht

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**COMMUNITY  
ENGINEERING  
SERVICES**

Dear Sir

## DEVELOPMENT OF MONAVANI

The attached request by Dekker & Gelderblom, dated 28 June 2005 with regards to accommodation of the proposed development in the water distribution system, refers.

This document should be read in conjunction with:

- A Strategy and Master Plan - Tshwane Bulk Water Supply System (CEs - June 2004)
- Computer Analysis and Master Planning - Centurion Water Distribution Network (CEs - June 2004)

Herewith are the details to provide Bulk water services to the development area.

### 1. WATER DISTRIBUTION SYSTEM

#### 1.1 *Distribution zone*

The proposed development was conceptually taken into consideration for the recently completed master plan (June 2004).

The master planning as done for this request indicated that this development area should be accommodated in the Mnandi reservoir and the future Mooiplaats reservoir zones, as shown on Figure 1.

The development is situated outside the water priority area and the developer will have to install/construct certain link services and external bulk services, and make pro rata contributions for services provided by other developers.

#### 1.2 *Water demand*

The original water analysis for the master plan was done with a total annual average daily demand (AADD) for the development of 6 050 kℓ/d.

Directors:  
L C Geustyn  
F J Haupt  
J E Koek  
L H Mtshali  
S S Dube



When Mooiplaats reservoir is constructed, the following items are required to switch the areas (7A, 7B, 11A, 11B, 12, 13 & 14) below the 1 450 m contour, over from the Mnandi reservoir to the Mooiplaats reservoir:

• MPR.B1	:	5 410 m x 700 mm Ø Feeder main	R11 783 000 *
• MRP.B3	:	Inlet flow control	R 479 000 *
• MPR.B4	:	20 000 kℓ New Mooiplaats reservoir	R 9 963 000 *
• MPR.F8	:	820 m x 700 mm Ø main pipe	R 1 620 000 *
• MPR.F20	:	505 m x 00 mm Ø main pipe	R 888 000 *
• MPR.F21	:	500 m x 600 mm Ø main pipe	R 880 000 *
• Item 8	:	450 m x 500 mm Ø main pipe	R 612 000 *
• Item 14	:	Close PRV	

#### 1.4 Master plan

Adjustments to the proposed master plan items of July 2004 are required to accommodate the development, due to new information regarding land use and township layout supplied by Dekker & Gelderblom. The following master plan items have changed:

- MNR.3 is replaced by Item 1
- MNR.14 is replaced by:
  - MNR.25 : 50 m X 250 mm Ø pipe link R 76 000 \*
  - MNR.26 : 175 m X 315 mm Ø parallel reinforcement R 211 000 \*
  - MNR.27 : 25 m x 250 mm Ø parallel reinforcement R 60 000 \*
- MNR.15 is replaced by Item 2 R275 000 \*
- MNR.28 : 25 m x 250 mm Ø pipe link R 60 000 \*
- MNR.29 : 10 m x 160 mm Ø pipe link R 16 000 \*

Many such applications for township development in the Mooiplaats reservoir zone are being received. It is suggested that priority be given to implementing the bulk water supply infrastructure for this zone.

## 2. PRO RATA LOADS ON THE FUTURE WATER PLAN ITEMS

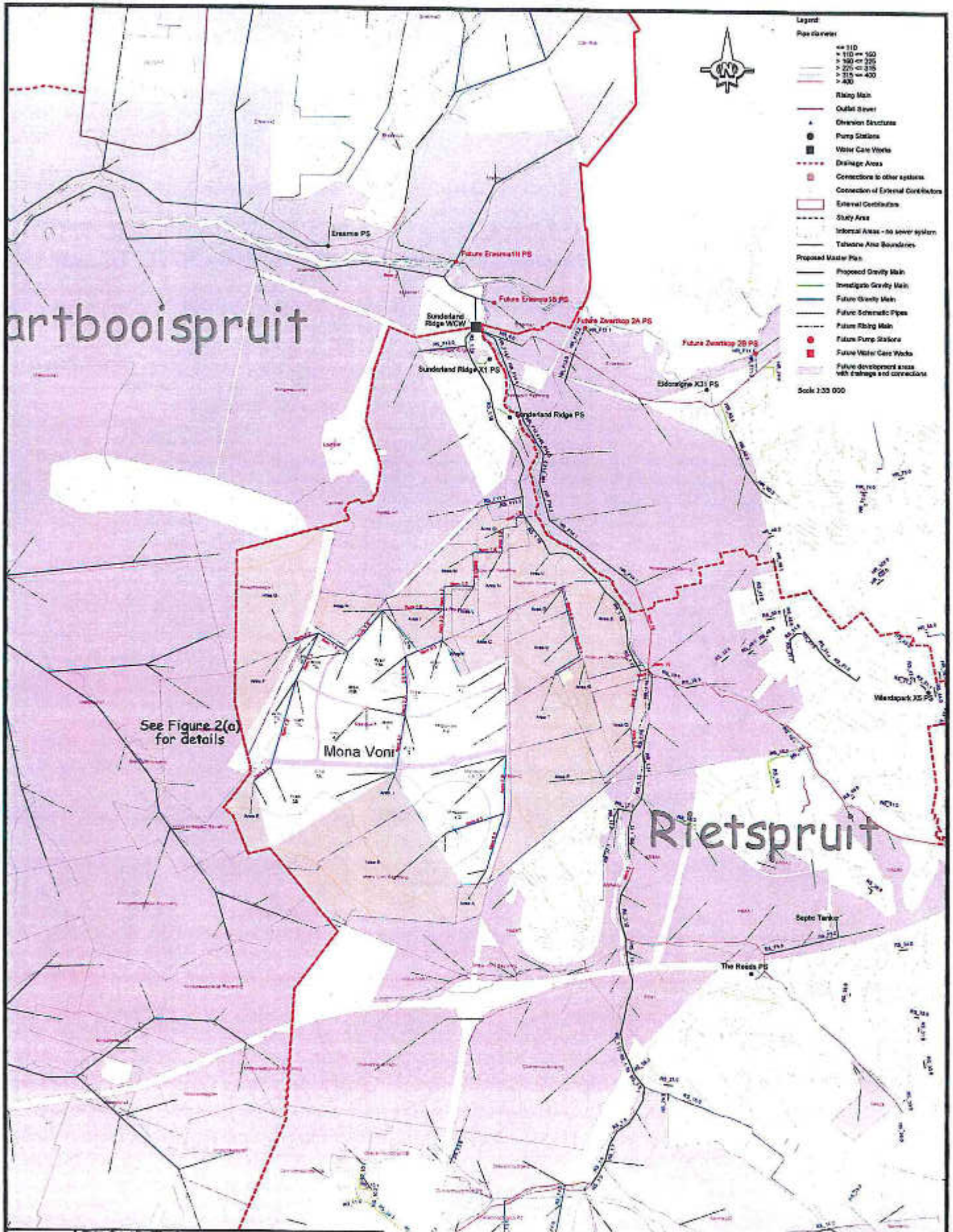
If required, the pro-rata loads of the proposed developments on the relevant master plan items can be calculated.

Yours sincerely  
 COMMUNITY ENGINEERING SERVICES  
 REG. NO.: 96/13328/07



Per: DR BF LOUBSER





**FIGURE 2**

**Required Works -  
Monavoni**

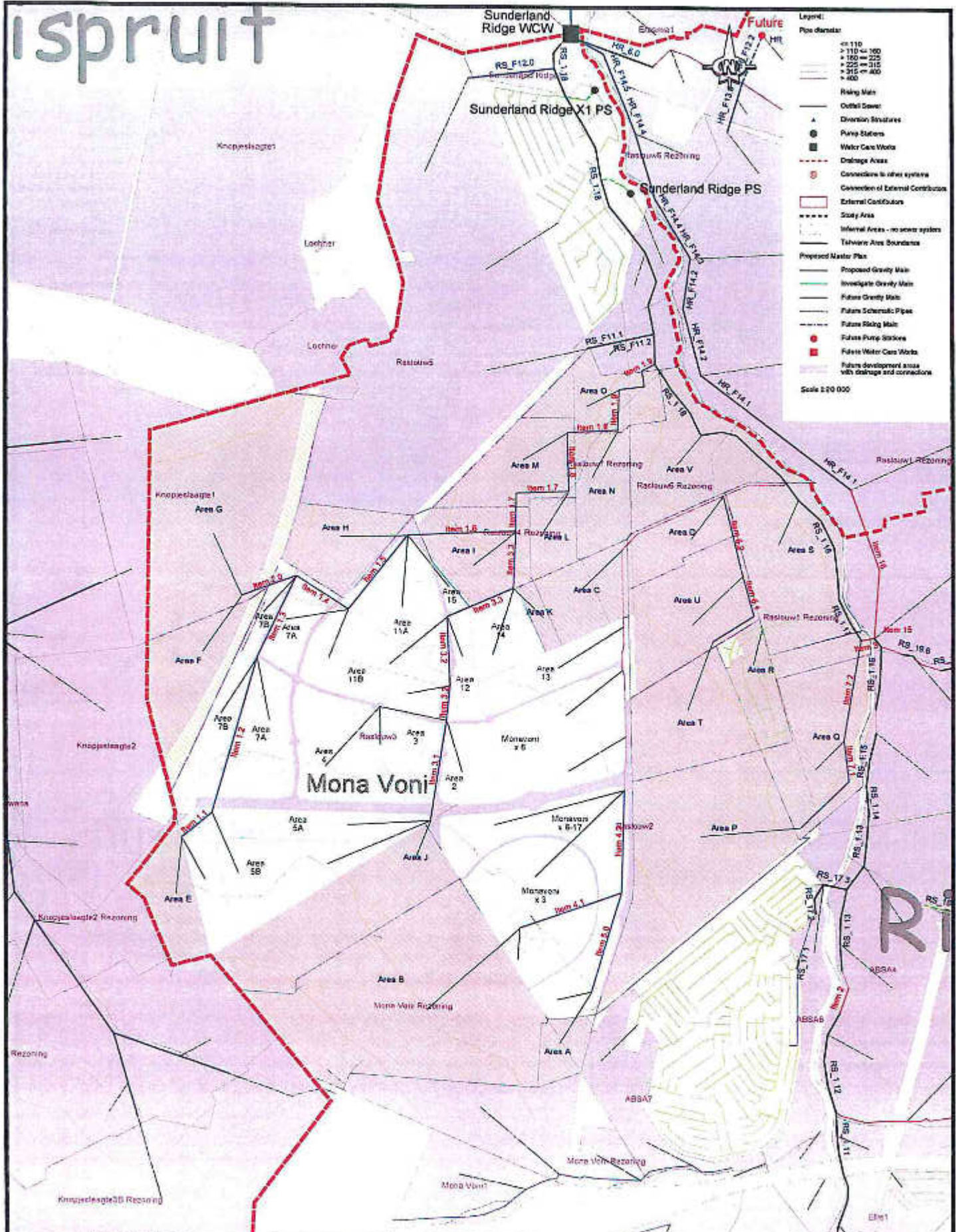


June 2004

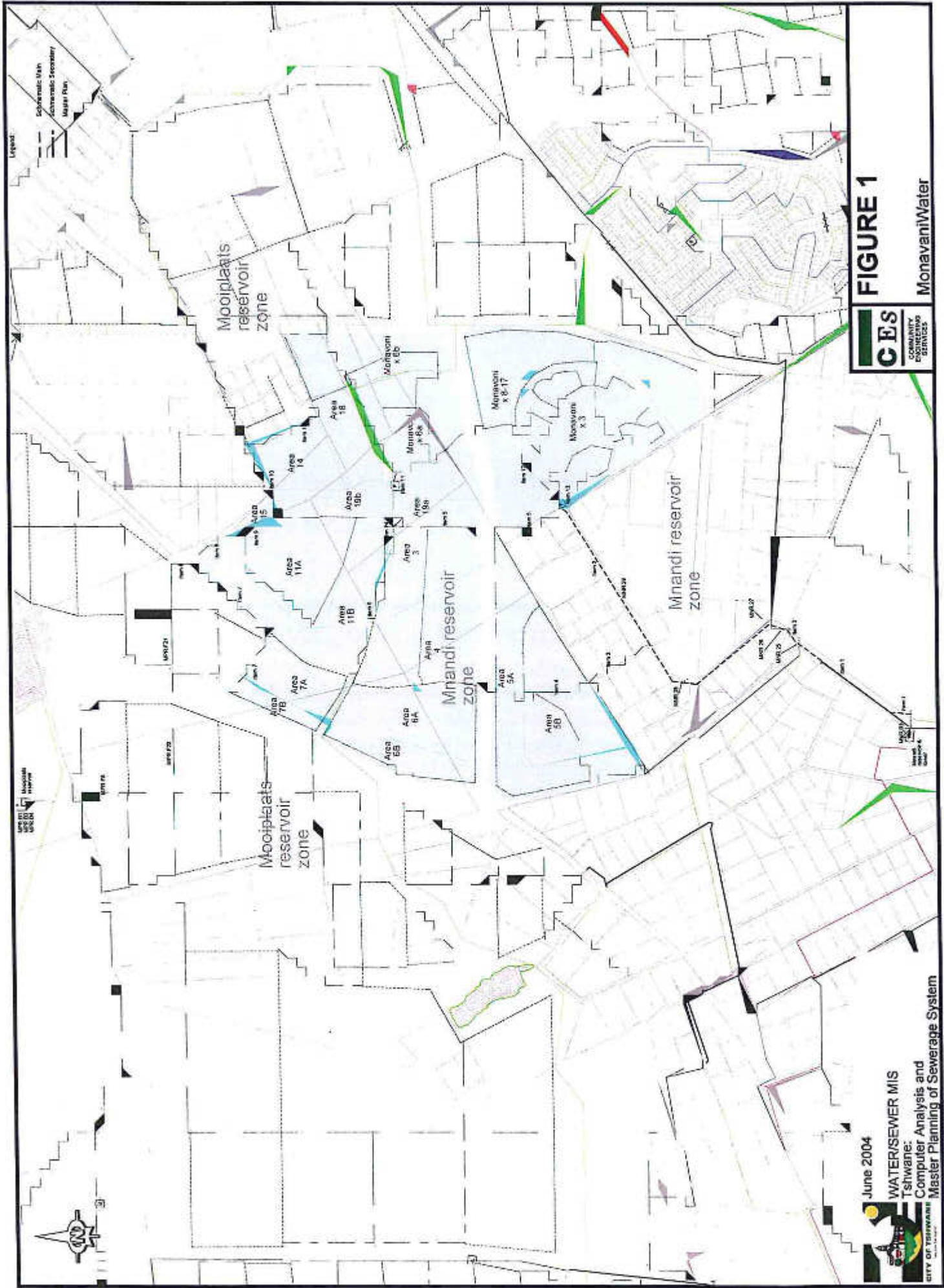
**WATER/SEWER MIS  
Tshwane:  
Computer Analysis and  
Master Planning of Sewerage System**



# ispruit



**FIGURE 2a**  
**Detail -**  
**Monavoni**



**FIGURE 1**



MonavaniWater

June 2004

**WATER/SEWER MIS**

Tshwane: Computer Analysis and Master Planning of Sewerage System





# **Annexure G(vi)**

Waste Management Plan



# WASTE MANAGEMENT PLAN FOR THE PROPOSED MONAVONI X 51

Part of the Remainder of Portion 5 of the Farm Mooiplaats  
355-JR and Part of Portion 2 of the Farm Swartkop 383  
JR

GAUT: 002/13-14/E0032

SEPTEMBER 2015



## BOKAMOSO

LANDSCAPE ARCHITECTS AND ENVIRONMENTAL CONSULTANTS

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MAROELANA

0161



## PROCEDURE FOR WASTE MANAGEMENT

### 1. **INTRODUCTION/PURPOSE**

The purpose of this procedure is to ensure that all waste material generated at within the proposed Monavoni X 51 Development is correctly sorted, stored, handled and where possible recycled or otherwise disposed of in accordance with legislative requirements, SHEQ policy and objectives and targets.

### 2. **APPLICATION/SCOPE**

All Erven within the proposed development.

### 3. **Related Documents**

SANS 10228  
DWA Minimum Requirements  
Occupational Health and Safety Act

### 4. **SAFETY, HEALTH AND ENVIRONMENT**

The procedure includes practices to protect the safety and health of employees and the environment from possible negative impacts of waste handling and disposal.

### 5. **PROCEDURE**

A waste is any unwanted or superfluous material generated on site that needs to be disposed of on site or off site.

#### **6.1 Waste Identification**

6.1.1 The SHE Team will list all waste generated on site in a waste register and shall identify each waste stream as being of the following categories:

- (a) Hazardous, or
- (b) Non-hazardous.

6.1.2 Hazardous waste is defined as an inorganic or organic element or compound that, because of its toxicological, physical, chemical or persistency properties, may exercise detrimental acute or chronic impacts on human health and the environment.

6.1.3 Non-hazardous waste (or general waste) is waste that does not pose an immediate threat to man or to the environment, i.e., household or kitchen waste, garden waste, dry industrial and commercial waste which has not been contaminated by any hazardous waste.

6.1.4 When in doubt as to whether a waste stream is hazardous or not, assume that it is hazardous until expert advice has been obtained.

For these purposes, a waste is assumed to be hazardous if it has not been decontaminated and contains:

- Any chemicals or substances from the production process at any site, excluding clean water;
- Packaging from any process chemicals;
- Sludges, scaling or precipitates from any tanks, sumps or drains;
- Laboratory chemicals;
- Oil and solvents;
- Fluorescent tubes.

#### **6.2 Waste Classification**

6.2.1 All hazardous waste generated and which is disposed of off site must be classified as per SANS 10228 and the Department of Water Affairs (DWA) Minimum Requirements<sup>1</sup> for the following requirements:

<sup>1</sup> Department of Water Affairs and Forestry; 'Minimum Requirements for Waste Disposal by Landfill'; Second Edition 1998

## PROCEDURE FOR WASTE MANAGEMENT

- (a) SANS Class;
  - (b) Hazard Rating, and
  - (c) Disposal and treatment options.
- 6.2.2 A waste stream is classified as follows:
- (a) If no classification is already available to the waste stream, or where uncertainty exists about whether a waste is hazardous or not, the Manager of the facility in question shall instruct the SHEQ Team to collect a representative sample of the waste and send this to approved laboratories for analysis.
  - (b) The Manager shall then determine the information in 6.2.1. in accordance with the Minimum Requirements.
  - (c) External specialist assistance may also be obtained.
  - (d) Records of such analysis and classification shall be recorded in the Waste Register.
- 6.2.3 Following the classification of each stream, the disposal and treatment options shall be identified in accordance with legal requirements. A suitable contractor shall be identified by the SHEQ Team to recycle and/or dispose of the waste. A contract or service level agreement shall be compiled to this effect for each site, stating the treatment and disposal options.
- 6.2.4 In terms of the OHS Act (GNR 1179, reg. 15), the facility shall investigate options for the recycling and re-use of hazardous chemical waste prior to disposal, so long as the options investigated are reasonable and cost-effective.

### 6.3 Waste Separation

- 6.3.1 The SHEQ Team shall ensure that the appropriately labelled bins are available for waste disposal on site. Each Waste Storage Area shall have a sign describing the waste stream which may be disposed of to that container/area.
- 6.3.2 The SHEQ Team shall therefore ensure that wastes are being separated into the following streams:

<b>Waste Stream</b>	<b>Sources</b>	<b>Notes</b>	<b>Typical disposal or recycling options</b>
<i>General Domestic Waste</i>	General office bins stored inside the office areas and kitchens.	Paper and hazardous office waste to be removed. (Except where such extensive separation is not practical due to the unavailability of waste recyclers and the remoteness of the site)	Disposal to Municipal General Landfill
<i>Used PPE</i>	Stores	Used PPE may be disposed off as general waste. PPE must be dismantled or cut up to prevent it from being used again.	Disposal to Municipal General Landfill
<i>Office and Administrative Paper Waste</i>	Each office building will have a labelled bin for office paper waste. The paper waste will be recycled.	Ensure that paper waste is not contaminated with oil or chemicals.	Recycled
<i>Boiler Ash</i>	Boilers		Depending on classification: may be land filled to general

## PROCEDURE FOR WASTE MANAGEMENT

<b>Waste Stream</b>	<b>Sources</b>	<b>Notes</b>	<b>Typical disposal or recycling options</b>
			or hazardous landfill or given/sold to contractors.
<i>Scrap metal</i>	Maintenance	All scrap metal will be inspected for contamination and, if clean, stored in a designated area. Scrap metal must be decontaminated and/or oil prior to being issued to scrap metal dealers. All oil and paint drums and cans must be drained of all oil and paint.	Given/sold to a scrap metal recycler if not contaminated.
<i>Fluorescent Tubes</i>	All	All waste fluorescent tubes will be crushed manually, ensuring that no escape of the dust from the tubes takes place. This drum will be sealed with a tight fitting lid so that no dust may escape during transport.	Landfilled to H:h landfill
<i>Oils</i>	Unknown / Maintenance	To be stored in non-leaking sealed drums.	Recycled.
<i>Medical waste</i>	Clinics or First Aid Stations	All sharps and other surgical blades used at the clinic shall be disposed of by the sister, into the dedicated sharps bin in the clinic.	This waste shall be removed by an approved medical waste contractor for incineration.
<i>Vegetation</i>	Grass cutting, leaves, branches.		Removed and delivered to the appropriate general waste disposal site in the absence of specific garden refuse sites. Or recycled to composters.
<i>Hazardous Maintenance Waste</i>	Maintenance Department	Batteries, Contaminated oil drums and tins, oily rags and contaminated sawdust/absorbent material. Normal amounts of empty pen cartridges, white board markers, tipex, photocopy toner units, inks to be disposed of in general waste.	Class H:h landfill.
<i>Cooking oil</i>	Kitchens	No rancid oils shall be used in the making of any food substances.	Class H:h landfill. NOT to sewer or stormwater.
<i>Building rubble</i>	Maintenance Department	Building rubble has been removed from the exclusions of hazardous waste and has to be classified prior to disposal. Use of building rubble as fill material is prohibited.	Depending on classification.
<i>Asbestos waste</i>	Maintenance	All asbestos waste is to be stored and disposed of according to the	Placed into double-lined plastic bags,



## PROCEDURE FOR WASTE MANAGEMENT

<b>Waste Stream</b>	<b>Sources</b>	<b>Notes</b>	<b>Typical disposal or recycling options</b>
	Department	Asbestos Regulations as per the Occupational Health and Safety Act 85 of 1993. Broken asbestos sheeting is to be replaced with non asbestos material.	labelled as "Asbestos Waste" and disposed of to a general landfill permitted to receive asbestos waste.
<i>Chemical Bags and other chemical containers</i>	Process areas	Containers of chemicals are classified according to the chemicals which they contained.	Depending on the classification. Where possible bags and containers are recycled to the supplier.
<i>Laboratory wastes (including containers)</i>	Laboratories	Laboratory waste is to be classified as Class 9 (Miscellaneous waste), unless the containers can be decontaminated and returned to the supplier.	Hazardous waste (H:h landfill) OR returned to supplier if decontaminated.
<i>Process wastes</i>	Process operations	To be identified and classified respectively	Depends on the classification. Process waste is recycled to the process in most cases.

### 6.4 Site specific waste

- 6.4.1 The waste register and waste classifications for each waste stream unique to each site shall determine the storage and treatment options for those waste streams.
- 6.4.2 Sweepings and waste recovered from processes shall be recycled wherever possible. If they cannot be re-used or recycled in the process, then they shall be stored as per 6.6 until classified, and then disposed of in accordance with the recommendations of the classification.

### 6.5 Waste Transfer

- 6.5.1 Waste is transferred from the source to a collection skip or drums in such a manner so as not to generate any environmental impacts, such as surface water and soil contamination through spills or leaks.
- 6.5.2 Any spills or leaks shall be addressed immediately through the Spill Response section of the Emergency Response Procedure by containing the spill with absorbent material, and disposing of the absorbent material and any contaminated soil into the same container as the waste stream which was spilt/leaked.
- 6.5.3 Any contaminated soil shall be removed immediately if the spill involved hazardous waste, and this soil and any absorbent material shall be disposed of to the same container as the waste which was spilt.

### 6.6 Hazardous Waste Storage Areas

- 6.6.1 Access control shall be implemented through the general site security.
- 6.6.2 Unless a specific permit is granted or where the bin is kept indoors, hazardous waste storage shall occur on impervious cement hard standing of good quality, and the area shall be bunded to prevent stormwater ingress. The quality of the cement bund and surface shall be inspected regularly and repairs effected if

## PROCEDURE FOR WASTE MANAGEMENT

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necessary. Each site owner shall be responsible for specifying the particular waste storage area.

- 6.6.3 The area shall be roofed or all containers and skips shall be covered in such a way that rainwater shall not leak into the waste.
- 6.6.4 The area shall drain to a sump. Any spills or contaminated stormwater shall be treated prior to disposal to effluent sewer. Stormwater or other water which appears clean (i.e. no discolouration or oil film) shall be disposed of to the effluent sewer and not to stormwater.
- 6.6.5 Dry, dusty hazardous wastes shall be covered during transfer and storage.
- 6.6.6 The above does not apply to hazardous waste containers situated in a building where rain ingress and spillage are not possible.

### 6.7 Waste Collection, Monitoring and Reporting

- 6.7.1 A suitable trained competent person shall supervise the collection of waste from site by approved waste collection companies and/or the Municipality.
- 6.7.2 The Waste collection and data input procedure is therefore as follows:
  - (a) The waste skip is placed on site by the contractor.
  - (b) When the waste skip or other container (such as a sump) is full, the authorised person shall inspect the waste container for cross-contamination. If the waste stream is satisfied with the waste consistency, than authorised person shall notify the SHEQ team who shall notify the waste contractor is notified and set a date for collection of the waste.
  - (c) Upon arrival at the site, the replacement skip/tanker and vehicle of the waste contractor is inspected by security or the SHEQ team for rusting, leaks and/or prior contamination prior to them being allowed on site. If security is doubtful as to the integrity of the skip, then the SHEQ team shall be contacted to resolve the matter.
  - (d) Security directs the contractor to the waste and shall notify one of the authorised personnel who shall receive the contractor, check and supervise the loading operation. Any problems or irregularities are to be reported to the SHEQ team before the truck leaves the site.
  - (e) The waste is collected by the contractor and replacement skip placed in the correct location (if required).
  - (f) The waste manifest document is signed by the driver of the truck and the authorised person.
  - (g) The Waste Manifest document is delivered to the SHEQ team who shall enter the data into the details of the waste load for future monitoring.

### 6.8 Waste Contracts

- 6.8.1 The contract with the Waste Disposal company shall specify that:
  - Any skips not approved by security or the SHEQ team shall be replaced at the cost of the contractor, and
  - The contractor shall comply with the provisions of GN R 1179 (of the OHS Act), in particular regulation 15, which states that all vehicles, re-usable containers and covers which have been in contact with hazardous chemical waste are cleaned and decontaminated after use in such a way that the vehicles, containers or covers do not cause a hazard to the environment, the on site staff and the waste contractor as well as the public (i.e. during transport).
- 6.8.2 If waste is to be removed in a skip or other open container, by vehicle, the designated person should ensure that this has a lid or an attachable cover, to prevent the contents from spilling or generating dust or litter during transit.

## PROCEDURE FOR WASTE MANAGEMENT

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It shall be the duty of the SHEQ team to ensure that the waste contractor is informed in writing of the nature and classification of the waste which is to be disposed.

### **6.9 Waste contractor audits**

- 6.9.1 The Environmental Manager shall request all waste contractors to provide proof of audit results on an annual basis.
- 6.9.2 The audits should have consisted of reviewing the operational practice of the contractor/supplier against any permits, DWA's Minimum Requirements and any applicable SANS codes for the handling of dangerous goods.
- 6.9.3 These audits results shall be used in the Management Review and Legal Compliance Audits.

### **6.10 Labelling of containers and Signage for Hazardous Waste Storage Areas**

- 6.10.1 Each hazardous waste storage area shall be signposted with a sign with the following specifications:
  - (a) Have a dedicated sign with the words "Hazardous Waste" clearly visible at the entrance to the gate or access point. The sign shall also display the name of the waste stream (e.g. "Used Oil") if the container in that area accepts only that waste stream. If containers are used to collect a variety of waste streams, then only the words "Hazardous Waste" shall appear on the sign.
  - (b) The signs for the waste storage areas shall also comply with the following:
    - Suitably protected from the elements.
    - Mounted in a conspicuous position above the waste bins or skips.
  - (c) Containers used to receive the waste shall comply with the following:
    - Containers shall be checked for leaking. Any leaking containers shall be replaced. For containers (skips) provided by contractors, these shall be approved prior to being allowed on site in accordance.
    - Containers containing dusty waste shall be covered.
    - All containers owned by the individual site owners which are position on site shall be clearly marked with the words: "Hazardous Waste".

# **Annexure G(vii)**

Traffic Study





# **MONAVONI MASTER PLAN**

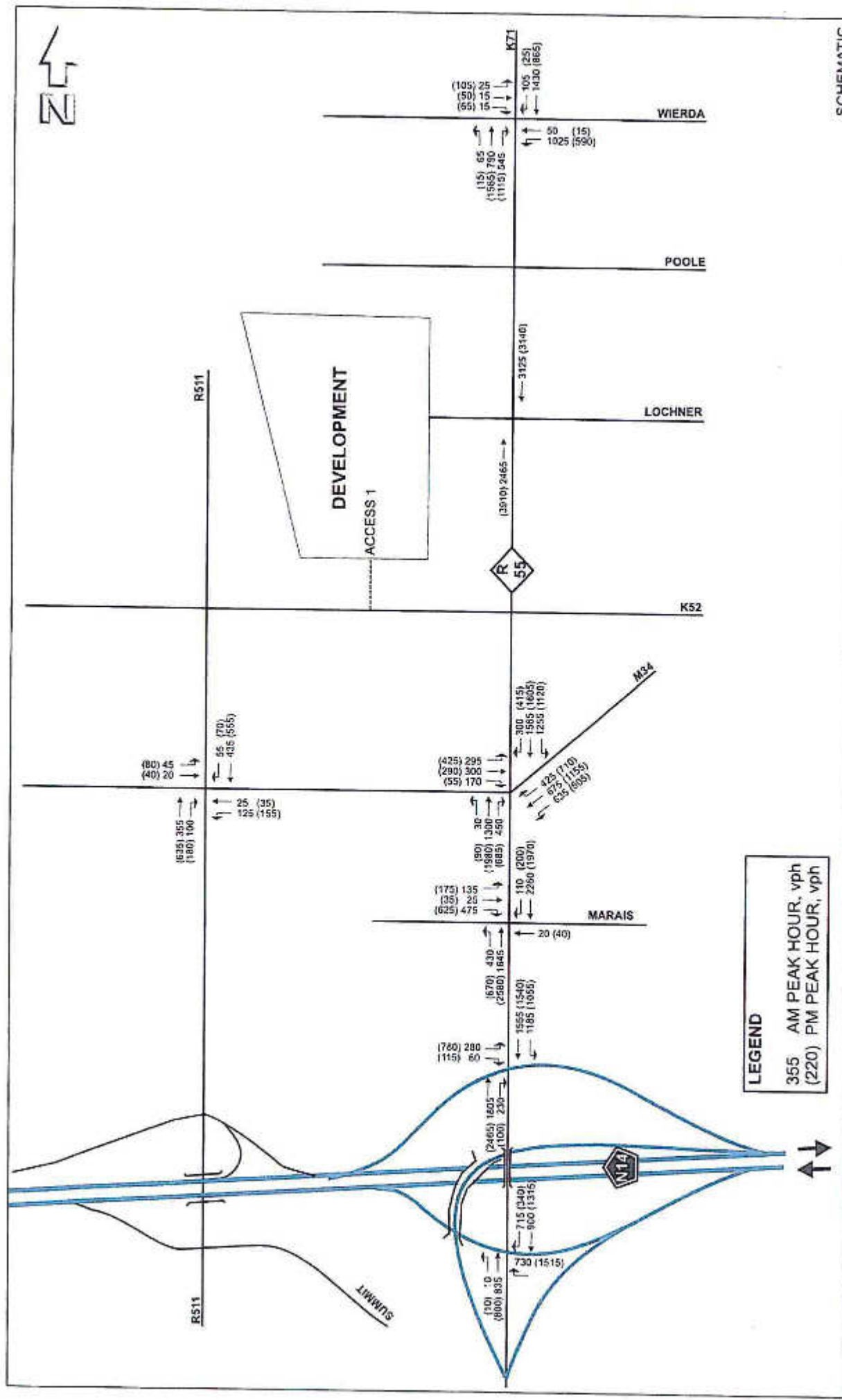
**Proposed developments located**

**West of the R55 (K71) and North of P102-1**

***August 2009***

29 De Havilland Crescent  
Pro Park  
Building 1  
Persequor Park 0020

Tel: (012) 349 1664  
Fax: (012) 349 1665  
e-mail: [mail@itse.co.za](mailto:mail@itse.co.za)



SCHEMATIC

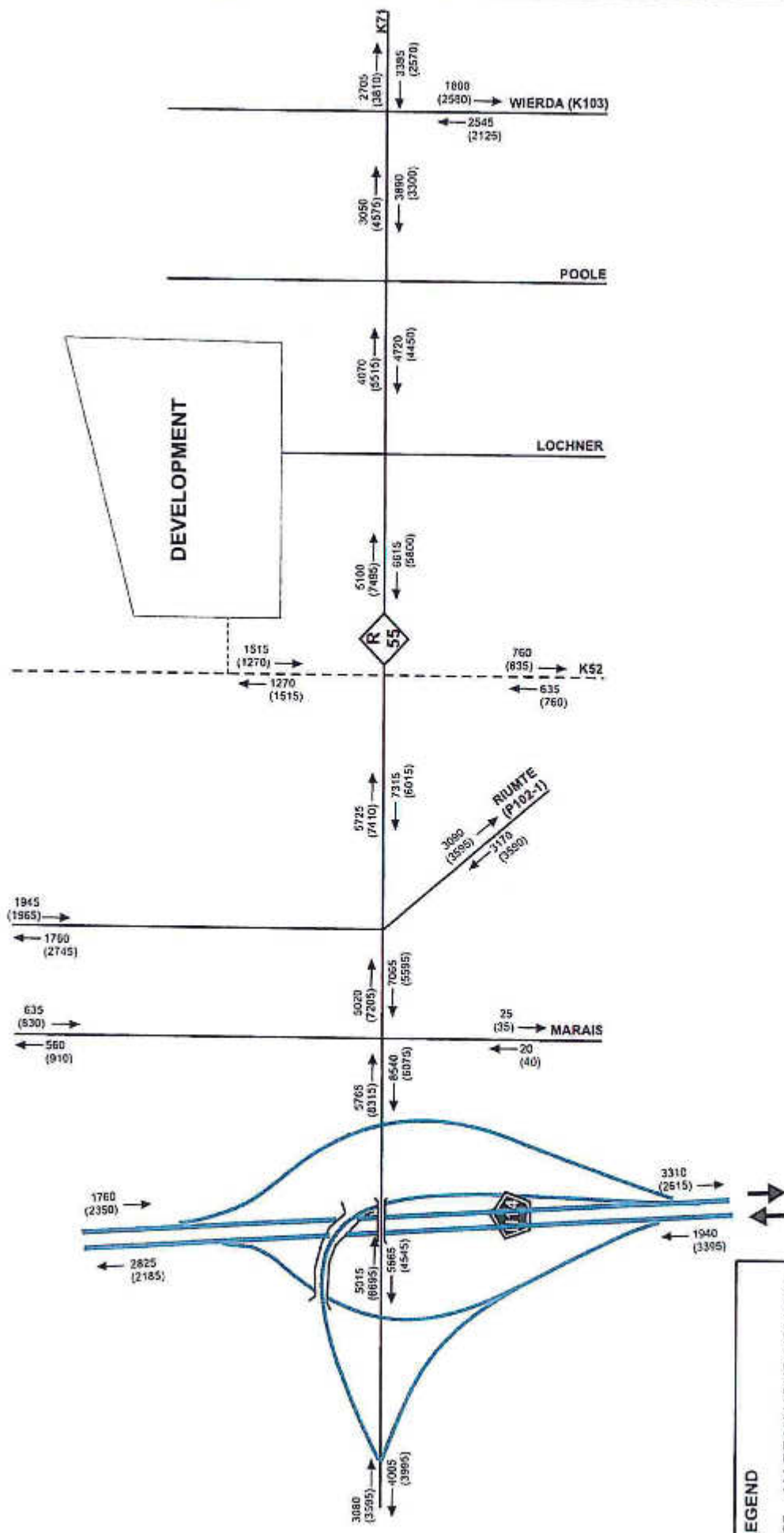
2675\Figure 4b\_LATENT RIGHTS.cdr

Project: MONAVONI MASTER PLANNING

Figure: LATENT RIGHTS TRAFFIC

No. 4b





SCHEMATIC

2675\Figure 5a\_LINK VOLUMES.cdr

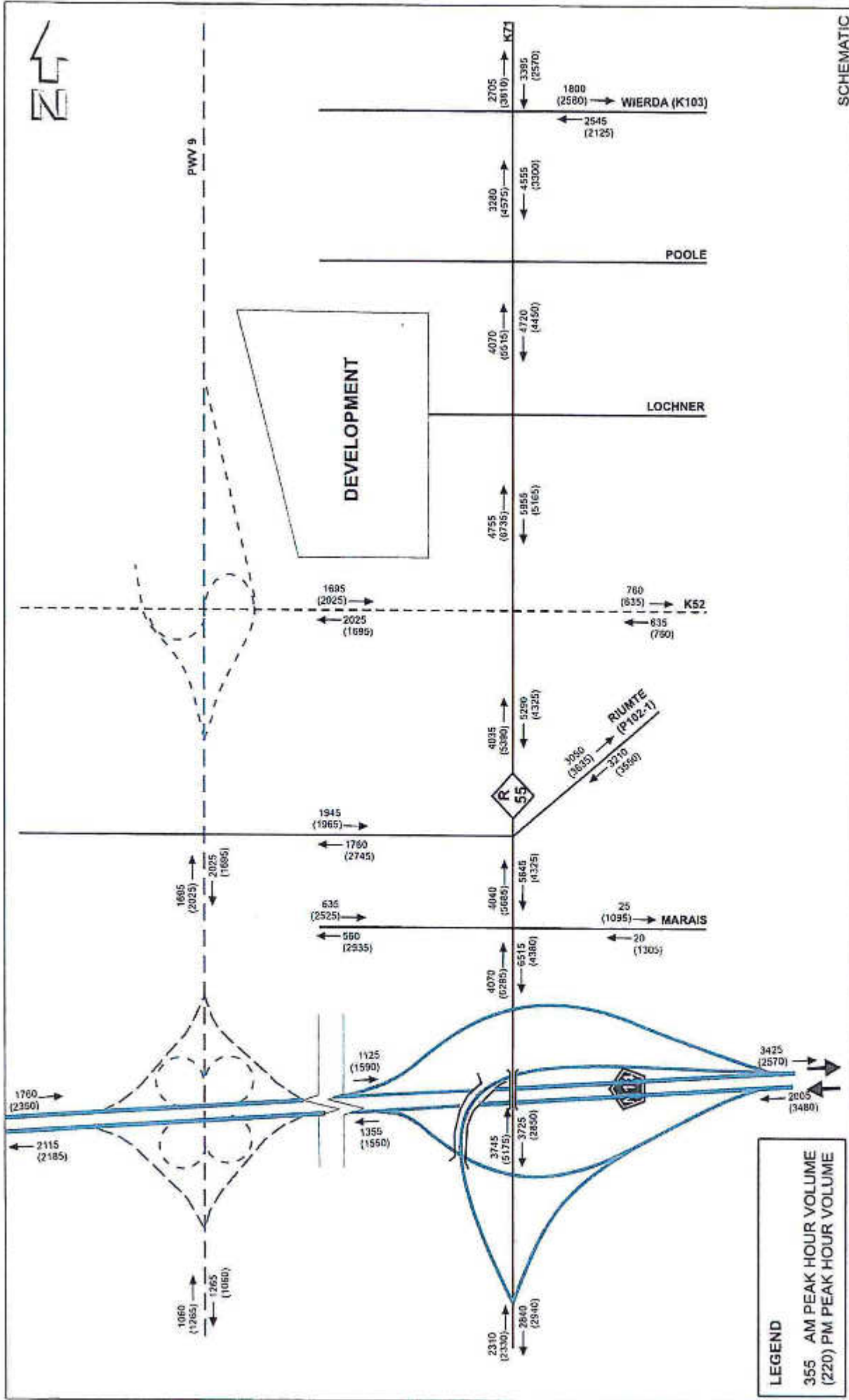
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Figure: 2019 BACKGROUND TRAFFIC, LATENT RIGHTS AND DEVELOPMENT TRAFFIC: LINK VOLUMES (ALTERNATIVE 1)

MONAVONI MASTER PLANNING

Project:





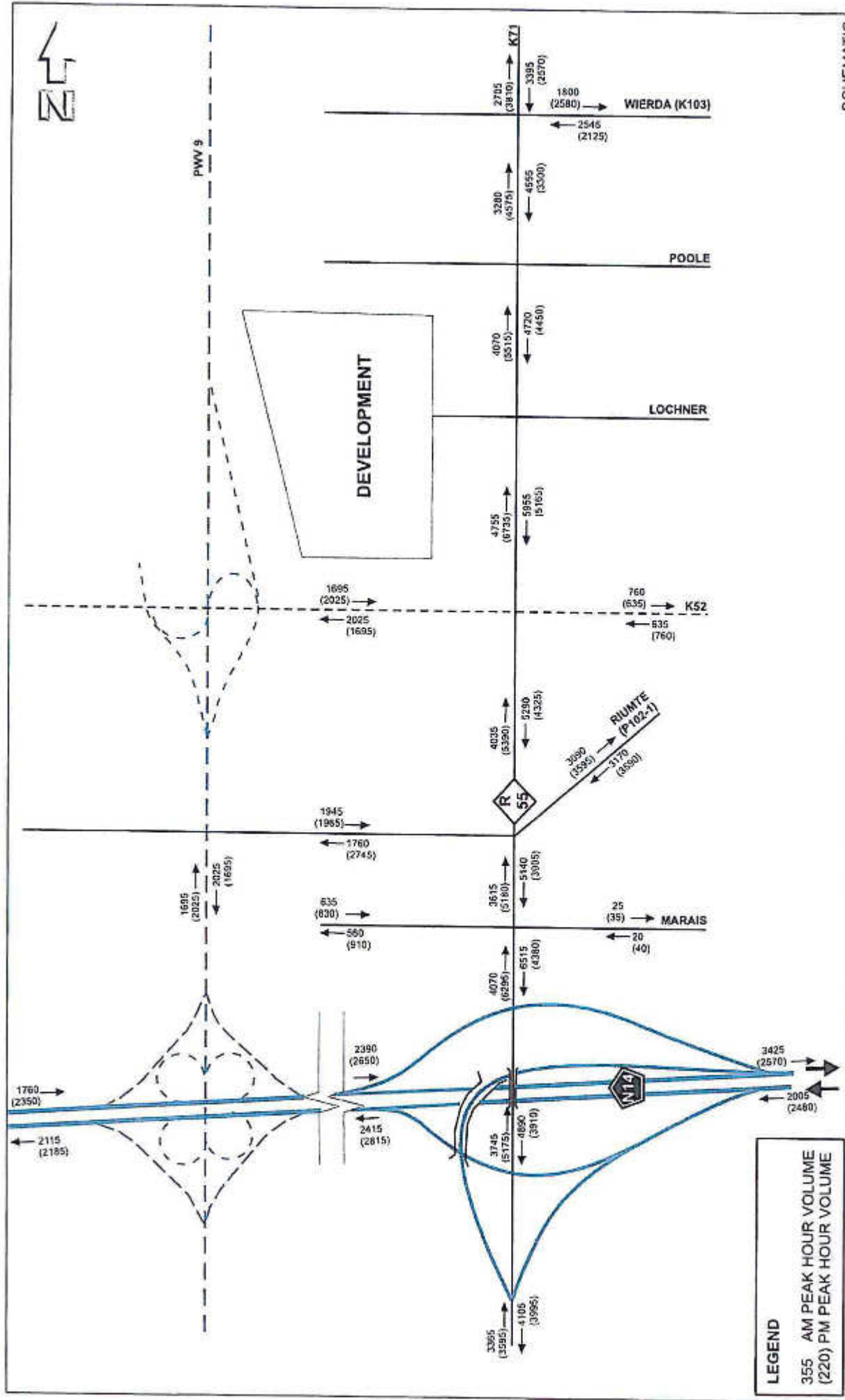
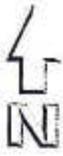
Project: **MONAVONI MASTER PLANNING**

Figure: **2019 BACKGROUND TRAFFIC, LATENT RIGHTS AND DEVELOPMENT TRAFFIC: LINK VOLUMES (ALTERNATIVE 2)**

No. **5b**







SCHEMATIC

2875\Figure 5c\_LINK VOLUMES.cdr

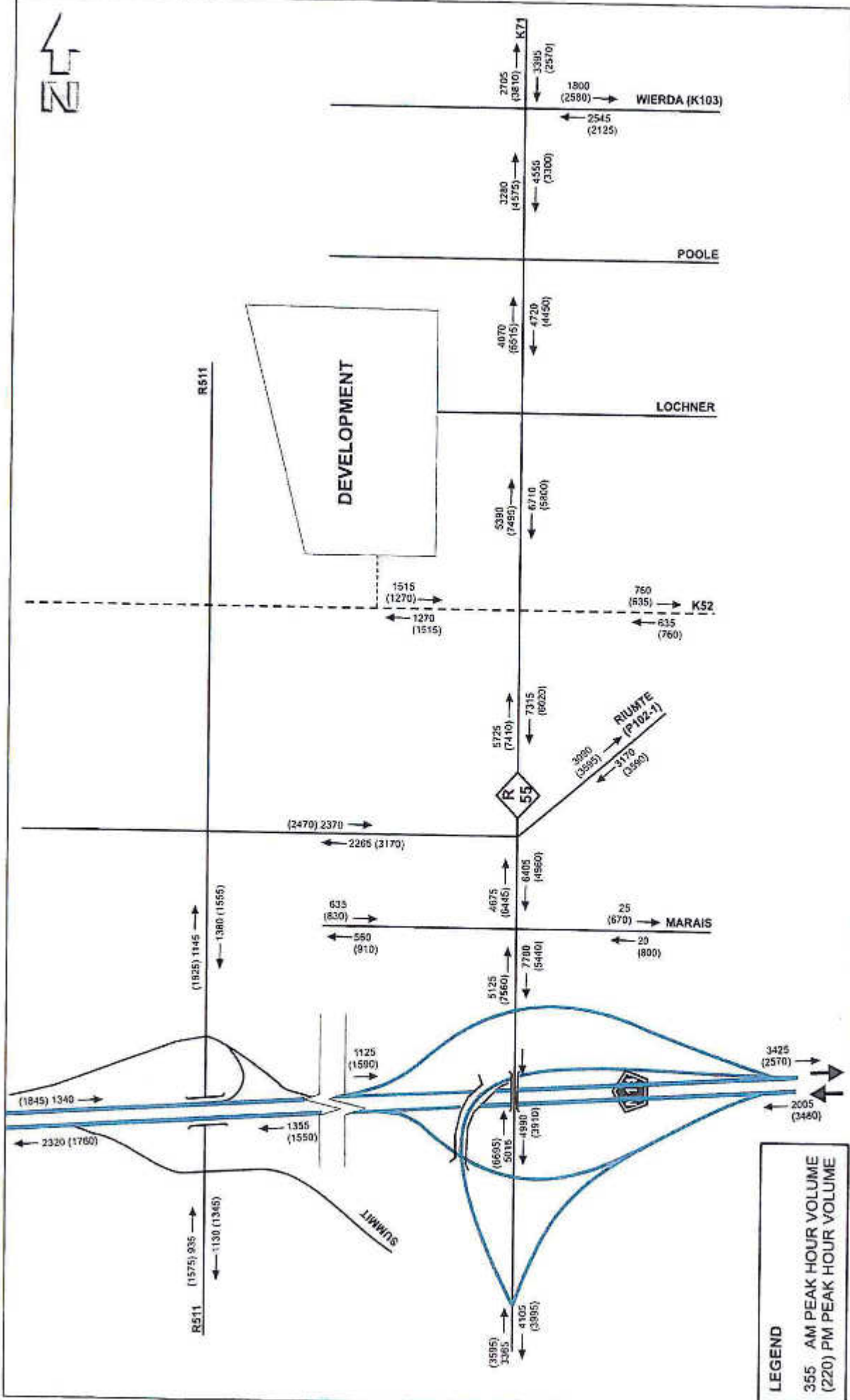
No. 5C

Figure: 2019 BACKGROUND TRAFFIC, LATENT RIGHTS AND DEVELOPMENT TRAFFIC: LINK VOLUMES (ALTERNATIVE 3)

MONAVONI MASTER PLANNING

Project:





SCHEMATIC

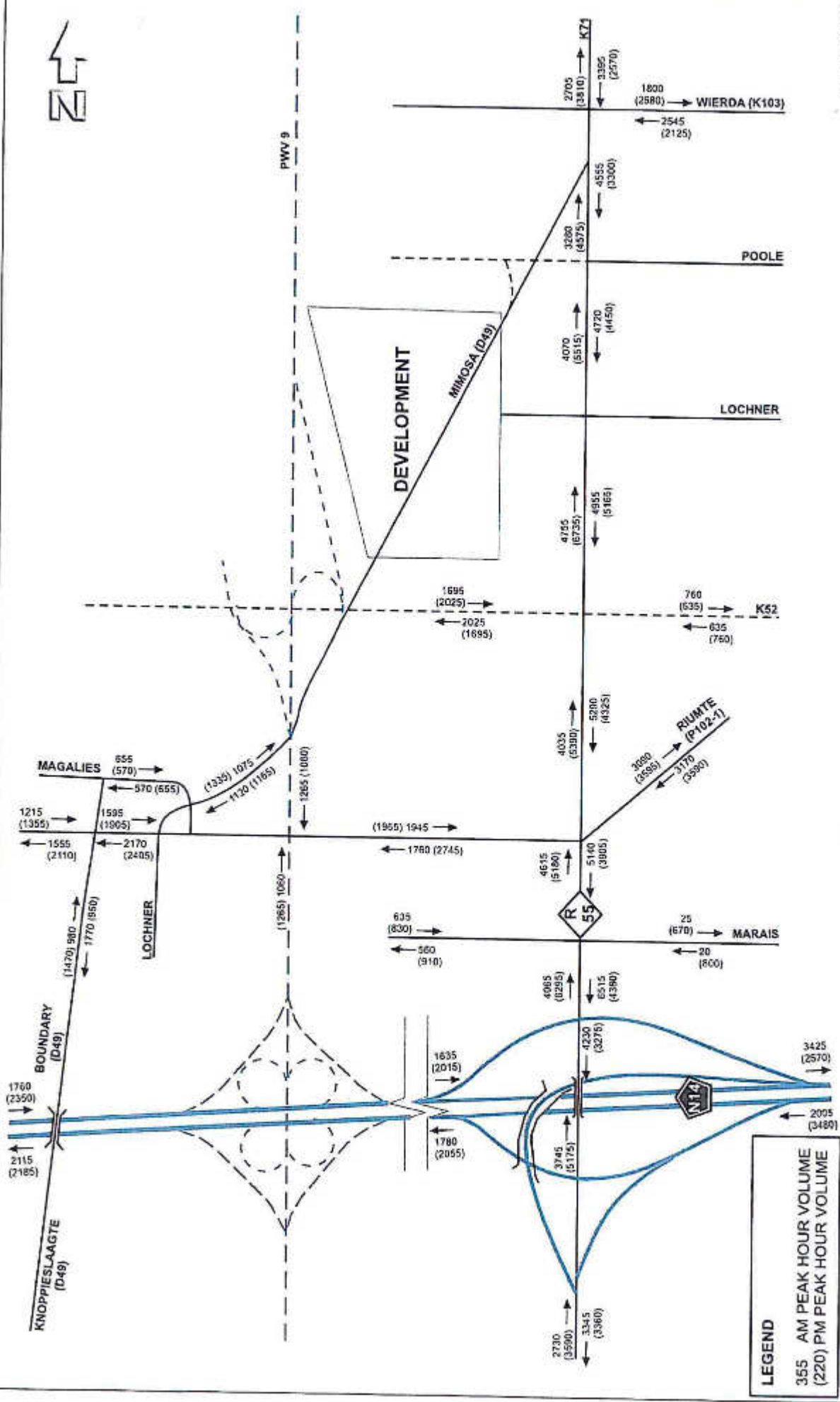
2675\Figure 5d\_LINK VOLUMES.cdr

No. 5d

Figure: 2019 BACKGROUND TRAFFIC, LATENT RIGHTS AND DEVELOPMENT TRAFFIC: LINK VOLUMES (ALTERNATIVE 4)

Project: MONAVONI MASTER PLANNING





SCHEMATIC

2675\Figure 5e\_LINK VOLUMES.cdr

No. 5e

TRIP DISTRIBUTION (ALTERNATIVE 5)

Figure:

MONAVONI MASTER PLANNING

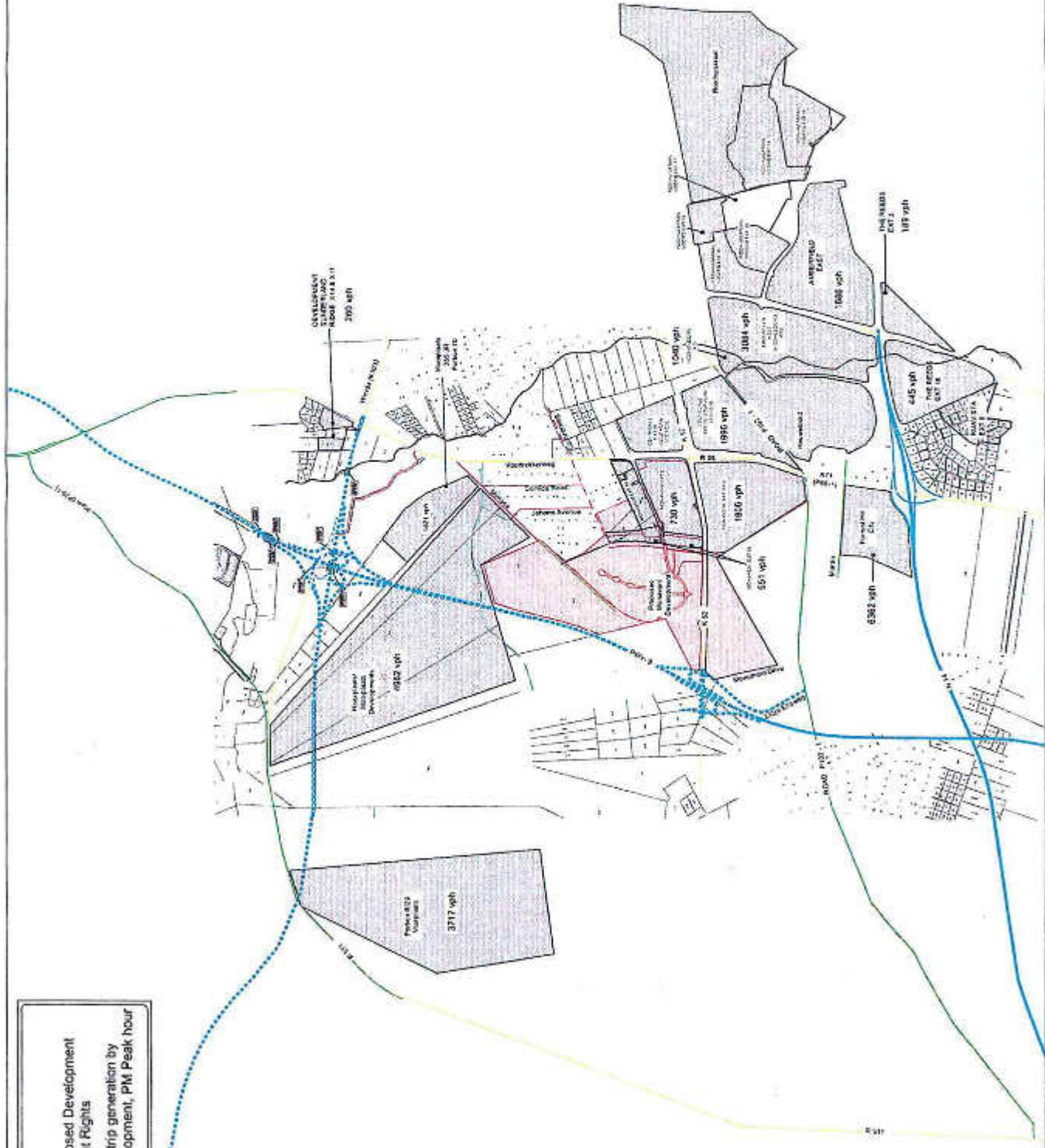
Project:





**Legend:**

- Proposed Development
- Latent Rights
- 370 vph : Total trip generation by development, PM Peak hour



**Monavoni Master Planning of all extentions**

**Traffic Impact Study**

**TABLE OF CONTENTS**

1. Traffic Impact Study Summary Table
2. Appendix A – Tables
3. Appendix B – Figures

<b>Monavoni Master Planning of all extensions</b>		
	<b>Description</b>	<b>Refer to Appendix</b>
<b>1. Introduction</b>	A new large mixed land use development is planned by M&T Development in the Monavoni area. All extensions of the proposed Monavoni development will cover approximately 323 ha and will consist of residential, offices, motor trade, light industrial and commercial land use. The locality of the proposed development is shown in <b>Figure 1</b> .	Appendix B, Figure 1
<b>2. Land Use</b>	The development will consist of: <ul style="list-style-type: none"> <li>☉ 164 257 m<sup>2</sup> Offices</li> <li>☉ 197109 m<sup>2</sup> Industrial</li> <li>☉ 10762 units Residential</li> </ul> <p>The areas shown are gross leasable area (GLA)</p>	
<b>3. Latent Rights</b>	A number of developments were approved or their applications have been submitted for approval in the vicinity of the proposed development. The developments included in the analysis as latent rights are shown in <b>Table 2</b> . The locality and the volumes of the latent rights are shown in <b>Figure 4a</b> and <b>Figure 4b</b> .  The required upgrades for the latent rights are summarised and shown in <b>Table 3</b> and <b>Figure 4c</b> .  Conclusion regarding latent rights is summarised in <b>Table 4</b> . The upgrades proposed for K71 between Lochner and N14 are inadequate because the latent rights will only provide one additional lane between Marais and N14, whereas two additional lanes are recommended. The upgrades proposed for the other roads are adequate.	Appendix A, Table 2, Table 3 and Table 4, Appendix B, Figure 4a and 4b
<b>4. Trip Generation</b>	The development will generate the following: <ul style="list-style-type: none"> <li>☉ 12 198 trips during the weekday AM and PM peak hours if the adjustment factor is not applied (Option 1).</li> <li>☉ 10 799 trips during the weekday AM and PM peak hours if the adjustment factor of 0.7 is applied to make provision for internal trips between residential, office and industrial (Option 2).</li> <li>☉ 9 292 trips during the weekday AM and PM peak hours if the adjustment factor of 0.8 is applied to indicate that 20% of trips will use public transport (Option 3).</li> </ul> <p><i>Note: Option 3 trips was used for the purpose of this report as it addresses the usage of public transport and make provision for internal trips between industrial, residential and offices.</i></p>	Appendix A, Table 1a, 1b and 1c

<b>Monavoni Master Planning of all extensions</b>		
	<b>Description</b>	<b>Refer to Appendix</b>
	Refer to <b>Table 1a, 1b and 1c</b> for the detail of the trip generation.	
<b>5. Expected Trip Distribution and Trip Assignment</b>	<p>The additional vehicle trips that will be generated by the proposed development were distributed to the adjacent road network. The trip distribution for the study was done based on the examination of the existing traffic flow patterns in the area, surveys conducted in the previous studies, as well as local knowledge of the area. The expected trip distribution of the proposed development is shown in <b>Figure 3a, 3b, 3c, 3d and 3e</b>.</p> <p>It should be noted that there are five alternatives in terms of trip distribution, the aim was to check most suitable trip distribution that will resolve the capacity especially on K71. The five alternatives are explained below:</p> <ul style="list-style-type: none"> <li>⇒ <b>Alternative 1:</b> All traffic towards south will use K71.</li> <li>⇒ <b>Alternative 2:</b> 40% of traffic towards south to use PWV9.</li> <li>⇒ <b>Alternative 3:</b> 40% of traffic towards south to use PWV9 until at N14, then 25% will join N14 to join K71 south (PWV will be constructed until N14)</li> <li>⇒ <b>Alternative 4:</b> 20% of traffic towards south to use R511 via Riumte (P102-1).</li> <li>⇒ <b>Alternative 5:</b> 25% of traffic towards south to use PWV9 until at N14, then 10% will join N14 to join K71 south (PWV will be constructed until N14), also 15% towards south will use D49.</li> </ul> <p><i>Alternative 5 was used for the purpose of this study as it will reduce chances of adding more traffic on K71 because K71 will not have spare capacity by the time most of the developments will be developed.</i></p> <p>The link volumes are shown in <b>Table 5a, 5b, 6a, 6b, 7a, 7b, 8a, 8b, 9a and 9b</b> for different alternatives.</p>	Appendix B, Figure 3a, 3b, 3c, 3d and 3e and Appendix A, Table 5a, 5b, 6a, 6b, 7a, 7b, 8a, 8b, 9a and 9b
<b>6. Background Volumes</b>	The surveyed traffic volumes were obtained from traffic counts conducted in June 2009 by ITS Engineers as well as from the study conducted by Arup (Forest Hill City) during August 2008 the counts were conducted during August 2005 and were grown with 4% per annum for our study purposes. .	Appendix B, Figure 2a and Figure 2b

<b>Monavoni Master Planning of all extensions</b>		
	<b>Description</b>	<b>Refer to Appendix</b>
<b>7. Expected Link Demand and Capacity Analysis</b>	<p>For each of the adjacent roads that will carry additional traffic generated by the development, the following was therefore calculated:</p> <ul style="list-style-type: none"> <li>➤ The existing traffic demand was determined from survey conducted by ITS Engineers.</li> <li>➤ Traffic generated by latent rights was obtained from other traffic studies.</li> <li>➤ Traffic generated by this development was calculated and assigned to each road.</li> <li>➤ A link volume / capacity ratio was calculated and based on this; a decision was made if additional lanes are required on the link.</li> </ul> <p>The results of capacity analysis and link volumes are shown in the attached <b>Table 5a, 5b, 6a, 6b, 7a, 7b, 8a, 8b, 9a and 9b</b> for different alternatives.</p> <p>The road upgrades that were determined on a link level, based on the capacity analyses, are shown in <b>Table 11</b>. The cost of each upgrade, in August 2009 Rands, are also indicated. The proposed upgrades exclude all internal roads in the development, also excluding Mimosa Road that is regarded by the City of Tshwane as a Class 4 road.</p>	Appendix A, Table 5a, 5b, 6a, 6b, 7a, 7b, 8a, 8b, 9a and 9b as well as Table 11
<b>8. Phasing of proposed road upgrades</b>	<p>The proposed road upgrades will not happen at once, but will be phased with the different extensions of the proposed townships. In order to provide an estimate of when which upgrades should be carried out, a matrix was developed in which the 10% of traffic generated per year was tied with a specific road upgrade. This matrix is shown in <b>Table 10</b>.</p> <p>The aim of this matrix was to balance spending of road upgrades, capacity required and traffic generated by each phase of the development.</p> <p>It is foreseen that the proposed upgrades are used as a planning guideline, and that as individual townships are established, a more detailed traffic impact study be carried out to determine the detail of the upgrades.</p>	Appendix A, Table 10



<b>Monavoni Master Planning of all extentions</b>		
	<b>Description</b>	<b>Refer to Appendix</b>
<b>9. Conclusion and recommendation</b>	<p>This document provides a master plan of road upgrades for the proposed development. It should not be regarded as a detailed traffic impact study, but as a guideline to determine macro level road upgrades that will be required to accommodate the development. The proposed development of approximately 164 257m<sup>2</sup> for offices, 197109m<sup>2</sup> for industrial and 10762 units for residential is expected to generate also 9292 vehicles per hour in the peak hour. The road network where the development will be located will require substantial upgrades to accommodate this extent of traffic volumes. This include widening a large section of K71, including the interchange with the N14, provision of a section of K52 and PWV9, upgrading access routes and the provision of several traffic signals. The estimated cost of all the road upgrades is +/- R 95 million. The funding of these road upgrades will have to be resolved with the relevant authorities, i.e. Gautrans and the City of Tshwane.</p> <p>The upgrades proposed in this report will provide adequate regional capacity that will be able to accommodate the traffic generated by the development, and the development, from a macro planning point of view, can therefore proceed.</p>	

**Monavoni Master Planning of all extentions**

**APPENDIX A**

**TABLES AND ADDITIONAL INFORMATION**

## APPENDIX A

### TABLES AND ADDITIONAL INFORMATION

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## Monavoni Master Planning of all extensions

### APPENDIX A

#### TRIP GENERATION

Table 1a below indicates the summary of Land use and expected peak hour trip generation

<b>AM Peak Hour</b>										
<b>Nr.</b>	<b>Land Use</b>	<b>Extent</b>	<b>Units</b>	<b>FAR</b>	<b>GLA</b>	<b>Trip Rate (vph)</b>	<b>Adjustment factor</b>	<b>Inbound (vph)</b>	<b>Outbound (vph)</b>	<b>Total (vph)</b>
1	Office	328514	m <sup>2</sup>	0.5	164257	2	1	2792	493	3285
2	Industrial	492771	m <sup>2</sup>	0.4	197109	0.7	1	1104	276	1380
3	Residential	10762	units	N.a	N.a	0.7	1	1883	5650	7533
<b>Totals</b>								<b>5780</b>	<b>6419</b>	<b>12198</b>
<b>PM Peak Hour</b>										
<b>Nr.</b>	<b>Land Use</b>	<b>Extent</b>	<b>Units</b>	<b>FAR</b>	<b>GLA</b>	<b>Trip Rate (vph)</b>	<b>Adjustment factor</b>	<b>Inbound (vph)</b>	<b>Outbound (vph)</b>	<b>Total (vph)</b>
1	Office	328514	m <sup>2</sup>	0.5	164257	2	1	493	2792	3285
2	Industrial	492771	m <sup>2</sup>	0.4	197109	0.7	1	276	1104	1380
3	Residential	10762	units	N.a	N.a	0.7	1	5650	1883	7533
<b>Totals</b>								<b>6419</b>	<b>5780</b>	<b>12198</b>

Table 1b below indicates the summary of Land use and expected peak hour trip generation

<b>AM Peak Hour</b>										
<b>Nr.</b>	<b>Land Use</b>	<b>Extent</b>	<b>Units</b>	<b>FAR</b>	<b>GLA</b>	<b>Trip Rate (vph)</b>	<b>Adjustment factor</b>	<b>Inbound (vph)</b>	<b>Outbound (vph)</b>	<b>Total (vph)</b>
1	Office	328514	m <sup>2</sup>	0.5	164257	2	0.7	1955	345	2300
2	Industrial	492771	m <sup>2</sup>	0.4	197109	0.7	0.7	773	193	966
3	Residential	10762	units	N.a	N.a	0.7	1	1883	5650	7533
<b>Totals</b>								<b>4611</b>	<b>6188</b>	<b>10799</b>
<b>PM Peak Hour</b>										
<b>Nr.</b>	<b>Land Use</b>	<b>Extent</b>	<b>Units</b>	<b>FAR</b>	<b>GLA</b>	<b>Trip Rate (vph)</b>	<b>Adjustment factor</b>	<b>Inbound (vph)</b>	<b>Outbound (vph)</b>	<b>Total (vph)</b>
1	Office	328514	m <sup>2</sup>	0.5	164257	2	0.7	345	1955	2300
2	Industrial	492771	m <sup>2</sup>	0.4	197109	0.7	0.7	193	773	966
3	Residential	10762	units	N.a	N.a	0.7	1	5650	1883	7533
<b>Totals</b>								<b>6188</b>	<b>4611</b>	<b>10799</b>
✓ <i>The adjustment factor of 0.7 applied above is to make provision for internal trips between residential, office and industrial.</i>										

Table 1c below indicates the summary of Land use and expected peak hour trip generation

AM Peak Hour										
Nr.	Land Use	Extent	Units	FAR	GLA	Trip Rate (vph)	Adjustment factor	Inbound (vph)	Outbound (vph)	Total (vph)
1	Office	328514	m <sup>2</sup>	0.5	164257	2	0.7	1955	345	2300
2	Industrial	492771	m <sup>2</sup>	0.4	197109	0.7	0.7	773	193	966
3	Residential	10762	units	N.a	N.a	0.7	0.8	1507	4520	6027
Totals								4234	5058	9292
PM Peak Hour										
Nr.	Land Use	Extent	Units	FAR	GLA	Trip Rate (vph)	Adjustment factor	Inbound (vph)	Outbound (vph)	Total (vph)
1	Office	328514	m <sup>2</sup>	0.5	164257	2	0.7	345	1955	2300
2	Industrial	492771	m <sup>2</sup>	0.4	197109	0.7	0.7	193	773	966
3	Residential	10762	units	N.a	N.a	0.7	0.8	4520	1507	6027
Totals								5058	4234	9292
1. The adjustment factor of 0.7 applied above is to make provision for internal trips between residential, office and industrial.										
2. The adjustment factor of 0.8 applied above is to indicate that 20% of trips will use public transport.										

Note: The trip generation rate of 0.7 vehicle trips per hour per dwelling unit, with a directional split of 25:75 (in:out) during the AM peak hour was used.

The reason for this trip generation rate is that recent studies showed that for an area of a significant scale, the average trip rate should be used and not the 75<sup>th</sup> percentile which is in this case 1 vehicle per hour and not the 1,1 vehicles per unit normally used for the expected type of income group.

## LATENT RIGHTS

Table 2: Trip Generation - Latent Rights Traffic

No.	Development	Extent	Land Use	Trip Rate	Peak Period	Trip Generation (vph)		
						In	Out	Total
1	The Reeds Extension 3	172 units	Residential	1.1	AM	46	143	189
					PM	143	46	
2	The Reeds Extension 18	405 units	Residential	1.1	AM	109	336	445
					PM	336	109	
3	ABSA development	1463 units 2 000 pupils	Residential* Educational	-	AM	512	951	1666
					PM	112	91	
4	Sundreland Ridge Extension 17	7 735 m <sup>2</sup>	Educational	-	AM	951	515	1463
					PM	0	0	
5	Sundreland Ridge Extension 14	35 322 m <sup>2</sup>	Industrial, Storage and Offices	-	AM	75	25	200
					PM	20	80	
6	Hoekplaats / Mooiplaats Development	49 500 m <sup>2</sup> , 844 units and 450 pupils	Residential, Retail, Industrial, Commercial, Primary School and Office	-	AM	130	30	320
					PM	30	130	
7	Portion R/29 Vlakplaats 354-JR	60 000 m <sup>2</sup> , 1 500 units	Residential, Retail and Office	-	AM	715	965	4454
					PM	1511	1263	
8	Forest Hill City	155 500 m <sup>2</sup> , 190 rooms and 1450 units	Offices, Retail, Residential and Hotel	-	AM	1116	1362	6195
					PM	1981	1736	
9	Heuweloord Extension 13	950 units	Residential	1.1	AM	1313	1717	9392
					PM	3407	2955	
10	Rooihuiskraal Noord Extension 33	2 804 units	Residential	1.1	AM	260	780	1040
					PM	780	260	
11	ABSA Amberfield East	1 533 units	Residential**	1.1	AM	771	2313	3084
					PM	2313	771	
12	Monavoni Extension 3 and 4	1 806 units	Residential	1	AM	337	1349	1686
					PM	1349	337	
13	Monavoni Extension 6	730 units	Residential	1	AM	452	1354	1806
					PM	1354	452	
14	Monavoni Extension 19	550 units	Residential	1	AM	182	548	730
					PM	548	182	
15	Celtisdal Extension 20	1 548 units, 500 pupils, 2 500 m <sup>2</sup> business and 8 280 m <sup>2</sup> retail	Residential, Educational, Business and Retail	-	AM	138	413	550
					PM	413	138	
16	Rua Vista Extension 12	834 units 485 m <sup>2</sup>	Residential Offices	1.1 2.3	AM	476	1558	1734
					PM	1385	611	
17	Rua Vista Extension 13	298 units	Residential	1.1	AM	174	523	809
					PM	17	95	
<b>Total</b>					AM	7017	14799	21816
					PM	17365	9858	27243

**Table 3: Proposed Roads upgrades (by Latent Rights)**

No.	Intersection Name	Description of Road Upgrading
1	N14 / K71 (R55/P66-1) Interchange (Southern Terminal)	<ul style="list-style-type: none"> <li>- Traffic Signal</li> <li>- Construction of an additional through lane on the northern and southern approaches.</li> <li>- New left turn loop.</li> </ul>
2	N14 / K71 (R55/P66-1) Interchange (Northern Terminal).	<ul style="list-style-type: none"> <li>- Traffic Signal</li> <li>- Construction of an additional through lane on the northern and southern approaches.</li> <li>- Construction of an additional left turn lane on the western and northern approach.</li> <li>- Construction of an additional right turn lane on the southern approach.</li> </ul>
3	K71 (R55/P66-1) / Ruimte Road (P102-1/M34)	<ul style="list-style-type: none"> <li>- Convert to a great separation</li> <li>- Traffic Signal</li> <li>- Construction of an additional right turn lane on the eastern approach.</li> <li>- Construction of an additional through lane on both eastern and western approaches</li> <li>- Construction of an additional right turn lane on both southern and northern approaches.</li> </ul>
4	K71 (R55/P66-1) / Poole	<ul style="list-style-type: none"> <li>- Traffic Signal</li> <li>- Construction of an additional right turn lane on the northern approach.</li> <li>- Construction of two additional left turn lanes on the southern approach.</li> <li>- Construction of an additional left and right turn lanes on the eastern approach.</li> <li>- Construction of an additional left and right turn lanes on the western approach.</li> </ul>
5	K71 (R55/P66-1) / Wierda (K103)	<ul style="list-style-type: none"> <li>- Traffic Signal</li> <li>- Construction of an additional right turn lanes on the eastern and western approaches.</li> <li>- Construction of an additional right turn lane on the southern approach.</li> </ul>
6	Ruimte Road (P102-1/M34) / Boundary D49	<ul style="list-style-type: none"> <li>- Traffic Signal</li> <li>- Construction of an additional right turn lanes on the southern and western approaches.</li> </ul>



**Table 4: Issues regarding Latent Rights**

No.	Name of Road	Description of Issues
1	K71 (R55/P66-1)	<ul style="list-style-type: none"> <li>- Will require three more lanes per direction</li> <li>- The road reserve is 65m.</li> <li>- Won't be able to accommodate three more lanes per direction.</li> <li>- No spare capacity for Monavoni development.</li> </ul>
2	North of K71 (R55/P66-1)	<ul style="list-style-type: none"> <li>- It will generate 1670 vph, which means it will require one more lane per direction.</li> <li>- Spare capacity for Monavoni development and Latent rights will be available.</li> </ul>
3	Ruimte Road (P102-1/M34)	<ul style="list-style-type: none"> <li>- It will generate 2370 vph to the east of K71 and 1870 vph to the west of K71, which means it will require two more lanes per direction to the east and one more lane per direction to the west.</li> <li>- Grade separation intersection on K71 and Ruimte (P102-1) is proposed.</li> <li>- The road reserve is 48,4 m</li> <li>- Recently the road is being upgraded to two lanes per direction</li> <li>- There is sufficient space to add one more lane.</li> <li>- One more lane will be required to the east.</li> <li>- It makes more sense to construct one lane per direction on K52 between K71 to P102-1, because K52 has more important function.</li> <li>- Ruimte (P102-1) to the east of K71 will have a spare capacity for latent rights.</li> </ul>
4	N14	<ul style="list-style-type: none"> <li>- Latent rights add 1500 vph to the east of K71 and 900 vph to the west of K71.</li> <li>- One extra lane will be required per direction on both east and west of K71.</li> <li>- Road reserve is 82 m.</li> </ul>
5	East of Wierda (K103)	<ul style="list-style-type: none"> <li>- It will generate 960 vph, which means it will require one more lane per direction.</li> <li>- Spare capacity for Monavoni development and Latent rights will be available.</li> </ul>
6	Mimosa (D49)	<ul style="list-style-type: none"> <li>- It will generate 560 vph, which means it will require one more lane per direction.</li> <li>- Spare capacity for Monavoni development and Latent rights will be available.</li> </ul>

TABLE 5B: MONAYONI MASTER SUMMARY OF LINK WEEKDAY AM PEAK TRAFFIC VOLUMES AND CAPACITY REQUIREMENTS - ALTERNATIVE 1

Road	Direction and Section	2009 Background Traffic (vph)	2009 Lane Requirements	2009 Lane Right of Way (vph)	2009 Background Traffic + Lane Right of Way (vph)	2009 Development Traffic + Lane Right of Way (vph)	Nr. of Lanes Required for Background Traffic	Nr. of Lanes Required for Development Traffic	Nr. of Lanes Required for 2009 Traffic + Lane Right of Way + Development Traffic	2019 Background Traffic (vph)	2019 Lane Right of Way (vph)	2019 Development Traffic (vph)	2019 Background Traffic + Lane Right of Way (vph)	2019 Development Traffic + Lane Right of Way (vph)	Nr. of Lanes Required for Background Traffic	Nr. of Lanes Required for Development Traffic	Nr. of Lanes Required for 2019 Traffic + Lane Right of Way + Development Traffic
K71 (R55) Vuurbaek Road	Between Wierda and P29-1	835	817	1534	2504	506	0.8	0.3	1.5	1384	2707	3530	3070	3530	0.9	2.0	2.9
	Between Wierda and Poolo	840	1602	2642	3489	1012	0.4	0.7	1.8	1430	2840	3672	3145	3672	0.6	2.0	2.6
K71 (R55) Vuurbaek Road	Northbound	570	2460	3030	3726	709	0.4	0.5	2.5	844	3310	4050	4050	4050	0.6	2.0	2.7
	Southbound	150	3124	3774	4468	633	0.4	0.5	2.9	567	4686	4721	4721	4721	0.6	2.0	2.6
K71 (R55) Vuurbaek Road	Northbound	545	2178	2723	3419	2117	0.4	1.4	3.2	807	2885	6102	3692	6102	0.5	2.0	2.5
	Southbound	715	3028	3743	4468	2520	0.5	1.7	4.2	1058	4096	6615	4096	6615	0.7	2.0	2.7
K71 (R55) Vuurbaek Road	Northbound	645	2000	2645	3290	2750	0.4	1.0	3.0	955	2975	5727	3930	5727	0.6	2.0	2.6
	Southbound	510	3124	3774	4468	3088	0.4	2.2	4.7	503	4027	7315	4027	7315	0.6	2.0	2.6
K71 (R55) Vuurbaek Road	Northbound	810	1494	2304	2723	2329	0.5	1.6	3.1	1189	2953	5022	2953	5022	0.8	2.0	2.8
	Southbound	1255	2276	3531	4227	2785	0.9	1.9	4.3	2006	4284	7066	4284	7066	1.3	2.0	3.3
K71 (R55) Vuurbaek Road	Northbound	915	2980	3895	4780	2329	0.6	1.5	3.6	1354	3438	5786	3438	5786	0.9	2.0	2.9
	Southbound	2540	2738	4778	5216	2782	1.4	1.9	5.0	3020	5758	8540	5758	8540	2.0	2.0	3.7
K71 (R55) Vuurbaek Road	Northbound	725	2035	2760	3285	1905	0.5	1.3	3.1	1073	3105	5013	3105	5013	0.7	2.0	2.7
	Southbound	1200	1613	2813	3413	2276	0.8	1.5	3.4	1776	3390	5866	3390	5866	1.2	2.0	3.2
K71 (R55) Vuurbaek Road	Northbound	845	558	1403	1961	1270	0.6	0.9	1.8	1251	1809	2979	1809	2979	0.8	2.0	2.8
	Southbound	1140	802	1942	2442	1517	0.8	1.0	3.3	1687	2469	4007	2469	4007	1.1	2.0	3.1
K71 (R55) Vuurbaek Road	Westbound	340	1005	1345	1685	283	0.2	0.2	1.1	353	1458	1761	1458	1761	0.3	1.9	2.2
	Eastbound	555	765	1320	1875	212	0.4	0.1	1.3	870	1725	1942	1725	1942	0.6	1.9	2.5
K71 (R55) Vuurbaek Road	Westbound	465	1755	2220	2685	212	0.6	0.1	1.3	1231	2955	3168	2955	3168	0.8	1.9	2.7
	Eastbound	562	2007	2569	3131	282	0.4	0.2	1.3	859	2046	2065	2046	2065	0.6	1.9	2.5
K71 (R55) Vuurbaek Road	Westbound	0	560	560	560	0	0.0	0.0	0.4	0	560	560	560	560	0.0	1.9	2.3
	Eastbound	0	635	635	635	0	0.0	0.0	0.4	0	635	635	635	635	0.0	1.9	2.3
K71 (R55) Vuurbaek Road	Westbound	0	20	20	20	0	0.0	0.0	0.3	0	20	20	20	20	0.0	1.9	2.2
	Eastbound	0	25	25	25	0	0.0	0.0	0.3	0	25	25	25	25	0.0	1.9	2.2
K71 (R55) Vuurbaek Road	Westbound	0	0	0	0	1270	0.0	0.0	0.3	0	0	1270	0	1270	0.0	0.0	0.3
	Eastbound	0	0	0	0	1517	0.0	1.0	1.0	0	0	1517	0	1517	0.0	0.0	1.0
K71 (R55) Vuurbaek Road	Westbound	0	0	0	0	635	0.0	0.4	0.4	0	0	635	0	635	0.0	0.0	0.4
	Eastbound	0	0	0	0	759	0.0	0.5	0.5	0	0	759	0	759	0.0	0.0	0.5
K71 (R55) Vuurbaek Road	Westbound	905	725	1630	2355	2049	0.6	0.5	1.6	1360	2965	4923	2965	4923	0.9	2.0	2.9
	Eastbound	265	735	1000	1265	1035	0.2	0.4	1.1	392	1127	1702	1127	1702	0.3	2.0	2.3
K71 (R55) Vuurbaek Road	Westbound	805	735	1540	2275	2389	0.6	0.5	1.6	1345	2985	4930	2985	4930	0.9	2.0	2.9
	Eastbound	265	735	1000	1265	1035	0.2	0.4	1.1	392	1127	1702	1127	1702	0.3	2.0	2.3
K71 (R55) Vuurbaek Road	Westbound	475	730	1205	1680	568	0.3	0.3	1.1	703	1403	1939	1403	1939	0.5	2.0	2.5
	Eastbound	995	1415	2410	3825	2003	0.7	0.3	2.0	1473	2888	3311	2888	3311	1.0	2.0	3.0
K71 (R55) Vuurbaek Road	Westbound	710	1073	1783	2453	483	0.5	0.3	1.5	1051	2124	2547	2124	2547	0.7	3.0	3.7
	Eastbound	495	960	1455	2040	561	0.3	0.3	1.0	793	1593	1798	1593	1798	0.5	3.0	3.5

Note 1: Lanes required to accommodate the demand, based on a lane capacity of (vph): 1000

Note 2: The growth rate of 8% per annum has been used to determine the growth of traffic between 2009 and 2015.

TABLE 33: MOHAWONI MASTER SUMMARY OF LINK WEEKDAY PM PEAK TRAFFIC VOLUMES AND CAPACITY REQUIREMENTS - ALTERNATIVE 1

Road	Section	Direction and Lane Requirements	2009 Background Traffic (vph)	2009 Right of Way (vph)	2009 Background Traffic + Latent Right of Way (vph)	Development Traffic (vph)	Nr. of Lanes Required for Background Traffic	Nr. of Lanes Required for Development Traffic	Nr. of Lanes Required for 2009 Traffic + Latent Right of Way + Development Traffic	2019 Background Traffic + Latent Right of Way (vph)	2019 Background Traffic + Latent Right of Way + Development Traffic (vph)	Nr. of Lanes Required for 2019 Traffic + Latent Right of Way + Development Traffic	Nr. of Lanes Required for 2019 Traffic + Latent Right of Way + Development Traffic	
R11 (R14) Vespershar Road	Between Wards and R32-1	Northbound	163	1570	2630	354	0.8	0.3	2.3	1717	3387	3.81	1.1	2.0
		Southbound	795	688	1683	2186	0.5	0.3	1.8	1177	2664	2570	0.6	2.0
	Between Wards and Poole	Northbound	250	2320	3270	417	0.6	0.6	2.7	1406	3726	4573	0.9	2.0
		Southbound	610	1365	1995	3037	0.4	0.7	2.0	903	2288	3300	0.6	2.0
	Between Poole and Lochner	Northbound	535	4165	4630	535	0.4	0.4	3.5	777	4832	5617	0.5	2.0
		Southbound	550	2310	2860	4076	0.3	0.5	2.8	710	3680	4418	0.5	2.0
	Between Lochner and MS2	Northbound	590	4192	4888	794	0.4	1.7	4.8	850	4964	7493	0.8	2.0
		Southbound	425	2650	3145	5162	0.3	1.4	3.7	733	3653	5665	0.5	2.0
	Between MS2 and R41	Northbound	590	3310	3860	7148	0.4	0.7	4.8	814	4124	7412	0.6	2.0
		Southbound	565	2436	2996	5147	0.4	1.4	3.0	635	3265	6011	0.6	2.0
Between R41 and Morals	Northbound	595	2950	3545	2762	0.7	1.9	4.0	1473	4423	7205	1.0	2.0	
	Southbound	870	1840	2650	5179	0.6	1.4	3.0	1284	3260	5597	0.9	2.0	
Between Morals and N14 North Terminal	Northbound	1415	3440	4655	7077	0.9	1.5	5.1	3076	5525	8317	1.4	2.0	
	Southbound	965	2465	3719	5679	0.8	1.6	3.8	1940	3745	6079	0.9	2.0	
Between N14 North Terminal and South	Northbound	1120	2760	3889	6166	0.7	1.5	4.1	1616	4418	6694	1.1	2.0	
	Southbound	870	1350	2220	4125	0.6	1.3	2.8	1284	2638	4543	0.9	2.0	
South of R14 Southern Terminal	Northbound	725	1805	1720	3847	0.5	1.0	2.2	1673	3528	3798	0.7	2.0	
	Southbound	1865	1150	2995	1270	0.7	0.6	2.3	1608	2728	3392	1.1	2.0	
West of R15	Westbound	590	1660	2250	212	0.4	0.1	1.6	873	2583	2745	0.6	1.0	
	Eastbound	535	770	1465	1658	0.4	0.2	1.1	949	1710	1563	0.6	1.0	
East of R15	Westbound	655	2170	3025	3276	0.4	0.2	2.2	970	3340	3502	0.6	1.0	
	Eastbound	370	5055	2985	3177	0.8	0.1	2.1	1288	3383	3586	0.9	1.0	
West of R55	Westbound	0	910	910	0	0.0	0.0	0.0	0	910	910	0.0	0.0	
	Eastbound	0	830	830	0	0.0	0.0	0.0	0	830	830	0.0	0.0	
East of R55	Westbound	0	40	40	0	0.0	0.0	0.0	0	40	40	0.0	0.0	
	Eastbound	0	35	35	0	0.0	0.0	0.0	0	35	35	0.0	0.0	
Between Access 1 and R55	Westbound	0	0	0	1517	0.0	1.0	1.0	0	0	1517	0.0	0.0	
	Eastbound	0	0	0	1270	0.0	0.8	0.8	0	0	1270	0.0	0.0	
East of R55	Westbound	0	0	0	769	0.0	0.5	0.5	0	0	769	0.0	0.0	
	Eastbound	0	0	0	616	0.0	0.4	0.4	0	0	616	0.0	0.0	
West of R41/R5	Westbound	810	310	1160	635	0.5	0.4	1.2	1199	1540	2184	0.8	1.0	
	Eastbound	470	875	1365	2124	0.3	0.5	1.4	686	1591	2319	0.5	1.0	
Between R41/R5 and R55	Westbound	810	310	1160	635	0.5	0.4	1.2	1199	1540	2184	0.8	1.0	
	Eastbound	470	875	1365	2124	0.3	0.5	1.4	686	1591	2319	0.5	1.0	
East of R55	Westbound	845	1515	2620	471	0.7	0.3	1.0	1458	2973	3396	1.0	2.0	
	Eastbound	645	1755	1620	2386	0.4	0.3	1.5	255	2110	2416	0.6	2.0	
West of R55	Westbound	855	607	1292	546	0.5	0.3	1.2	1014	1821	2186	0.7	1.0	
	Eastbound	670	1164	1514	2237	0.4	0.3	1.5	362	2105	2519	0.7	1.0	

Note 1: Lanes required to accommodate the demand, based on a lane capacity of (vph): 1500  
 Note 2: The growth rate of 4% per annum has been used to determine the growth of traffic between 2009 and 2019.

TABLE 65: MONAVONI MASTER SUMMARY OF LINK WEEKDAY AM PEAK TRAFFIC VOLUMES AND CAPACITY REQUIREMENTS - ALTERNATIVE 2

Road	Section	Direction and Lane Requirements	2009 Latent Right-of-Way Traffic (vph)	2009 Background Traffic (vph)	2009 Develop ment Traffic (vph)	2009 Traffic + Latent Right-of-Way + Development Traffic (vph)	Nr. of Lanes Required for Background Traffic	Nr. of Lanes Required for Development Traffic	Nr. of Lanes Required for Traffic + Latent Right-of-Way + Development Traffic	2019 Background Traffic + Latent Right-of-Way + Development Traffic (vph)	2019 Background Traffic + Latent Right-of-Way + Development Traffic (vph)	Nr. of Lanes Required for Background Traffic	Nr. of Lanes Required for Development Traffic	Nr. of Lanes Required for Traffic + Latent Right-of-Way + Development Traffic
R71 (R55) Voostramer Road	Between Viersa and P39-1	Northbound	335	1762	526	2958	0.6	0.3	0.9	2707	2707	0.3	2.0	2.3
		Southbound	379	2594	423	3496	0.6	0.3	0.9	2973	2973	0.3	2.0	2.3
	Between Viersa and P39	Northbound	585	1402	1012	2989	0.4	0.7	1.1	3218	3218	0.4	2.0	2.4
		Southbound	840	2467	847	4154	0.6	0.7	1.3	4557	4557	0.6	2.0	2.6
	Between Poole and Lochin	Northbound	570	2466	799	3735	0.4	0.5	0.9	4088	4088	0.4	2.0	2.4
		Southbound	950	3124	635	4409	0.4	0.4	0.8	4721	4721	0.4	2.0	2.4
	Between Lusher and K52	Northbound	545	2466	1492	4493	0.4	1.1	1.5	4759	4759	0.4	2.0	2.4
		Southbound	715	3124	3839	5000	0.5	1.1	1.6	5953	5953	0.5	2.0	2.5
	Between K52 and P39	Northbound	645	2020	2065	3723	0.4	0.7	1.1	4033	4033	0.4	2.0	2.4
		Southbound	610	3124	1285	4993	0.4	0.6	1.0	4971	4971	0.4	2.0	2.4
	Between Ruffic and Mazas	Northbound	810	1782	1569	3651	0.5	0.7	1.2	4340	4340	0.5	2.0	2.5
		Southbound	1325	2374	3729	4993	0.5	0.9	1.4	5644	5644	0.5	2.0	2.5
Between Mazas and R14 North Terminal	Northbound	915	2878	2893	3623	0.6	0.4	1.0	4096	4096	0.6	2.0	2.6	
	Southbound	3040	2726	4778	5937	1.1	0.5	1.6	6916	6916	1.1	2.0	3.1	
Between R14 North Terminal and South Terminal	Northbound	725	2035	2780	3385	0.5	0.4	0.9	3743	3743	0.5	2.0	2.5	
	Southbound	1255	1613	2988	3121	0.8	0.2	1.0	3471	3471	0.8	2.0	2.8	
South of R14	Northbound	845	848	1681	2122	0.9	0.1	1.0	2308	2308	0.9	2.0	2.9	
	Southbound	1140	898	2038	2791	0.8	0.2	1.0	2645	2645	0.8	2.0	2.8	
West of R55	Westbound	340	1095	1043	1508	0.2	0.2	0.4	1761	1761	0.2	1.0	1.2	
	Eastbound	855	765	1420	1632	0.4	0.1	0.5	1946	1946	0.4	1.0	1.4	
East of R55	Westbound	825	1705	2583	2813	0.6	0.2	0.8	3259	3259	0.6	1.0	1.6	
	Eastbound	560	2507	2167	2779	0.4	0.1	0.5	3046	3046	0.4	1.0	1.4	
West of R55	Westbound	0	560	0	560	0.0	0.0	0.0	560	560	0.0	1.0	1.0	
	Eastbound	0	835	0	835	0.0	0.0	0.0	835	835	0.0	1.0	1.0	
East of R55	Westbound	0	20	0	20	0.0	0.0	0.0	20	20	0.0	1.0	1.0	
	Eastbound	0	25	0	25	0.0	0.0	0.0	25	25	0.0	1.0	1.0	
Between P39 and R55	Westbound	0	0	0	2023	0.0	1.1	1.1	2023	2023	0.0	2.0	2.0	
	Eastbound	0	0	0	1684	0.0	1.1	1.1	1684	1684	0.0	2.0	2.0	
East of R55	Westbound	0	0	0	635	0.0	0.4	0.4	635	635	0.0	0.0	0.4	
	Eastbound	0	0	0	799	0.0	0.3	0.3	799	799	0.0	0.0	0.3	
Between K52 and R14	Northbound	0	0	0	1684	0.0	1.1	1.1	1684	1684	0.0	0.0	1.1	
	Southbound	0	0	0	2023	0.0	1.3	1.3	2023	2023	0.0	0.0	1.3	
South of R14	Northbound	0	0	0	1596	0.0	0.8	0.8	1596	1596	0.0	0.0	0.8	
	Southbound	0	0	0	1305	0.0	0.6	0.6	1305	1305	0.0	0.0	0.6	
West of P39	Westbound	425	726	1150	1908	0.3	0.5	0.8	2113	2113	0.3	2.0	2.3	
	Eastbound	265	735	1060	1628	0.2	0.4	0.6	1762	1762	0.2	2.0	2.2	
Between P39 and R55	Westbound	425	735	1150	1908	0.3	0.5	0.8	2113	2113	0.3	2.0	2.3	
	Eastbound	265	735	1060	1628	0.2	0.4	0.6	1762	1762	0.2	2.0	2.2	
East of R55	Westbound	575	735	1305	2036	0.4	0.3	0.7	2005	2005	0.4	2.0	2.4	
	Eastbound	1010	1415	2430	3860	0.7	0.3	1.0	5483	5483	0.7	2.0	2.7	
East of R55	Westbound	710	1070	1785	2566	0.5	0.3	0.8	2547	2547	0.5	2.0	2.5	
	Eastbound	435	860	1035	1361	0.3	0.1	0.4	1788	1788	0.3	2.0	2.3	

Note 1: Lanes required to accommodate the demand, based on a lane capacity of (vph): 1500  
 Note 2: The growth rate of AN per annum has been used to determine the growth of traffic between 2009 and 2019.

TABLE 08: MONAVONI MASTER SUMMARY OF LINK WEEKDAY PM PEAK TRAFFIC VOLUMES AND CAPACITY REQUIREMENTS - ALTERNATIVE 2

Road	Section	Direction and Lane Requirements	2009 Background Traffic (vph)	2009 Latent Rights Traffic (vph)	2009 Background Traffic + Latent Rights Traffic (vph)	2009 Development Traffic (vph)	No. of Lanes Required for Background Traffic	No. of Lanes Required for Development Traffic	No. of Lanes Required for 2009 Traffic + Latent Rights + Development Traffic	2019 Background Traffic + Latent Rights + Development Traffic (vph)	2019 Background Traffic (vph)	2019 Latent Rights Traffic (vph)	2019 Development Traffic (vph)	No. of Lanes Required for Background Traffic	No. of Lanes Required for Development Traffic	No. of Lanes Required for 2019 Traffic + Latent Rights + Development Traffic
K71 (R55) Waterworks Road	Between Wierda and Pop-1	Northbound	1160	1670	2830	423	0.8	0.3	1.1	3857	1777	3954	3811	1.3	2.0	3.3
		Southbound	795	960	1655	506	0.5	0.3	0.8	2570	1177	2854	2370	0.8	2.0	2.8
	Between Wierda and Profie	Northbound	359	2580	2939	647	0.5	0.5	1.0	4658	1608	3725	4373	0.9	2.9	3.8
		Southbound	610	1385	1995	1012	0.4	0.7	1.1	3227	922	2288	2320	0.6	2.9	3.5
	Between Poole and Luthingo	Northbound	625	1103	1728	365	0.4	0.4	0.8	2093	717	687	2517	0.5	2.0	2.5
		Southbound	870	2398	3268	775	0.3	0.3	0.6	4043	748	3693	4445	0.5	2.0	2.5
	Between Louwer and R55	Northbound	530	4108	4638	1735	0.4	0.4	0.8	6373	853	4564	5714	0.5	2.0	2.5
		Southbound	445	2160	2605	1482	0.3	0.3	0.6	4087	733	3453	5185	0.5	2.0	2.5
	Between R52 and Ruarie	Northbound	550	3310	3860	1565	0.4	0.4	0.8	5425	814	4784	5399	0.5	2.0	2.5
		Southbound	585	2420	2995	1659	0.4	0.7	1.1	4354	838	3100	4225	0.5	2.0	2.5
	Between Ruarie and Mann	Northbound	695	2710	3405	1365	0.7	0.6	1.3	4770	1473	4127	4487	0.9	2.0	2.9
		Southbound	670	1930	2600	1659	0.6	0.7	1.3	3368	1348	3788	4328	0.9	2.0	2.9
	Between Marais and N14 North	Northbound	1416	3440	4856	799	0.5	0.5	1.0	5655	2095	5525	6779	1.4	2.9	4.3
		Southbound	905	2465	3370	525	0.6	0.4	1.0	3941	1949	3745	4290	0.9	2.8	3.7
	Between R14 North and South	Northbound	1120	2780	3900	250	0.7	0.3	1.0	4150	1658	4416	5177	1.1	2.0	3.1
		Southbound	870	1350	2220	212	0.6	0.1	0.7	2632	1268	2618	2850	0.9	2.0	2.9
	South of R14 Southern Terminal	Northbound	775	1095	1870	1883	0.9	0.2	1.1	3753	1073	2073	2331	0.7	2.0	2.7
		Southbound	1085	1180	2265	212	0.7	0.1	0.8	3477	1606	2728	2928	1.1	2.0	3.1
	West of R25	Westbound	570	3490	4060	212	0.4	0.1	0.5	4272	873	2521	2745	0.5	1.0	1.5
		Eastbound	635	2770	3405	1550	0.4	0.2	0.6	4955	949	1710	1863	0.5	1.0	1.5
	East of R25	Westbound	655	2370	3025	212	0.4	0.1	0.5	3237	970	3240	3651	0.8	1.0	1.8
		Eastbound	670	2925	3595	253	0.8	0.2	1.0	3848	1248	3382	3536	0.9	1.0	1.9
	Between PW16 and R55	Westbound	0	0	0	1694	0.0	1.1	1.1	1694	0	0	1694	0.0	1.0	1.1
		Eastbound	0	0	0	2023	0.0	1.1	1.1	2023	0	0	2023	0.0	1.0	1.1
	East of R55	Westbound	0	0	0	625	0.0	0.4	0.4	625	0	0	625	0.0	1.0	1.0
		Eastbound	0	0	0	625	0.0	0.4	0.4	625	0	0	625	0.0	1.0	1.0
	West of R55	Northbound	0	0	0	2653	0.0	1.1	1.1	2653	0	0	2653	0.0	1.0	1.1
		Southbound	0	0	0	1024	0.0	1.1	1.1	1024	0	0	1024	0.0	1.0	1.1
	East of R55	Northbound	0	0	0	1285	0.0	0.8	0.8	1285	0	0	1285	0.0	1.0	1.0
		Southbound	0	0	0	1019	0.0	0.7	0.7	1019	0	0	1019	0.0	1.0	1.0
	Between R22 and R14	Northbound	0	0	0	2023	0.0	1.1	1.1	2023	0	0	2023	0.0	1.0	1.1
		Southbound	0	0	0	1694	0.0	1.1	1.1	1694	0	0	1694	0.0	1.0	1.1
	South of R14	Northbound	0	0	0	1285	0.0	0.8	0.8	1285	0	0	1285	0.0	1.0	1.0
		Southbound	0	0	0	1019	0.0	0.7	0.7	1019	0	0	1019	0.0	1.0	1.0
	West of PW13	Westbound	810	250	1060	625	0.5	0.4	0.9	1785	1199	1549	2184	0.8	2.8	3.6
		Eastbound	470	845	1315	750	0.3	0.5	0.8	2065	686	1831	2319	0.5	2.8	3.3
	Between PW16 and R55	Westbound	810	250	1060	625	0.5	0.4	0.9	1785	1199	1549	2184	0.8	2.8	3.6
		Eastbound	470	845	1315	750	0.3	0.5	0.8	2065	686	1831	2319	0.5	2.8	3.3
	East of R55	Westbound	685	807	1492	506	0.6	0.3	0.9	1998	1014	1821	2188	0.7	2.0	2.7
		Eastbound	675	1154	1829	423	0.4	0.3	0.7	2252	362	2155	2578	0.7	2.0	2.7

Note 1: Lanes required to accommodate the demand, based on a lane capacity of 1500  
 Note 2: The growth rate of 4% per annum has been used to determine the growth of traffic between 2009 and 2019.

TABLE 7a. MONAVONI MASTER SUMMARY OF LINK WEEKDAY AM PEAK TRAFFIC VOLUMES AND CAPACITY REQUIREMENTS - ALTERNATIVE 3

Road Section	Direction and Lane Requirements	2009		2019		% of Lanes Required for		2019		2019		2019		No. of Lanes Required for 2019 Traffic + Lanes Development Traffic (vph)	No. of Lanes Required for 2019 Traffic + Lanes Development Traffic (vph)	No. of Lanes Required for 2019 Traffic + Lanes Development Traffic (vph)
		Background Traffic (vph)	Lanes Traffic (vph)	Background Traffic (vph)	Lanes Traffic (vph)	Background Traffic (vph)	Lanes Traffic (vph)	Background Traffic (vph)	Lanes Traffic (vph)	Background Traffic (vph)	Lanes Traffic (vph)	Background Traffic (vph)	Lanes Traffic (vph)			
Between Winick and P29-1	Northbound	923	817	1742	566	0.6	0.3	1384	2271	2707	0.5	2.0	2.0	1.8		
	Southbound	270	1534	2024	420	0.6	0.3	1436	2070	3330	1.0	2.0	2.0	2.3		
Between Winick and Road	Northbound	585	1402	1987	617	0.4	0.7	1665	2918	3279	0.6	2.0	2.0	3.3		
	Southbound	840	2467	3327	817	0.6	0.5	1243	3770	4537	0.8	2.0	2.0	3.0		
Between P29-1 and Lochner	Northbound	570	2145	3036	759	0.4	0.5	1644	3010	4059	0.6	2.0	2.0	2.7		
	Southbound	659	3124	3714	835	0.4	0.4	1622	4016	4771	0.6	2.0	2.0	3.1		
Between Lochner and M32	Northbound	545	2146	3011	1442	0.4	1.0	107	3072	4755	0.5	2.0	2.0	3.3		
	Southbound	715	3819	1770	5629	0.5	1.3	1058	4182	5953	0.7	2.0	2.0	4.0		
Between M32 and P29-1	Northbound	645	2025	2885	1070	0.4	0.7	1555	3077	4033	0.8	3.0	3.0	2.7		
	Southbound	610	3174	3734	1285	0.4	0.5	1503	4027	5881	0.8	3.0	3.0	3.5		
K71 (R55) Woodpecker Road	Northbound	810	1782	2535	626	0.5	0.4	1139	2841	3616	0.8	2.0	2.0	2.4		
	Southbound	1335	2374	3729	759	0.9	0.5	3006	4375	5128	1.2	2.0	2.0	3.4		
Between Winick and N14 North Terminal	Northbound	913	3016	3933	626	0.6	0.4	1364	3433	4068	0.9	2.0	2.0	2.7		
	Southbound	2040	2728	4728	756	1.4	0.5	3020	5758	6516	2.0	2.0	2.0	4.3		
Between N14 North Terminal and South Terminal	Northbound	725	2035	2740	626	0.5	0.4	1072	3102	3743	0.7	2.0	2.0	2.5		
	Southbound	1235	1612	2818	1517	0.8	1.0	1856	3471	4948	1.2	2.0	2.0	3.5		
South of N14 Southern Terminal	Northbound	845	846	1651	1270	0.6	0.8	1251	2037	2657	0.8	2.0	2.0	2.7		
	Southbound	1140	898	2028	1517	0.8	1.0	1687	2585	4105	1.1	2.0	2.0	2.7		
West of R55	Westbound	240	1003	1315	1538	0.2	0.2	508	1638	1761	0.3	1.0	1.0	1.2		
	Eastbound	655	745	1420	212	0.4	1.1	370	1725	1946	0.6	1.0	1.0	1.3		
East of R65	Westbound	625	1701	2569	212	0.4	0.1	1231	2064	2158	0.8	1.0	1.0	2.1		
	Eastbound	560	2007	2867	253	0.4	0.2	828	2019	2019	0.5	1.0	1.0	2.1		
Between PW19 and R55	Westbound	0	0	0	2022	0.0	1.3	0	0	2022	0.0	0.0	0.0	1.3		
	Eastbound	0	0	0	1884	0.0	1.1	0	0	1884	0.0	0.0	0.0	1.1		
East of R55	Westbound	0	0	0	626	0.0	0.4	0	0	626	0.0	0.0	0.4			
	Eastbound	0	0	0	270	0.0	0.5	0	0	270	0.0	0.0	0.5			
West of R65	Westbound	0	560	560	0	0.0	0.0	0	0	560	0.0	0.0	0.4			
	Eastbound	0	635	635	0	0.0	0.0	0	0	635	0.0	0.0	0.4			
East of R65	Westbound	0	20	20	0	0.0	0.0	0	0	20	0.0	0.0	0.0			
	Eastbound	0	25	25	0	0.0	0.0	0	0	25	0.0	0.0	0.0			
Between N12 and N14	Northbound	0	0	0	1694	0.0	1.1	0	0	1694	0.0	0.0	1.1			
	Southbound	0	0	0	2072	0.0	1.3	0	0	2072	0.0	0.0	1.3			
South of N14	Northbound	0	0	0	0	0.0	0.0	0	0	0	0.0	0.0	0.0			
	Southbound	0	0	0	0	0.0	0.0	0	0	0	0.0	0.0	0.0			
West of PW19	Westbound	425	1225	1150	1878	0.3	0.5	629	1354	2113	0.4	2.0	2.0	1.4		
	Eastbound	265	735	1009	626	0.2	0.4	302	1127	1782	0.3	2.0	2.0	1.2		
Between PW19 and R55	Westbound	425	725	1150	1030	0.3	0.7	629	1364	2413	0.4	2.0	2.0	1.6		
	Eastbound	265	735	1009	1285	0.2	0.8	389	1127	2392	0.3	2.0	2.0	1.6		
East of R55	Westbound	375	730	1305	423	0.4	0.3	851	1381	2025	0.6	2.0	2.0	1.3		
	Eastbound	1015	1415	2439	566	0.7	0.3	1922	2917	3455	1.0	2.0	2.0	2.3		
East of R55	Westbound	710	1075	1783	423	0.5	0.3	1091	2124	2517	0.7	1.0	1.0	1.7		
	Eastbound	495	860	1035	360	0.3	0.3	703	1233	1788	0.5	1.0	1.0	1.2		

Note 1: Lanes required to accommodate the demand, based on a lane capacity of (vph): 1500  
 Note 2: The growth rate of 6% per annum has been used to determine the growth of traffic between 2009 and 2019.

TABLE 7b: MONAVONI MASTER SUMMARY OF LINK WEEKDAY PM PEAK TRAFFIC VOLUMES AND CAPACITY REQUIREMENTS - ALTERNATIVE 3

Section	Direction and Lane Requirements	2009 Background Traffic (Vph)	2009 Lane Background Traffic + Left Lane Right (Vph)	2009 Development Traffic (Vph)	2009 Background Traffic + Left Lane Right + Development Traffic (Vph)	Nr. of Lanes Required for Development Traffic	Nr. of Lanes Required for 2009 Traffic + Left Lane Right + Development Traffic	2019 Background Traffic (Vph)	2019 Background Traffic + Left Lane Right + Development Traffic (Vph)	2019 Background Traffic + Left Lane Right + Development Traffic (Vph)	Nr. of Lanes Existing	Nr. of Lanes Required for 2019 Traffic + Left Lane Right + Development Traffic
Between Werts and P29-1	Northbound	1102	1606	429	3137	0.8	2.2	1717	3367	3811	2.0	2.5
	Southbound	795	887	106	2188	0.5	1.6	1177	2584	2970	2.0	2.7
Between Werts and P29-1	Northbound	657	3320	1072	5049	0.6	2.7	1456	3726	4573	2.0	3.0
	Southbound	612	1385	1995	3092	0.4	2.0	503	2468	3160	2.0	2.2
Between Pools and Linnar	Northbound	535	4103	628	5266	0.4	3.3	272	4842	5517	0.5	3.7
	Southbound	503	2350	710	4059	0.3	2.6	710	3650	4419	0.5	3.0
Between Linnar and N29	Northbound	569	4155	1770	6484	0.4	3.3	459	4844	6734	0.6	4.5
	Southbound	495	2250	1482	4927	0.3	1.8	733	3833	5145	0.6	3.4
Between R52 and Rumbic	Northbound	550	3310	1205	5065	0.4	3.4	814	4134	5319	0.6	3.8
	Southbound	565	2430	2196	4084	0.4	2.7	836	3266	4265	0.6	2.9
Between Rumbic and Maris	Northbound	355	2730	215	4301	0.7	3.1	1473	4423	5182	1.8	2.5
	Southbound	370	1940	635	3405	0.6	2.3	1288	3368	3903	0.9	2.6
Between Maris and N14 North Terminal	Northbound	1435	5440	4955	11830	0.9	3.7	2695	5595	6283	1.1	4.2
	Southbound	965	2405	605	3975	0.6	2.6	1340	3745	4389	0.9	2.8
Between N14 North Terminal and South Terminal	Northbound	1128	2705	799	4632	0.7	3.1	1658	4418	5177	1.1	3.1
	Southbound	870	1385	1270	3490	0.6	2.3	1388	2838	3408	0.9	2.6
South of N14 Southern Terminal	Northbound	725	1005	1517	3447	0.5	1.0	1035	3078	3596	0.7	2.0
	Southbound	1685	1120	2691	3476	0.7	2.3	1656	2786	3496	1.1	2.7
West of R65	Westbound	509	860	225	1694	0.4	1.6	473	2523	2745	0.6	1.0
	Eastbound	535	770	1405	1610	0.4	1.1	340	1710	1943	0.6	1.3
East of R65	Westbound	605	2070	3028	5703	0.4	2.2	970	3340	3922	0.6	2.4
	Eastbound	870	2025	2465	5320	0.6	2.1	1288	3383	3925	0.9	2.4
Between P409 and P55	Westbound	0	0	1634	1634	0.0	1.1	0	0	1634	0.0	1.1
	Eastbound	0	0	2023	2023	0.0	1.3	0	0	2023	0.0	1.3
East of P55	Westbound	0	0	759	759	0.0	0.5	0	0	759	0.0	0.5
	Eastbound	0	0	616	616	0.0	0.4	0	0	616	0.0	0.4
West of P55	Westbound	0	310	0	310	0.0	0.2	0	310	310	0.0	0.2
	Eastbound	0	330	0	330	0.0	0.2	0	330	330	0.0	0.2
East of P55	Westbound	0	40	0	40	0.0	0.2	0	40	40	0.0	0.2
	Eastbound	0	35	0	35	0.0	0.2	0	35	35	0.0	0.2
Between R52 and N14	Westbound	0	0	2023	2023	0.0	1.3	0	0	2023	0.0	1.3
	Eastbound	0	0	1634	1634	0.0	1.1	0	0	1634	0.0	1.1
South of N14	Westbound	0	0	0	0	0.0	0.0	0	0	0	0.0	0.0
	Eastbound	0	0	0	0	0.0	0.0	0	0	0	0.0	0.0
West of P409	Westbound	610	209	1169	1795	0.5	1.2	1329	1549	2104	0.8	1.5
	Eastbound	470	895	1365	2720	0.3	1.4	446	1501	2449	0.3	1.6
Between P409 and P55	Westbound	810	259	1169	1835	0.5	1.6	1189	1449	2013	0.8	1.8
	Eastbound	470	1385	1039	2894	0.3	1.7	486	1571	2449	0.3	1.8
East of P65	Westbound	565	1515	2403	4483	0.7	2.0	1438	2975	3479	1.0	2.3
	Eastbound	470	1155	1425	2248	0.4	1.5	392	2147	2570	0.7	1.7
East of P65	Westbound	645	407	1362	2414	0.5	1.2	1054	1821	2120	0.7	1.4
	Eastbound	870	1344	1834	4048	0.4	1.6	992	2125	2579	0.7	1.7

Note 1: Lane required to accommodate the demand, based on a lane capacity of (vph): 1500  
 Note 2: The growth rate of 4% per annum has been used to determine the growth of traffic between 2009 and 2019.

TABLE B3: MONAVONI MASTER SUMMARY OF LINK WEEKDAY AM PEAK TRAFFIC VOLUMES AND CAPACITY REQUIREMENTS - ALTERNATIVE 4

Road	Section	Direction	2009		2019		2039		2019		2039		Existing nr. of lanes	Nr. of Lanes Required for 2039 Background Traffic	Nr. of Lanes Required for 2039 Development Traffic	Nr. of Lanes Required for 2039 Traffic + Latent Rights + Development Traffic	
			Background Traffic (vph)	Latent Rights (vph)	Background Traffic (vph)	Latent Rights (vph)	Background Traffic (vph)	Latent Rights (vph)	Background Traffic (vph)	Latent Rights (vph)							
K71 (RSE) Ventureker Road	Between W1014 and P23-1	Northbound	205	817	1782	516	2558	0.6	0.3	1.5	1384	2531	2767	0.9	2.0	2.9	1.8
		Southbound	370	1531	2594	423	2933	0.6	0.3	2.0	1455	2970	3393	1.0	2.0	3.0	2.3
	Between W1014 and P23-1	Northbound	565	1482	1507	1612	2998	0.4	0.7	2.0	805	2288	3079	0.6	2.0	2.6	2.2
		Southbound	840	2467	3397	4147	4154	0.6	0.6	2.8	1243	3718	4557	0.8	2.0	2.8	3.3
	Between P2014 and L23-2	Northbound	530	3488	3026	748	3325	0.4	0.5	0.5	644	3118	3685	0.6	2.0	2.6	2.7
		Southbound	630	3724	3174	635	4499	0.4	0.4	2.9	923	4881	4721	0.6	2.0	2.6	3.2
	Between K52 and K52	Northbound	545	3458	3011	2117	3128	0.4	1.4	2.4	897	3273	5180	0.5	2.0	2.5	3.0
		Southbound	745	3124	2529	2529	2388	0.4	1.7	2.4	1038	4167	6711	0.7	2.0	2.7	3.4
	Between K52 and R10-1	Northbound	645	3035	3685	2752	3417	0.4	1.8	2.2	545	2925	3727	0.4	2.0	2.4	2.8
		Southbound	510	3124	3286	3286	3282	0.4	2.2	2.7	503	4027	3715	0.6	2.0	2.6	3.2
	Between R10-1 and M10-1	Northbound	810	1782	2592	1694	4285	0.5	1.1	2.0	1199	2981	4675	0.8	2.0	2.8	3.6
		Southbound	1355	2074	3729	2623	5732	0.9	1.3	1.7	8056	4579	6403	1.3	2.0	3.3	4.3
Between M10-1 and N14 North Terminal	Northbound	915	3078	2923	1604	4487	0.6	1.1	1.3	1244	3403	5126	0.9	2.0	2.9	3.8	
	Southbound	2040	2720	4778	2023	1021	1.4	1.3	2.4	3020	5768	7781	2.0	2.0	4.0	5.0	
Between N14 North Terminal and South Terminal	Northbound	775	2025	2762	1905	4665	0.5	1.3	2.0	1873	3168	5013	0.7	2.0	2.7	3.4	
	Southbound	1285	1613	2808	1517	4186	0.4	1.0	2.3	1658	3471	4988	1.2	2.0	3.2	4.2	
South of R14 Southern Terminal	Northbound	845	1816	1831	1270	2601	0.6	0.8	2.0	1251	2897	3587	0.8	2.0	2.8	3.6	
	Southbound	1140	1976	2028	1317	3355	0.8	1.0	2.4	1487	2388	4193	1.1	2.0	3.1	4.1	
Between R55 and R51-1	Westbound	340	1005	1345	758	2104	0.2	0.5	1.4	503	1568	2387	0.3	1.0	1.3	1.6	
	Eastbound	655	785	1420	635	2053	0.4	0.4	1.4	970	1735	2270	0.6	1.0	1.6	2.2	
East of R105	Westbound	425	1735	2440	212	2271	0.6	0.1	1.8	1221	2584	3165	0.6	1.0	1.6	2.2	
	Eastbound	560	2007	2547	253	2820	0.4	0.2	1.9	1499	2836	3688	0.6	1.0	1.6	2.2	
Between Access 1 and R55	Westbound	0	0	0	1270	1270	0.0	0.8	0.8	0	0	1270	0.0	0.0	0.8	0.8	
	Eastbound	0	0	0	1517	1517	0.0	1.0	1.0	0	0	1517	0.0	0.0	1.0	1.0	
East of R55	Westbound	0	0	0	625	625	0.0	0.4	0.4	0	0	625	0.0	0.0	0.4	0.4	
	Eastbound	0	0	0	719	719	0.0	0.5	0.5	0	0	719	0.0	0.0	0.5	0.5	
West of R65	Westbound	0	560	560	0	560	0.0	0.0	0.4	0	560	560	0.0	1.0	1.0	1.4	
	Eastbound	0	635	635	0	635	0.0	0.0	0.4	0	635	635	0.0	1.0	1.4	1.8	
East of R55	Westbound	0	35	35	0	35	0.0	0.2	0.2	0	35	35	0.0	0.0	0.2	0.2	
	Eastbound	0	25	25	0	25	0.0	0.2	0.2	0	25	25	0.0	0.0	0.2	0.2	
South of N14	Northbound	0	300	300	635	935	0.0	0.4	0.6	0	300	935	0.0	1.0	1.0	1.6	
	Southbound	0	370	370	769	1129	0.0	0.5	0.6	0	370	1129	0.0	1.0	1.0	1.6	
Between R14 and R10-1	Northbound	0	370	300	247	1147	0.0	0.6	0.6	0	300	1147	0.0	1.0	1.0	1.6	
	Southbound	0	370	370	1072	1362	0.0	0.7	0.9	0	370	1362	0.0	1.0	1.0	1.6	
West of R10-1	Westbound	425	715	1150	359	1403	0.3	0.2	0.2	628	1324	1697	0.4	2.0	2.4	2.8	
	Eastbound	265	715	1040	212	1212	0.2	0.1	0.6	392	1127	1319	0.3	2.0	2.3	2.7	
Between R51-1 and R55	Westbound	425	723	1120	0	1190	0.3	0.0	0.0	629	1324	1697	0.4	2.0	2.4	2.8	
	Eastbound	265	755	1060	0	1300	0.2	0.0	0.7	392	1127	1319	0.3	2.0	2.3	2.7	
East of R55	Westbound	575	720	1005	423	1728	0.4	0.3	1.2	603	1841	2005	0.6	2.0	2.6	3.2	
	Eastbound	1015	1415	2432	506	2926	0.7	0.3	2.0	1532	2817	3421	1.0	2.0	3.0	4.0	
East of R55	Westbound	710	1075	1780	420	2286	0.5	0.3	1.5	1051	2124	2547	0.7	1.0	1.7	2.4	
	Eastbound	495	640	1055	505	1951	0.3	0.3	1.0	753	1290	1798	0.5	1.0	1.5	2.0	

Note 1: Lanes required to accommodate the demand, based on a lane capacity of 1200  
 Note 2: The growth rate of 4% per annum has been used to determine the growth of traffic between 2009 and 2039.









**Table 10: Proposed phasing of upgrades**

Year	All Latent Rights (vph)	Latent Rights Monavoni (vph)	Latent Rights + Monavoni (vph)	Cumulative volumes of Monavoni + Latent Rights (vph)	Cumulative volumes of Monavoni (vph)	No. of Lanes for both Latent Rights and Monavoni	No. of Lanes for Monavoni based on trip distribution	Roads that should be upgraded	Phasing	Conditions
1	1740	506	2246	2246	506	1.5	0.2			Traffic to South can use K71 and no extra lane should be provided by Monavoni
2	1740	506	2246	4492	1012	3.0	0.3	K52	1	Construction of K52 with one lane per direction
3	1740	506	2246	6738	1518	4.5	0.2	D49	2	Upgrade link to D49
4	1740	506	2246	8984	2024	6.0	1.3			
5	1740	506	2246	11230	2530	7.5	0.4	PWV	3	Construction of PWV9 from K52 to N14 if not in place
6	1740	506	2246	13476	3036	9.0	2.0			
7	1740	506	2246	15722	3542	10.5	2.4			
8	1740	506	2246	17968	4048	12.0	0.3	K71	4	Contribution to K71 North of K103
9	1740	506	2246	20214	4554	13.5	0.3	K73	5	Contribution to K73 East of K71
10	1740	506	2246	22460	5060	15.0	0.5	K71	6	Contribution to K71 South of K71 northern terminal if PWV South of N14 is not in place
Total	17400	5060	22460							
Capacity per lane: 1500										

Table 11: Estimated cost of external road upgrades

Table 11: Monavoni Masterplan - Estimated cost of external road upgrades

Nr	Route	Section	Upgrade	Extent	Estimated cost	Cumulative Cost
1	K71	North of Wierda (K103)	Additional through lanes for both directions	2000 m x 2 lanes	R 11,900,000	R 11,900,000
2	PWV 9	K52 to N14	Construction of 1 lane per direction, Bridge and Ramps to the east **	3000m x 2 lanes + 100m Bridge for 2 lanes + 800m ramps	R 56,900,000	R 68,800,000
3	K52	K71 to Riumle (P102-1)	1 lane per direction, new road	2200m x 2 lanes	R 14,960,000	R 83,760,000
4	D49 / Magalies	Intersection	1 lane per direction, reconstruction	1000m x 2 lanes + 2 x R0,5m for traffic signals	R 3,960,000	R 87,720,000
5	Theron	Riumle to Von Willich	1 lane per direction, reconstruction	1000m x 2 lanes	R 1,600,000	R 89,320,000
6	K52	K71 to PWV9	1 lane per direction, new road	2600m x 2 lanes	R 6,120,000	R 95,440,000
7	<b>TOTAL</b>				<b>R 95,440,000</b>	
<p><i>Note: The initial cost estimate was done in August 2009 at an average rate for the following:</i>  <i>R850.00 per sqm for road.</i>  <i>R25 000.00 per sqm for the bridge.</i>  <i>R400.00 per sqm for reconstruction of road.</i>  <i>** Land expropriation cost is excluded.</i></p>						

**Monavoni Master Planning of all extentions**

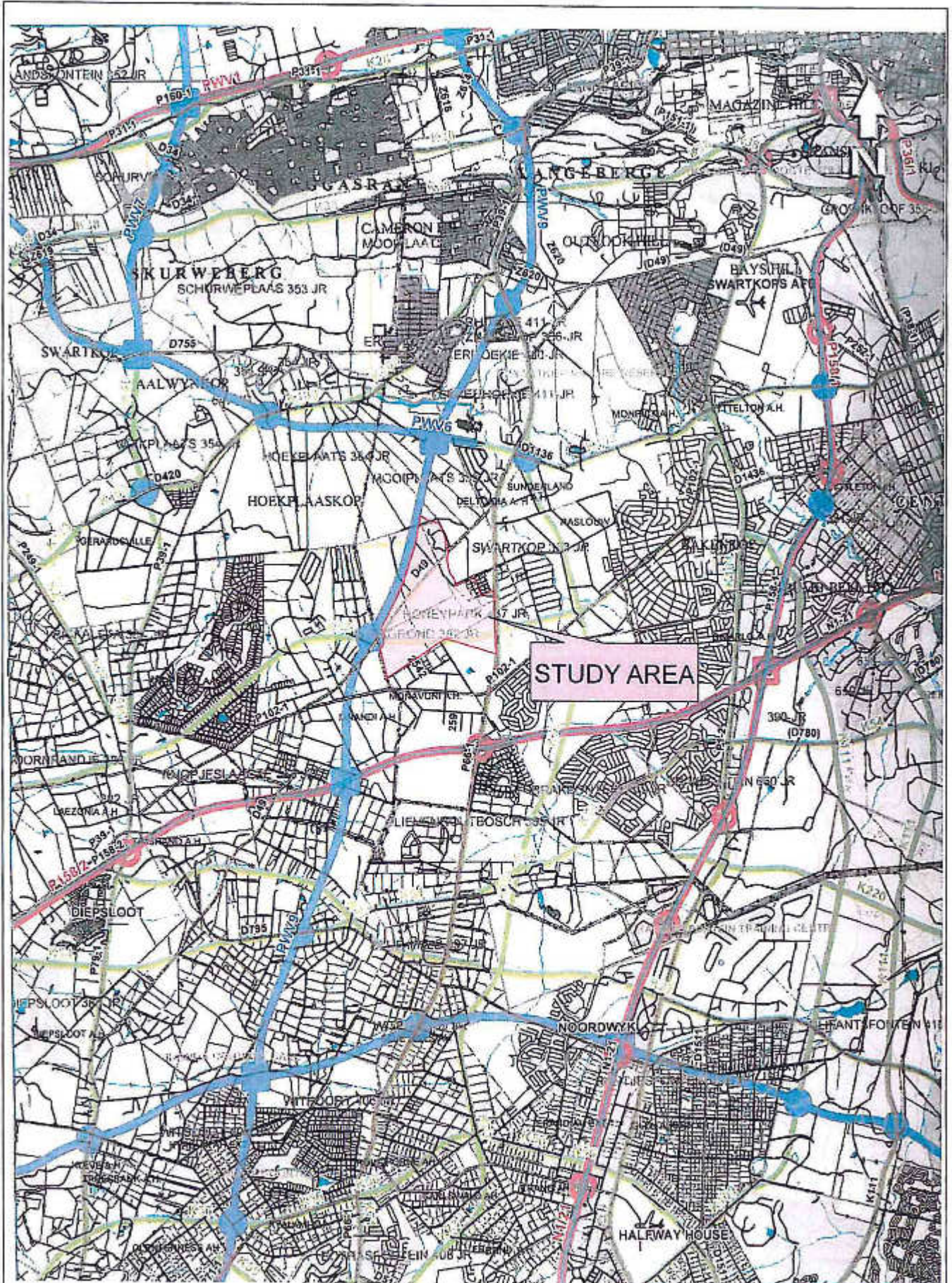
**APPENDIX B**

**FIGURES**

## **APPENDIX B**

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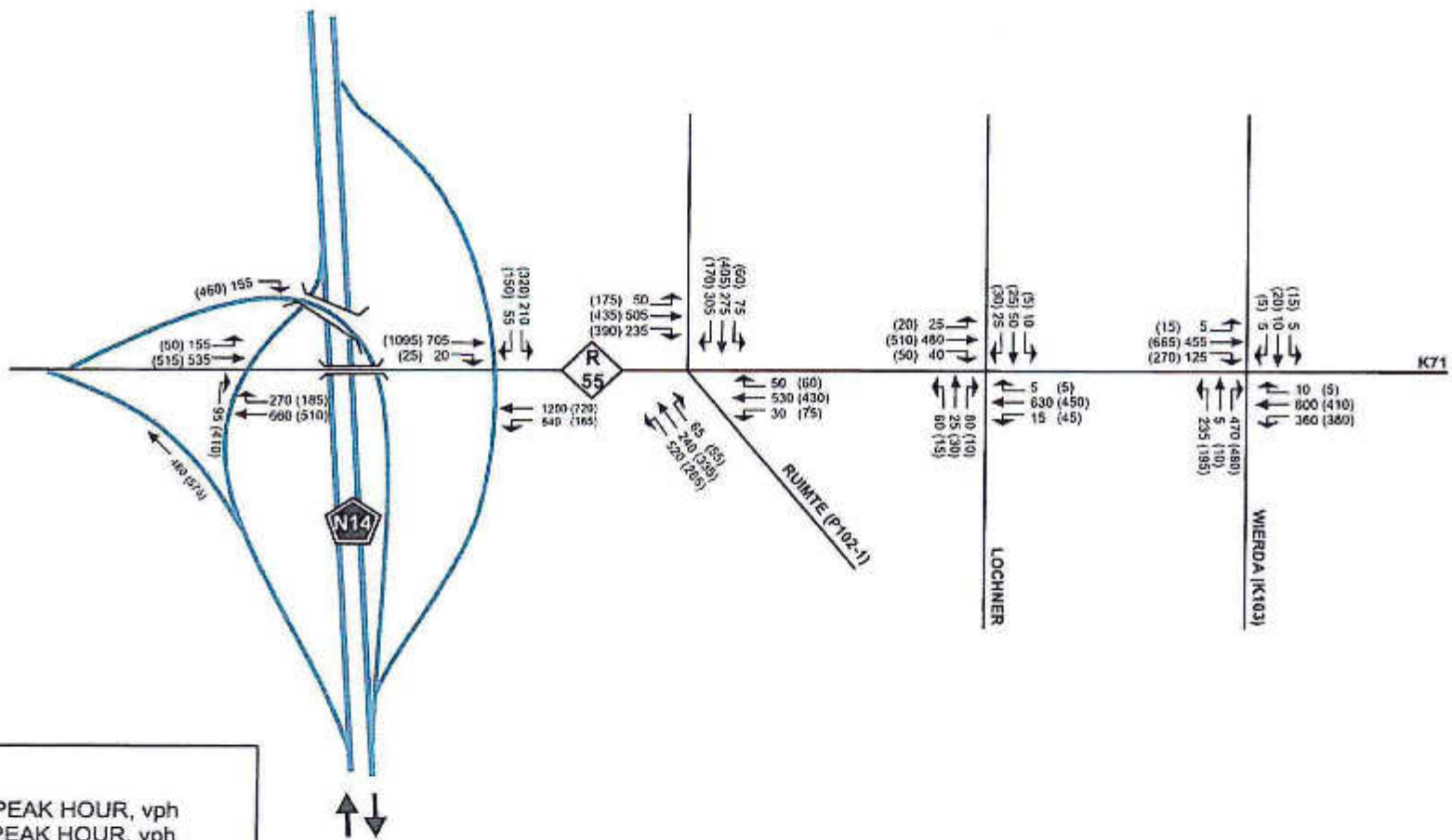
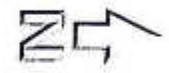
SCHMATIC

2675 /Road Network.cdr



Project:	Monavoni Master Planning	Figure:	Locality and Provincial Road Network
			No. 1





SCHEMATIC

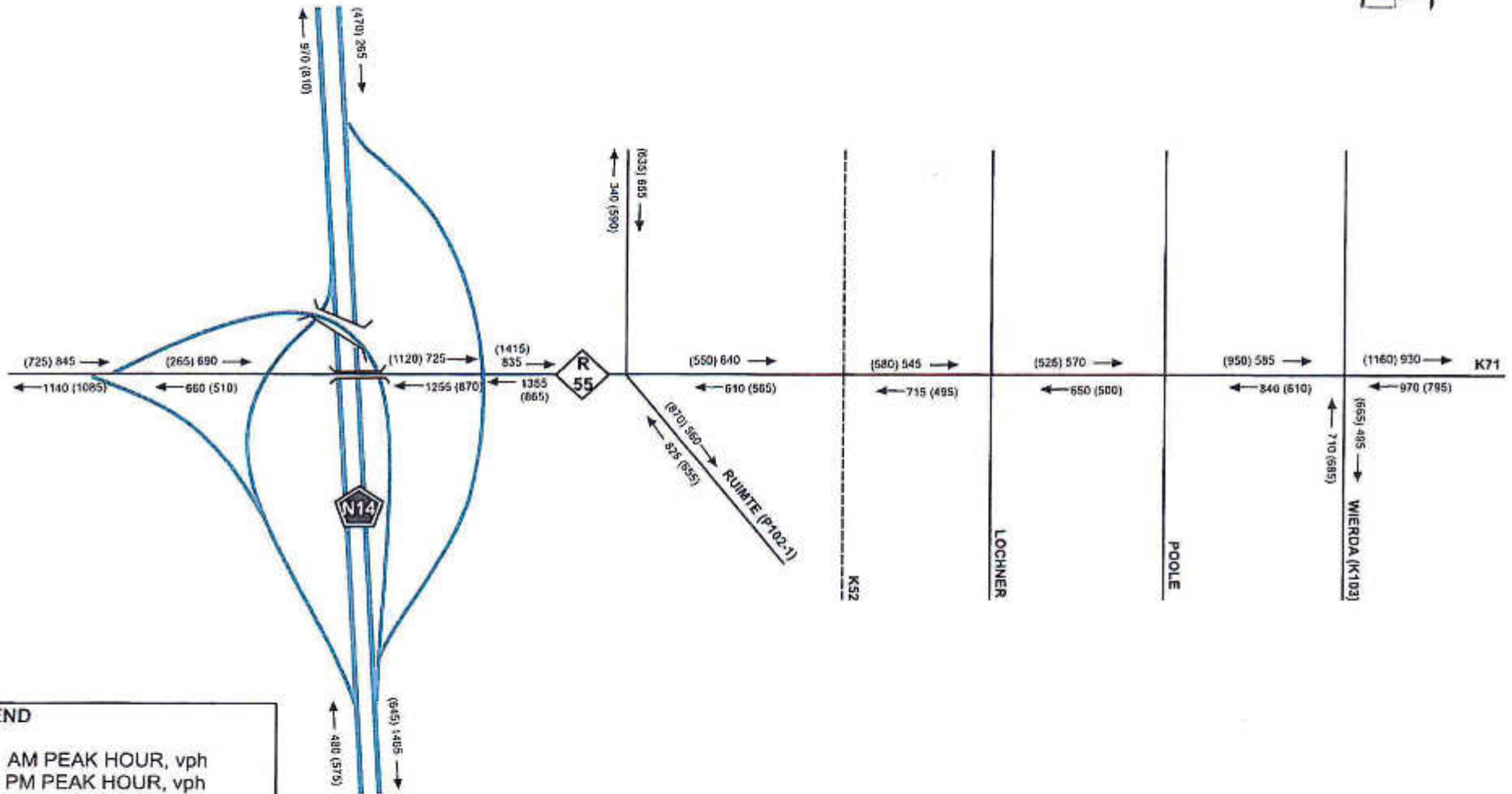
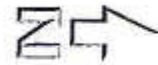
2875\Figure 2a\_Background Traffic Vol.cdr



Project: **MONAVONI MASTER PLANNING**

Figure: **BACKGROUND TRAFFIC VOLUMES**

No. **2a**



**LEGEND**  
355 AM PEAK HOUR, vph  
(220) PM PEAK HOUR, vph  
DATE OF COUNTS: 02 JUNE 2009

SCHEMATIC

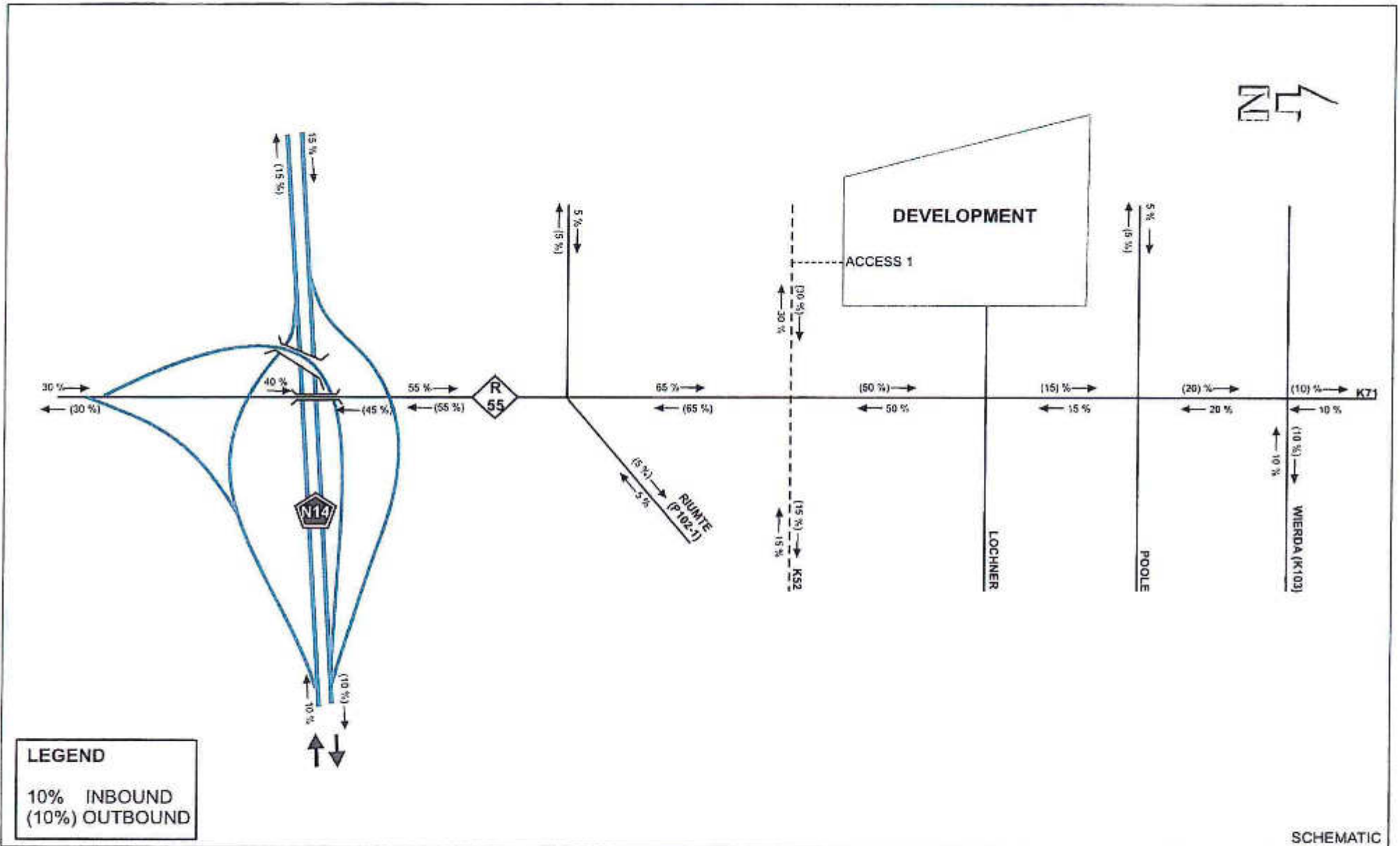
2675\Figure 2b\_Link Vol for Background Traffic.cdr



Project: **MONAVONI MASTER PLANNING**

Figure: **BACKGROUND TRAFFIC: LINK VOLUMES**

No. **2b**



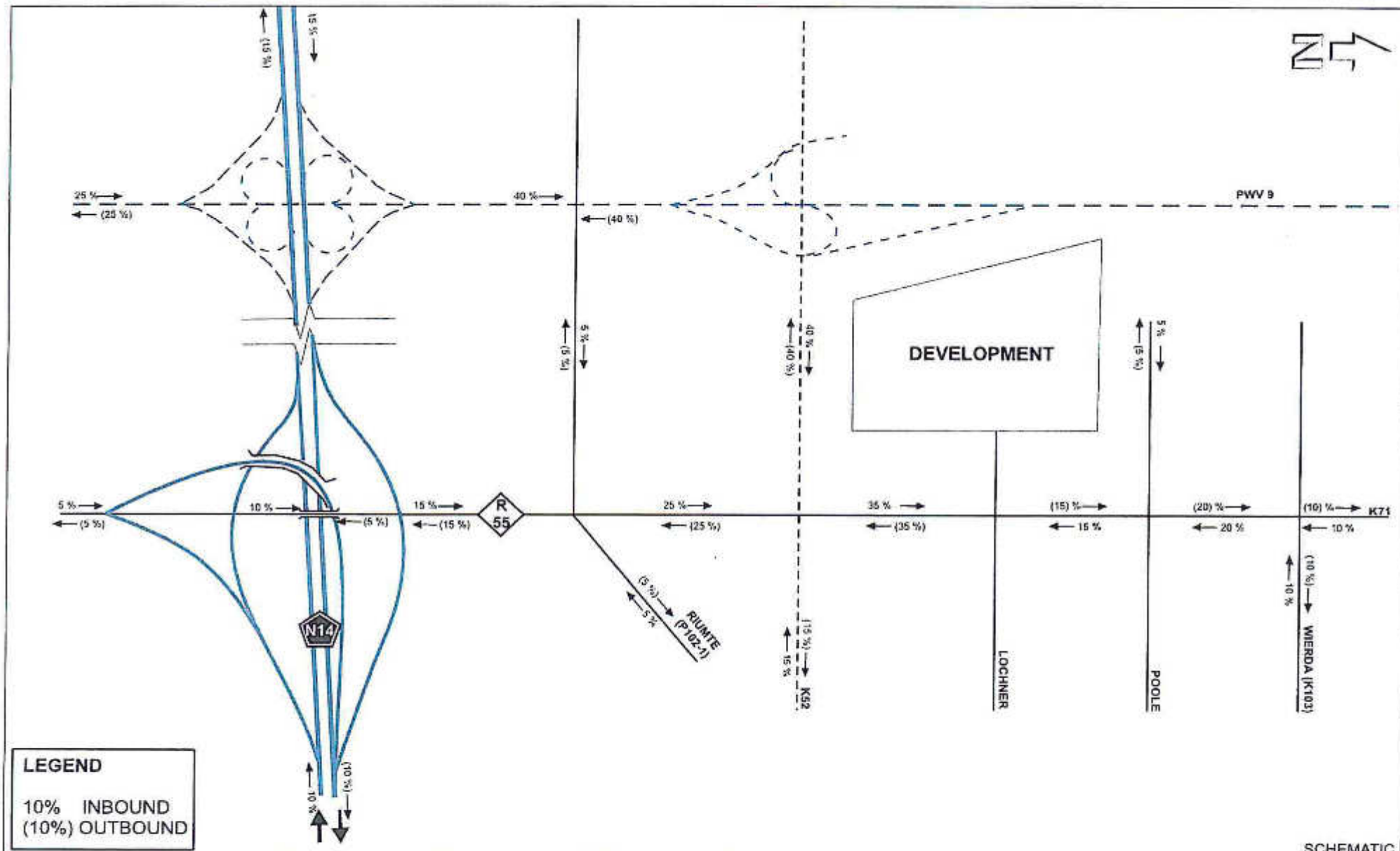
2675\Figure 3a\_TRIP DISTRIBUTION.cdr



Project: MONAVONI MASTER PLANNING

Figure: TRIP DISTRIBUTION (ALTERNATIVE 1)

No. 3a



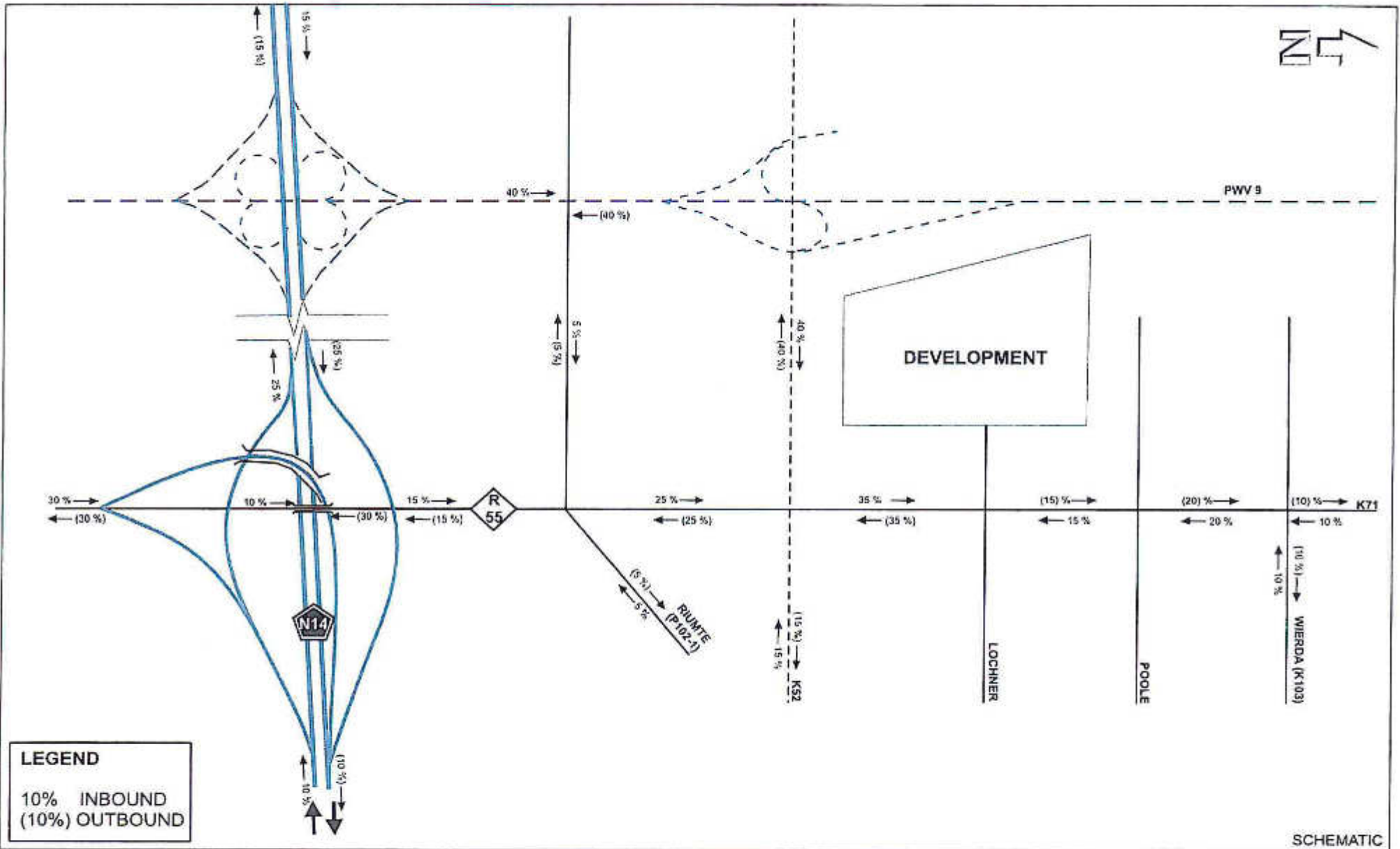
2675\Figure 3b\_TRIP DISTRIBUTION.cdr



Project: **MONAVONI MASTER PLANNING**

Figure: **TRIP DISTRIBUTION (ALTERNATIVE 2)**

No. **3b**



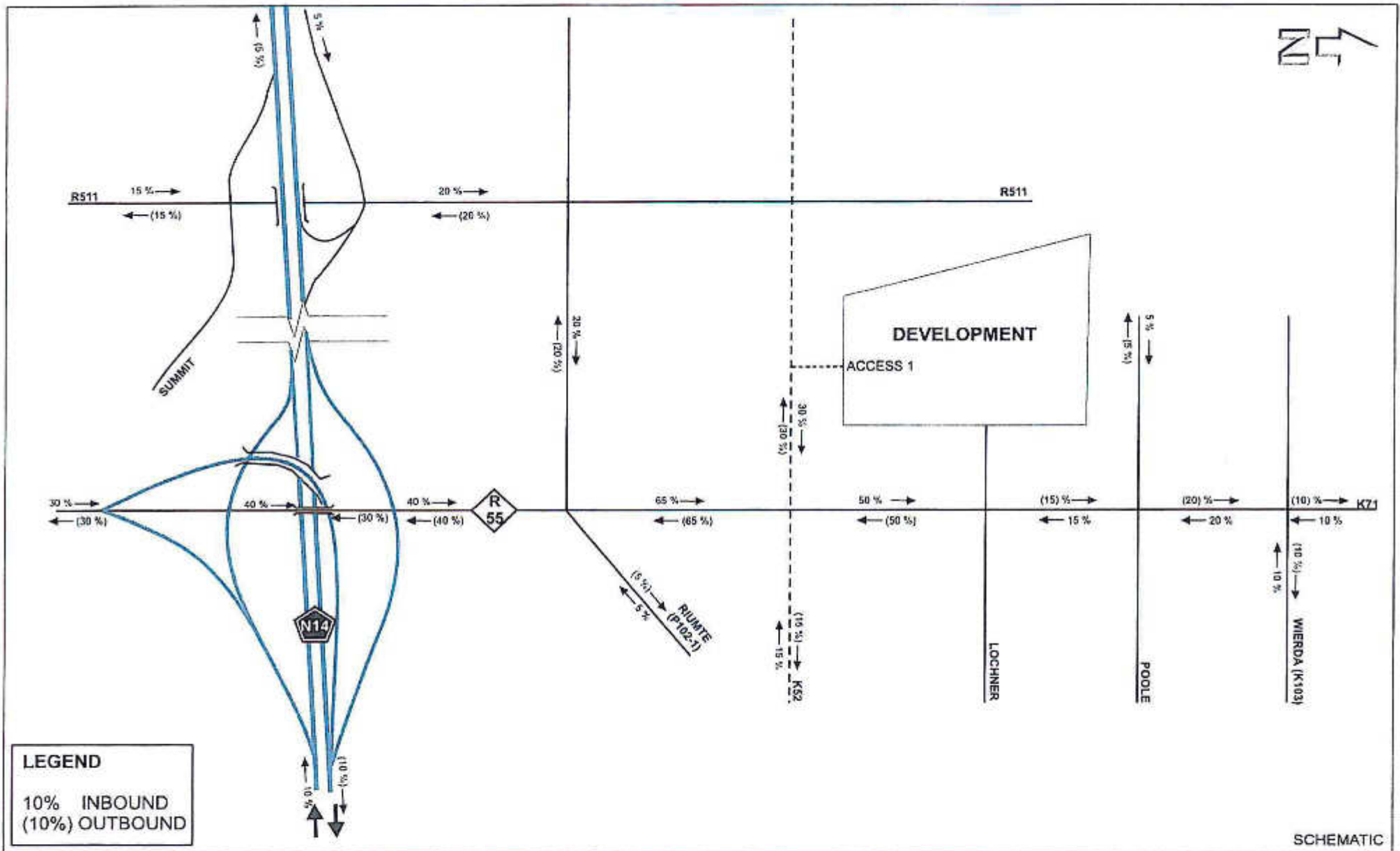
2675\Figure 3c\_TRIP DISTRIBUTION.cdr



Project: **MONAVONI MASTER PLANNING**

Figure: **TRIP DISTRIBUTION (ALTERNATIVE 3)**

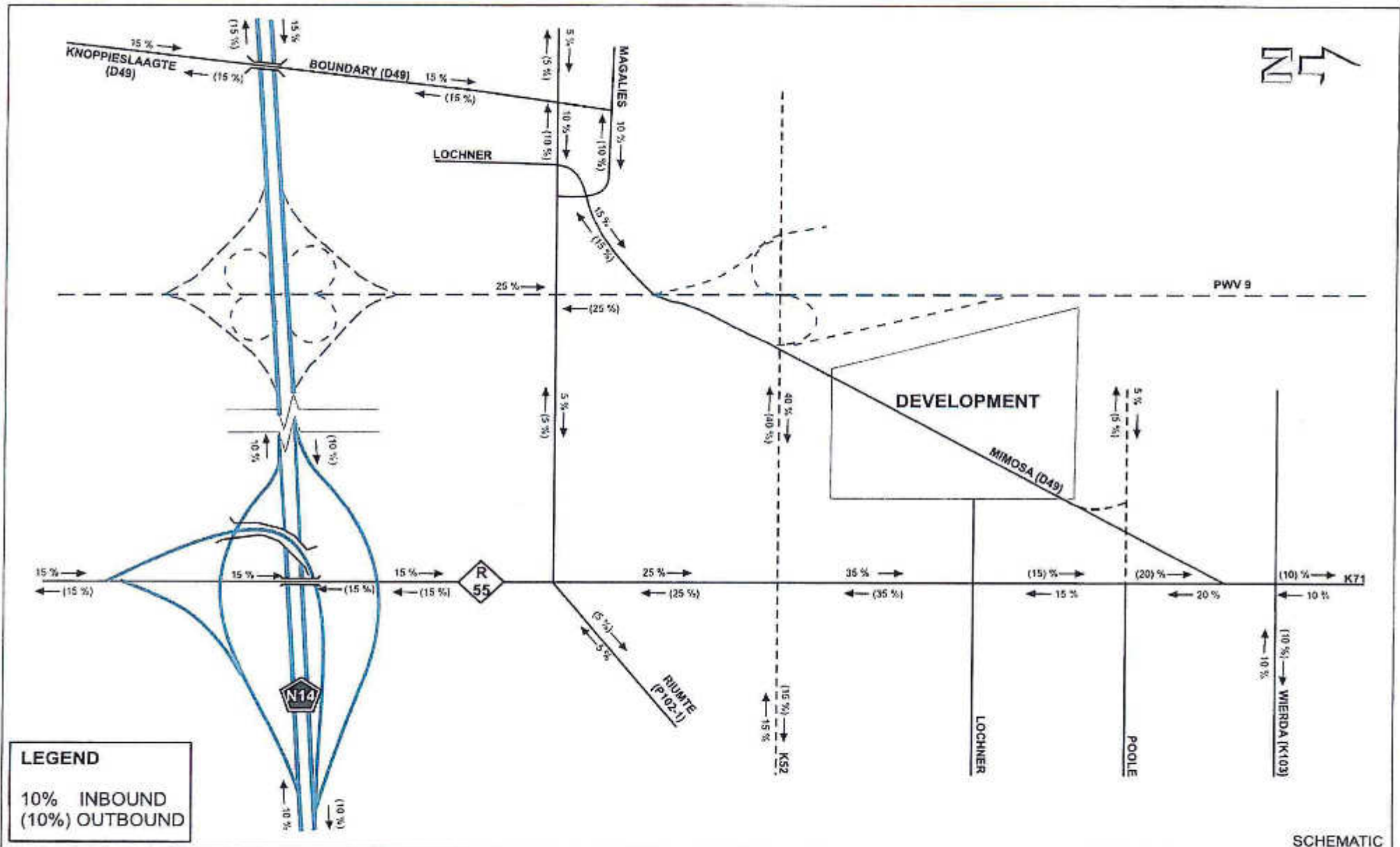
No. **3c**



Project: **MONAVONI MASTER PLANNING**

Figure: **TRIP DISTRIBUTION (ALTERNATIVE 4)**

No. **3d**



2675\Figure 33\_TRIP DISTRIBUTION.cdr



Project: **MONAVONI MASTER PLANNING**

Figure: **TRIP DISTRIBUTION (ALTERNATIVE 5)**

No. **3e**



# Annexure H

Comments from the Council  
for Geoscience







## Council for Geoscience

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No. of Pages: 3

18 September 2009

Tshwane Metropolitan Municipality  
Department Roads and Stormwater: Geology Section  
Centurion Offices  
P O Box 14013  
Lyttelton  
0140

**Attention: The Deputy Manager: Infrastructure Planning and Management  
Hannes Claasen**

*By Fax: 012 358 3361*

**The Deputy Manager Regional Spatial Planning  
Lettie van der Berg**

*By Fax: 012 358 3592*

Dear Sir / Madam,

### **MONAVONI Extensions 50 and 51**

The firm, Relly, Milner and Shedden Consulting Earth Scientists (RMS) submitted their report: "A Dolomite Stability Investigation for the Proposed Townships of Monavoni Extensions 50 and 51 on Portion 5 of Mooiplaats 355 JR Centurion (Tshwane Metro) Gauteng", dated February 2009 on behalf of their client, M&T Developments, to this office for comment on 16 September 2009. This office acts as Agent to your Municipality in auditing the geoscientific work and emanating recommendations. The investigation was carried out to collate existing borehole information from various phases of drilling over the last five years and then to assess the risk of sinkhole/ doline formation.

The investigated site covers a surface area of approximately 73 Ha and comprises two proposed townships namely Monavoni Extensions 50 and 51. It is our understanding that industrial, commercial and residential (multi storey only) land uses are proposed for this site.

The site appears to be underlain by rocks and weathering products of the Oaktree Formation as well as numerous syenite intrusions.

A total of 72 boreholes were used to assess this site.

The site has been divided into four risk class zones namely:

- o Zone A: RMS indicates that there are two small portions on this site which were identified with the use of 5 boreholes. This zone is characterized by residual syenite overlying dolomite bedrock and hence have been assigned a low to moderate risk, namely IRC 3a. Proposed land use; multi-storey residential, commercial and industrial.
- o Zone B: This zone covers the central portion of Extension 51 and most of Extension 50. It was determined with the use of 31 boreholes and is largely characterized by variable conditions related to the thickness of wad and the depth to dolomite below the intrusive. It has been assigned an inherent risk class of IRC 3b(3a,5). Proposed land use; multi-storey residential, commercial and industrial.
- o Zone C: This zone occupies the central and western part of Extension 51, identified with the use of 14 boreholes and indicating widespread shallow bedrock conditions. It has been assigned an inherent risk class of IRC 5. Proposed land use; multi-storey residential, commercial and industrial.
- o Zone D: There are seven pockets making up the zone on this site and which was determined with the use of 22 boreholes. It is characterised by wad at surface overlying dolomite and/or syenite bedrock at depth. An inherent risk of IRC 6 has been assigned. Proposed land use; commercial and industrial.

This office is in general agreement with the dolomite stability conditions identified on this site which is generally underlain by a medium to high risk of small to medium size sinkholes (2-5m diameter). In general, dolomite bedrock is situated at reasonably shallow depths (5-10m from surface) across the whole site. While RMS have designated this site as IRC 3a and 3b with IRC 5 and 6 areas, it is considered prudent to rather view this area as IRC 5 and 6, one in which a high risk of small to medium sized sinkhole conditions are common. Design should thus take cognisance of such conditions. Further, detail subdivision between these risk classes via substantial extra drilling is unlikely to be feasible. Doline formation should be considered due to the presence of wad near surface overlying intrusions of syenite.

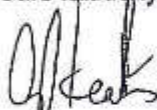
This office has no objection to commercial and industrial developments being considered for this site however:

- o The implementation of a stringent Dolomite Risk Management Plan is considered essential.
- o Design for a 5m loss of support is considered essential.
- o Footprint drilling will be required for most structures, as per draft SANS 1936 requirements.

In our opinion, this office has no objection to well founded, multi-storey residential developments. It is our understanding that such structures will be built to withstand the expected sinkhole/ doline risk and thus not pose any physical or financial risk to individual homeowners. The positions of these structures will have to be defined by footprint drilling, particularly to avoid IRC 6 areas. The unexpected presence of such conditions, when revealed during the footprint drilling, could affect the layout of the proposed development. The draft SANS 1936 currently poses some limitations on the type of multi-storey structures (low rise or high rise) depending on the risk classes present. Concerns, as raised by yourself, regarding the threat that subsidences may pose to water bearing services need to be addressed. Normal housing units are not recommended and would in any case be subject to current density limitations.

If you have any further queries, please do not hesitate to contact this office.

Yours faithfully,



**G J HEATH**

**ENGINEERING GEOSCIENCE UNIT**

**CC:** Relly, Milner & Shedden  
P O Box 32107  
Glenstantia  
0010

**ATTENTION:** Mr. E Shedden

*By Fax:* 012 998 6890



# **Annexure I**

BIODIVERSITY INFORMATION  
RECEIVED BY GDARD



## Lizelle Gregory

---

**From:** Bokamoso <lizelleg@mweb.co.za>  
**Sent:** 17 February 2014 11:31 AM  
**To:** mientjie@bokamoso.net  
**Cc:** user1@bokamoso.net  
**Subject:** FW: Shapefiles:Monavoni X 51

---

**From:** SETSIBA, ALBERTINA (GDARD) [<mailto:ALBERTINA.SETSIBA@gauteng.gov.za>]  
**Sent:** 17 February 2014 11:15 AM  
**To:** Bokamoso ([lizelleg@mweb.co.za](mailto:lizelleg@mweb.co.za))  
**Subject:** Shapefiles:Monavoni X 51

Dear Mientjie

With regard to the above project, specialist biodiversity studies are required to investigate the following aspects:

- \* Plants, with specific reference to *habenaria mossii* and *Habenaria kraenzliniana*.
- \* Vegetation

The absence of wetlands on site should be verified. Should a wetland be located, a wetland specialist study will be required.

Please note that this information is relevant solely for the study site specified in your request. Red/Orange Listed plant species information relevant to a wider geographic area can be obtained from Lorraine Mills ([Lorraine.Mills@gauteng.gov.za](mailto:Lorraine.Mills@gauteng.gov.za)).

All specialist studies must comply with GDARD Requirements for Biodiversity Assessments. The most recent version of this document (currently version 2) can be obtained by e-mailing [GDARD BiodiversityInfo@gauteng.gov.za](mailto:GDARD.BiodiversityInfo@gauteng.gov.za).

Should the environmental assessment practitioner be of the opinion that any of the above specialist studies are unnecessary for the site/activity in question, then an ecologically-based motivation justifying why the studies are deemed unnecessary must be submitted to GDARD as part of the application. This submission will be evaluated and either accepted or returned to the applicant for the completion of the necessary studies.

Please do not send follow up inquiries to this message as they will not be processed. For further queries please contact Phuti Matlamela ([Phuti.matlamela@gauteng.gov.za](mailto:Phuti.matlamela@gauteng.gov.za)).

Regards

Ms Ramokone Albertina Setsiba  
Department of Agriculture & Rural Development  
Biodiversity Management,  
Bioregional Planning Unit: EIAs  
11 Diagonal Building  
(011) 240 3436



## GAUTENG STATE OF THE PROVINCE ADDRESS by Premier Nomvula Mokonyane

Date: 24 February 2014 | Time: 8h30 | Venue: Gauteng Legislature

Gauteng Provincial Government

Hotline: 08600 11000

**Disclaimer:** This message may contain confidential information and is intended only for the individual named. If you are not the named addressee you should not disseminate, distribute or copy this e-mail. Please notify the sender immediately by e-mail if you have received this e-mail by mistake and delete this e-mail from your system. E-mail transmission cannot be guaranteed to be secured or error-free as information could be intercepted, corrupted, lost, destroyed, arrive late or incomplete, or contain viruses. The sender therefore does not accept liability for any errors or omissions in the content of this message, which arise as a result of e-mail transmission. The Gauteng Provincial Government does not take responsibility for Gauteng Provincial Government users' personal views. Gauteng Provincial Government services available online at: [www.gautengonline.gov.za](http://www.gautengonline.gov.za)



# **Annexure J**

Letters regarding the craves





486 Jura Street  
CONSTANTIA PARK  
0010

E-mail: e\_shed@telkomsa.net

**RELLY, MILNER AND SHEDDEN**  
Consulting Earth Scientists

P.O. Box 32107  
GLENSTANTIA, 0010  
Tel: (012) 993 2049  
Fax: (012) 998 6890  
Cell: 082 551 6034

Our Ref:

08111gma

3 February 2009

M & T Development (Pty) Ltd  
PO Box 39727  
FAERIE GLEN  
0043

For attention: Mr PW Kruger

Dear Sir

**CAVES IN DOLOMITE ON PORTIONS OF HONEYPARK 437-JR, STUKGROND 382-JR AND SWARTKOP 383-JR, CENTURION (TSHWANE METRO).**

This letter is written in response to your request to provide information of the possible presence of caves on the above-mentioned site.

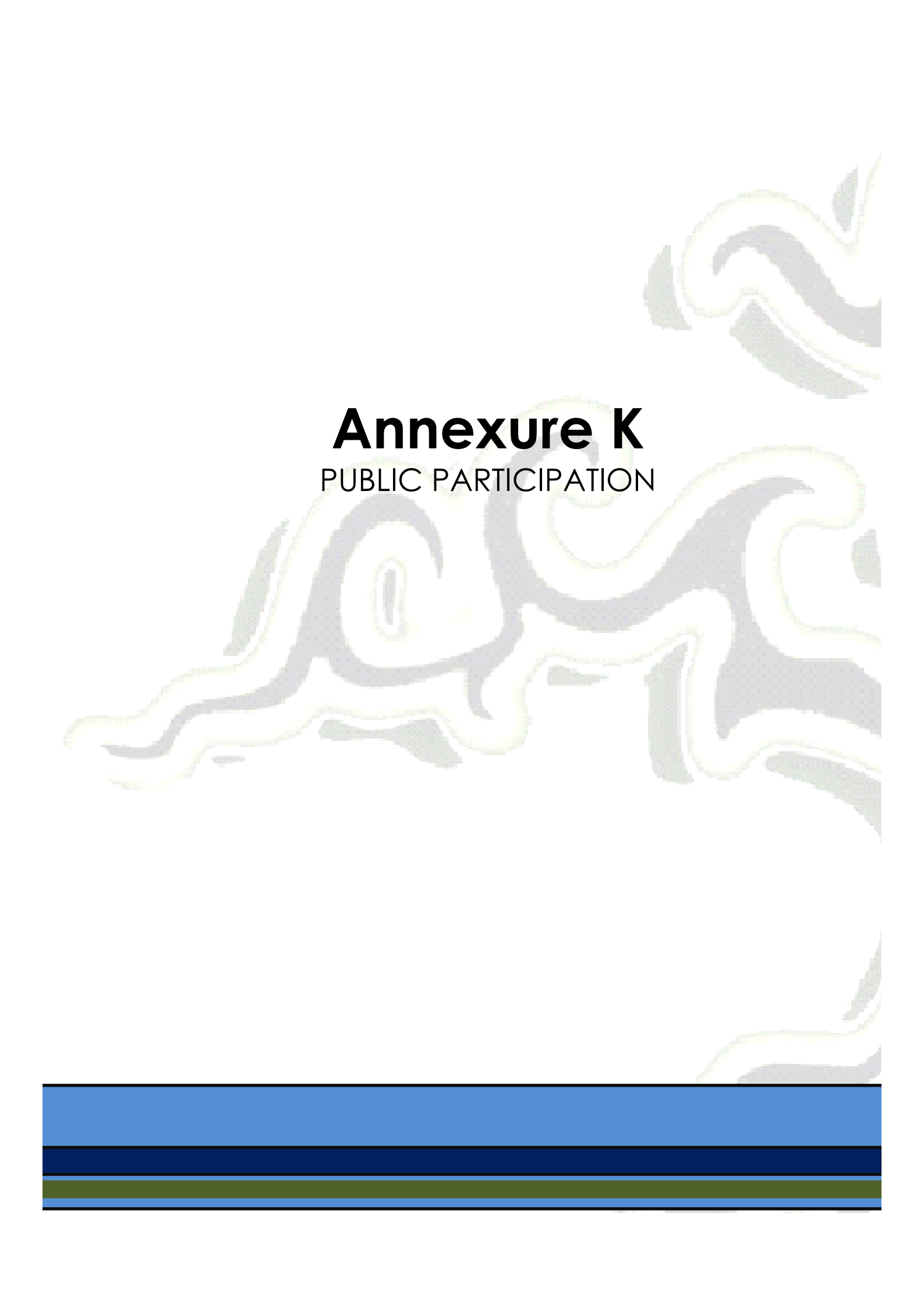
There are no known caves of significance on the site. This firm is involved in the assessment of the dolomite stability of portions of various farm (Honeypark 437-JR, Stukgrond 382-JR and Swartkop 383-JR) in the western part of Centurion (Tshwane Metro). The investigation consisted of collating and assessing the results from one hundred and sixty-eight percussion boreholes. The boreholes have been drilled by various consultants over a 4 year period. Limited field mapping of dolomite and syenite outcrops was undertaken by the writer over the site. No evidence of any caves, whether large or small, was observed during the fieldwork. The writer has been involved in dolomite investigations in this general region for the past 30 years and is unaware of any significant caves on or in the immediate vicinity of this site.

We trust the contents of the letter provides the information required but should any additional information be necessary please do not hesitate to contact us.

Yours faithfully

E Shedden (Pr Sci Nat)  
**RELLY MILNER AND SHEDDEN**





# **Annexure K**

## PUBLIC PARTICIPATION





# **Annexure K(i)**

SITE NOTICE



# NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

Notice is given of an application for an **Environmental Impact Assessment Process** that was submitted to the Gauteng Department of Agriculture and Rural Development, in terms of Regulation No. R543 published in the Government Notice No. 33306 of 18 June 2010 of the National Environment Management Act, 1998 (Act No. 107 of 1998) governing **Environmental Impact Assessment Procedures (Listing Notice: 1, 2 and 3 – Government Notice R544, R545 & R546)** for the following activity:

**Reference No:** Gaut: 002/13-14/E0032

**Project Name:** Monavoni X51

**Property Description:** Part of the Remainder of Portion 5 of the farm Mooiplaats 355 JR and part of Portion 2 of the Farm Zwartkop 383 JR

**Proposed Zoning Information:** The proposed activity will entail the construction of a mixed use township and associated infrastructure with the following proposed land uses: “**Industrial 2**”; “**Business 2**”; “**Residential 2**” with a density of **25 units/ha** and “**Private Open Space**”

**Listing Activities Applied for:**

GNR 544 (Listing Notice 1), 18 June 2010	Activity 9, 13, 22, 23, 24, 26, 37, 47 & 56
GNR 545 (Listing Notice 2), 18 June 2010	Activity 15
GNR 546 (Listing Notice 3), 18 June 2010	Activity 4, 13, 14, 19 & 26

**Proponent Name:** JR 209 Investments (Pty) Ltd

**Location:** The proposed township is situated to the east of the proposed PWV9, west of the R55, to the north of the M34 (Ruimte Road) and the N14, south of Mimosa Road, south west of Sunderland Ridge, and to the east of Gardener Ross Golf Estate.

**Date of Notice:** 7 February – 18 March 2014

**Queries regarding this matter should be referred to:**

**Bokamoso Landscape Architects and Environmental Consultants CC**

Public Participation registration and inquiries: **Juanita De Beer**

Project inquiries: **Mientjie Coetzee**

P.O. Box 11375

Maroelana 0161

www.bokamoso.biz

Tel: (012) 346 3810

Fax: (086) 570 5659

E-mail: lizelleg@mweb.co.za

In order to ensure that you are identified as an Interested and/or Affected Party (I&AP) please submit your name, contact information and interest in the matter, in writing, to the contact person given above **within 40 days of this Notice**.

# NOTICE OF SCOPING ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

Notice is given of an application for a **Scoping Environmental Impact Assessment Process** that was submitted to the Gauteng Department of Agriculture and Rural Development, in terms of Regulation No. R543 published in the Government Notice No. 33306 of 18 June 2010 of the National Environment Management Act, 1998 (Act No. 107 of 1998) governing **Environmental Impact Assessment Procedures (Listing Notice: 1, 2 and 3 – Governing Notice R544, R545 & R546)** for the following activity:

**Reference No:** Gaut: 002/13-14/E0032

**Project Name:** Monavoni X 51

**Property Description:** Part of the Remainder of Portion 5 of the farm Mooiplaats 355 JR and part of Portion 2 of the farm Zwartkop 383 JR

**Proposed Zoning Information:** The proposed activity will entail the construction of a mixed use township and associated infrastructure with the following proposed land uses: “**Industrial 2**”; “**Business 2**”; “**Residential 2**” with a density of **25 units/ha** and “**Private Open Space**”.

## Listing Activities Applied for:

GNR 544 (Listing Notice 1), 18 June 2010	Activity 9, 13, 22, 23, 24, 26, 37, 47 & 56
GNR 545 (Listing Notice 2), 18 June 2010	Activity 15
GNR 546 (Listing Notice 3), 18 June 2010	Activity 4, 13, 14, 19 & 26

**Proponent Name:** R 209 Investments (Pty) Ltd

**Location:** The proposed township is situated to the east of the proposed PWV9, west of the R55, to the north of the M34 (Ruimte Road) and the N14, south of Mimosa Road, south west of Sunderland Ridge, and to the east of Gardener Ross Golf Estate.

**Date of Notice:** 16 May 2013 – 25 June 2013

**Queries regarding this matter should be referred to:**

## **Bokamoso Landscape Architects and Environmental Consultants**

Public Participation registration and inquiries: **Juanita De Beer**

Project inquiries: **Mientjie Coetzee**

P.O. Box 11375

Maroelana 0161

www.bokamoso.net

Tel: (012) 346 3810

Fax: (086) 570 5659

E-mail: lizelle@mweb.co.za

In order to ensure that you are identified as an Interested and/or Affected Party (I&AP) please submit your name, contact information and interest in the matter, in writing, to the contact person given above **within 40 days of this Notice**.

17.05.2013 09:31

# NOTICE OF SCOPING ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

Notice is given of an application for a Scoping Environmental Impact Assessment Process that was submitted to the Gauteng Department of Agriculture and Rural Development, in terms of Regulation No. 2592 published in the Government Notice No. 33006 of 18 June 2010 of the National Environmental Management Act, 1998 (Act No. 102 of 1998) governing Environmental Impact Assessment Procedures (Using Notice: 1, 2 and 3 - Governing Notice 8544, 8545 & 8546) for the following activity:

Reference No: G017/02273-14/8X332

Project Name: Mendonca X 31

Property Description: Part of the Remainder of Portion 5 of the farm Medonkops 355 JR and part of Portion 2 of the farm Zwantsop 383 JF

Proposed Zoning Information: The proposed activity will entail the construction of a mixed use township and associated infrastructure with the following proposed land uses: "Industrial 2", "Business 2", "Residential 2" with a density of 25 units/ha and "Private Open Space".

Using Activities Applied for:

GNR 344 (Using Notice 1), 18 June 2010	Activity 9, 11, 22, 23, 24, 25, 37, 47 & 50
GNR 345 (Using Notice 2), 18 June 2010	Activity 15
GNE 546 (Using Notice 3), 18 June 2010	Activity 4, 10, 14, 19 & 24

Proponent Name: R 209 Investments (pty) Ltd

Location: The proposed township is situated to the east of the proposed PWV9, west of the R55, to the north of the M34 (Bumle Road) and the M14, south of Mimosa Road, south west of Sunderland Ridge, and to the east of Gardiner Ross Golf Estate.

Date of Notice: 16 May 2013 - 25 June 2013

Queries regarding this matter should be referred to:

**Bokamoso Landscape Architects and Environmental Consultants**  
 Public Participation registration and inquiries: **Juanita De Jager**  
 Project inquiries: **Mientje Coetzee**  
 P.O. Box 11375  
 Mamelona 6145  
 www.bokamoso.net

Tel: (012) 345 3810  
 Fax: (085) 570 1689  
 Email: jbeleg@wesa.co.za

In order to ensure that you are identified as an Interested and/or Affected Party (I&A/P) please submit your name, contact information and interest in the matter in writing to the contact person given above within 40 days of this Notice.

**NOTICE OF SCORING ENVIRONMENTAL  
IMPACT ASSESSMENT PROCEED**

1. PROJECT TITLE: [Illegible]

2. PROJECT LOCATION: [Illegible]

3. PROJECT DESCRIPTION: [Illegible]

4. ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS: [Illegible]

5. PUBLIC COMMENT PERIOD: [Illegible]

6. CONTACT INFORMATION: [Illegible]

17.05.2013 09:31



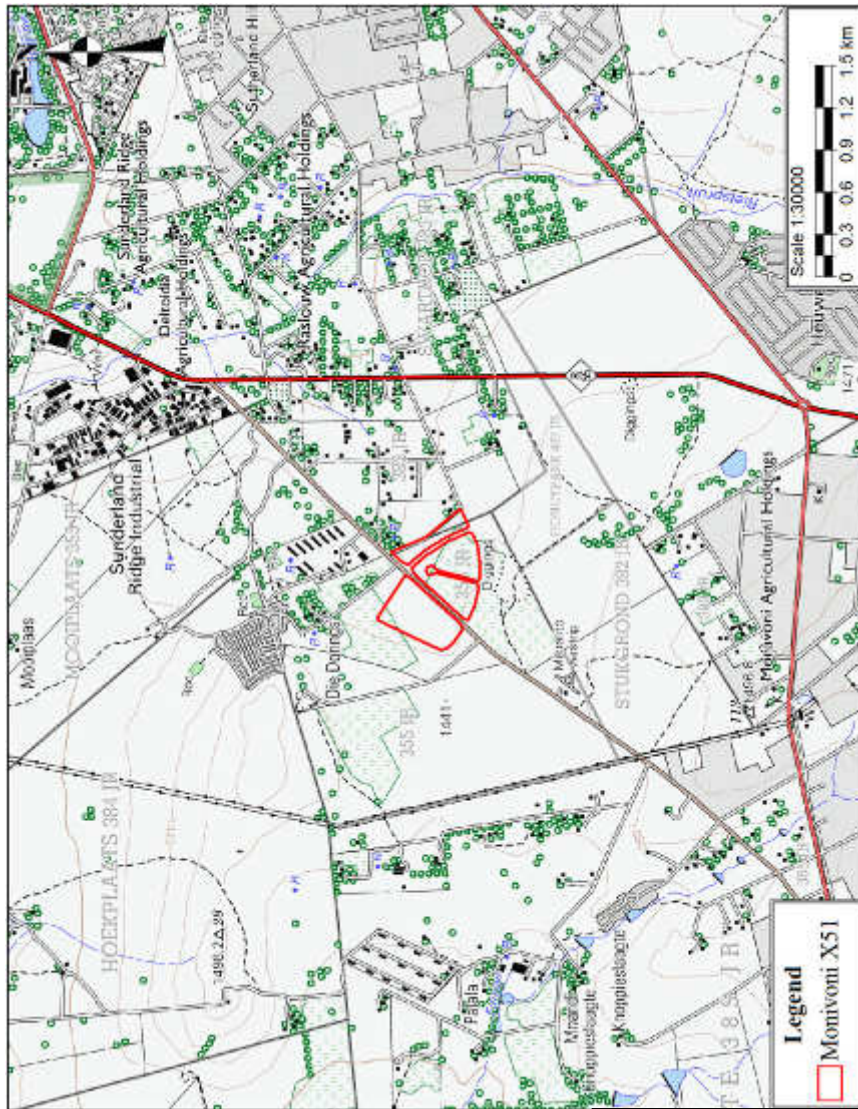
# **Annexure K(ii)**

NOTICE/FLYERS DISTRIBUTED  
TO I&AP'S



# Mona voni X 51

## NOTICE OF SCOPING ENVIRONMENTAL IMPACT ASSESSMENT PROCESS



**Locality Map**

Notice is given of an application for an **Scoping Environmental Impact Assessment Process** that was submitted to the Gauteng Department of Agriculture and Rural Development, in terms of Regulation No. R543 published in the Government Notice No. 33306 of 18 June 2010 of the National Environment Management Act, 1998 (Act No. 107 of 1998) governing **Environmental Impact Assessment Procedures (Notice 1, 2 and 3 – Governing Notice R544, R545 & R546)** for the following activity:

**Reference No:** Gaut: 002/13-14/E0032

**Project Name:** Mona voni X 51

**Property Description:** Part of the Remainder of Portion 5 of the farm Mooiplaats 355 JR and part of Portion 2 of the farm Zwartkop 383 JR.

**Proposed Zoning Information:** The proposed activity will entail the construction of a mixed use township and associated infrastructure with the following proposed land use: **“Industrial 2”, Business 2”, “Residential 2”** with a density of **25 units/ha** and **“Private Open Space”**.

**Proponent Name:** JR 209 Investments (Pty) Ltd

**Listing Activities Applied:** GNR 544 (Listing Notice 1), 18 June 2010 – Activity 9, 13, 22, 23, 24, 26, 37, 47 & 56. GNR 545 (Listing Notice 2), 18 June 2010 – Activity 15. GNR 546 (Listing Notice 3), 18 June 2010 – Activity 4, 13, 14, 19 & 26.

**Location:** The proposed township is situated to the east of the proposed PWV9, west of the R55, to the north of the M34 (Ruimte Road) and the N14, south of Mimosa Road, south west of Sunderland Ridge, and to the east of Gardener Ross Golf Estate.

**Date of Notice:** 16 May – 25 June 2013

**Queries regarding this matter should be referred to:**

Bokamoso Landscape Architects and Environmental Consultants

Public Participation registration and inquiries: **Juanita De Beer**

Project inquiries: **Mientjie Coetzee**

P.O. Box 11375

Maroelana 0161

[www.bokamoso.net](http://www.bokamoso.net)

TeL: (012) 346 3810

Fax: (086) 570 5659

E-mail: [lize.lleg@mweb.co.za](mailto:lize.lleg@mweb.co.za)



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# Monavoni X51

## NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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**Reference No:** Gaut: 002/13-14/E0032

**Project Name:** Monavoni X51

**Property Description:** Part of the Remainder of Portion 5 of the Farm Mooiplaats 355 JR and part of Portion 2 of the Farm Zwartkop 383 JR

**Proposed Zoning Information:** The proposed activity will entail the construction of a mixed use township and associated infrastructure with the following proposed land uses: **“Industrial 2”**; **“Business 2”**; **“Residential 2”** with a density of **25 units/ha** and **“Private Open Space”**.

**Proponent Name:** JR 209 Investments (Pty) Ltd

**Listing Activities Applied:** GNR 544 (Listing Notice 1), 18 June 2010 – Activity 9, 13, 22, 23, 24, 26, 37, 47 & 56 and GNR 545 (Listing Notice 2), 18 June 2010 – Activity 15 and GNR 546 (Listing Notice 3), 18 June 2010 – Activity 4, 13, 14, 19 & 26.

**Location:** The proposed township is situated to the east of the proposed PWV9, west of the R55, to the north of the M34 (Ruimte Road) and the N14, south of Mimosa Road, south west of Sunderland Ridge, and to the east of Gardener Ross Gold Estate.

**Date of Notice:** 7 February – 18 March 2014

**Queries regarding this matter should be referred to:**

Bokamoso Landscape Architects and Environmental Consultants CC  
Public Participation registration and inquiries: **Juanita De Beer**

Project inquiries: **Mientjie Coetzee**

P.O. Box 11375

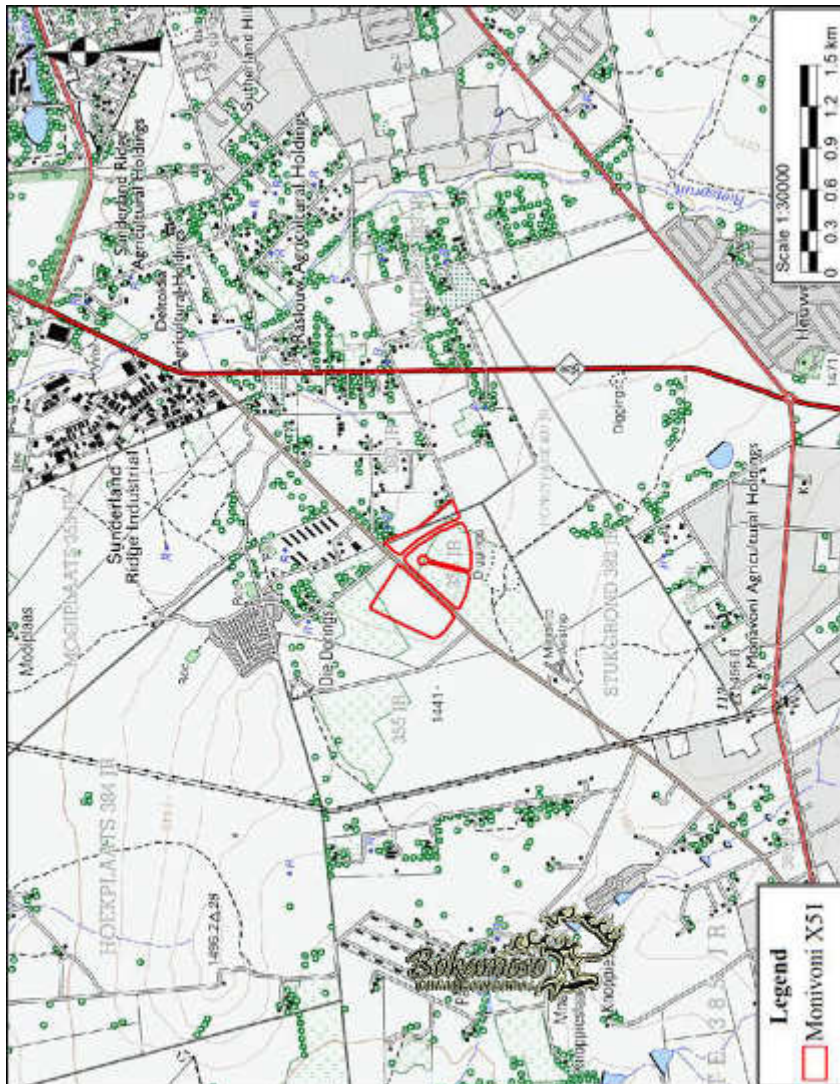
Maroelana 0161

**www.bokamoso.biz**

Tel: (012) 346 3810

Fax: (086) 570 5659

E-mail: lizelle@mweb.co.za



**Locality Map**

In order to ensure that you are identified as an Interested and/or Affected Party (I&AP) please submit your name, contact information and interest in the matter, in writing, to the contact person given above **within 40 days of this Notice**.

**List of REGISTERED LETTERS**  
**Lys van GEREGISTREERDE BRIEWE**  
 (With an insurance option/met 'n versekeringsopsie)



**Full tracking and tracing/Volledige volg en spoor**

Name and address of sender  
 Naam en adres van afsender: Bobamase PO Box 11375,  
Marcelona 0161  
Mondvoni X51 + Mondvoni X52

Enquiries/Navrag  
 Toll-free number  
 Tolvry nommer  
**0800 111 502**

No	Name and address of addressee Naam en adres van geadresseerde	Insured amount Versekerde bedrag	Insurance fee Versekeringsgeld	Postage Posgeld	Service fee Diensgeld	Affix Track and Trace customer copy Plak Volg-en-Spoor-kliëntafskrif
1	Mooiplaats Landfill P.O. Box 73503, Fairland, 2030					REGISTERED LETTER (with a domestic insurance option) ShareCall 0800 111 502 www.sagpo.co.za RD 605 073 859 ZA CUSTOMER COPY 301028R
2	Chieftain Real Estate Incorporated in Ireland P.O. Box 181, Palokwane, 0699					REGISTERED LETTER (with a domestic insurance option) ShareCall 0800 111 502 www.sagpo.co.za RD 605 073 828 ZA CUSTOMER COPY 301028R
3	JR 209 Investments P.O. Box 75266, Lynnwood Ridge, 0040					REGISTERED LETTER (with a domestic insurance option) ShareCall 0800 111 502 www.sagpo.co.za RD 605 073 831 ZA CUSTOMER COPY 301028R
4						
5						
6						
7						
8						
9						
10						
Total Totaal		R	R	R	R	

Number of letters posted  
 Getal briewe gepos

Signature of client  
 Handtekening van kliënt:

Signature of accepting officer  
 Handtekening van aanneembeampte:

The value of the contents of these letters is as indicated and compensation is not payable for a letter received unconditionally. Compensation is limited to R100,00. No compensation is payable without documentary proof. Optional insurance of up to R2 000,00 is available and applies to domestic registered letters only.

Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreeerde briewe van toepassing.





Companies and Intellectual  
Property Commission

a member of **the dti** group

## CIPC Company Report

**windeed**  
information is our business

### SEARCH DETAILS

**Date Requested** 2013/05/15 16:15  
**Reference** -

### COMPANY SUMMARY

**Name** MOOIPLAATS LANDFILL  
**Status** In Business  
**Registration Number** 1999/016063/07  
**Registration Date** 1999/07/27

### DIRECTOR LIST (1)

VAN NIEKERK, DIRK JOHANNES THEODORUS (Director - Active)

### AUDITOR(S) LIST (3)

TAG INCORPORATED  
GENESIS CHARTERED ACCOUNTANTS  
HOWELL EN KIE

### COMPANY INFORMATION

<b>Registration No</b>	1999/016063/07	<b>Registered Office</b>	PLOT 36 OLD WARMBATHS ROAD BON ACCORD
<b>Status</b>	In Business		0009
<b>Enterprise Name</b>	MOOIPLAATS LANDFILL		
<b>Registration Date</b>	1999/07/27		
<b>Enterprise Type</b>	Private Company		
<b>Conv. Enterprise No</b>		<b>Postal Address</b>	P O BOX 73503 FAIRLAND
<b>Business Start</b>	1999/07/27		
<b>Old Reg No</b>			2030
<b>Financial Year End</b>	2	<b>Region</b>	Gauteng
<b>Fin Effective Date</b>	1999/07/27	<b>Country</b>	Unknown
<b>Tax Number</b>	9786048646	<b>Country of Origin</b>	
<b>Short Name</b>		<b>CK Date</b>	-
<b>Translated Name</b>		<b>CK Date Received</b>	-
<b>Status Date</b>	-	<b>Date of Type</b>	1999/07/27
<b>Authorized Shares</b>		<b>Issued Shares</b>	
<b>Authorized Capital</b>		<b>Issued Capital</b>	
<b>Industry</b>	Financial intermediation, insurance, real estate and business services		

**DIRECTOR(S)****VAN NIEKERK, DIRK JOHANNES THEODORUS (Director)**

<b>ID Number/Passport Number</b>	6201205072000	<b>Initials</b>	DJT
<b>Date of Birth</b>	1962/01/20	<b>Member size percentage</b>	0
<b>Status</b>	Active	<b>Member Contribution</b>	0
<b>Resignation Date</b>	-	<b>Residential Address</b>	
<b>Country of Residence</b>	South Africa	<b>Postal Address</b>	P O BOX 314 BON ACCORD 0009
<b>Telephone Number</b>		<b>e-mail Address</b>	
<b>Fax Number</b>		<b>Profession</b>	
<b>Cell Number</b>		<b>Appointment</b>	1999/07/27

**AUDITOR(S)****TAG INCORPORATED**

<b>Name</b>	TAG INCORPORATED	<b>Status</b>	Resign
<b>Prof. Code</b>	Chartered Accounts	<b>Type</b>	Auditor
<b>Prof. No</b>	961450	<b>Postal Address</b>	
<b>Start Date</b>	-		
<b>End Date</b>	-		
<b>Expiry Date</b>	-		
<b>Reg. Entry Date</b>	-		
<b>CM31 Completed</b>	-	<b>Physical Address</b>	
<b>CM31 Received</b>	-		
<b>Ref. No</b>			
<b>Fine Letter</b>			
<b>Date of status change (if applicable)</b>	-	<b>Act Ind Mpy No Sp</b>	

**GENESIS CHARTERED ACCOUNTANTS**

<b>Name</b>	GENESIS CHARTERED ACCOUNTANTS	<b>Status</b>	Current
<b>Prof. Code</b>	Chartered Accounts	<b>Type</b>	Auditor
<b>Prof. No</b>	950386	<b>Postal Address</b>	P O BOX 73503 FAIRLAND
<b>Start Date</b>	-		
<b>End Date</b>	-		
<b>Expiry Date</b>	-		2030
<b>Reg. Entry Date</b>	-		
<b>CM31 Completed</b>	-	<b>Physical Address</b>	178 SMIT STREET SUITE 8 SUNPARK FAIRLAND
<b>CM31 Received</b>	-		
<b>Ref. No</b>			
<b>Fine Letter</b>			
<b>Date of status change (if applicable)</b>	-	<b>Act Ind Mpy No Sp</b>	

**HOWELL EN KIE**

<b>Name</b>	HOWELL EN KIE	<b>Status</b>	Removed
<b>Prof. Code</b>	Invalid Profession Code	<b>Type</b>	Auditor
<b>Prof. No</b>		<b>Postal Address</b>	P O BOX 136 NEWLANDS 0081
<b>Start Date</b>	1999/07/27		
<b>End Date</b>	2007/07/05		
<b>Expiry Date</b>	-		
<b>Reg. Entry Date</b>	1999/07/27		
<b>CM31 Completed</b>	1999/07/27	<b>Physical Address</b>	548 CHARLESSTRAAT MENLO PARK PRETORIA
<b>CM31 Received</b>	1999/07/22		
<b>Ref. No</b>			0001
<b>Fine Letter</b>			
<b>Date of status change (if applicable)</b>	-	<b>Act Ind Mpy No Sp</b>	

**CAPITAL INFORMATION**

No capital information to display.

**HISTORY**

<b>Eff. Date</b>	<b>Change Type</b>
1999/07/27	Directors/Member Change/Secretary/Trust/Both Dir And Office (No information to display)
1999/07/27	Auditor/Acc Officer Change (No information to display)
2006/09/15	Auditor/Acc Officer Change (Add Record Name : = TAG INCORPORATED Status : = Resign)
2006/09/15	Auditor/Acc Officer Change (Add Record Name : = GENESIS CHARTERED ACCOUNTANTS Status : = Current)
2007/07/05	Auditor/Acc Officer Change (HOWELL EN KIE Status : Remove)
2007/07/26	Registered Address Change (PLOT 36 DE ONDERSTEPOORT PRETORIA 0110)
2007/07/26	Postal Address Change (P O BOX 314 BON ACCORD 0009)

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## CIPC Company Report

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### SEARCH DETAILS

**Date Requested** 2013/05/15 16:08  
**Reference** -

### COMPANY SUMMARY

**Name** CHIEFTAIN REAL ESTATE INCORPORATED IN IRELAND  
**Status** In Business  
**Registration Number** 2005/020428/10  
**Registration Date** 2005/06/13

### DIRECTORS LIST (3)

O'ROURUE, MAJELLA (Director - Active)  
O'ROURUE, GERARD (Director - Active)  
SPRUYT, LORNELIS JOHANNES (Representative - Resigned)

### AUDITORS LIST (1)

LLOYD VILJOEN

### COMPANY INFORMATION

<b>Registration No</b>	2005/020428/10	<b>Registered Address</b>	87 A BICCARD STREET POLOKWANE
<b>Status</b>	In Business		
<b>Enterprise Name</b>	CHIEFTAIN REAL ESTATE INCORPORATED IN IRELAND		0699
<b>Registration Date</b>	2005/06/13		
<b>Enterprise Type</b>	External Company		
<b>Conv. Enterprise No</b>		<b>Postal Address</b>	P O BOX 181 POLOKWANE
<b>Business Start</b>	2005/06/13		
<b>Old Reg No</b>			0699
<b>Financial Year End</b>	9	<b>Region</b>	Gauteng
<b>Fin Effective Date</b>	2005/06/13	<b>Country</b>	Unknown
<b>Tax Number</b>	9549573153	<b>Country of Origin</b>	INCORPORATED IN IRELAND
<b>Short Name</b>		<b>CK Date</b>	-
<b>Translated Name</b>		<b>CK Date Received</b>	-
<b>Status Date</b>	-	<b>Date of Type</b>	2005/06/13
<b>Authorized Shares</b>	0	<b>Issued Shares</b>	371.82
<b>Authorized Capital</b>	0	<b>Issued Capital</b>	371.82
<b>Industry</b>	Real estate activities		

**DIRECTORS****O'ROURUE, MAJELLA, (Status:Active)**

ID Number	Type	Member Size %	Member Contribution	App. Date	Res. Date	Physical Address	Postal Address
6103160000000	Director	0	0	2005/06/13	-	MILLHOUSE BALLYCLOUGH  0000	MILLHOUSE BALLYCLOUGH  0000

**O'ROURUE, GERARD, (Status:Active)**

ID Number	Type	Member Size %	Member Contribution	App. Date	Res. Date	Physical Address	Postal Address
6111170000000	Director	0	0	2005/06/13	-	MILLHOUSE BALLYCLOUGH  0000	MILLHOUSE BALLYCLOUGH  0000

**SPRUYT, LORNELIS JOHANNES, (Status:Resigned)**

ID Number	Type	Member Size %	Member Contribution	App. Date	Res. Date	Physical Address	Postal Address
7008135036081	Representative	0	0	2005/06/13	-	20 DOVER STREET FIRST FLOOR RANDPARK BUILDING FERNDALE RANDBURG 2124	P O BOX 181 POLOKWANE  0700

**AUDITORS****LLOYD VILJOEN**

<b>Name</b>	LLOYD VILJOEN	<b>Status</b>	Resign
<b>Prof. Code</b>	Chartered Accounts	<b>Type</b>	Auditor
<b>Prof. No</b>	903914A	<b>Postal Address</b>	P O BOX 933 RANDBURG 2125
<b>Start Date</b>	-		
<b>End Date</b>	-		
<b>Expiry Date</b>	-		
<b>Reg. Entry Date</b>	-		
<b>CM31 Completed</b>	-	<b>Physical Address</b>	20 DOVER STREET FIRST FLOOR RANDPARK BUILDING FERNDALE RANDBURG 2194
<b>CM31 Received</b>	-		
<b>Ref. No</b>			
<b>Fine Letter</b>			
<b>Act Ind Mpy No Sp</b>			

**CAPITAL INFORMATION**

Type	No of Shares	Parri Value	Cap. Amount	Cap. Premium
Authorized Ordinary	372	0	1	0

**HISTORY**

Eff. Date	Change Type
2005/06/14	Directors/Member Change/Secretary/Trust/Both Dir And Office (Change Record Surname = O'ROURUE First Names = MAJELLA Status = Active)
2005/06/14	Directors/Member Change/Secretary/Trust/Both Dir And Office (Change Record Surname = SPRUYT First Names = LORNELIS JOHANNES Status = Active)
2005/06/14	Directors/Member Change/Secretary/Trust/Both Dir And Office (Change Record Surname = O'ROURUE First Names = GERARD Status = Active)
2007/02/06	In Deregistration CC/CO (A-List or B-List) (No information to display)
2007/03/02	Cancellation of Deregistration Process (No information to display)
2007/05/07	Auditor/Acc Officer Change (Change Record Name : = LLOYD VILJOEN Status : = Resign)
2007/10/26	Postal Address Change (P O BOX 123 RANDBURG 2125)
2007/10/26	Registered Address Change

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## CIPC Company Report

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### SEARCH DETAILS

**Date Requested** 2013/05/15 16:10  
**Reference** -

### COMPANY SUMMARY

**Name** JR 209 INVESTMENTS  
**Status** In Business  
**Registration Number** 2000/020447/07  
**Registration Date** 2000/08/18

### DIRECTOR LIST (3)

TSAI, STEVEN MARTIN (Director - Active)  
TSAI, IRENE MARGERET (Director - Active)  
LE ROUX, JAN GERRIT (Director - Resigned)

### AUDITOR(S) LIST (1)

WILLIE MENTZ

### COMPANY INFORMATION

<b>Registration No</b>	2000/020447/07	<b>Registered Office</b>	204 XCELPARK RODERICKS ROAD LYNNWOOD
<b>Status</b>	In Business		
<b>Enterprise Name</b>	JR 209 INVESTMENTS		0081
<b>Registration Date</b>	2000/08/18		
<b>Enterprise Type</b>	Private Company		
<b>Conv. Enterprise No</b>		<b>Postal Address</b>	P O BOX 75266 LYNNWOOD RIDGE
<b>Business Start</b>	2000/08/18		
<b>Old Reg No</b>			0040
<b>Financial Year End</b>	2	<b>Region</b>	Gauteng
<b>Fin Effective Date</b>	2000/08/18	<b>Country</b>	Unknown
<b>Tax Number</b>	9633060141	<b>Country of Origin</b>	
<b>Short Name</b>		<b>CK Date</b>	-
<b>Translated Name</b>		<b>CK Date Received</b>	-
<b>Status Date</b>	-	<b>Date of Type</b>	2000/08/18
<b>Authorized Shares</b>	1000	<b>Issued Shares</b>	1
<b>Authorized Capital</b>	1000	<b>Issued Capital</b>	1
<b>Industry</b>	Financial intermediation, insurance, real estate and business services		

**DIRECTOR(S)** **TSAI, STEVEN MARTIN (Director)**

<b>ID Number/Passport Number</b>	5411015762085	<b>Initials</b>	SM
<b>Date of Birth</b>	1954/11/01	<b>Member size percentage</b>	0
<b>Status</b>	Active	<b>Member Contribution</b>	0
<b>Resignation Date</b>	-	<b>Residential Address</b>	8 WITKOP PLACE FAERIE GLEN 0043
<b>Country of Residence</b>	South Africa	<b>Postal Address</b>	P O BOX 39727 FAERIE GLEN 0043
<b>Telephone Number</b>		<b>e-mail Address</b>	
<b>Fax Number</b>		<b>Profession</b>	BUSINESSMAN
<b>Cell Number</b>		<b>Appointment</b>	2000/11/13

 **TSAI, IRENE MARGERET (Director)**

<b>ID Number/Passport Number</b>	6305280792083	<b>Initials</b>	IM
<b>Date of Birth</b>	1963/05/28	<b>Member size percentage</b>	0
<b>Status</b>	Active	<b>Member Contribution</b>	0
<b>Resignation Date</b>	-	<b>Residential Address</b>	8 WITKOP PLACE FAERIE GLEN 0043
<b>Country of Residence</b>	South Africa	<b>Postal Address</b>	P O BOX 39727 FAERIE GLEN 0043
<b>Telephone Number</b>		<b>e-mail Address</b>	
<b>Fax Number</b>		<b>Profession</b>	BUSINESSMAN
<b>Cell Number</b>		<b>Appointment</b>	2000/10/18

 **LE ROUX, JAN GERRIT (Director)**

<b>ID Number/Passport Number</b>	5308055051009	<b>Initials</b>	JG
<b>Date of Birth</b>	1953/08/05	<b>Member size percentage</b>	0
<b>Status</b>	Resigned	<b>Member Contribution</b>	0
<b>Resignation Date</b>	2000/11/13	<b>Residential Address</b>	C/O ALPINE ROAD & SOUTH VILLAGE LNE LYNNWOOD PRETORIA 0081
<b>Country of Residence</b>	South Africa	<b>Postal Address</b>	P O BOX 1663 PRETORIA 0001
<b>Telephone Number</b>		<b>e-mail Address</b>	
<b>Fax Number</b>		<b>Profession</b>	ATTORNEY
<b>Cell Number</b>		<b>Appointment</b>	2000/08/18

**AUDITOR(S)****WILLIE MENTZ**

<b>Name</b>	WILLIE MENTZ	<b>Status</b>	Current
<b>Prof. Code</b>	Chartered Accounts	<b>Type</b>	Auditor
<b>Prof. No</b>	925446A	<b>Postal Address</b>	P O BOX 636 TRICHARDT 2300
<b>Start Date</b>	-		
<b>End Date</b>	-		
<b>Expiry Date</b>	-		
<b>Reg. Entry Date</b>	-		
<b>CM31 Completed</b>	-	<b>Physical Address</b>	C/O RAPPORTRYER AND LAING STREET
<b>CM31 Received</b>	-		TRICHARDT
<b>Ref. No</b>			
<b>Fine Letter</b>			2300
<b>Date of status change (if applicable)</b>	-	<b>Act Ind Mpy No Sp</b>	

**CAPITAL INFORMATION**

Type	No of Shares	Parri Value	Cap. Amount	Cap. Premium
Authorized Ordinary	1000	0	1	0
Authorized Ordinary	1	0	1	0

**HISTORY**

Eff. Date	Change Type
2000/11/27	Directors/Member Change/Secretary/Trust/Both Dir And Office (Add Record Surname = TSAI First Names = STEVEN MARTIN Status = Active)
2000/11/27	Directors/Member Change/Secretary/Trust/Both Dir And Office (Add Record Surname = TSAI First Names = IRENE MARGERET Status = Active)
2000/11/27	Directors/Member Change/Secretary/Trust/Both Dir And Office (Change Record Surname = LE ROUX First Names = JAN GERRIT Status = Resigned)
2000/12/18	Registered Address Change (CNR ALPINE ROAD/SOUTH VILLAGE LANE LYNNWOOD 0081)
2000/12/18	Postal Address Change (P O BOX 1663 PRETORIA 0001)

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## CIPC Company Report

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### SEARCH DETAILS

**Date Requested** 2013/05/15 16:13  
**Reference** -

### COMPANY SUMMARY

**Name** MOOIPLAATS LANDFILL  
**Status** In Business  
**Registration Number** 1999/016063/07  
**Registration Date** 1999/07/27

### DIRECTOR LIST (1)

VAN NIEKERK, DIRK JOHANNES THEODORUS (Director - Active)

### AUDITOR(S) LIST (3)

TAG INCORPORATED  
GENESIS CHARTERED ACCOUNTANTS  
HOWELL EN KIE

### COMPANY INFORMATION

<b>Registration No</b>	1999/016063/07	<b>Registered Office</b>	PLOT 36 OLD WARMBATHS ROAD BON ACCORD
<b>Status</b>	In Business		0009
<b>Enterprise Name</b>	MOOIPLAATS LANDFILL		
<b>Registration Date</b>	1999/07/27		
<b>Enterprise Type</b>	Private Company		
<b>Conv. Enterprise No</b>		<b>Postal Address</b>	P O BOX 73503 FAIRLAND
<b>Business Start</b>	1999/07/27		
<b>Old Reg No</b>			2030
<b>Financial Year End</b>	2	<b>Region</b>	Gauteng
<b>Fin Effective Date</b>	1999/07/27	<b>Country</b>	Unknown
<b>Tax Number</b>	9786048646	<b>Country of Origin</b>	
<b>Short Name</b>		<b>CK Date</b>	-
<b>Translated Name</b>		<b>CK Date Received</b>	-
<b>Status Date</b>	-	<b>Date of Type</b>	1999/07/27
<b>Authorized Shares</b>		<b>Issued Shares</b>	
<b>Authorized Capital</b>		<b>Issued Capital</b>	
<b>Industry</b>	Financial intermediation, insurance, real estate and business services		

**DIRECTOR(S)****VAN NIEKERK, DIRK JOHANNES THEODORUS (Director)**

<b>ID Number/Passport Number</b>	6201205072000	<b>Initials</b>	DJT
<b>Date of Birth</b>	1962/01/20	<b>Member size percentage</b>	0
<b>Status</b>	Active	<b>Member Contribution</b>	0
<b>Resignation Date</b>	-	<b>Residential Address</b>	
<b>Country of Residence</b>	South Africa	<b>Postal Address</b>	P O BOX 314 BON ACCORD 0009
<b>Telephone Number</b>		<b>e-mail Address</b>	
<b>Fax Number</b>		<b>Profession</b>	
<b>Cell Number</b>		<b>Appointment</b>	1999/07/27

**AUDITOR(S)****TAG INCORPORATED**

<b>Name</b>	TAG INCORPORATED	<b>Status</b>	Resign
<b>Prof. Code</b>	Chartered Accounts	<b>Type</b>	Auditor
<b>Prof. No</b>	961450	<b>Postal Address</b>	
<b>Start Date</b>	-		
<b>End Date</b>	-		
<b>Expiry Date</b>	-		
<b>Reg. Entry Date</b>	-		
<b>CM31 Completed</b>	-	<b>Physical Address</b>	
<b>CM31 Received</b>	-		
<b>Ref. No</b>			
<b>Fine Letter</b>			
<b>Date of status change (if applicable)</b>	-	<b>Act Ind Mpy No Sp</b>	

**GENESIS CHARTERED ACCOUNTANTS**

<b>Name</b>	GENESIS CHARTERED ACCOUNTANTS	<b>Status</b>	Current
<b>Prof. Code</b>	Chartered Accounts	<b>Type</b>	Auditor
<b>Prof. No</b>	950386	<b>Postal Address</b>	P O BOX 73503 FAIRLAND
<b>Start Date</b>	-		
<b>End Date</b>	-		
<b>Expiry Date</b>	-		2030
<b>Reg. Entry Date</b>	-		
<b>CM31 Completed</b>	-	<b>Physical Address</b>	178 SMIT STREET SUITE 8 SUNPARK FAIRLAND
<b>CM31 Received</b>	-		
<b>Ref. No</b>			
<b>Fine Letter</b>			
<b>Date of status change (if applicable)</b>	-	<b>Act Ind Mpy No Sp</b>	

**HOWELL EN KIE**

<b>Name</b>	HOWELL EN KIE	<b>Status</b>	Removed
<b>Prof. Code</b>	Invalid Profession Code	<b>Type</b>	Auditor
<b>Prof. No</b>		<b>Postal Address</b>	P O BOX 136 NEWLANDS 0081
<b>Start Date</b>	1999/07/27		
<b>End Date</b>	2007/07/05		
<b>Expiry Date</b>	-		
<b>Reg. Entry Date</b>	1999/07/27		
<b>CM31 Completed</b>	1999/07/27	<b>Physical Address</b>	548 CHARLESSTRAAT MENLO PARK PRETORIA
<b>CM31 Received</b>	1999/07/22		
<b>Ref. No</b>			0001
<b>Fine Letter</b>			
<b>Date of status change (if applicable)</b>	-	<b>Act Ind Mpy No Sp</b>	

**CAPITAL INFORMATION**

No capital information to display.

**HISTORY**

<b>Eff. Date</b>	<b>Change Type</b>
1999/07/27	Directors/Member Change/Secretary/Trust/Both Dir And Office (No information to display)
1999/07/27	Auditor/Acc Officer Change (No information to display)
2006/09/15	Auditor/Acc Officer Change (Add Record Name : = TAG INCORPORATED Status : = Resign)
2006/09/15	Auditor/Acc Officer Change (Add Record Name : = GENESIS CHARTERED ACCOUNTANTS Status : = Current)
2007/07/05	Auditor/Acc Officer Change (HOWELL EN KIE Status : Remove)
2007/07/26	Registered Address Change (PLOT 36 DE ONDERSTEPOORT PRETORIA 0110)
2007/07/26	Postal Address Change (P O BOX 314 BON ACCORD 0009)

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# **Annexure K(iii)**

Newspaper Advertisement











# **Annexure K(iv)**

Interested and Affected  
Parties List



	Monavoni X51	
<b>Nr</b>	<b>Registered Parties</b>	<b>Contact details</b>
<b>Stakeholders</b>		
1	Council Geo-Science	<a href="mailto:jgrobler@geoscience.org.za">jgrobler@geoscience.org.za</a>
2	SAHRA Gauteng	<a href="mailto:asalomon@sahra.org.za">asalomon@sahra.org.za</a> <a href="mailto:nndobochani@sahra.org.za">nndobochani@sahra.org.za</a>
3	PHRAG	<a href="mailto:maphata.ramphele@gauteng.gov.za">maphata.ramphele@gauteng.gov.za</a>
4	DWA	<a href="mailto:justicem@dwaf.gov.za">justicem@dwaf.gov.za</a> <a href="mailto:keetm@dwaf.gov.za">keetm@dwaf.gov.za</a> <a href="mailto:siwelanel@dwa.gov.za">siwelanel@dwa.gov.za</a> <a href="mailto:tshifaror@dwa.gov.za">tshifaror@dwa.gov.za</a>
5	Eskom	<a href="mailto:central@eskom.co.za">central@eskom.co.za</a> <a href="mailto:paia@eskom.co.za">paia@eskom.co.za</a>
6	SANRAL	<a href="mailto:schmidk@nra.co.za">schmidk@nra.co.za</a>
7	Gautrans	<a href="mailto:kumen.govender@gauteng.gov.za">kumen.govender@gauteng.gov.za</a>
8	Randwater	<a href="mailto:customerservice@randwater.co.za">customerservice@randwater.co.za</a>
9	City of Tshwane	<a href="mailto:rudzanim@tshwane.gov.za">rudzanim@tshwane.gov.za</a>
10	Spoornet	<a href="mailto:daniel.ramokone@transnet.net">daniel.ramokone@transnet.net</a>
11	DA Roads	<a href="mailto:casperm@tshwane.gov.za">casperm@tshwane.gov.za</a>
12	<b>Ward Councillor</b>	Marike Kruger-Muller <a href="mailto:marikekrugermuller@gmail.com">marikekrugermuller@gmail.com</a>
13	<b>Ward Councillor</b>	
<b>Interested and Affected Parties</b>		
1	Andrew Salomon <b>SAHRA</b>	<a href="mailto:asalomon@sahra.org.za">asalomon@sahra.org.za</a> Tel: 021 462 4502
2	Antoinette Petersen <b>Golder</b>	<a href="mailto:apietersen@golder.co.za">apietersen@golder.co.za</a> Tel: 011 254 4994
3	Mohamed	<a href="mailto:riaz@marys.co.za">riaz@marys.co.za</a>





# **Annexure K(v)**

Comments to and from  
I&AP's



## Bianca

---

**From:** Bokamoso <lizelle@mweb.co.za>  
**Sent:** 14 June 2013 03:53 PM  
**To:** mientjie@bokamoso.net; user3@bokamoso.net  
**Cc:** user1@bokamoso.net  
**Subject:** FW: Monavoni Ext 51 and Ext 52  
**Attachments:** sahra letter Monavoni X52 GP june2013.pdf; sahra letter Monavoni X51 GP june2013.pdf

**Flag Status:** Flagged

---

**From:** Andrew Salomon [<mailto:asalomon@sahra.org.za>]  
**Sent:** 14 June 2013 03:32 PM  
**To:** [lizelle@mweb.co.za](mailto:lizelle@mweb.co.za); [grant.botha@gauteng.gov.za](mailto:grant.botha@gauteng.gov.za)  
**Subject:** Monavoni Ext 51 and Ext 52

Attached please find the SAHRA APM Unit responses to your notification regarding the above developments.

Regards  
Andrew Salomon

--

Heritage Impact Assessor  
South African Heritage Resources Agency  
111 Harrington Street  
Cape Town  
8000  
Tel: 021 4624502

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<http://mail.sahra.org.za/disclaimer.html>

## Bianca

---

**From:** Bianca <user11@bokamoso.net>  
**Sent:** 25 February 2015 09:30 AM  
**To:** user3@bokamoso.net  
**Subject:** FW: PORTION 5 OF THE FARM MOOIPLAATS 355-JR AND PART OF PORTION 2 OF THE FARM SWARTKOP TO BE KNOWN MONAVONI EXTENSION 51  
**Attachments:** 20150225073648.pdf  
**Flag Status:** Flagged

---

**From:** Bokamoso [<mailto:lizelleg@mweb.co.za>]  
**Sent:** 25 February 2015 09:27 AM  
**To:** [user11@bokamoso.net](mailto:user11@bokamoso.net); [user1@bokamoso.net](mailto:user1@bokamoso.net)  
**Subject:** FW: PORTION 5 OF THE FARM MOOIPLAATS 355-JR AND PART OF PORTION 2 OF THE FARM SWARTKOP TO BE KNOWN MONAVONI EXTENSION 51

---

**From:** Rudzani Mukheli [<mailto:RudzaniM@TSHWANE.GOV.ZA>]  
**Sent:** 25 February 2015 08:59 AM  
**To:** Bokamoso  
**Cc:** KHAKA, KHAKA (GDARD); MATLAMELA, PHUTI (GDARD); MTHOMBOTHU, COMFORT (GDARD)  
**Subject:** PORTION 5 OF THE FARM MOOIPLAATS 355-JR AND PART OF PORTION 2 OF THE FARM SWARTKOP TO BE KNOWN MONAVONI EXTENSION 51



Good Morning

Please find the attached comments on the abovementioned application.

Regards

---

[http://www.tshwane.gov.za/Pages/Email\\_disclaimer.aspx](http://www.tshwane.gov.za/Pages/Email_disclaimer.aspx)



This email is free from viruses and malware because [avast! Antivirus](#) protection is active.

## Bianca

---

**From:** Juanita <user3@bokamoso.net>  
**Sent:** 15 July 2013 11:00 AM  
**To:** 'asalomon@sahra.org.za'; 'apetersen@golder.co.za';  
'marikekrugermuller@gmail.com'  
**Subject:** Monavoni X51 & Monavoni X52 - Review Notice Invitation  
**Attachments:** Review Notice.pdf; Review Notice.pdf

Dear Interested and/or Affected Party Member,

Please refer to the attached Review Notice Invitations regarding the **Draft Scoping Report** for the proposed **Monavoni X51 & Monavoni X52 Projects**.

All interested and affected parties are invited to review the development information and to register any issues and concerns to be included and addressed in the Final Scoping Report.

The Report will be **available from Wednesday, 17 July 2013** at the Zwartkops Rally Racing Track's Main Office or on our website: [www.bokamoso.biz](http://www.bokamoso.biz)

Hope this finds you well.

Kind Regards/Vriendelike Groete

*Juanita De Beer*



**Landscape Architects &  
Environmental Consultants cc.**

T: (+27)12 346 3810 | F: (+27) 86 570 5659 | E: [lizelleg@mweb.co.za](mailto:lizelleg@mweb.co.za) | [www.bokamoso.biz](http://www.bokamoso.biz)  
36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161

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## Bianca

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**From:** Juanita <user3@bokamoso.net>  
**Sent:** 29 August 2013 10:27 AM  
**To:** info@budgies2bantams.co.za  
**Subject:** Monavoni X51 & Monavoni X52  
**Attachments:** Public Notice EIA.pdf; Public Notice EIA.pdf

Dear Hennops Valley Conservancy,

Please refer to the attached Public Notices regarding the proposed ***Development on part of the Remainder of Portion 5 and Portion 56 of the Farm Mooiplaats 355 JR to be known as Monavoni X52 and the proposed Development on part of Portion 5 of the Farm Mooiplaats 355 JR and part of Portion 2 of the Farm Zwartkop to be known as Monavoni X51*** Projects.

The Draft Scoping Reports are also available on our website for review: [www.bokamoso.biz](http://www.bokamoso.biz)

If you are Interested and/or Affected please response to this email to register as Interested and/or Affected Party Member.

Hope this finds you well.

Kind Regards/Vriendelike Groete

*Juanita De Beer*



**Landscape Architects &  
Environmental Consultants cc.**

T: (+27)12 346 3810 | F: (+27) 86 570 5659 | E: lizelleg@mweb.co.za | [www.bokamoso.biz](http://www.bokamoso.biz)  
36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161

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## Bianca

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**From:** Juanita <user3@bokamoso.net>  
**Sent:** 16 May 2013 10:26 AM  
**To:** jgrobler@geoscience.org.za; asalomon@sahra.org.za;  
maphata.ramphele@gauteng.gov.za; justicem@dwaf.gov.za; keetm@dwaf.gov.za;  
siwelanel@dwa.gov.za; tshifaror@dwa.gov.za; Central@eskom.co.za;  
paia@eskom.co.za; schmidk@nra.co.za; kumen.govender@gauteng.gov.za;  
customerservice@randwater.co.za; rudzanim@tshwane.gov.za;  
daniel.ramokone@transnet.net; casperm@tshwane.gov.za;  
'marikekrugermuller@gmail.com'  
**Subject:** Monavoni X51 & Monavoni X52  
**Attachments:** Public Notice EIA.pdf; Public Notice EIA.pdf

Dear Interested and/or Affected Party Member,

Please refer to the attached Public Notice regarding the proposed Monavoni X51 & the proposed Monavoni X52 Projects.

Hope this finds you well.

**Kind Regards/Vriendelike Groete**

*Juanita De Beer*



**Landscape Architects &  
Environmental Consultants cc.**

T: (+27)12 346 3810 | F: (+27) 86 570 5659 | E: lizelleg@mweb.co.za | www.bokamoso.net  
36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161

**Please consider the environment before printing this email**

## Bianca

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**From:** Juanita <user3@bokamoso.net>  
**Sent:** 07 February 2014 01:42 PM  
**To:** 'jgrobler@geoscience.org.za'; asalomon@sahra.org.za;  
'maphata.ramphele@gauteng.gov.za'; 'justicem@dwaf.gov.za';  
'Siwelanel@dwa.gov.za'; tshifaror@dwa.gov.za; 'central@eskom.co.za';  
'paia@eskom.co.za'; 'SchmidK@nra.co.za'; kumen.govender@gauteng.gov.za;  
nkoneigh@randwater.co.za; 'rudzanim@tshwane.gov.za';  
daniel.ramokane@transnet.net; casperm@tshwane.gov.za;  
marikekrugermuller@gmail.com; 'apietersen@golder.co.za';  
info@budgies2bantams.co.za  
**Subject:** Monavoni X51 - Public Participation  
**Attachments:** Public Notice EIA.pdf

Dear Interested and/or Affected Party Member,

Please refer to the attached Public Notice regarding the proposed **Monavoni X51** Project.

Hope this finds you well.

Kind Regards/Vriendelike Groete

*Juanita De Beer*



**Landscape Architects &  
Environmental Consultants cc.**

T: (+27)12 346 3810 | F: (+27) 86 570 5659 | E: lizelle@mweb.co.za | [www.bokamoso.biz](http://www.bokamoso.biz)  
36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161

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## Bianca

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**From:** Juanita <user3@bokamoso.net>  
**Sent:** 17 July 2013 01:36 PM  
**To:** asalomon@sahra.org.za  
**Subject:** Monavoni X51 & X52  
**Attachments:** 2 Cultural Historical Monavoni Whole.pdf

Dear Andrew Salomon,

Please refer to the Archaeologist Study for the proposed Monavoni X51 & X52 Projects.

Hope this finds you well.

Kind Regards/Vriendelike Groete

*Juanita De Beer*



**Landscape Architects &  
Environmental Consultants cc.**

T: (+27)12 346 3810 | F: (+27) 86 570 5659 | E: lizelle@mweb.co.za | [www.bokamoso.biz](http://www.bokamoso.biz)  
36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161

**Please consider the environment before printing this email**

## Bianca

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**From:** Juanita <user3@bokamoso.net>  
**Sent:** 18 June 2013 09:22 AM  
**To:** asalomon@sahra.org.za  
**Subject:** RE: Monavoni Ext 51 and Ext 52

Dear Andrew Salomon,

Thank you for your response, I have registered your comments on our data basis.

Hope this finds you well.

Kind Regards/Vriendelike Groete

*Juanita De Beer*



**Landscape Architects &  
Environmental Consultants cc.**

T: (+27)12 346 3810 | F: (+27) 86 570 5659 | E: lizelle@mweb.co.za | [www.bokamoso.biz](http://www.bokamoso.biz)  
36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161

Please consider the environment before printing this email

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**From:** Andrew Salomon [<mailto:asalomon@sahra.org.za>]  
**Sent:** 14 June 2013 03:32 PM  
**To:** [lizelle@mweb.co.za](mailto:lizelle@mweb.co.za); [grant.botha@gauteng.gov.za](mailto:grant.botha@gauteng.gov.za)  
**Subject:** Monavoni Ext 51 and Ext 52

Attached please find the SAHRA APM Unit responses to your notification regarding the above developments.

Regards  
Andrew Salomon

--

Heritage Impact Assessor  
South African Heritage Resources Agency  
111 Harrington Street  
Cape Town  
8000  
Tel: 021 4624502

This electronic communication and its content(s) are subject to a disclaimer which can be accessed on the following link:  
<http://mail.sahra.org.za/disclaimer.html>

## Bianca

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**From:** Juanita <user3@bokamoso.net>  
**Sent:** 03 March 2014 08:38 AM  
**To:** 'dpdelarey@gmail.com'  
**Subject:** RE: Monavoni x 51

Geagte Daan de la Rey,

Baie dankie vir jou terugvoering, jy is geregistreer as belanghebbende persoon vir die voorgestelde Monavoni X51 Projek.

Ons sal jou ophoogte hou in verband met die verdere proses in die toekoms.

Hoop dit is in orde.

Kind Regards/Vriendelike Groete

*Juanita De Beer*



**Landscape Architects &  
Environmental Consultants cc.**

T: (+27)12 346 3810 | F: (+27) 86 570 5659 | E: [lizelleg@mweb.co.za](mailto:lizelleg@mweb.co.za) | [www.bokamoso.biz](http://www.bokamoso.biz)  
36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161

Please consider the environment before printing this email

**From:** Daan de la Rey [<mailto:dpdelarey@gmail.com>]  
**Sent:** 02 March 2014 03:02 PM  
**To:** [lizelleg@mweb.co.za](mailto:lizelleg@mweb.co.za)  
**Subject:** Monavoni x 51

Geagte Mientjie Coetzee en Juanita de Beer

Ek is die eienaar van hoewe 170 Lochnerweg en sal graag meer inligting wil ontvang ten opsigte van die beoogde ontwikkeling.

Groete

Daan de la Rey  
0848402400



## Bianca

---

**From:** Juanita <user3@bokamoso.net>  
**Sent:** 12 February 2014 11:51 AM  
**To:** 'gerrit@developlan.co.za'  
**Subject:** RE: Monavoni X 51

Dear Gerrit De Graaff,

Thank you for your response, I have registered you as Interested and/or Affected Party Member for the proposed Monavoni X51 Project.

We will keep you updated regarding the process in the future.

Hope this finds you well.

Kind Regards/Vriendelike Groete

*Juanita De Beer*



**Landscape Architects &  
Environmental Consultants cc.**

T: (+27)12 346 3810 | F: (+27) 86 570 5659 | E: lizelle@mweb.co.za | [www.bokamoso.biz](http://www.bokamoso.biz)  
36 Lebonbo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161

Please consider the environment before printing this email

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**From:** Gerrit De Graaff [<mailto:gerrit@developlan.co.za>]  
**Sent:** 12 February 2014 10:12 AM  
**To:** 'Bokamoso'  
**Cc:** 'Dirk van Niekerk'; 'Elias Barnard'; 'Coenie Willemse'; 'Antoinette Pietersen'  
**Subject:** Monavoni X 51

Good morning **Juanita de Beer**  
**Mientjie Coetzee**

Your "Notice of Environmental Impact Assessment Process" attached hereto has reference.

In this regard we act on behalf of "**MOOPLAATS LANDFILL (PTY) LTD.**"

Mooiplaats Landfill (Pty) Ltd is the owner of:

- **PORTION 86 (A PORTION OF PORTION 5) OF THE FARM MOOPLAATS NO. 355 JR and**
- **PORTION 7 (A PORTION OF PORTION 5) OF THE FARM MOOPLAATS NO. 355 JR.**

There is a legal/ permitted landfill site with associated buffer zones on Portion 86.

We would like to be identified as an Interested and/ or Affected Party and would like to receive all relevant documentation.

All communication must please also be sent to all abovementioned e-mail addresses.

Please acknowledge receipt of this e-mail.

Regards

**Gerrit de Graaff**

**T.R.P (SA), B. (TRP)UP, M.S.A.P.I**

DEVELOPLAN TOWN AND REGIONAL PLANNERS INC.

P. O. Box 1516

Groenkloof

0027

012 346 0283

## Final Comment

### In terms of Section 38 of the National Heritage Resources Act (Act 25 of 1999)

Attention: JR 209 Investments (Pty) Ltd

**The proposed activity will entail the construction of a mixed use township and associated infrastructure with the following proposed land uses: "Industrial 2", "Business 2", "Residential 2" with a density of 25 units/ha and "Private Open Space"/ Part of the Remainder of Portion 5 of the farm Mooiplaats 355 JR and part of Portion 2 of the farm Zwartkop 383 JR.**

**Van Schalkwyk, J. January 2008. Heritage impact survey report for the Proposed Development On Various Holdings Of The Monavoni Agricultural Holdings Area Of The Pretoria Magisterial District, Gauteng.**

The proposed development entails a housing estate as well as a filling station and associated infrastructure, on numerous holdings in the Monavoni Agricultural Holdings on Portions of the farms Mooiplaats 355JR and Stukgrond 382JR, southwest of Pretoria.

The author states that no sites, features or objects of cultural significance were identified in the study area during the survey.

### Case Decision

As there is apparently no evidence of any significant archaeological material in this area, the SAHRA Archaeology, Palaeontology and Meteorites Unit has no objection to the development (in terms of the archaeological component of the heritage resources) on condition that, if any new evidence of archaeological sites or artefacts, palaeontological fossils, graves or other heritage resources are found during development, SAHRA or an archaeologist must be alerted immediately.

Where bedrock is to be affected, or where there are coastal sediments, or marine or river terraces and in potentially fossiliferous superficial deposits, the developer must ensure that a professional Palaeontological Desk Top study is undertaken to assess whether or not the development will impact upon palaeontological resources. If this is deemed unnecessary, a letter of recommendation for exemption from a professional Palaeontologist is needed. If the area is deemed sensitive, a full Phase 1 Palaeontological Impact Assessment will be required and if necessary a Phase 2 rescue operation might be necessary.

Should you have any further queries, please contact the designated official using the case number quoted above in the case header.

Yours faithfully





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Andrew Salomon  
Heritage Officer: Archaeology  
South African Heritage Resources Agency



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Colette Scheermeyer  
SAHRA Head Archaeologist  
South African Heritage Resources Agency

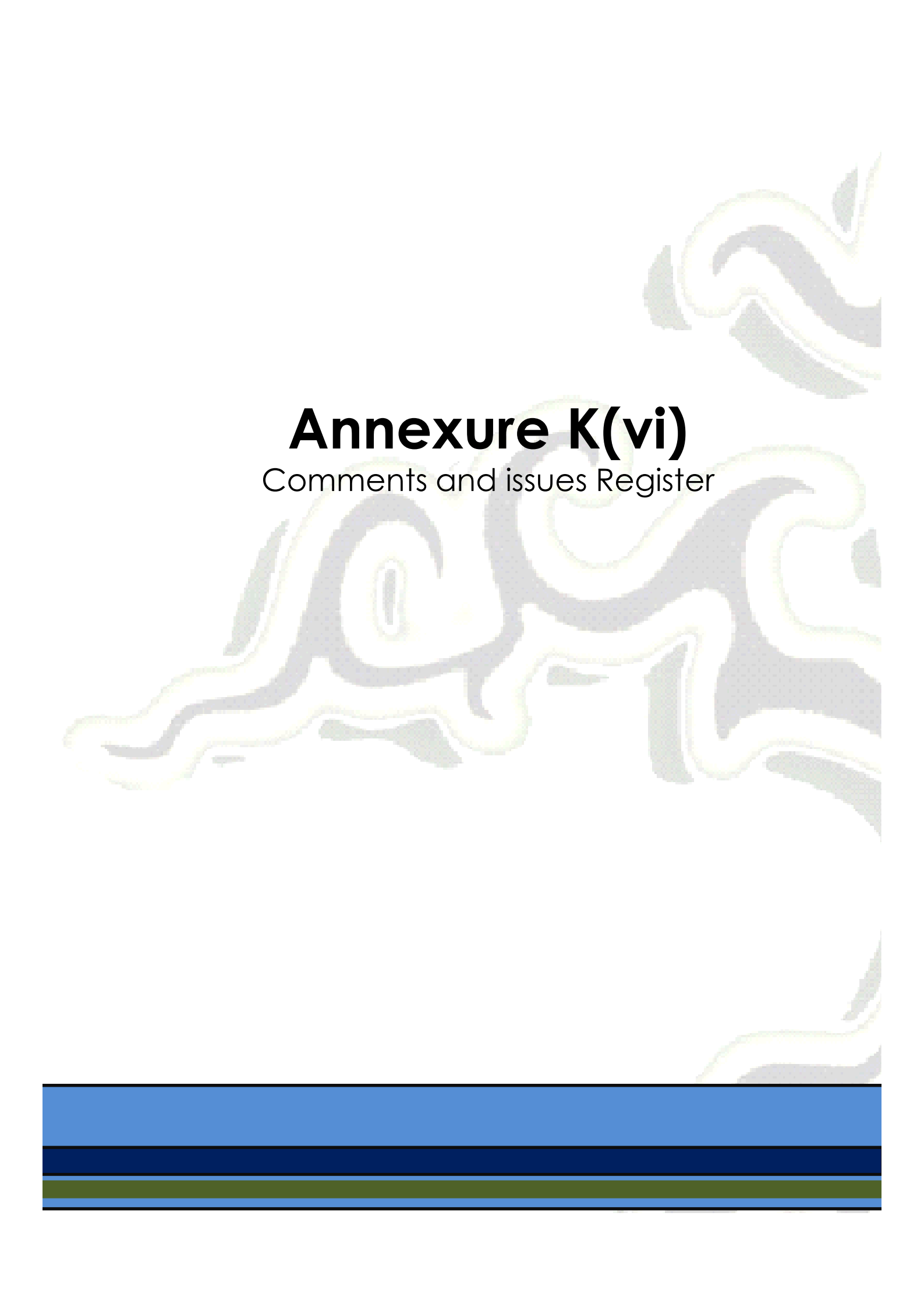
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**ADMIN:**

Direct URL to case: <http://www.sahra.org.za/node/119811>

**Terms & Conditions:**

1. This approval does not exonerate the applicant from obtaining local authority approval or any other necessary approval for proposed work.
2. If any heritage resources, including graves or human remains, are encountered they must be reported to SAHRA immediately.
3. SAHRA reserves the right to request additional information as required.



# **Annexure K(vi)**

Comments and issues Register



**COMMENT AND RESPONSE REPORT-  
DRAFT SCOPING REPORT FOR THE PROPOSED DEVELOPMENT ON PART OF PORTION 5 OF THE FARM MOOPLAATS 355 JR AND PART OF  
PORTION 2 OF THE FARM ZWARTKOP TO BE KNOWN AS MONAVONI X51  
Gaut: 002/13-14/E0032**

Issue	Commentator	Date	Response
<p>In terms of the National Heritage Resources Act, no 25 of 1999, heritage resources, including archaeological or palaeontological sites over 100 years old, graves older than 60 years, structures older than 60 years are protected. They may not be disturbed without a permit from the relevant heritage resources authority. This means that prior to development it is incumbent on the developer to ensure that a Heritage Impact Assessment is done. This must include the archaeological component (Phase 1) and any other applicable heritage components. Appropriate (Phase 2) mitigation, which involves recording, sampling and dating sites that are to be destroyed, must be done as required. The quickest process to follow for the archaeological component is to contract an accredited specialist (see the web site of the Association of Southern African Professional Archaeologist <a href="http://www.asapa.org.za">www.asapa.org.za</a>) to provide a Phase 1 Archaeological Impact Assessment Report. This must be done before any large development takes place. The Phase 1 Impact Assessment Report will identify the archaeological sites and assess their significance. It should also make recommendations (as indicated in section 38) about the process to be followed. For example, there may need to be a mitigation phase (Phase 2) where the specialist will collect or excavate material and date the site.</p> <p>At the end of the process the heritage authority may give permission for destruction of the sites. Where bedrock is to be affected, or where there are coastal sediments, or marine or river terraces and in potentially fossiliferous</p>	<p>Andrew Salomon <b>SAHRA</b> <a href="mailto:asalomon@sahra.org.za">asalomon@sahra.org.za</a></p>	<p>14 June 2013</p>	<p>A Heritage Impact Study was conducted and is included in the EIA Report. <b><i>Refer to Annexure G4.</i></b></p> <p>Based on what was found and its evaluation, it is recommended that any development can continue, on condition of acceptance of the following recommendations:</p> <ul style="list-style-type: none"> <li>- If construction takes place and archaeological sites are exposed, it should immediately be reported to a museum, preferably once at which an archaeologist is available, so that an investigation and evaluation of the find can be made.</li> </ul>

<p>superficial deposits, a Palaeontological Desk Top study must be undertaken to assess whether or not the development will impact upon palaeontological resources - or at least a letter of exemption from a Palaeontologist is needed to indicate that this is unnecessary. If the area is deemed sensitive, a full Phase 1 Palaeontological Impact Assessment will be required and if necessary a Phase 2 rescue operation might be necessary.</p> <p>If the property is very small or disturbed and there is no significant site the heritage specialist may choose to send a letter to the heritage authority to indicate that there is no necessity for any further assessment. Any other heritage resources that may be impacted such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewsapes must also be assessed.</p>			
<p><b>Discussion</b></p> <p>In reviewing the application the Department made the following findings:</p> <ul style="list-style-type: none"> <li>a) According to the Tshwane Open Space Framework the proposed site is influenced by the Hennopsvallei Conservancy open space typology.</li> <li>b) The Report indicated that the proposed application site is 41, 7622 hectares in extent and will consist of a “Residential 2” development of 5 erven in an area of (19.6653ha), 5 erven zoned for “Industrial 2”, at an area of (4.9702ha), 15 erven zoned for “business 2” at an area of (10.2379), private open space at an area of (2.2341ha) and access roads (0.6643ha).</li> <li>c) The Report indicated that the proposed application site in not affected by a 1:50 or</li> </ul>	<p>R.Mukheli CoJ <a href="mailto:Rudzanim@tshwane.gov.za">Rudzanim@tshwane.gov.za</a></p>	<p>26 August 2013</p>	<p>Refer to response below.</p>

<p>1:100 year flood line and therefore will require no application in regards to Section 21 of the National Water Act.</p> <p>d) The Report indicated that the proposed application site is located within the Urban Edge as delineated in the Spatial Development Framework, the 2007 Provincial Urban Edge and the revised 2008/2009 urban edge.</p> <p>e) According to the Report the application site is surrounded by similar development as the current development proposal and is in line with the Monavoni Development Framework 2020 (framework not approved yet), which earmarks the area for densification and densities up to 120 units per hectare.</p> <p>f) The report indicated that the north western part of the application site falls within the Hennopvallei Conservancy, it was further indicated that the application site is not affected by any ridges or floodlines that could create linkages with open space system within the conservancy.</p> <p>g) According to the Report the vegetation cover on site consists open grassland (either primary or secondary grassland) with a small portion of the site which has some scattered alien vegetation (Old cultivated lands).</p> <p>h) The Report indicated due to the fact that the site is underlain by dolomite, a Geotechnical study will be conducted and included in the EIA Report.</p> <p><b>Recommendations</b></p> <p>The Department supports the Scoping Report subject to the following recommendations:</p> <p>a) A Dolomite Stability study (Geotechnical survey) must be conducted to confirm the presence of dolomite on the proposed study</p>			<p>a) <b>Refer to Annexure G1</b> for the Dolomite Stability Report compiled by Relly, Milner and Shedden Consulting</p>
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<p>area. The study should not only include mitigation and precautionary measures, but also recommendations on the structural design.</p> <p>b) A Traffic Impact Study must be included within the EIA Report. This Report should aim to address expected traffic volumes and the expected noise impact of the proposed development.</p> <p>c) GDARD Biodiversity comments should be included within the final EIA Report. Any issues as identified by the GDARD Biodiversity Section must be addressed within the final Report.</p> <p>d) Comments from the Hennopsvallei Conservancy must be included in the final EIA Report. Any issue related to this project from the conservation department must be addressed before the final EIA report is submitted.</p> <p>e) A Storm water Management Plan must be included within the EIA Report. The plan should aim to prevent pollution, erosion and siltation during both the construction and operational phases. The increase in speed, quantity and quality of surface storm water should also be addressed.</p> <p>f) An Environmental Management Plan should be included within the final EIA Report. The EMP should address impacts and mitigation measures for the pre-construction, construction and post-construction activities. All issues and recommendations as indicated above should be included within the final and approved EMP. An Environmental Control Officer and contact details should also be included within the EMP.</p> <p>g) A Rehabilitation plan shall be included in EIA Report and should aim to prevent erosion and aid the return of natural, endemic and indigenous vegetation cover to at least 80% of the rehabilitated area. Any disturbance to the "Private Open Space" shall be rehabilitated to</p>			<p>Earth Scientists.</p> <p>b) <b>Refer to Sections 6.2.7.f</b> of the Final EIA Report and <b>Annexure G7</b>, Traffic Master Plan.</p> <p>c) GDARD Biodiversity comments are included within the EIA Report. Any issues as identified by the GDARD Biodiversity Section are addressed within the Report.</p> <p>d) The Draft EIA Report was submitted to the Hennops Conservancy for comments, and the comments from the Hennopsvallei Conservancy will be included in the final EIA Report. <b>No comments were received from the Hennopsvallei on the Draft EIA Report.</b></p> <p>e) <b>Refer to Section 6.2.7.c</b> and EMP, <b>Annexure N</b>. Bokamoso will recommend that the submissions and approval of a Storm water Management Plan to DWA and CoT be included in the authorization.</p> <p>f) Refer to <b>EMP, Annexure N</b>.</p> <p>g) Refer to <b>EMP, Annexure N</b>.</p>
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<p>at least 80% coverage of the rehabilitated area. The proposed rehabilitation plan should be included within the finalized and approved EMP in detail.</p> <p><b>Conclusion</b></p> <p>The Department has no objection to the Scoping Report, subject to the consideration and inclusion of the recommendations outlined as above.</p>			
<p>The proposed development entails a housing estate as well as filling station and associated infrastructure, on numerous holdings in the Monavoni Agricultural Holdings on Portions of the farm Mooiplaats 355 JR and Stukgrond 382 JR, southwest of Pretoria.</p> <p>The author states that no sites, features or objects of cultural significance were identified in the study area during the survey.</p> <p><b>Case Decision</b></p> <p>As there is apparently no evidence of any significant archaeological material in this area, the SAHRA Archaeology, Palaeontology and Meteorites Unit has no objection to the development (in terms of the archeological component of the heritage resources) on condition that, if any new evidence of archaeological sites or artefacts, palaeontological fossils, graves or other heritage resources are found during development, SAHRA or an archaeologist must be alerted immediately.</p> <p>Where bedrock is to be affected, or where there are coastal sediments, or marine or river terraces and in potentially fossiliferous superficial deposits, the developer must ensure that a professional Palaeontological Desk Top study is undertaken to assess whether or not the development will impact upon palaeontological resources. If this is</p>	<p>Andrew Salomon  <b>SAHRA</b>  <a href="mailto:asalomon@sahra.org.za">asalomon@sahra.org.za</a></p>		<p>A Heritage Impact Study was conducted and s included in the EIA Report. <b>Refer to Annexure G4.</b></p> <p>Based on what was found and its evaluation, it is recommended that any development can continue, on condition of acceptance of the following recommendations:</p> <ul style="list-style-type: none"> <li>- If construction takes place and archaeological sites are exposed, it should immediately be reported to a museum, preferably once at which an archaeologist is available, so that an investigation ad evaluation of the find can be made.</li> </ul>

<p>deemed unnecessary, a letter of recommendation for exemption from a professional Palaeontologist is needed. If the area is deemed sensitive, a full Phase 1 Palaeontological Impact Assessment will be required and if necessary a Phase 2 rescue operation might be necessary.</p>			
<p>The Final Scoping Report is supported subject to recommendations issued by this Department in our letter dated 26/08/2013.</p> <p>a) The Department noted the specialist reports to be undertaken during the EIA phase and recommends that a thorough investigation be conducted for the proposed development site.</p> <p>b) The plan of study for EIA as provided in annexure E of the final scoping report is supported.</p> <p><b>Conclusion</b> The Department has no objection to the Final Scoping Report, subject to the consideration and inclusion of the recommendations as outlined above.</p>	<p>R. Mukheli <a href="mailto:Rudzanim@tshwane.gov.za">Rudzanim@tshwane.gov.za</a> <b>City of Tshwane</b></p>	<p>8 November 2013</p>	<p>a) All required specialist reports was undertaken and included in the EIA Report. Refer to Annexure G for all the specialist reports.</p> <p>b) Noted.</p>
<p><b>EIA Phase</b></p>			
<p>Your "Notice of Environmental Impact Assessment Process" attached hereto has reference.</p> <p>In this regard we act on behalf of "<b>Mooiplaats Landfill (Pty) Ltd</b>".</p> <p>Mooiplaats Landfill (Pty) Ltd is the owner of:</p> <ul style="list-style-type: none"> <li>- <b>Portion 86 (A Portion of Portion 5) of the Farm Mooiplaats No. 355 JR and</b></li> <li>- <b>Portion 7 (A Portion of Portion 5) of the Farm Mooiplaats No. 355 JR.</b></li> </ul> <p>There is a legal/permitted landfill site with associated buffer zones on Portion 86.</p>	<p>Gerrit de Graaff <a href="mailto:gerrit@developlan.co.za">gerrit@developlan.co.za</a></p>		<p>Registered.</p>

<p>We would like to be identified as an Interested and/or Affected Party and would like to receive all relevant documentation.</p> <p>All communication must please also be sent to all abovementioned email addresses.</p>			
<p>The Department supports the draft EIA Report subject to the following recommendations:</p> <ol style="list-style-type: none"> <li>a) Recommendation by Fauna and Flora Specialist on the orange-listed Hypoxis hemerocallidea (African potato) that was found sparsely scattered in the natural primary grassland should be taken into consideration, i.e. these plants should be relocated to a safe, suitable area approved by GDARD.</li> <li>b) Recommendation by Fauna and Flora Specialist that corridors of grassland that have not been disturbed by services trenches should be excluded in all the planned new townships of Monavoni and on the neighbouring sites that are to be developed together with these sites. These corridors should be connected to the rocky outcrops on the various portions that are being developed and to the Aracia karroo vegetation in the eastern part of the Monavoni area to facilitate connectivity. These areas must be properly managed throughout the lifespan of the project.</li> <li>c) Recommendation by Council of Geoscience should be taken into consideration. i.e. <ul style="list-style-type: none"> <li>• The implementation of a stringent Dolomite Risk Management Plan is considered essential.</li> <li>• Design for a 5m loss of support is considered essential.</li> <li>• Footprint drilling will be required for most structures, as per draft SANS1936 requirements.</li> </ul> </li> <li>d) Recommendations by the Traffic Impact specialist should be considered and included within the final</li> </ol>	<p>Rudzani Mukheli  <b>City of Tshwane</b>  <a href="mailto:RudzaniM@tshwane.gov.za">RudzaniM@tshwane.gov.za</a></p>	<p>25 February  2015</p>	<p>The recommendations made by CoT will be included in the EMP. <b>Refer to Annexure N.</b></p> <ol style="list-style-type: none"> <li>a) The orange-listed Hypoxis hemerocallidea (African potato) that was found sparsely scattered in the natural primary grassland will be relocated to a safe, suitable area approved by GDARD.</li> <li>b) This recommendation will be included in the EMP.</li> <li>c) The implementation of a stringent Dolomite Risk Management Plan is considered essential and will be taken into consideration.</li> <li>d) Recommendations by the Traffic Impact specialist will be considered and are included in the Final EIA Report. <b>Refer to Annexure G7.</b></li> <li>e) GDARD Biodiversity comments are</li> </ol>

<p>EIA Report, aiming to address expected traffic volume and the expected noise impact on the proposed development.</p> <p>e) GDARD Biodiversity comments should be included within the final EIA Report. Any issues as identified by the GDARD Biodiversity Section must be addressed within the final EIA Report.</p> <p>f) Comments from the Hennopsvallei Conservancy must be included in the final EIA Report. Any issues related to this project property from the conservation department must be addressed before the final EIA report is submitted.</p> <p>g) A Stormwater Management Plan must be included within the final EIA Report. The plan should aim to prevent pollution, erosion and siltation during both the construction and operational phases. The increase in speed, quantity and quality of surface stormwater should also be addressed.</p> <p>h) An Environmental Management Plan should be included within the final EIA Report. The EMP should address impacts and mitigation measures for the pre-construction, construction and post-construction activities. All issues and recommendations as indicated above should be included within the final and approved EMP. An Environmental Control Officer and contact details should also be included within the EMP.</p> <p>i) A Rehabilitation plan shall be included in the final EIA report and should aim to prevent erosion and aid the return of natural, endemic and indigenous vegetation cover to at least 80% of the rehabilitated area. Any disturbance to the "Private Open Space" shall be rehabilitated to at least 80% coverage of the rehabilitated area. The proposed rehabilitation plan should be included within the finalized and approved EMP in detail.</p> <p><b>Conclusion</b> The Department has no objection to the proposed development, subject to the consideration and inclusion of the recommendations outlined as above.</p>			<p>included within the final EIA Report. <b>Refer to Annexure I.</b> All issues identified by the GDARD Biodiversity Section are addressed within the Fauna and Flora Report. <b>Refer to Annexure G3.</b></p> <p>f) The Draft EIA Report was submitted to the Hennops Conservancy for comments. No comments on the Draft Report were received.</p> <p>g) A storm water plan has been set out in the service report. <b>Refer to Annexure G5.</b> The plan should aim to prevent pollution, erosion and siltation during both the construction and operational phases. The increase in speed, quantity and quality of surface stormwater should also be addressed.</p> <p>h) <b>Refer to Annexure N for the EMP.</b></p> <p>i) A Rehabilitation plan shall form part of the Environmental authorization as a recommendation and will aim to prevent erosion and aid the return of natural, endemic and indigenous vegetation cover to at least 80% of the rehabilitated area. Any disturbance to the "Private Open Space" shall be rehabilitated to at least 80% coverage of the rehabilitated area. The proposed rehabilitation plan should be included within the finalized and approved EMP in detail.</p>
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# **Annexure K(vii)**

Review Notice



## Bianca

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**From:** Juanita <user3@bokamoso.net>  
**Sent:** 06 February 2015 02:44 PM  
**To:** marikekrugermuller@gmail.com; asalomon@sahra.org.za; apietersen@golder.co.za; riaz@marys.co.za; mooiplaas@greenthumb.co.za; gerrit@developlan.co.za; dpdelarey@gmail.com  
**Subject:** Monavoni X51 - Public Participation Process  
**Attachments:** Review Notice.pdf

Dear Interested and/or Affected Party Member,

Please refer to the attached Review Invitation Notice regarding the proposed **Monavoni X51** Project.

Kind Regards/Vriendelike Groete

*Juanita De Beer*

*Public Participation Consultant*

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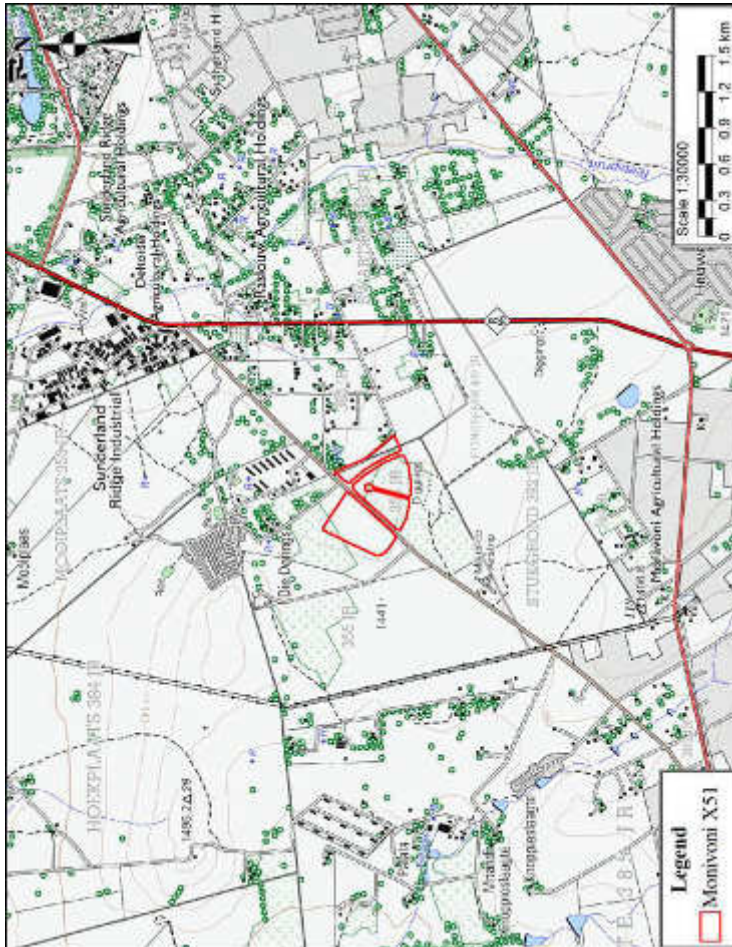
**Landscape Architects &  
Environmental Consultants**

T: (+27)12 346 3810 | F: (+27) 86 570 5659 | E: [lizelleg@mweb.co.za](mailto:lizelleg@mweb.co.za) | [www.bokamoso.biz](http://www.bokamoso.biz)  
36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161



# Monavoni X51 Draft EIA

## Report for Review



All interested and affected parties are invited to review the development information and to register any issues and concerns to be included and addressed in the Final EIA Report.

**Venue:** Zwartkops Rally Racing Track – Main Office

**Tel:** 012 384 2291/9

**Date:** 5 February – 16 March 2015

**Available on our Website:**

**www.bokamoso.biz**

Please do not hesitate to contact us if there are any questions in connection with the abovementioned development.

Contact person: **Juanita De Beer**

Tel: 012 346 3810 Fax: 086 570 5659

E-mail: [lizelleg@mweb.co.za](mailto:lizelleg@mweb.co.za)



## Bianca

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**From:** Juanita <user3@bokamoso.net>  
**Sent:** 15 October 2013 03:14 PM  
**To:** marikakm@tshwane.gov.za; asalomon@sahra.org.za; apetersen@golder.co.za;  
info@budgies2bantams.co.za  
**Cc:** justine.chan@gauteng.gov.za  
**Subject:** Monavoni X51 & Monavoni X52 - Review Notice

Dear Interested and/or Affected Party Member,

Please note that the Final Scoping Report for the proposed **Monavoni X51 & Monavoni X52** Projects will be available for Review on our website: [www.bokamoso.biz](http://www.bokamoso.biz).

The period of 21 days allowed for your review and comments is from 16 October until 5 November 2013. Your comments should be sent directly to Justine Chan (email: [Justine.Chan@gauteng.gov.za](mailto:Justine.Chan@gauteng.gov.za)) as well as to cc our office at Bokamoso attention Mientjie Coetzee ([lizelleg@mweb.co.za](mailto:lizelleg@mweb.co.za) or fax: 086 570 5659).

We trust you find the above in order. Please do not hesitate to contact our office should you have any questions in this regard.

Kind Regards/Vriendelike Groete

*Juanita De Beer*



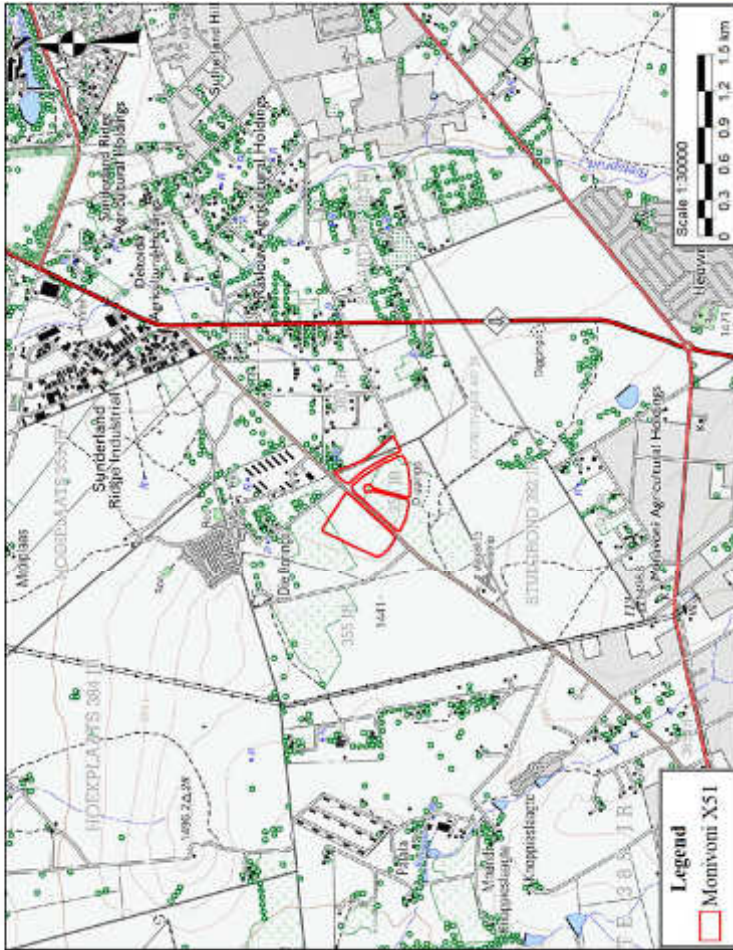
**Landscape Architects &  
Environmental Consultants cc.**

T: (+27)12 346 3810 | F: (+27) 86 570 5659 | E: [lizelleg@mweb.co.za](mailto:lizelleg@mweb.co.za) | [www.bokamoso.biz](http://www.bokamoso.biz)  
36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161

Please consider the environment before printing this email

# Monavoni X51 Draft

## Scoping Report for Review



All interested and affected parties are invited to review the development information and to register any issues and concerns to be included and addressed in the Final Scoping Report.

**Venue:** Zwartkops Rally Racing Track – Main Office

**Tel:** 012 384 2291/9

**Date:** 17 July – 26 August 2013

**Website:** [www.bokamoso.biz](http://www.bokamoso.biz)

Please do not hesitate to contact us if there are any questions in connection with the above mentioned development.

Contact person: **Juanita De Beer**

Tel: 012 346 3810 Fax: 086 570 5659

E-mail: [lizeleg@mweb.co.za](mailto:lizeleg@mweb.co.za)





# Annexure L

Copy of the EIA Application  
from submitted to GDARD





**Gauteng Department of Agriculture and Rural Development**

**Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010 (Version1)**

**Kindly note that:**

1. This application form is to be completed for both the Basic Assessment process and the Scoping & EIA process.
2. This application form is current as of 2 August 2010. It is the responsibility of the EAP to ascertain whether subsequent versions of the form have been published or produced by the competent authority.
3. The application must be typed within the spaces provided in the form. The sizes of the spaces provided are not necessarily indicative of the amount of information to be provided. It is in the form of a table that can extend itself as each space is filled with typing.
4. Selected boxes must be indicated by a cross and, when the form is completed electronically, must also be highlighted.
5. Incomplete applications may be returned to the applicant for revision.
6. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.
7. Three copies of this form and the attachments must be handed in at the offices of the relevant competent authority as detailed below.
8. No faxed or e-mailed applications shall be accepted. Only hand delivered or posted applications will be accepted.
9. Unless protected by law, and clearly indicated as such, all information filled in on this application will become public information on receipt by the competent authority. The applicant/Environmental Assessment Practitioner (EAP) must provide any Interested and Affected Party (I&AP's) with the information contained in this application on request, during any stage of the application process.
10. Attachments, where applicable, to this document are to be ordered in the following prescribed manner

Annexure - A	Locality map
Annexure - B	a) Mandate from Landowner b) Mandate from Landowner
Annexure - C	List of all organs of state and State Departments of where the draft report will be submitted, their full contact details and contact person

Annexure -D	List of Landowners
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**DEPARTMENTAL DETAILS**

Gauteng Department of Agriculture and Rural Development  
 Attention: Administrative Unit of the Sustainable Utilisation of the Environment (SUE) Branch  
 P.O. Box 8769  
 Johannesburg  
 2000

Administrative Unit of the Sustainable Utilisation of the Environment (SUE) Branch  
 18<sup>th</sup> floor Glen Cairn Building  
 73 Market Street, Johannesburg

Administrative Unit telephone number: (011) 355 1345  
 Department central telephone number: (011) 355 1900

1

<b>File Reference Number:</b> <b>Application Number:</b> <b>Date Received:</b>	(For official use only)					

**1. NATURE OF THE ACTIVITY**

The proposed establishment of a township, to be known as Monavoni X 51, on part of the Remainder of Portion 5 of the farm Mooiplaats 355 JR and part of Portion 2 of the farm Zwartkop 383 JR

Select the appropriate box with regards to the application form submission

An application for conducting a basic assessment (as defined in the regulations)?	<input type="checkbox"/>	A resubmission of an application for conducting a basic assessment (as defined in the regulations)?	<input type="checkbox"/>
An application for conducting a Scoping & EIA process (as defined in the regulations)	<input checked="" type="checkbox"/>	A resubmission of an application for conducting a SR & EIA process (as defined in the regulations)	<input type="checkbox"/>

If this is a class application, has a copy of approval letter to undertake such an application been attached as such application may/shall not be undertaken without an approval from this Department

Has this project or a substantial similar project which has been previously submitted by the applicant been denied authorisation by the relevant authority in the last three (3) years

YES	NO <input checked="" type="checkbox"/>
-----	---

If yes will the application contain new or additional material not submitted previously

To be noted that Regulation 68 of EIA Regulations, 2010 states that no applicant may resubmit an application which is substantially similar to an application previously denied authorisation by the relevant authority unless 3 years has lapsed since the refusal or new material is to be presented

YES	NO
-----	----

**2. PROJECT DETAILS**

**Project title:** Monavoni X 51

To be noted that the project will be registered under this title and this title must be duplicated through the application life of the project

**Local authority(ies) in whose jurisdiction the proposed application will fall** City of Tshwane

**3. ACTIVITY POSITION**

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in decimal degrees. The degrees should have at least six decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

**Alternative:** (Coordinates are supplied for each cluster of extensions in close proximity to each other – see Locality Plan attached as Annexure A)

<b>Latitude (S):</b>		<b>Longitude (E):</b>
<span style="border: 1px solid black; padding: 2px;">25°51'33.43"</span>		<span style="border: 1px solid black; padding: 2px;">28°5'37.54"</span>

  
  
 2

# APPLICATION FORM [REGULATION 12 (1)&(2)(A)(B)(I)(II)]

**In the case of linear activities:**

**Alternative:**

- Starting point of the activity
- Middle point of the activity
- End point of the activity

**Latitude (S):**

**Longitude (E):**


For route alternatives that are longer than 500m, please provide co-ordinates taken every 250 meters along the route and attached in the appropriate Appendix

Addendum of route alternatives attached

No

**Property description:**

Part of the Remainder of Portion 5 of the farm Mooiplaats 355 JR and part of Portion 2 of the farm Zwartkop 383 JR

(Farm name, portion etc.) Where a large number of properties (including alternatives) are involved (e.g. linear activities), please attach a list of the property descriptions to this application.

## 4. ACTIVITIES APPLIED FOR

Describe the activity and associated infrastructure, which is being applied for, in detail

The proposed activity will entail the construction of a mixed use township and associated infrastructure with the following proposed land uses: "Industrial 2"; "Business 2"; "Residential 2" with a density of 25 units/ha and "Private Open Space".

Which Listing Notice is the activity(ies) listed under?

Listing Notice 1

X

Listing Notice 2

X

Listing Notice 3

X

If "or also" listed under Listing Notice 3, describe the Geographical Area triggering the activity and its regional, provincial, national & international significance

The proposed development site is affected by irreplaceable sites as identified in terms of the Gauteng C Plan 3.

**Please Note: The Activities applied for represent a preliminary list of potential activities that could be triggered. The list of activities applied for will however be finalized and motivated during the EIA phase. Additional activities identified during the course of the application process will be re-advertised during the EIA phase**

An application may be made for more than one listed or specified activity that, together, make up one development proposal. All the listed activities that make up this application must be listed.

Indicate the number and date of the relevant Government Notice:

**Activity No (s) (in terms of the relevant notice):**  
e.g. Listing notices 1, 2 or 3

**Describe each listed activity as per the wording in the relevant listing notice:**

Listing No. 1 R. 544, 18 June 2010	Activity 9	The construction of facilities or infrastructures exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water- (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more, excluding where: (a) such facilities or infrastructures are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or (b) where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.
Listing No. 1 R. 544, 18 June 2010	Activity 13	The construction of facilities or infrastructure for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 but not exceeding 500 cubic metres.
Listing No. 1 R. 544, 18 June 2010	Activity 22	The construction of a road outside urban areas, (i) with a reserve wider than 13,5 meters or, (ii) where no reserve exists where the road is wider than 8 metres, or (iii) for which an environmental authorisation was obtained for the route

**APPLICATION FORM [REGULATION 12 (1)&(2)(A)(B)(I)(II)]**

		determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice 545 of 2010.
Listing No. 1 R. 544, 18 June 2010	Activity 23	The transformation of undeveloped, vacant or derelict land to (i) residential, retail, commercial, recreational, industrial or institutional use, inside an urban area, and where the total area to be transformed is 5 hectares or more, but less than 20 hectares, or (ii) residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares;  except where such transformation takes place for linear activities.
Listing No. 1 R. 544, 18 June 2010	Activity 24	The transformation of land bigger than 1000 square meters in size, to residential, retail, commercial, industrial or institutional use, where, at the time of the coming into effect of this Schedule such land was zoned open space, conservation or had an equivalent zoning.
Listing No. 1 R. 544, 18 June 2010	Activity 26	Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
Listing No. 1 R. 544, 18 June 2010	Activity 37	The expansion of facilities or infrastructure for the bulk transportation of water where: a. the facility or infrastructure is expanded by more than 1000 metres in length; or b. where the throughput capacity of the facility or infrastructure will be increased by 10% or more -  excluding where such expansion: i. relates to transportation of water, sewage or storm water within a road reserve; or ii. where such expansion will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.
Listing No. 1 R. 544, 18 June 2010	Activity 47	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre - (i) where the existing reserve is wider than 13.5 metres; or (ii) where no reserve exists, where the existing road is wider than 8 metres -  excluding widening or lengthening occurring inside urban areas.
Listing No. 1 R. 544, 18 June 2010	Activity 56	Phased activities for all activities listed in this Schedule, which commenced on or after the effective date of this Schedule, where any one phase of the activity may be below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specific threshold:-  Excluding the following activities listed in this Schedule: 2; 11(i)-(vii); 16(i)-(iv); 17; 19; 20; 22(i) & 22(ii); 25; 26; 27(ii) & (iv); 28; 39; 45(i)-(iv) & (vii)-(xv); 50; 51; 53; and 54.
Listing No. 2 R. 545, 18 June 2010	Activity 15	Physical alteration of undeveloped land, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more;  Except where such physical alterations takes place for: (i) linear development activities; or (ii) agricultural or afforestation where activity 16 in this Schedule will apply.
Listing No. 3 R. 546, 18 June	Activity 4	The construction of a road wider than 4 metres with a <b>(b) In Gauteng:</b>



**APPLICATION FORM [REGULATION 12 (1)&(2)(A)(B)(I)(II)]**

2010		reserve less than 13,5 metres.	<ul style="list-style-type: none"> <li>i. A protected area identified in terms of NEMPAA, excluding conservancies;</li> <li>ii. National Protected Area Expansion Strategy Focus areas;</li> <li>iii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act as adopted by the competent authority;</li> <li>iv. Sites or areas identified in terms of the Ramsar Convention;</li> <li>v. Sites identified as irreplaceable or important in the Gauteng Conservation plan;</li> <li>vi. Areas larger than 2 hectares zoned for use as public open space;</li> <li>vii. Areas zoned for conservation purpose;</li> <li>viii. Any declared protected area including Municipal or Provincial Nature Reserves as contemplated by the Environmental Conservation Act, 1989 (Act No. 73 of 1989) and the Nature Conservation Ordinance (Ordinance 12 of 1983);</li> <li>ix. Any site identified as land with high agricultural potential located within the Agricultural Hubs or Important Agricultural Sites identified in terms of the Gauteng Agricultural Potential Atlas, 2006.</li> </ul>
Listing No. 3 R. 546, 18 June 2010	Activity 13	<p>The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, except where such removal of vegetation is required for:</p> <p>(1) the undertaking of a process or activity included in the list of waste management activities published in terms of section 19 of the National Environmental Management Waste Act, 2008 (Act No. 59 of 2008) in which case the activity is regarded to be excluded from this list;</p> <p>(2) the undertaking of a linear activity falling below the thresholds mentioned in Listing Notice 1 in terms of GN No.544 of 2010.</p>	<p><b>(d) In Gauteng:</b></p> <ul style="list-style-type: none"> <li>i. A protected area identified in terms of NEMPAA, excluding conservancies;</li> <li>ii. National Protected Area Expansion Strategy Focus areas;</li> <li>iii. Any declared protected area including Municipal or Provincial Nature Reserves as contemplated by the Environment Conservation Act, 1989 (Act No. 73 of 1989), the Nature Conservation Ordinance (Ordinance 12 of 1983); (v) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</li> <li>iv. Sites or areas identified in terms of an International Convention;</li> </ul> <p>Sites identified as irreplaceable or important in the Gauteng Conservation Plan.</p>
Listing No. 3 R. 546, 18 June 2010	Activity 14	<p>The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetation cover constitutes indigenous vegetation, except where such removal of vegetation is required for:</p> <p>(1) purposes of agriculture or afforestation inside areas identified in spatial instruments adopted by the competent authority for agriculture or afforestation purposes;</p>	<p><b>(a) In Eastern Cape, Free State, Kwa-Zulu Natal, Gauteng, Limpopo, Mpumalanga, Northern Cape, Northwest and Western Cape:</b></p> <ul style="list-style-type: none"> <li>i. All areas outside urban areas.</li> </ul>

**APPLICATION FORM [REGULATION 12 (1)&(2)(A)(B)(I)(II)]**

		<p>(2) the undertaking of a process or activity included in the list of waste management activities published in terms of section 19 of the National Environmental Management Waste Act, 2008 (Act No. 59 of 2008) in which case the activity is regarded to be excluded from this list;</p> <p>(3) The undertaking of a linear activity falling below the thresholds in Notice 544 of 2010.</p>	
Listing No. 3 R. 546, 18 June 2010	Activity 19	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.	<p><b>(b) in Gauteng:</b></p> <ul style="list-style-type: none"> <li>i. A protected area identified in terms of NEMPAA, excluding conservancies;</li> <li>ii. National Protected Area Expansion Strategy Focus areas;</li> <li>iii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</li> <li>iv. Sites or areas identified in terms of an International Convention;</li> <li>v. Any site identified as land with high agricultural potential located within the Agricultural Hubs or Important Agricultural Sites identified in terms of the Gauteng Agricultural Potential Atlas, 2006;</li> <li>vi. All sites identified as irreplaceable or important in terms of the applicable Gauteng Conservation Plan;</li> <li>vii. Any declared protected area including Municipal or Provincial Nature Reserves as contemplated by the Environment Conservation Act, 1989 (Act No. 73 of 1989), the Nature Conservation Ordinance (Ordinance 12 of 1983) and the NEMPAA.</li> </ul>
Listing No. 3 R. 546, 18 June 2010	Activity 26	Phased activities for all activities listed in this Schedule and as it applies to a specific geographical area, which commenced on or after the effective date of this Schedule, where any phase of the activity may be below a threshold but where a combination of the phases, including expansions or extensions, will exceed a	All the areas as identified for the specific activities listed in this schedule.

**APPLICATION FORM [REGULATION 12 (1)&(2)(A)(B)(I)(II)]**

	specified threshold.	
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Please note that any authorisation that may result from this application will only cover activities specifically applied for.

**5. OTHER AUTHORISATIONS REQUIRED**

**5.1 DO YOU NEED ANY AUTHORISATIONS IN TERMS OF ANY OF THE FOLLOWING LAWS?**

- |  |           |
|--|-----------|
| 4.1.1 National Environmental Management: Waste Act           | Yes /No X |
| 4.1.2 National Environmental Management: Air Quality Act     | Yes/No X  |
| 4.1.3 National Environmental Management: Protected Areas Act | Yes/No X  |
| 4.1.4 National Environmental Management: Biodiversity Act    | Yes/No X  |
| 4.1.5 Mineral Petroleum Development Resources Act            | Yes/No X  |
| 4.1.6 National Water Act                                     | Yes/No X  |
| 4.1.7 National Heritage Resources Act                        | Yes/No X  |
| 4.1.8 Other (please specify)                                 | Yes/No X  |
| 4.2 Have such applications been lodged already?              | Yes/No X  |

**6. BACKGROUND INFORMATION**

<b>Project applicant:</b>	JR 209 Investments (Pty) Ltd		
<b>Trading name (if any):</b>	M&T Development		
<b>Contact person:</b>	Mr. Barry Hertzog		
<b>Physical address:</b>	Witchhazel Avenue 340, Eco Court Building, Highveld, Centurion, 0046		
<b>Postal address:</b>	P O Box 39727, Faerie Glen		
<b>Postal code:</b>	0043	<b>Cell:</b>	
<b>Telephone:</b>	012 676 8594	<b>Fax:</b>	012 676 8585
<b>E-mail:</b>	barry@mtdevelopment.co.za		

<b>Project Environmental Assessment Practitioner:</b>	Bokamoso Landscape CC, T/A Bokamoso Landscape Architects and Environmental Consultants		
<b>Contact person:</b>	Mrs. Lizelle Gregory		
<b>Postal address:</b>	P.O. Box 11375, Maroelana		
<b>Postal code:</b>	0161	<b>Cell:</b>	083 255 8384
<b>Telephone:</b>	012 346 3810	<b>Fax:</b>	086 570 5659
<b>E-mail:</b>	lizelleg@rnweb.co.za		

**EAP qualifications & relevant experience**

Registered Landscape Architect and Environmental Consultant (degree obtained at the University of Pretoria) with 17 years experience in the following fields:

- Environmental Planning and Management;
- Landscape Architecture; and
- Landscape Contracting

L. Gregory also lectured at the Tshwane University Technology and the University of Pretoria.

**Professional affiliation(s) (if any)**

Lizelle Gregory is a registered member of the South African Council of the Landscape Architects Profession (SACLAP), the International Association of Impact Assessments (IAIA), and The Institute for Landscape Architects south Africa (ILASA) and the Institute of Environmental Management and Assessment (IEMAS).

Her professional practise number is: 97078

<b>Landowners:</b>	JR 209 Investments (Pty) Ltd		
<b>Contact person:</b>	Barry Hertzog		
<b>Postal address:</b>	P O Box 39727, Faerie Glen		
<b>Postal code:</b>	0043	<b>Cell:</b>	
<b>Telephone:</b>	012 676 8594	<b>Fax:</b>	012 676 8585
<b>E-mail:</b>	barry@mtdevelopment.co.za		

  
 7

**APPLICATION FORM [REGULATION 12 (1)&(2)(A)(B)(I)(II)]**

In instances where there is more than one landowner (including for alternative sites), please attach a list of landowners with their contact details to this application.

In instances where the landowner is not the applicant –attach proof of notification of the landowner and a proof of receipt of such notice by the owner, manager or person in control of the land.

List of the land owner is attached	No
Landowner notification proof is attached	N/A
Landowner proof of receipt of such notification is attached	N/A

**Local authority in whose jurisdiction the proposed activity will fall:**

**Contact person:**  
**Postal address:**  
**Postal code:**  
**Telephone:**  
**E-mail:**

City of Tshwane	
Livhuwani Siphuma	
Private Bag 1454, Pretoria	
0001	<b>Cell:</b>
012 358 8871	<b>Fax:</b> 012 358 8934
livhuwanis@tshwane.gov.za	

In instances where there is more than one local authority involved (including for alternative sites), please attach a list of local authorities with their contact details to this application.

List of local authorities is attached

List of properties is attached

**Town(s) or district(s):**  
**Street/Physical address:**

City of Tshwane
Part of the Remainder of Portion 5 of the farm Moolplaats 355 JR and part of Portion 2 of the farm Zwartkop 383 JR

In instances where there is more than one town or district involved, please attach a list of towns or districts to this application.

List of towns or districts is attached

**State Departments administering a law affecting the environment:**  
**Contact person:**  
**Postal address:**  
**Postal code:**  
**Telephone:**  
**E-mail:**

List attached as Annexure C	
	<b>Cell:</b>
	<b>Fax:</b>

In instances where there is more than one State Department involved, please attach a list of all State Departments with their contact details.

**Current land-use zoning:**

Agricultural
--------------

In instances where there is more than one current land-use zoning (including alternatives), please attach a list of current land use zonings that also indicate which portions each use pertains to , to this application.

List of current land use zonings is attached

  
  
  
**8**

**Locality map:**

A locality map(s) (including alternatives) must be attached to the back of this document, as Annexure A. The scale of the locality map must be between 1:10 000 and 1:50 000. The scale must be indicated on the map. The map must indicate the following:

- an accurate indication of the project site position as well as the positions of the alternative sites, if any;
- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites;
- all rivers within a 1km radius of the site or alternative sites; and
- a north arrow.

**7. COMPLIANCE WITH CONDITIONS**

Have you ever been in non-compliance with a condition of an authorisation or exemption issued by this Department or any other provincial or national environmental department in terms of the Environment Conservation Act (No 73 of 1989) or the National Environmental Management Act (No 107 of 1998) as amended?

YES	NO X
-----	---------

If yes, indicate details of non-compliance together with reasons for non-compliance:

N/A
-----

Attach all relevant documentation e.g. compliance audit reports, pre-directives, directives, compliance notices

**8. ACTIVITY INFORMATION**

**Socio-economic value of the activity**

What is the expected capital value of the activity on completion?

What is the expected yearly income that will be generated by or as a result of the activity?

Will the activity contribute to service infrastructure?

Will the activity contribute to a public amenity?

Total number of new employment opportunities to be created in the development phase of this activity.

Of these opportunities how many are:

Women

**People with disabilities**

Female

Male

**Youth**

Female

Male

What is the expected value of the employment opportunities during the development phase?

What percentage of this will accrue to previously disadvantaged individuals?

Total number of new employment opportunities to be created in the operational phase of this activity.

Of these opportunities how many are:

Women

**People with disabilities**

Female

Male

**Youth**

Female

Male

What is the expected current value of the employment opportunities during the first 10 years?

What percentage of this will accrue to previously disadvantaged individuals?

R 3,9 billion
R800m
Yes
Yes
2550
204
5
21
153
1377
R600m
70
2100
908
42
18
24
1260
504
756
R1,4b
70

**Need and desirability of the activity**

Motivate and explain the need and desirability of the activity (including demand for the activity):

M&T Development owns a substantial amount of property within the area of the application site, and has developed various developments in the area. With the developments M&T spent a considerable amount of money to obtain engineering services to the adjacent townships. The already installed services will therefore be optimally utilized as was planned from the previous developments that M&T developed in the adjacent area of the application site. Furthermore, the demand for mixed-use, integrated developments will be satisfied.

Indicate any benefits that the activity will have for society in general:

The proposed development will promote the live/work concept where individuals live where they work and in such a way promote a healthier environment. This mixed use development will feed individuals living there to the industries, retailers and the offices proposed within the development. Numerous job opportunities will also be created for people living in the surrounding environments. Furthermore, security has become the number one priority for all developments in South Africa. This proposed mixed use industrial development will provide in a need for secure development where a work place with peace of mind will be established.

Indicate any benefits that the activity will have for the local communities where the activity will be located:

Development when adequately determined gives way to commercial growth. The mixed use development will provide a large number of job opportunities both during the construction and the operational phases of the development. Furthermore, the proposed development will contribute to rates and taxes payable to the local municipality.

**9. DECLARATIONS**

The Applicant

I, **Barry Hertzog**, on behalf of **JR 209 Investments 209 (Pty) Ltd**, declare that I - am<sup>1</sup>, the applicant in this application for **Monavoni Extension 51 on part of the Remainder of Portion 5 of the farm Mooiplaats 355 JR and part of Portion 2 of the farm Zwartkop 383 JR** have appointed an environmental assessment practitioner to act as the independent environmental assessment practitioner for this application;

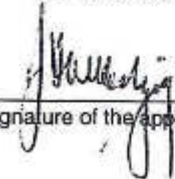
- will provide the environmental assessment practitioner and the competent authority with access to all information at my disposal that is relevant to the application;
- will be responsible for the costs incurred in complying with the Environmental Impact Assessment Regulations, 2010, including but not limited to –
  - costs incurred in connection with the appointment of the environmental assessment practitioner or any person contracted by the environmental assessment practitioner;
  - costs incurred in respect of the undertaking of any process required in terms of the Regulations;
  - costs in respect of any fee prescribed by the Minister or MEC in respect of the Regulations;
  - costs in respect of specialist reviews, if the competent authority decides to recover costs; and
  - the provision of security to ensure compliance with conditions attached to an environmental authorisation, should it be required by the competent authority;
- will ensure that the environmental assessment practitioner is competent to comply with the requirements of these Regulations and will take reasonable steps to verify whether the EAP complies with the Regulations;
- will inform all registered interested and affected parties of any suspension of the application as well as of any decisions taken by the competent authority in this regard;
- am responsible for complying with the conditions of any environmental authorisation issued by the competent authority;
- hereby indemnify the Government of the Republic, the competent authority and all its officers, agents and employees, from any liability arising out of the content of any report, any procedure or any action which the applicant or environmental assessment practitioner is responsible for in terms of these Regulations;
- will not hold the competent authority responsible for any costs that may be incurred by the applicant in proceeding with an activity prior to obtaining an environmental authorisation or prior to an appeal being decided in terms of these Regulations;
- will perform all other obligations as expected from an applicant in terms of the Regulations;
- all the particulars furnished by me in this form are true and correct; and
- I am aware that a false declaration is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.

<sup>1</sup> If this is signed on behalf of the applicant, proof of such authority from the applicant must be attached.



APPLICATION FORM [REGULATION 12 (1)&(2)(A)(B)(I)(II)]

- I am aware that a false declaration is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.

  
 Signature of the applicant<sup>2</sup> / Signature on behalf of the applicant:

Name of company (if applicable):  
 2013/04/15

Date:  


Signature of the Commissioner of Oaths:  
 15/4/2013  
 CACSA

Date:  
 Designation:

**LEONARD THEO GREGORY**  
 COMMISSIONER OF OATHS  
 36 LEBOMBO ROAD  
 ANHLEA GARDENS  
 PRETORIA 0081  
 CHARTERED ACCOUNTANT OF SOUTH AFRICA

**ADDENDUM A**

**10. DECLARATIONS<sup>3</sup>**

The Environmental Assessment Practitioner;

I, **Lizelle Gregory**, declare under oath that –  
 I act as the independent environmental practitioner for this application **Monavoni Extension 51 on part of the Remainder of Portion 5 of the farm Mooiplaats 355 JR and part of Portion 2 of the farm Zwartkop 383 JR**

- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;

<sup>2</sup> If the applicant is a juristic person, a signature on behalf of the applicant is required as well as proof of such authority.  
<sup>3</sup> Addendum A must be completed and submitted with the report if application form was done and submitted by the applicant.

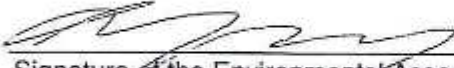


APPLICATION FORM [REGULATION 12 (1)&(2)(A)(B)(I)(II)]

- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.

**For Scoping/ EIA applications I further declare under oath that**

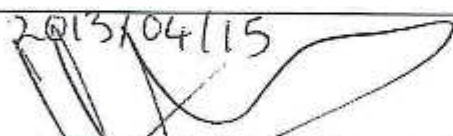
- I will fix the site notice(s) in a conspicuous place, on the property(ies) where it is intended to undertake the activity(ies)
- I will place a notice in the required newspaper(s)
- I will provide the following with all the project information and give I&AP's an opportunity to register as an I&AP
  - landowners and occupiers of adjacent land
  - landowners and occupiers of land within 100 metres of the boundary of the property
  - the ward councillor
  - any organisation that represents the community in the area of the application
  - the municipality which has jurisdiction over the area in which the proposed activity will be undertaken
  - any organ of state that may have jurisdiction over any aspect of the activity of the applicant's intention to submit an application to the competent authority; and
- I will include on the register all persons as required per Regulation 55 (1) (c)
- The Reports as submitted will contain the same information (including layout, project design and mitigation) as provided to the registered I&APs for comment
- All issues raised by the I&APs during the public participation process will be included in the Comments and Response Report as attached

  
Signature of the Environmental Assessment Practitioner:

**Bokamoso Landscape Architects and Environmental Consultants**

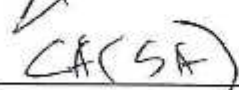
Name of company:

Date:

2013/04/15  


Signature of the Commissioner of Oaths:

Date:

15/04/2013  
  
CA(SA)

Designation:

Commissioner of Oaths Official stamp (below)

**LEONARD THEO GREGORY**  
COMMISSIONER OF OATHS  
36 LEBOMBO ROAD  
ASHLEA GARDENS  
PRETORIA 0081  
CHARTERED ACCOUNTANT OF SOUTH AFRICA

**11. CHECKLIST**

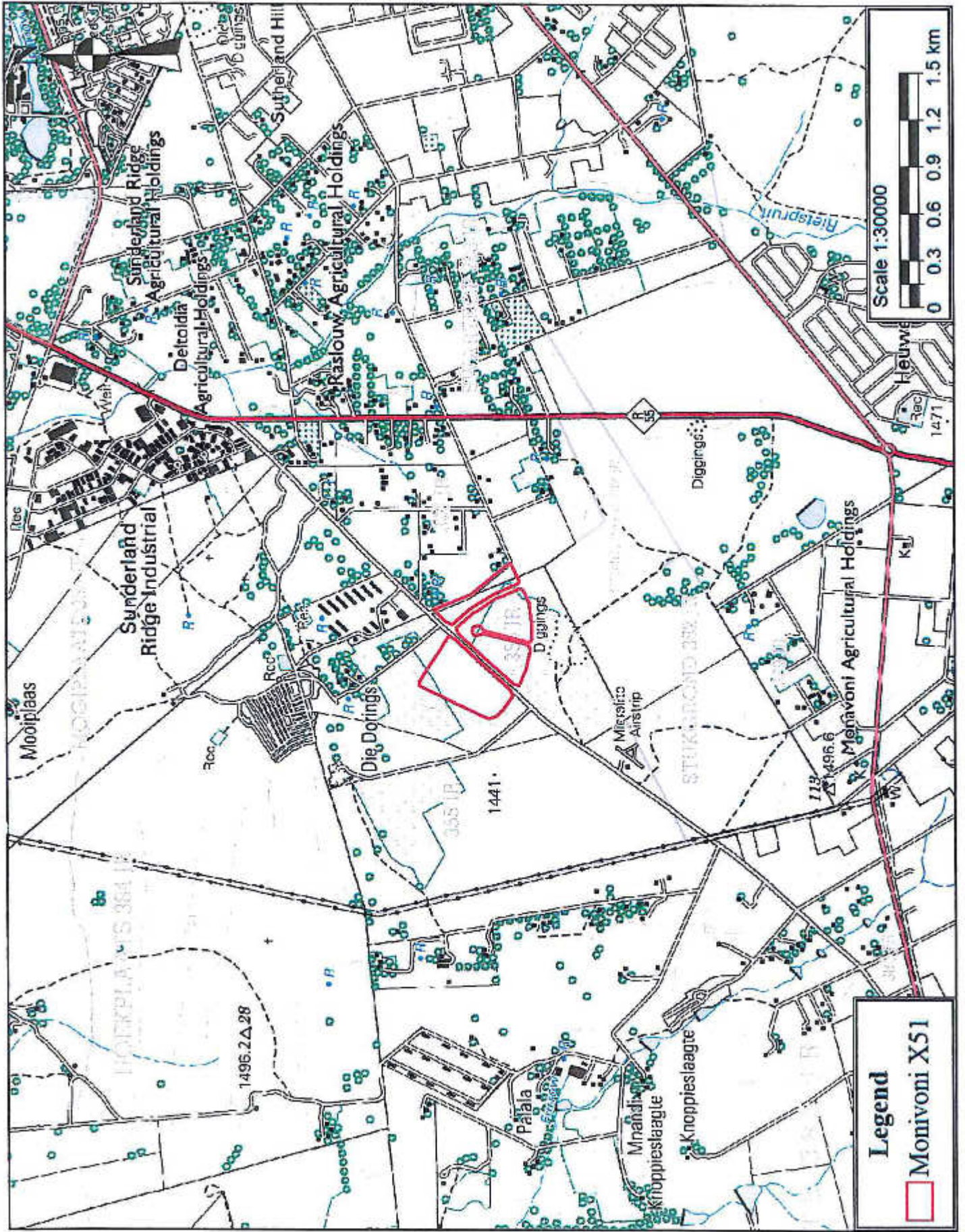
To ensure that all information that the Department needs to be able to process this application, please check that:

- Where requested, supporting documentation has been attached;
- All relevant sections of the form have been completed; and
- The form has been signed by the applicant, by the EAP or both.





# Annexure A



# Annexure C

## Department of Environmental Affairs

<b>Contact person:</b>	Mr Albi Modise		
<b>Postal address:</b>	Private Bag X447, Pretoria		
<b>Postal code:</b>	0001	<b>Cell:</b>	+27 83 490 2871
<b>Telephone:</b>	+27 12 310-3123	<b>Fax:</b>	+27 12 322-2476
<b>E-mail:</b>	<a href="mailto:AModise@environment.gov.za">AModise@environment.gov.za</a>		

## Department of Health

<b>Contact person:</b>	Mr Motsomi Senne		
<b>Postal address:</b>	Private Bag X9070, Cape Town		
<b>Postal code:</b>	8000	<b>Cell:</b>	
<b>Telephone:</b>	(021) 466 7260	<b>Fax:</b>	(021) 465 1575
<b>E-mail:</b>			

## Department of Water Affairs

<b>Contact person:</b>	Mr. Justice Maluleke		
<b>Postal address:</b>	Private Bag X313, Pretoria		
<b>Postal code:</b>	0001	<b>Cell:</b>	
<b>Telephone:</b>	012 336 6507	<b>Fax:</b>	012 336 8311
<b>E-mail:</b>	<a href="mailto:MalulekeJ@dwa.gov.za">MalulekeJ@dwa.gov.za</a>		

## Department of Transport

<b>Contact person:</b>	Mr Mangisi George Mahlalela		
<b>Postal address:</b>	Private Bag X193, PRETORIA		
<b>Postal code:</b>	0001	<b>Cell:</b>	
<b>Telephone:</b>	(012) 309 3698	<b>Fax:</b>	(012) 328 3370
<b>E-mail:</b>			

## Department of Human Settlements

<b>Contact person:</b>	Mr Thabane Zulu		
<b>Postal address:</b>	Private Bag X644, PRETORIA		
<b>Postal code:</b>	0001	<b>Cell:</b>	
<b>Telephone:</b>	(012) 421 1312	<b>Fax:</b>	(012) 341 2998
<b>E-mail:</b>	<a href="mailto:nokuthula.mbeje@dhs.gov.za">nokuthula.mbeje@dhs.gov.za</a>		

Department of Economic Development

<b>Contact person:</b>	<a href="#">Mr Ebrahim Patel</a>		
<b>Postal address:</b>	Private Bag X149, PRETORIA		
<b>Postal code:</b>	0001	<b>Cell:</b>	
<b>Telephone:</b>	(012) 394 1006	<b>Fax:</b>	(012) 394 0255
<b>E-mail:</b>			

City of Tshwane Metropolitan Municipality

<b>Contact person:</b>	Livhuwani Siphuma		
<b>Postal address:</b>	Private Bag 1454, PRETORIA		
<b>Postal code:</b>	0001	<b>Cell:</b>	
<b>Telephone:</b>	012 358 8871	<b>Fax:</b>	012 358 8934
<b>E-mail:</b>	<a href="mailto:livhuwanis@tshwane.gov.za">livhuwanis@tshwane.gov.za</a>		



# **Annexure M**

Comments from SAHRA



## Final Comment

### In terms of Section 38 of the National Heritage Resources Act (Act 25 of 1999)

Attention: JR 209 Investments (Pty) Ltd

**The proposed activity will entail the construction of a mixed use township and associated infrastructure with the following proposed land uses: "Industrial 2", "Business 2", "Residential 2" with a density of 25 units/ha and "Private Open Space"/ Part of the Remainder of Portion 5 of the farm Mooiplaats 355 JR and part of Portion 2 of the farm Zwartkop 383 JR.**

**Van Schalkwyk, J. January 2008. Heritage impact survey report for the Proposed Development On Various Holdings Of The Monavoni Agricultural Holdings Area Of The Pretoria Magisterial District, Gauteng.**

The proposed development entails a housing estate as well as a filling station and associated infrastructure, on numerous holdings in the Monavoni Agricultural Holdings on Portions of the farms Mooiplaats 355JR and Stukgrond 382JR, southwest of Pretoria.

The author states that no sites, features or objects of cultural significance were identified in the study area during the survey.

### Case Decision

As there is apparently no evidence of any significant archaeological material in this area, the SAHRA Archaeology, Palaeontology and Meteorites Unit has no objection to the development (in terms of the archaeological component of the heritage resources) on condition that, if any new evidence of archaeological sites or artefacts, palaeontological fossils, graves or other heritage resources are found during development, SAHRA or an archaeologist must be alerted immediately.

Where bedrock is to be affected, or where there are coastal sediments, or marine or river terraces and in potentially fossiliferous superficial deposits, the developer must ensure that a professional Palaeontological Desk Top study is undertaken to assess whether or not the development will impact upon palaeontological resources. If this is deemed unnecessary, a letter of recommendation for exemption from a professional Palaeontologist is needed. If the area is deemed sensitive, a full Phase 1 Palaeontological Impact Assessment will be required and if necessary a Phase 2 rescue operation might be necessary.

Should you have any further queries, please contact the designated official using the case number quoted above in the case header.

Yours faithfully





Enquiries: Andrew Salomon  
Tel: 021 462 4502  
Email: [asalomon@sahra.org.za](mailto:asalomon@sahra.org.za)  
CaseID: 2351

Date: Tuesday October 29, 2013

Page No: 2



A handwritten signature in black ink, appearing to read 'Andrew Salomon', is written over a horizontal line.

Andrew Salomon  
Heritage Officer: Archaeology  
South African Heritage Resources Agency

A handwritten signature in black ink, appearing to read 'Colette Scheermeyer', is written over a horizontal line.

Colette Scheermeyer  
SAHRA Head Archaeologist  
South African Heritage Resources Agency

**ADMIN:**

Direct URL to case: <http://www.sahra.org.za/node/119811>

**Terms & Conditions:**

1. This approval does not exonerate the applicant from obtaining local authority approval or any other necessary approval for proposed work.
2. If any heritage resources, including graves or human remains, are encountered they must be reported to SAHRA immediately.
3. SAHRA reserves the right to request additional information as required.



The South African Heritage Resources Agency

Street Address: 111 Harrington Street, Cape Town 8000 \* Postal Address: PO Box 4637, Cape Town 8000  
\* Tel: +27 21 462 4502 \* Fax: +27 21 462 4509 \* Web: <http://www.sahra.org.za>



# **Annexure N**

Environmental Management  
Plan



# ENVIRONMENTAL MANAGEMENT PLAN FOR THE PROPOSED MONAVONI X 51

Part of the Remainder of Portion 5 of the Farm Mooiplaats  
355-JR and Part of Portion 2 of the Farm Swartkop 383  
JR

GAUT: 002/13-14/E0032

SEPTEMBER 2015



## BOKAMOSO

LANDSCAPE ARCHITECTS AND ENVIRONMENTAL CONSULTANTS

Tel: (012) 346 3810

Fax: 086 570 5659

E-mail: [lizelleg@mweb.co.za](mailto:lizelleg@mweb.co.za)

P O BOX 11375

MAROELANA

0161



## 1 Project Outline

### 1.1 Background

**Bokamoso Landscape Architects and Environmental Consultants CC** were appointed by **JR 209 Investments (Pty) Ltd** as **independent consultants** to prepare the applicable environmental reports and GDARD accepted the application that was submitted. The Reference Number issued by GDARD for the project is **GAUT: 002/12-13/E0223**.

### 1.2 Project description

**JR 209 Investments (Pty) Ltd** trading as M&T Development (Pty) Ltd is planning a proposed township development to be known as Monavoni Extension 51 on part of the Remainder of Portion 5 of the farm Mooiplaats 335 JR and part of Portion 2 of the farm Swartkop 383 JR. **(Refer to Figure 1: Locality Map and Figure 2: Aerial Map).**

The application is made for the establishment of a residential township Monavoni Extension 51 with the following proposed land uses:

- 5 erven zoned "Industrial 2";
- 10 erven zoned for "Business 2";
- 5 erven zoned for "Residential 2" purposes with a density of 25 units/ha;
- 5 erven zoned "Private Open Space".

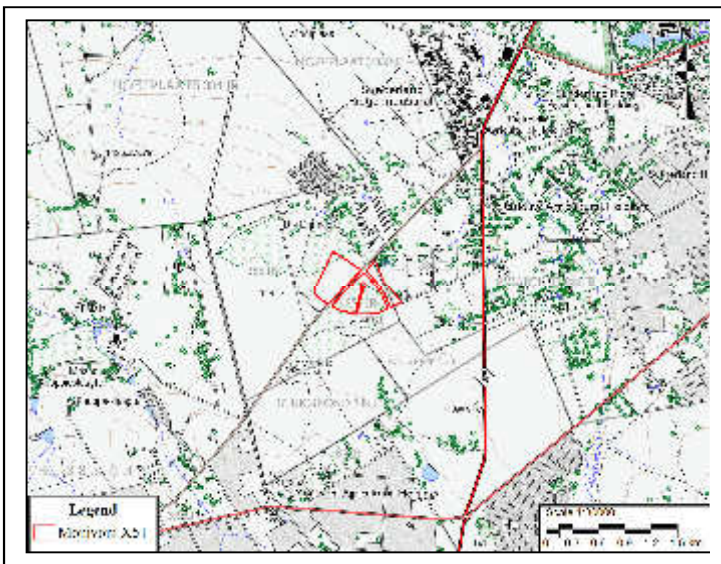


Figure 1 – Locality Map



Figure 2 – Aerial Map

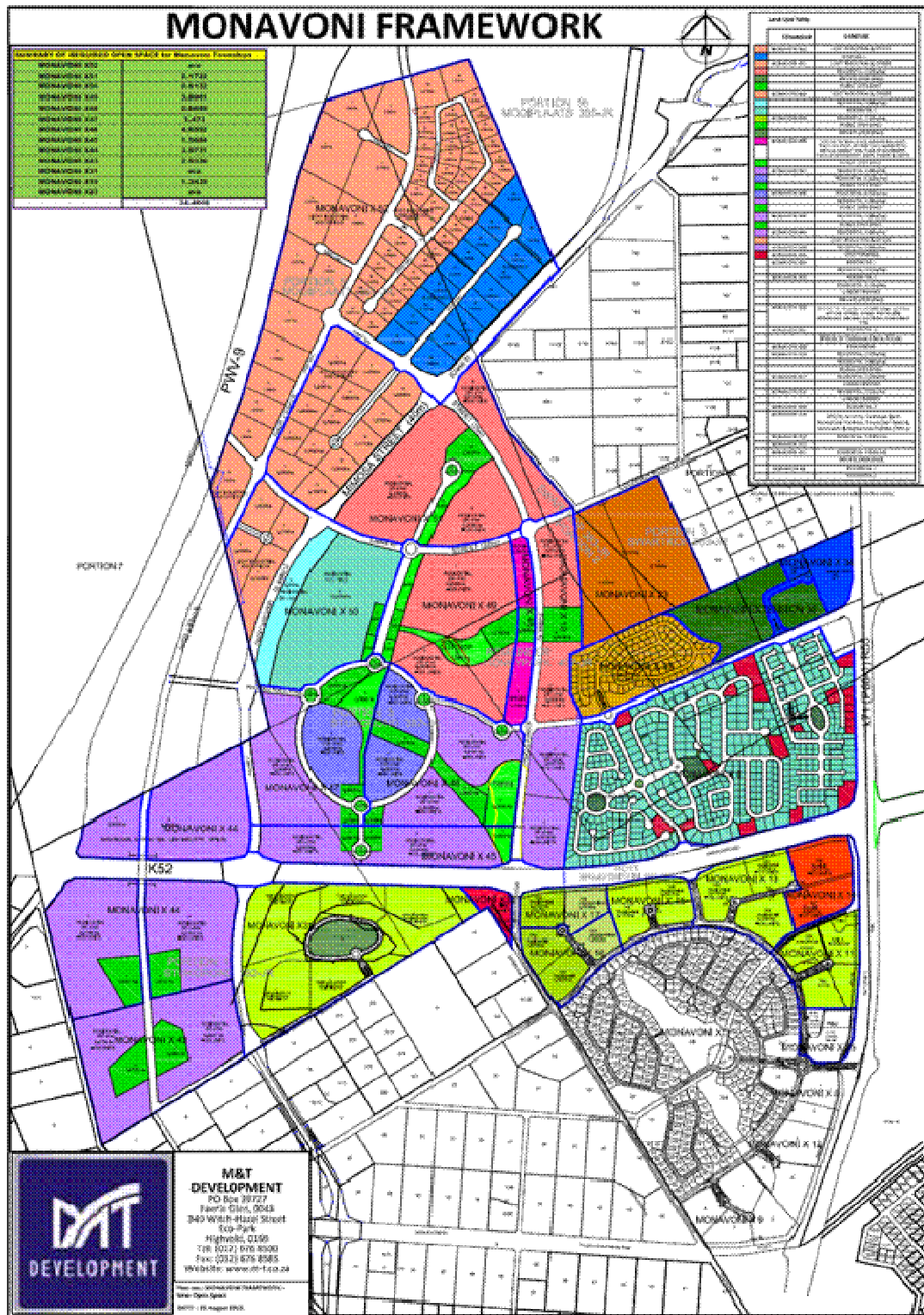


Figure 3 – Monavoni Development Framework

**Timeframe for construction:**

The expected timeframe for construction is approximately 18 months.

**The EMP will be a binding document for purposes of compliance.**

### **1.3 Receiving Environment**

**Geology:**

- According to a Geotechnical and Dolomite Stability Report by J.P. Venter the site is underlain by Dolomite and chert of the Malmani Subgroup of the Chuniespoort Group of the Transvaal Supergroup.

**Hydrology:**

- The study area is not affected by any rivers or streams. The site slopes towards the north-eastern.

**Fauna and flora:**

- No Red-listed plant species were found.
- The Natural primary grassland on the site was deemed sensitive.
- The Orange- listed *Hypoxis hemerocallidea* (African potato) was found sparsely scattered in the Natural primary grassland and the Rocky outcrop vegetation habitats. These plants should be relocated to a safe, suitable area approved by GDARD.
- Corridors of Natural primary grassland that have not been disturbed by services trenches should be included in all the planned new townships of Monavoni and on the neighbouring sites that are to be developed together with these sites. These corridors should be connected to the rocky outcrop on the study site and on the other portions that are being developed and to the *Acacia karroo* vegetation in the eastern part of Monavoni to facilitate connectivity.
- These areas must be properly managed throughout the lifespan of the project in terms of fire, eradication of exotics etc. to ensure continuous biodiversity.

- The open grassland on site offers ideal habitat conditions for the Melodius Lark in terms of breeding and foraging purposes. Several displaying male Melodius Larks were observed on the study site.

**Cultural /Historical:**

- No sites of heritage significance could be found.

**Visual:**

- The proposed development could have visual impacts on the surrounding view sheds during the construction and operational phases and mitigation measures should be implemented.

**Noise:**

- The proposed development could have noise impacts on surrounding residents.

**Dust:**

- Dust could impact the surrounding residences if the construction will be done during the dry and windy months. It is proposed that regular damping down of the study area must be done if constructed during dry and windy months.

## **2 EMP Objectives and context**

---

### **Objectives**

The objectives of this plan are to:

- Identify the possible environmental impacts of the proposed activity;
- Develop measures to minimise, mitigate and manage these impacts;
- Meet the requirements of the Record of Decision of GDARD and other of other Authorities; and
- Monitor the project.

## **EMP context**

This EMP fits into the overall planning process of the project by carrying out the conditions of consent set out by the GDARD. In addition, all mitigation measures recommended in the EIA report are included in the EMP.

This EMP addresses the following three phases of the development:

- Pre-construction planning phase;
- Construction phase; and
- Operational phase.

## **3 Monitoring**

---

In order for the EMP to be successfully implemented all the role players involved must have a clear understanding of their roles and responsibilities in the project.

These role players may include the Authorities (A), other Authorities (OA), Developer/proponent (D), Environmental Control Officer (ECO), Project Manager (PM), Contractors (C), Environmental Assessment Practitioner (EAP) and Environmental Site Officer (ESO). Landowners interested and affected parties and the relevant environmental and project specialist's area also important role players.

### **3.1 Roles and responsibilities**

#### **Developer (D)**

The developer is ultimately accountable for ensuring compliance with the EMP and conditions contained in the RoD. The developer must appoint an independent Environmental Control Officer (ECO), for the duration of the pre-construction and



construction phases, to ensure compliance with the requirements of this EMP. The developer must ensure that the ECO is integrated as part of the project team.

### **Project Manager (PM)**

The project Manager is responsible for the coordination of various activities and ensures compliance with this EMP through delegation of the EMP to the contractors and monitoring of performance as per the Environmental Control Officer's monthly reports.

### **Environmental Control Officer (ECO)**

An independent Environmental Control Officer (ECO) shall be appointed, for the duration of the pre-construction and construction phase of the services and bulk infrastructure, by the developer to ensure compliance with the requirements of this EMP.

### **Contact details of appointed ECO**

**ECO details will be available as soon as developer appointed a company.**

- The Environmental Control Officer shall ensure that the contractor is aware of all the specifications pertaining to the project.
- Any damage to the environment must be repaired as soon as possible after consultation between the Environmental Control Officer, Consulting Engineer and Contractor.
- The Environmental Control Officer shall ensure that the developer staff and/or contractor are adhering to all stipulations of the EMP.
- The Environmental Control Officer shall be responsible for monitoring the EMP throughout the project by means of site visits and meetings. This should be documented as part of the site meeting minutes.
- The Environmental Control Officer shall be responsible for the environmental training program.
- The Environmental Control Officer shall ensure that all clean up and rehabilitation or any remedial action required, are completed prior to transfer of properties.

- A post construction environmental audit is to be conducted to ensure that all conditions in the EMP have been adhered to.

**Contractor (C):**

The contractors shall be responsible for ensuring that all activities on site are undertaken in accordance with the environmental provisions detailed in this document and that sub-contractor and laborers are duly informed of their roles and responsibilities in this regard.

The contractor will be required, where specified to provide Method Statements setting out in detail how the management actions contained in the EMP will be implemented.

The contractors will be responsible for the cost of rehabilitation of any environmental damage that may result from non-compliance with the environmental regulations.

**Environmental Site Officer (ESO):**

The ESO is appointed by the developer as his/her environmental representative to monitor, review and verify compliance with the EMP by the contractor. The ESO is not an independent appointment but must be a member of the contractor's management team. The ESO must ensure that he/she is involved at all phases of the construction (from site clearance to rehabilitation).

**Authority (A):**

The authorities are the relevant environmental department that has issued the Environmental Authorization. The authorities are responsible for ensuring that the monitoring of the EMP and other authorization documentation is carried out by means of reviewing audit reports submitted by the ECO and conducting regular site visits.

**Other Authorities (OA):**

Other authorities are those that may be involved in the approval process of the EMP.

### **Environmental Assessment Practitioner (EAP):**

According to section 1 of NEMA the definition of an environmental assessment practitioner is “the individual responsible for the planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management plans or any other appropriate environmental instruments through regulations”.

### **3.2 Lines of Communication**

The Environmental Control Officer in writing should immediately report any breach of the EMP to the Project Manager. The Project Manager should then be responsible for rectifying the problem on-site after discussion with the contractor. Should this require additional cost, then the developer should be notified immediately before any additional steps are taken.

### **3.3 Reporting Procedures to the Developer**

Any pollution incidents must be reported to the Environmental Control Officer immediately (within 12 hours). The Environmental Control Officer shall report to the Developer on a regular basis (site meetings).

### **3.4 Site Instruction Entries**

The site instruction book entries will be used for the recording of general site instructions as they relate to the works on site. There should be issuing of stop work order for the purposes of immediately halting any activities of the contractor that may pose environmental risk.

### **3.5 ESA/ESO (Environmental Site Officer) Diary Entries**

Each of these books must be available in duplicate, with copies for the Engineer and Environmental Site Officer. These books should be available to the authorities for inspection or on request. All spills are to be recorded in the ESA/Environmental Site Officer's diary.

### **3.6 Methods Statements**

Methods statements from the contractor will be required for specific sensitive actions on request of the authorities or ESA/ESO (Environmental Site Officer). All method statements will form part of the EMP documentation and are subject to all terms and conditions contained within the EMP document. For each instance wherein it is requested that the contractor submit a method statement to the satisfaction of ESA/ESO, the format should clearly indicate the following:

- What – a brief description of the work to be undertaken
- How- a detailed description of the process of work, methods and materials
- Where- a description / sketch map of the locality of work; and
- When- the sequencing of actions with due commencement dates and completion date estimate.

The contractor must submit the method statement before any particular construction activity is due to start. Work may not commence until the method statement has been approved by the ESA/ESO.

### **3.7 Record Keeping**

All records related to the implementation of this management plan (e.g. site instruction book, ESA/ESO dairy, methods statements etc.) must be kept together in an office where it is safe and can be retrieved easily. These records should be kept for two years at any time be available for scrutiny by any relevant authorities.

### **3.8 Acts**

#### **1. The National Water Act, 1998 (Act No: 36 of 1998)**

The purpose of this Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways that take into account, amongst other factors, the following:

- ❑ Meeting the basic human needs of present and future generations;
- ❑ Promoting equitable access to water;
- ❑ Promoting the efficient, sustainable and beneficial use of water in the public interest;
- ❑ Reducing and preventing pollution and degradation of water resources;
- ❑ Facilitating social and economic development; and
- ❑ Providing for the growing demand for water use.

**Impact on proposed Development:**

**Significant –** The study area is not affected by any rivers or flood lines. In terms of Section 21 of the National Water Act the 1:100 year floodline must be indicated on layout maps.

**2. National Environmental Management: Air Quality Act (Act No. 39 of 2004)**

This act replaced the Atmospheric Pollution Prevention Act (Act No. 45 of 1965), however Part 2 of this act is still applicable. Part 2 of the act deals with the control of noxious or offensive gases. The proposed development will not release any of the listed gases into the atmosphere and this act is therefore not applicable to the proposed development.

The purpose of the Act is "To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto."

The purpose of the Act is "To provide for the prevention of the pollution of the atmosphere, for the establishment of a National Air Pollution Advisory Committee, and for matters incidental thereto".

The Atmospheric Pollution Prevention Act was traditionally administered by the Department of Health until 1995, when it was transferred to the jurisdiction of the Department of Environmental Affairs and Tourism. The Act controls four forms of air pollution:

- ❑ Part II            Noxious or Offensive gases
- ❑ Part III           Atmospheric Pollution by Smoke
- ❑ Part IV           Dust Control
- ❑ Part V            Air Pollution by Fumes Emitted by Vehicles

**Impact on proposed Development:**

**Significant –** During the construction phase dust pollution can become a significant factor, especially to the surrounding developments and landowners. Dust control would be adequately minimised during this phase by way of water spraying and possible dust-nets, when required.

The additional vehicles generated by the proposed development will have an insignificant impact on the air pollution due to emissions gasses created by any additional vehicles or traffic of the proposed development.

**3. National Environmental Management Act (Act 107 of 1998)**

The NEMA is primarily an enabling Act in that it provides for the development of environmental implementation plans and environmental management plans. The principles listed in the act serve as a general framework within which environmental management and implementation plans must be formulated.

The principles in essence state that environmental management must place people and their needs at the forefront of its concern and that development must be socially, environmentally and economically sustainable.

**Impact on proposed Development:**

**Significant –** The proposed development of Monavoni X 51 is listed under the activities as regulated under NEMA.

**4. The Municipal Systems Act (Act 32 of 2000)**

This Act was introduced to provide for the core principles, mechanisms and processes that are necessary to enable municipalities to move progressively towards the social and economic upliftment of local communities, and ensure universal access to essential services that are affordable to all.

The proposed development will support the local authority in complying with the principles of the Municipal Systems Act, by assisting in providing the community with essential services, such as water and sewage infrastructure.

**Impact on proposed Development:**

**Significant –** The proposed development will promote the Municipal System within City of Tshwane as the proposed development will upgrade and improve the essential services such as water and sewerage to the area, therefore contributing to the social and economic upliftment of the City of Tshwane.

**5. The Draft Red Data Species Policy**

This policy is provided for the protection, conservation and maintenance of Red Data species within the Gauteng Province.

**Impact on proposed Development:**

**Not significant – No** red listed species were identified on site.

#### **6. National Veld and Forest Fire Act, 1998 (Act No. 101, 1998)**

The purpose of this Act is to prevent and combat veld, forest and mountain fires throughout the Republic. Furthermore the Act provides for a variety of institutions, methods and practices for achieving the prevention of fires.

#### **Impact on proposed Development:**

**Significant –** Fires of construction workers may only be lit in the designated site camp as indicated in assistance with the ECO. It is important that a site development camp be located on a part of the application site that is already disturbed.

#### **7. National Heritage Resources Act, 1999 (Act No. 25 of 1999)**

The National Heritage Resources Act legislates the necessity and heritage impact assessment in areas earmarked for development, which exceed 0.5ha. The Act makes provision for the potential destruction to existing sites, pending the archaeologist's recommendations through permitting procedures. Permits are administered by the South African Heritage Resources Agency (SAHRA).

#### **Impact on proposed Development:**

**Not significant – No** features of Heritage importance are present on site.

#### **8. Conservation of Agricultural Resources Act (Act No. 43 of 1983)**

This Act provides for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.



**Impact on proposed Development:**

**Not significant** – According to the agricultural specialist the site cannot be used economically for agricultural purposes. The site does not fall within any Agricultural Hub.

**9. Water Services Act, 1997** (Act No. 108 of 1997)

This Act provides for the minimum standards and measures of which the following Water Services should adhere to:

- Basic sanitation
- Basic water supply
- Interruption in provision of water services
- Quality of potable water
- Control of objectionable substances
- Disposal of grey water
- Use of effluent
- Quantity and quality of industrial effluent discharged into a sewerage system
- Water services audit as a component in the Water Services Development Plan
- Water and effluent balance analysis and determination of water losses
- Repair of leaks
- Consumer installations other than meters
- Pressure in reticulation system

**Impact on proposed Development:**

**Significant** – The proposed development will have to be supplied with the basic water bearing services; therefore the water should comply with the minimum standards and measures of this Act.

## **10. National Environmental Management Act: Biodiversity Act (Act No. 10 of 2004)**

The purpose of the Biodiversity Act is to provide for the management of South Africa's biodiversity within the Framework of the NEMA and the protection of species and ecosystems that warrant National protection. As part of the implementation strategy, the National Spatial Biodiversity Assessment was developed.

### **Impact on proposed Development:**

**Not significant – No** red listed species were identified.

## **11. National Spatial Biodiversity assessment**

The National Spatial Biodiversity Assessment (NSBA) classifies areas as worthy of protection based on its biophysical characteristics, which are ranked according to priority levels.

### **Impact on proposed Development:**

**Not significant – No** red listed species were identified.

## **12. Protected Species – Provincial Ordinances**

Provincial ordinances were developed to protect particular plant species within specific provinces. The protection of these species is enforced through permitting requirements associated with provincial lists of protected species. Permits are administered by the Provincial Departments of Environmental Affairs.

### **Impact on proposed Development:**

**Not significant – No** red listed plant species were identified.

### **13. National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)**

The purpose of this Act is to provide for the protection, conservation and management of ecologically viable areas representative of South Africa's biological biodiversity and its natural landscapes.

#### **Impact on proposed Development:**

**Not Significant** – No area was identified as a system which needs protection, conservation and management.

### **14. Gauteng Transport Infrastructure Act, 2001**

To consolidate the laws relating to roads and other transport infrastructure in Gauteng; and to provide for the planning, design, development, construction, financing, management, control, maintenance, protection and rehabilitation of provincial roads, railway lines and other transport infrastructure in Gauteng.

#### **Impact on proposed Development:**

**Not significant** – Some upgrading of the surrounding road network will be needed, but is deemed as insignificant as this will only provide entrance to the proposed development.

### **15. National Road Traffic Act, 1996 (Act No. 93 of 1996)**

This Act provides for all road traffic matters which shall apply uniformly throughout the Republic and for matters connected therewith.

#### **16. Environmental Conservation Act: Noise Regulations, 1989 (Act no.73 of 1989)**

The purpose of this Act is to provide measures and management relating Noise levels. This Act enables Noise levels to be acceptable to standards within a specific area and community.

##### **Impact on proposed Development:**

**Significant –** The proposed development may include some noisy activities with the installation of necessary infrastructure and services.

#### **17. National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)**

The purpose of the act is to reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.

##### **Impact on proposed Development:**

**Not Significant –** The proposed development does not trigger any listed activities in terms of the Waste Act.

## 4 Project activities

### 4.1 Pre-Construction Phase

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
General	Project contract	To make the EMP enforceable under the general conditions of the contract.	The EMP document must be included as part of the tender documentation for all contractor appointments		Developer	-	3
			All municipal by laws must be adhered to.				
			The DWs must be notified of any deviations from the conditions and commitments.				
			The proposed development must comply with all Sections of the National Water Services Act, 1997 (Act 107 of 1997).				
Design and planning	Stability of structures and restriction of land use due to geology	To ensure stability of structures	<p>1) The layout and land uses must correspond to the stability zonation and development types recommended by the geotechnical engineer.</p> <p>2) The foundation recommendations supplied by the geotechnical engineers must be adhered to.</p> <p>3) Detailed foundation investigations should be done for large structures because residual dolomite material may experience settlements under load or be collapsible.</p>		Individual Developer Engineer	-	
			The NHBRC precautionary measures for development in dolomitic areas must be implemented.	The EMP is included as part of the tender documentation	Engineer Individual Developer	-	

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			<p>1) A dolomite risk management plan must be compiled for this township in general and copies must be submitted to the Council for Geoscience and the NHBRC. This system must be practical with detailed requirements applicable to the township. This can, however, only be done after the township to be established has been approved.</p> <p>2) The application of strict water precautionary measures for the development is essential. Storm water management on the study area is extremely important to prevent the concentration of storm water. No accumulation of surface water is to be permitted and the entire development must be properly drained.</p> <p>3) The normal drainage precautionary measures and special installation measures for underground wet services, applicable to dolomitic terrain and in compliance with the Tshwane Metropolitan Municipality should be adhered to.</p>	Dolomite Risk Management Plan compiled	Engineer		
	<b>Storm water design</b>	To prevent and restrict erosion, siltation and groundwater pollution	<p>1) A detailed storm water management plan must be approved by the Local Authority and Council for Geoscience prior to commencement of construction activities. Such approval must be submitted to DWS together with a copy of the original storm water management plans. Must be implemented according to</p>	Compilation and approval of storm water management plan	Engineer Individual Developer	-	9

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			<p>guidelines provided by the relevant Local Authority Departments.</p> <p>2) The storm water design for the proposed development must be designed to:</p> <p>Reduce and/ or prevent siltation, erosion and water pollution.</p> <p>3) Storm water runoff should not be concentrated as far as possible and sheet flow should be implemented.</p> <p>5) Energy dissipaters must be installed on the study area to break the speed of the water.</p> <p>6) Surface storm water generated as a result of the development must not be channeled directly into any natural drainage system or wetland.</p> <p>7) The storm water management plan should be designed in a way that aims to ensure that post development runoff does not exceed predevelopment values in:</p> <ul style="list-style-type: none"> <li>- Peak discharge for any given storm;</li> <li>- Total volume of runoff for any given storm;</li> <li>- Frequency of runoff; and</li> <li>- Pollutant and debris concentrations reaching water courses.</li> </ul> <p>8) No natural channels will be allowed. All open channels and attenuation ponds must be lined with concrete.</p> <p>9) Concentrated surface drainage is not permitted.</p> <p>10) Storm water polluted by refuse, sewage and other surface pollution should be kept from coming into contact with public streams / clean water systems.</p>				

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			The developer must ensure that no wastewater may run freely into any of the surrounding streets or naturally vegetated areas and also ensure the correct positioning of construction camps and their sanitation facilities.	Correct positioning of construction camps	Engineer		
	<b>Light pollution</b>	To minimise light pollution	The generation of light by night events, security lighting and other lighting shall be effectively designed so as not to spill unnecessary light outward into the oncoming traffic, or into the yards of the neighbouring properties or open spaces.	Lighting effectively designed.	Architect	-	
	<b>Visual impact</b>	To minimize the visual impact of the proposed development.	Architectural guidelines to minimize the visual impact: The proposed development will be seen from a distance and therefore the roofs should not reflect the sun or be covered with roofing materials that have bright colours. Black or charcoal coloured roofs will blend in tastefully with the surrounding environment. Suitable plant materials should be used at strategic points to screen off impacts caused by roofs and cars in large parking areas. Existing trees and vegetation clumps should be retained as far as possible. The trees and vegetation will instantly soften the impact of the proposed permanent structures and they will bring the scale of the structures within the urban context down to a more human scale. The colour scheme should be taken from the palette of colours in the natural surroundings.	Architectural guidelines minimizes visual impact	Architect	-	
<b>Climate</b>	<b>Extreme</b>	To prevent the	Where open parking bays are involved.	Landscape	Landscape	-	



TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
	change in micro climate temperatures	extreme change in micro climate temperatures	one tree for every two parking bays shall be indicated on the Site Development Plan which shall be approved by the Local Authority and Design Review Committee, if any.	Development Plan complies	Architect		
Geology and Soils	Unsuitable Geotechnical conditions	To prevent unsuitable Geotechnical conditions	The special precautionary measures, as indicated within the Geotechnical Report and Risk Management Report must be adhered to at all times. 1) A storm water management plan must be implemented on the study area to prevent the erosion of soil. 2) A pro-active maintenance strategy for water bearing services and other infrastructure should be implemented.	Precautionary measures implemented	Geotechnical engineer Dolomite Risk Manager	-	9
Fauna and flora	Floral biodiversity and ecological health	To ensure that the species introduced to the area, are compatible with the current and future quality of the ecological processes.	1) The site development plan for the proposed development shall be submitted to the local authority for approval. 2) It is important that all the plant positions, quantities and coverage per m <sup>2</sup> be indicated on a plan. 3) The proposed planting materials for the areas to be landscaped shall be non-invasive, and preferably indigenous and /or endemic. 4) As much of the existing indigenous trees, vegetation clumps and natural grassland will have to be incorporated within the proposed formal landscaping. 5) The vegetation around the Drainage channel must be retained and rehabilitated where necessary. 6) Buffer zones should be adhered to.	The landscape development plan submitted to the local authority for approval.	Landscape Architect	-	10,11,13
			The removal of Category 1 Declared invaders from the property is mandatory and Category 2 Declared invaders must	Category 1 and 2 declared Invaders removed	Contractor ECO		3,8

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
	<b>Loss of sensitive vegetation</b>	To ensure protection of orange listed plants To avoid erosion and disturbance to indigenous vegetation	The Orange- listed Hypoxis hemerocallidea (African potato) should be relocated to a safe, suitable area approved by GDARD.	Orange listed plants rescued prior to construction	Qualified specialist		
<b>Preparing Site Access</b>	<b>Environmental integrity</b>		Designated routes shall be determined for the construction vehicles and designated areas for storage of equipment. Clearly mark the site access point and routes on site to be used by construction vehicles and pedestrians. Provide an access map to all contractors whom in turn must provide copies to the construction workers. Instruct all drivers to use access point and determined route.	Access to site is erosion free. Minimum disturbance to surrounding vegetation. Vehicles make use of established access routes.	Contractor	Continuous	
	<b>Waste storage</b>	To control the temporary storage of waste.	Temporary waste storage points on site shall be determined. These storage points shall be accessible by waste removal trucks and these points should not be located in sensitive areas /areas highly visible from the properties of the surrounding land-owners/tenants/in areas where the wind direction will carry bad odours across the properties of adjacent tenants or landowners.		Contractor ESO	-	
		Ensure waste storage area does not generate pollution To prevent water pollution	Build a bund around waste storage area to stop overflow into storm water.		Contractor	-	
			-The storage and use of fuel and other chemicals on site must be adequately managed to prevent soil and water pollution. -Containment areas must be provided for		Developer Contractor		

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			handling of potential pollutants at refuelling depots - Transport, storage, handling and disposal of hazardous substances must be adequately controlled and managed.				
			No wastewater may run freely into any of the surrounding streets or naturally vegetated areas.		Contractor		

#### 4.2 Construction Phase

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
Contractor's Camp	Loss of Vegetation and topsoil	To minimize damage to and loss of vegetation and retain quality of topsoil	Site to be established under supervision of ECO/ESO.	Minimal vegetation removed/damaged during site activities.	Contractor	Before any construction activity commences and as and when required	5, 10, 11, 13
	Surface and ground water pollution	To minimize pollution of surface and Groundwater resources.	1) Sufficient and temporary facilities including ablution facilities must be provided for construction workers operating on the site. 2) A minimum of one chemical toilet shall be provided per 10 construction workers. The contractor shall keep the toilets in a clean, neat and hygienic condition. Toilets provided by the contractor must be easily accessible and a maximum of 50m from the works area to ensure they are utilized. The contractor (who must use reputable toilet-servicing company) shall be responsible for the cleaning, maintenance	Effluents managed Effectively.  No pollution of water resources from site.  Workforce use toilets provided.	Contractor ESO	As and when required	

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			<p>and servicing of the toilets. The contractor (using reputable toilet-servicing company) shall ensure that all toilets are cleaned and emptied before the builders' or other public holidays.</p> <p>3) No person is allowed to use any other area than chemical toilets.</p> <p>4) No French drain systems may be installed.</p> <p>5) No chemical or waste water must be allowed to contaminate the run-off on site. This could possibly contaminate the drainage channel.</p> <p>6) The chemical toilets may not be placed in close proximity of the adjacent dwellings to prevent odors from causing uncomfortable situations.</p> <p>7) Avoid the clearing of the site camp (of specific phase) or paved surfaces with soap. This could drain into the drainage channel on site and contaminate to open space system in the area.</p>				
	To minimize pollution of surface and Groundwater resources due to spilling of materials.		<p>1) Drip trays and/ or lined earth bunds must be provided under vehicles and equipment, to contain spills of hazardous materials such as fuel, oil and cement.</p> <p>2) Repair and storage of vehicles only within the demarcated site area.</p> <p>3) Spill kits must be available on site.</p> <p>4) Oils and chemicals must be confined to specific secured areas within the site camp. These areas must be banded with adequate containment (at least 1.5 times the volume of the fuel) for potential spills or leaks.</p> <p>5) All spilled hazardous substances must be contained in impermeable containers for</p>	No pollution of the environment	Contractor ESO	Daily	

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			removal to a licensed hazardous waste site. 6) No leaking vehicle shall be allowed on site. The mechanic/ the mechanic of the appointed contractor must supply the environmental officer with a letter of confirmation that the vehicles and equipment are leak proof. 7) No bins containing organic solvents such as paints and thinners shall be cleaned on site, unless containers for liquid waste disposal are placed for this purpose on site. The mixing of concrete shall only be done at specifically selected sites, as close as possible to the entrance, on mortar boards or similar structures to prevent run-off into drainage line, streams and natural vegetation.				
		To minimize pollution of surface and groundwater resources by cement	No effluent (including effluent from any storage areas) may be discharged into any water surface or ground water resource.	No evidence of contaminated soil on the construction site.	Contractor ESO	Daily	
		To minimize pollution of surface and Groundwater resources due to effluent.		No evidence of contaminated water resources.	Contractor ESO	Daily	
	<b>Pollution of the environment</b>	To prevent unhygienic usage on the site and pollution of the natural assets.	1) Weather proof waste bins must be provided and emptied regularly. 2) The contractor shall provide laborers to clean up the contractor's camp and construction site on a daily basis. 3) Temporary waste storage points on the site should be determined. THESE AREAS SHALL BE PREDETERMINED AND LOCATED IN AREAS THAT IS ALREADY DISTURBED. These storage points should be accessible by waste removal trucks and these points should be located in already disturbed areas /areas not highly visible from the properties	No waste bins overflowing No litter or building waste lying in or around the site	Contractor ESO	Daily Weekly	5,13

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			<p>of the surrounding land-owners/ in areas where the wind direction will not carry bad odours across the properties of adjacent landowners. This site should comply with the following:</p> <ul style="list-style-type: none"> <li>• Skips for the containment and disposal of waste that could cause soil and water pollution, i.e. paint, lubricants, etc.;</li> <li>• Small lightweight waste items should be contained in skips with lids to prevent wind littering;</li> <li>• Bunded areas for containment and holding of dry building waste.</li> </ul> <p>4) No solid waste may be disposed of on the site.                      5) No waste materials shall at any stage be disposed of in the open veld of adjacent properties or within the drainage lines (No-Go areas).                      6) The storage of solid waste on the site, until such time as it may be disposed of, must be in a manner acceptable to the local authority and DWS.                      7) Cover any wastes that are likely to wash away or contaminate storm water.</p>				
		<b>Recycle material where possible and correctly dispose of unusable wastes</b>	<p>1) Waste shall be separated into recyclable and non-recyclable waste, and shall be separated as follows:</p> <ul style="list-style-type: none"> <li>• General waste: including (but not limited to) construction rubble,</li> <li>• Reusable construction material.</li> </ul> <p>2) Recyclable waste shall preferably be deposited in separate bins.                      3) All solid waste including excess spoil (soil, rock, rubble etc) must be removed to a</p>	<p>Sufficient containers available on site                      No visible signs of pollution</p>	<p>Contractor                      ESO</p>	<p>Daily                      Weekly</p>	

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			<p>permitted waste disposal site on a weekly basis.</p> <p>4) No bins containing organic solvents such as paints and thinners shall be cleaned on site, unless containers for liquid waste disposal are placed for this purpose on site.</p> <p>5) Keep records of waste reuse, recycling and disposal for future reference. Provide information to ESO.</p> <p>-The storage and use of fuel and other chemicals on site must be adequately managed to prevent soil and water pollution.</p> <p>-Containment areas must be provided for handling of potential pollutants at refuelling depots</p> <p>- Transport, storage, handling and disposal of hazardous substances must be adequately controlled and managed.</p>	<p>Correct storage and use of fuel.</p> <p>Containment areas provided for handling of potential pollutants at refuelling depots.</p>	Contractor		
			<p><b>If any pollution incident is experienced, DWS must be notified immediately.</b></p>	Contractor			
	<p><b>Increased fire risk to site and surrounding areas</b></p>	<p><b>To decrease fire risk.</b></p>	<p>1) Fires shall only be permitted in specifically designated areas and under controlled circumstances. This area may not be located in close proximity of the power lines as the natural grass within this area can easily take flame and could spread to surrounding open space system.</p> <p>2) Food vendors shall be allowed within specified areas.</p> <p>3) Fire extinguishers to be provided in all vehicles and fire beaters must be available on site.</p> <p>4) Emergency numbers/ contact details must</p>	<p>No open fires on site that have been left unattended</p>	Contractor	Monitor daily	6

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
Construction site	Geology and soils	To prevent the damaging of the existing soils and geology.	<p>be available on site, where applicable.</p> <p>1) The top layer of all areas to be excavated for the purposes of construction shall be stripped and stockpiled in areas where this material will not be damaged, removed or compacted.</p> <p>2) All surfaces that are susceptible to erosion, shall be protected either by cladding with biodegradable material or with the top layer of soil being seeded with grass seed/planted with a suitable groundcover.</p>	Excavated materials correctly stockpiled  No signs of erosion	Contractor	Monitor daily	
			<p>1) Stockpiling will only be done in designated places where it will not interfere with the natural drainage paths of the environment.</p> <p>2) In order to minimize erosion and siltation and disturbance to existing vegetation, it is recommended that stockpiling be done/equipment is stored in already disturbed/exposed areas.</p> <p>3) Cover stockpiles and surround downhill sides with a sediment fence to stop materials washing away.</p> <p>4) Remove vegetation only in areas designated during the planning stage and for the purpose of construction.</p> <p>5) Rehabilitation/ landscaping to be done immediately after the involved works are completed (will prevent erosion of the topsoil layer on site).</p> <p>6) All compacted areas should be ripped prior to them being rehabilitated/landscaped by the contractor.</p> <p>7) The top layer of all areas to be excavated must be stripped and stockpiled in areas where this material will not be damaged,</p>	Excavated materials correctly stockpiled  No visible signs of erosion and sedimentation  Minimal invasive weed growth  Vegetation only removed in designated areas	Contractor of Developer	Monitor daily	4,9



TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			<p>removed or compacted. This stockpiled material should be used for the rehabilitation of the site and for landscaping purposes.</p> <p>8) Strip topsoil at start of works and store in stockpiles no more than 1,5 m high in designated materials storage area.</p> <p>9) During the laying of any cables, pipelines or infrastructure (on or adjacent to the site) topsoil shall be kept aside to cover the disturbed areas immediately after such activities are completed. Rehabilitation of these areas shall be done directly after infill of the trenches. No rocks shall be placed on the topsoil after re-filling.</p> <p>1) It is recommended that the construction of the development be done in phases.</p> <p>2) Each phase should be rehabilitated immediately after the construction for that phase has been completed. The rehabilitated areas should be maintained by the appointed rehabilitation contractor until a vegetative coverage of at least 80% has been achieved.</p> <p>3) Mark out the areas to be excavated.</p> <p>4) Large exposed areas during the construction phases should be limited. Where possible areas earmarked for construction during later phases should remain covered with vegetation coverage until the actual construction phase. This will prevent unnecessary erosion and siltation in these areas.</p> <p>5) Unnecessary clearing of flora resulting in exposed soil prone to erosive conditions should be avoided.</p> <p>6) All embankments must be adequately</p>	<p>No erosion scars</p> <p>No loss of topsoil</p> <p>All damaged areas successfully rehabilitated</p>	Contractor ESO	Monitor daily	

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			<p>compacted and planted with grass to stop any excessive soils erosion and scouring of the landscape if required.</p> <p>7) The eradication of alien vegetation should be followed up as soon as possible by replacement with indigenous vegetation to ensure quick and sufficient coverage of exposed areas.</p> <p>8) Storm water outlets shall be correctly designed to prevent any possible soil erosion.</p> <p>9) All surface run-offs shall be managed in such a way so as to ensure erosion of soil does not occur.</p> <p>10) Implementation of temporary storm water management measures that will help to reduce the speed of surface water by the individual erf owner / developer.</p> <p>11) All surfaces that are susceptible to erosion shall be covered with a suitable vegetative cover as soon as construction is completed by the individual erf owner / developer.</p>				
	<b>Stability of structures due to geology</b>	To ensure stability of structures.	<p>1) A risk management plan must be designed and implemented.</p> <p>2) The precautionary measures for construction on dolomite must be implemented.</p> <p>3) The foundation recommendations supplied by the geotechnical engineers must be adhered to.</p> <p>4) It is recommended that excavations (for foundations and underground services) be inspected on the site to ensure that conditions at variance to that described can</p>		Engineers / Contractor / Individual Developer	When required	

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			<p>be noted and the necessary adjustments made.</p> <p>5) Detailed foundation inspections should be carried out at the time of construction to identify variances and adjust foundation designs accordingly if need be.</p> <p>6) The recommendations and mitigation measures in the Risk management plan, comments from Geoscience and the Geotechnical report should be implemented and adhered to.</p>				
			<p>The normal drainage precautionary measures and special installation measures for underground wet services, applicable to dolomitic terrain and in compliance with the Tshwane Metropolitan Municipality requirements, should be adhered to.</p>	<p>Drainage precautions implemented</p>	<p>Engineers Contractors</p>		
	<b>Blasting</b>	<p>Safety during blasting operations</p>	<p>Blasting may only be done by specialists in the field and should be limited to localised areas.</p> <p>Surrounding land-owners of properties in close proximity of blasting exercises must be informed/ warned (at least one week in advance) of blasting exercises that will take place on the study area.</p> <p>Warning signs to warn site workers and members of the public of blasting exercises must be erected at strategic points on the study area and the area where the blasting exercises will take place must be fenced off with barrier tape.</p>	<p>Blasting done by specialists</p> <p>Surrounding land owners informed in advance</p> <p>Warning signs erected and barrier tape in place.</p>	<p>Contractors</p>		

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			Blasting operations should be carefully controlled and the necessary safety precautions must be implemented.				
	<b>Hydrology</b>	Groundwater management	1) Ongoing monitoring of groundwater levels on and in the immediate vicinity of the site is recommended.	No deviation from baseline data during regular sampling	Engineer	Monthly	
		To minimise pollution of soil, surface and groundwater	1) Increased run-off during construction must be managed using berms and other suitable structures as required to ensure flow velocities are reduced. 2) The contractor shall ensure that excessive quantities of sand, silt and silted water do not enter the storm water system.	No visible signs of erosion. No visible signs of pollution	Contractor	Monitor daily	
	<b>Fauna and flora</b>	To protect the existing fauna and flora.	1) All exotic invaders and weeds must be eradicated on a continuous basis. 2) Exotic invaders must be included in an alien management program for the site. Eradication must occur every 6 months. 3) No plants not indigenous to the area, or exotic plant species, especially lawn grasses and other ground-covering plants, should be introduced in the communal landscaping of the proposed site, as they will drastically interfere with the nature of the area	No exotic plants used for landscaping	Contractor ESO / Design Review Committee	As and when required Every 6 months	10,11,13
		To protect the existing fauna and flora.	1) Trees that are intended to be retained shall be clearly marked on site. 2) Snaring and hunting of fauna by construction workers on or adjacent to the study area are strictly prohibited and offenders shall be prosecuted. 3) Should hedgehogs be encountered during	No measurable signs of habitat destruction	Contractor ESO	As and when required	5,10,11,13, 16

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			<p>the development, these should be relocated to natural grassland areas in the vicinity:</p> <p>4) Should the Hartequin snake be encountered during the construction phase of the development, it must be properly recorded, sent to the Transvaal Museum (if dead) or moved to other areas suitable for its preservation.</p> <p>5) Wood harvesting of any trees or shrubs on the study area or adjacent areas shall not be allowed, especially within the Non-perennial drainage line. OFFENDERS WILL BE PROSECUTED AND A FINE WILL BE ISSUED IN ACCORDANCE WITH THE GDARD.</p> <p>6) Where possible, work should be restricted to one area at a time.</p> <p>7) Noise should be kept to a minimum and the development should be done in phases to allow faunal species to temporarily migrate into the conservation areas in the vicinity.</p> <p>8) The contractor must ensure that no fauna species are disturbed, trapped, hunted or killed during the construction phase. Conservation-orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance;</p> <p>9) Vegetation clumps and natural grassland areas to be retained and incorporated within the proposed development formal landscaping, must be marked and demarcated before any commencement of construction activities. These areas must be fenced off (will be seen as "No-Go" areas).</p> <p>10) The trenches for the water pipelines and</p>				

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			<p>sewage lines should be as narrow as possible. Environmental damage caused by these trenches may be kept to a minimum by good forward planning and thereby reducing the actual length of time that they are open. Possible damage to wildlife is in direct proportion to the time that these trenches are open and may destroy amphibian and reptilian species.</p> <ul style="list-style-type: none"> <li>• Alien and invasive plants must be removed from areas to be excluded from development and the area rehabilitated with vegetation endemic to the area;</li> <li>• No plants not indigenous to the area, or exotic plant species, especially lawn grasses and other ground covering plants, should be introduced in the landscaping of the proposed development, as they might spread into the areas of natural vegetation;</li> <li>• Forage and host plants required by pollinator species in the area should also be used in landscaped areas;</li> <li>• Dumping of builder's rubble and other waste in the areas earmarked for exclusion must be prevented through fencing or other management measures;</li> <li>• Entrance by vehicles, especially off-road cars and bakkies, off-road bicycles and quad bikes to the areas to be excluded should be</li> </ul>		Contractor ESO	As and when required	5,10,11,13,16

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			<p>prohibited, both during the construction phase and during the lifespan of the project;</p> <ul style="list-style-type: none"> <li>• Foot paths should be restricted to areas where erosion can be controlled and damage to vegetation can be kept to a minimum;</li> <li>• The areas earmarked for exclusion from development must be fenced off during the construction phase to ensure that the developer and his contractors do not damage these areas or do not cover them with soil, builder's rubble or waste.</li> <li>• It is suggested that the building restrictions under the high tension power lines which transect the entire site, be used as a conservation feature by managing the grassland to attain as close as possible climax status;</li> <li>• Large indigenous trees should be left as part of the landscaping; and</li> <li>• Proper Veld Management Practices, such as fire management, should be implemented in the conservation areas.</li> </ul>				
<b>Social</b>	<b>Noise impact</b>	To maintain noise levels below "disturbing" as defined in the national Noise Regulations.	<p>1) Site workers must comply with the Provincial noise requirements as outlined.                      2) Noise activities shall only take place during working hours</p>	No complaints from surrounding residents and I & AP	Contractor	Monitored daily	16

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
	<b>Dust impact</b>	Minimise dust from the site	<p>1) Dust pollution could occur during the construction works, especially during the dry months. Regular and effective damping down of working areas (especially during the dry and windy periods) must be carried out to avoid dust pollution that will have a negative impact on the surrounding environment.</p> <p>2) When necessary, these working areas should be damped down in the mornings and afternoons.</p>	<p>No visible signs of dust pollution</p> <p>No complaints from surrounding residents and I &amp; AP</p>	Contractor	Monitored daily	2
	<b>Safety and security</b>	To ensure the safety and security of the public.	<p>1) Although regarded as a normal practice, it is important to erect proper signs indicating the operations of heavy vehicles in the vicinity of dangerous crossings and access roads or even in the development site if necessary.</p> <p>2) With the exception of the appointed security personnel, no other workers, friend or relatives will be allowed to sleep on the construction site (weekends included)</p> <p>3) Construction vehicles and activities to avoid peak hour traffic times</p> <p>4) Presence of law enforcement officials at strategic places must be ensured</p> <p>5) Following actions would assist in management of safety along the road</p> <ul style="list-style-type: none"> <li>▪ Adequate road marking</li> <li>▪ Adequate roadside recovery areas</li> <li>▪ Allowance for pedestrians and cyclists where necessary</li> <li>▪ Although regarded as a normal practice, it is important to erect proper signs indicating the danger of the excavation in and around the development site. Putting</li> </ul>	<p>No incidences reported</p>	Contractor ECO	Monitored daily	



TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			temporary fencing around excavations where possible.				
	<b>Influx of people from other areas</b>	In order to limit the influx of people from other areas	It is recommended that (where possible) only people from the local communities in and around the application site are employed.	People from local community employed.	Contractor	When required	
	<b>Infrastructure and services</b>		The road and services upgrading as recommended by the involved engineers to be implemented.	Road and services upgrading according to recommendation	Engineers	When required	4,15
		Installation of services	Determine areas where services will be upgraded and relocated well in advance. Discuss possible disruptions with affected parties to determine most convenient times for service disruptions and warn affected parties well in advance of dates that service disruptions will take place	No complaints from I & AP	Contractor ESO	When required	4,9
	<b>Cultural Resources</b>		1) It should be noted that in terms of the South African Resources Act (Act 25 of 1999) Section 35(4) no person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or material 2)- Also important is that Section 34(1) of this act states that no person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit, issued by the relevant provincial heritage resources authority. 3) If archaeological sites or graves are exposed during the construction work, it should be reported to a museum immediately, preferably to a museum with	No destruction of or damage to archaeological sites	Contractor ECO	Monitor daily	7

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
	<b>Visual impact</b>	In order to minimise the visual impact	<p>an archaeologist available, so that an investigation and evaluation of the finds can be made.</p> <ol style="list-style-type: none"> <li>1) The disturbed areas shall be rehabilitated immediately after the involved construction works are completed.</li> <li>2) Shade cloth must be used to conceal and minimise the visual impact of the site camps and storage areas</li> <li>3) All equipment and materials should be stored in a designated area indicated by the ECO.</li> <li>4) All areas must be kept neat and tidy and waste should be stored in the designated areas and removed on a weekly basis.</li> </ol>	Visual impacts minimized	Contractor ESO	Monitor daily	
	<b>Vegetation</b>	Landscaping	<ol style="list-style-type: none"> <li>1) When planting trees, care should be taken to avoid the incorrect positioning of trees and other plants, to prevent the roots of trees planted in close proximity to the line of water-bearing services from causing leaking in, or malfunctioning of the services.</li> <li>2) The proposed planting materials for the areas to be landscaped should preferably be endemic and indigenous.</li> <li>3) All new trees and shrubs to be planted on the study area shall be inspected for pests and diseases prior to them being planted.</li> <li>4) The inspection shall be carried out by the maintenance contractor at the property of the supplier and not on the study area.</li> <li>5) All trees to be planted shall be in 20L containers with a height of approximately 1,8 metres and a main stem diameter of approximately 300 mm.</li> </ol>	Landscaping done according to landscape development plan	Landscape architect Contractor	When required	

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable Act no.
			6) Rehabilitation of the drainage channel with indigenous vegetation should be done after construction has been completed on site. 1) Aerate compacted soil and check and correct pH for soils affected by construction activities. 2) Make sure plant material will be matured enough and hardened off ready for planting. Water in plants immediately as planting proceeds. 3) Apply mulch to conserve moisture Plant according to the layout and planting techniques specified by the Landscape Architect in the Landscape Development plans for the site.	Landscaping done according to landscape development plan	Landscape architect Contractor	When required	
		Loss of plants	Ensure that materials used for mulching and topsoil/ fertilisers are certified weed free. Collect certifications where available. Control weed growth that appears during construction.	Weed growth controlled	Landscape architect Contractor	When required	
		Spread of weeds	1) Compacted soils shall be ripped at least 200mm. 2) All clumps and rocks larger than 30mm diameter shall be removed from the soil to be rehabilitated 3) The soil shall be leveled before seeding 4) Hydro-seed the soil with Potch mixture or plant with suitable indigenous ground covering as specified) 5) Watering shall take place at least once per day for the first 14 days until germination of seeds have taken place 6) Thereafter watering should take place at least for 20 minutes every 4 days until grass have hardened off.	Grass have hardened off	Landscape architect Contractor	Once a day Then every 4 days	

### 4.3 Operational Phase

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Responsibility	Frequency of Action	Applicable Act no.
<b>SITE CLEAN UP AND PREPARED FOR USE</b>	Storm water pollution	Do not allow any materials to wash into the storm water system.	Remove erosion and sediment controls only if all bare soil is sealed, covered or re-vegetated. Sweep roadways clean and remove all debris from kerb and gutter areas. Do not wash into drains.	Contractor	-	
		Minimise waste	Decontaminate and collect waste in storage area ready for off-site recycling or disposal. Arrange for final collection and removal of excess and waste materials.	Contractor	-	
<b>ESTABLISHING PLANTS</b>	Slow or no re-vegetation to stabilise soil; loss or degradation of habitat	To ensure re-vegetation to stabilize soil	Agreed schedule for regular follow-up watering, weed control, mulch supplements and amenity pruning, if needed. Replace all plant failures within three month period after planting.	Contractor	To be agreed	
<b>MATERIALS FAILURE</b>	Structural damage. Loss of site materials.		Inspect all structures monthly to detect any cracking or structural problems. Confirm with designer if there are design problems. Rectify with materials to match, or other agreed solution.	Contractor	-	
<b>DRAINAGE FAILURE</b>	On-site and downstream drainage pollution or flooding	Storm water management plan	Inspect all site drainage works and repair any failures. Confer with design engineer and to correct site problems.	Contractor	-	
<b>SITE AUDIT</b>	Eventual project failure	Successful project establishment	Routinely audit the works and adjust maintenance schedule accordingly.	Contractor	-	
<b>GENERAL</b>			Open fires and smoking during maintenance works are strictly prohibited.	Contractor	-	6
<b>GEOLOGY</b>	Erosion of	Prevent topsoil	Due to loose topsoil, the soil must be covered by	Engineer /	Once off	

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Responsibility	Frequency of Action	Applicable Act no.
	topsoil	erosion	means of re-seeding and vegetation with suitable ground covering. A risk management plan must be designed and implemented. After completion it will become the responsibility of the Owners' Association. Infrastructure and ground-surface monitoring should be integral part of the risk management plan. Maintenance checks of infrastructure, the inspection of buildings, and the detection and repair/remediation of leaking services are amongst the tasks that will need to be undertaken at local council level. Findings should be recorded and entered into a database. Inspectors need to be aware or educated as to what to look for (ponding of water, cracks in the ground). Inspectors should be aware of the procedures to be followed in the event of an emergency.	Contractor / Dolomite risk management plan compiled	Engineer	
<b>REHABILITATION</b>		To ensure alien and weeds are eradicated	A Rehabilitation Plan should be implemented after construction and should aim to prevent erosion and aid in the return of natural, endemic and indigenous vegetation cover to at least 80% of the rehabilitated area.	Contractor/ each home owner	Every 6 months	
	<b>Open Space System</b>	To ensure the proper management of the open space system	- Only indigenous plant species, preferably species that are indigenous to the natural vegetation of the area, should be used for landscaping in communal areas. As far as possible, plants naturally growing on the development site, but would otherwise be destroyed during clearing for development purposes, should be incorporated into landscaped areas. Forage and host plants required by pollinators should also be planted in landscaped areas.  - In order to minimize artificially generated	Contractor HOA		

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Responsibility	Frequency of Action	Applicable Act no.
			<p>surface storm water runoff, total sealing of paved areas such as parking lots, driveways, pavements and walkways should be avoided. Permeable material should rather be utilized for these purposes.</p> <ul style="list-style-type: none"> <li>- Proper Veld Management Practices, such as fire management, should be implemented in the open space areas.</li> <li>- Corridors of Natural primary grassland must be included as part of the Monavoni Development Framework. These Open Space Areas must be properly managed throughout the lifespan of the project in terms of fire, eradication of exotics etc. to ensure continuous biodiversity.</li> </ul> <p>The DWS must be notified of any deviations from the conditions and commitments.</p>			

## **5 Procedures for environmental incidents**

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### **5.1 Leakages & spills**

- Identify source of problem.
- Stop goods leaking, if safe to do so.
- Contain spilt material, using spills kit or sand.
- Notify Environmental Control Officer
- Remove spilt material and place in sealed container for disposal (if possible).
- Environmental Control Officer to follow Incident Management Plan.

### **5.2 Failure of erosion/sediment control devices**

- Prevent further escape of sediment.
- Contain escaped material using silt fence, hay bales, pipes, etc.
- Notify ECO.
- Repair or replace failed device as appropriate.
- Dig/scrape up escaped material; take care not to damage vegetation.
- Remove escaped material from site.
- ECO to follow Incident Management plan.
- Monitor for effectiveness until re-establishment.

### **5.3 Bank/slope failure**

- Stabilize toe of slope to prevent sediment escape using aggregate bags, silt fence, logs, hay bales, pipes, etc.
- Notify ECO.
- ECO to follow Incident Management plan.
- Divert water upslope from failed fence.
- Protect area from further collapse as appropriate.
- Restore as advised by ECO.
- Monitor for effectiveness until stabilized.

#### **5.4 Discovery of rare or endangered species**

- Stop work.
- Notify ECO.
- If a plant is found, mark location of plants.
- If an animal, mark location where sighted.
- ECO to identify or arrange for identification of species and or the relocation of the species if possible.
- If confirmed significant, ECO to liaise with Endangered Wildlife Trust.
- Recommence work when cleared by ECO.

#### **5.5 Discovery of archeological or heritage items**

- Stop work.
- Do not further disturb the area.
- Notify ECO.
- ECO to arrange appraisal of specimen.
- If confirmed significant, ECO to liaise with National, Cultural and History Museum.  
P.O. Box 28088  
SUNNYSIDE  
0132  
Contact Mr. J. van Schalkwyk  
or  
Mr. Naude
- Recommence work when cleared by ECO

### **6. EMP review**

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1. The Site supervisor is responsible for ensuring the work crew is complying with procedures, and for informing the work crew of any changes. The site supervisor is responsible for ensuring the work crew is aware of changes that may have been implemented by GDARD before starting any works.



2. If the contractor cannot comply with any of the activities as described above, they should inform the ECO with reasons within 7 working days.