REPORT ON

THE ESTABLISHMENT OF MONITORING BOREHOLES FOR MONITORING GROUND WATER QUALITY AT CELL 1 OF THE NEW TONK METER ROAD WASTE DISPOSAL FACILITY SITUATED IN AREA E OF PORTION 81 OF THE FARM RIETFONTEIN 128-IR, SPRINGS, GAUTENG PROVINCE

by

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1. BACKGROUND INFORMATION

Over a three year period between 2010 to 2012 extensive geotechnical and geohydrological investigations were conducted on Areas D, E, F and G of Portion 81 of the farm Rietfontein 128-IR, Springs by BKS (Pty) Ltd on behalf of Vereeniging Refractories (Pty) Ltd (Verref) with the aim of developing the area into waste disposal facilities. The results of these investigations are documented in the BKS Report No. J01740/04 published in 2013. The geological, geotechnical and geohydrological results of this investigation are contained in Appendices 9 and 10 respectively of this report (Appendix 9 by Venter, J P, Meyer, R and Stiff, J, and Appendix 10 by R Meyer).

The selection of sites for the establishment of monitoring boreholes for Cell 1 in Area E currently under development and construction is based on the geological and geohydrological information described in these above mentioned reports. Only a brief summary of the findings of the extensive geological and geohydrological investigations described in these reports will be presented here. For more detailed information on the geological and geohydrological conditions of the area the reader is referred to the reports by Venter *et al* (2012) and Meyer (2012).

2. PURPOSE OF THIS DOCUMENT

The purpose of this report is to explain the selection of monitoring borehole positions, describe the geological and geohydrological conditions observed at each borehole and present the results of the first chemical analyses done on water samples collected from these boreholes.

3. GEOLOGICAL AND GEOHYDROLOGICAL CONDITIONS IN AREA E

Area E has been mined by Corobrik for brick making clays over several years. The overburden consists generally of ferrugenised transported and residual material near surface as well as residual mudrock lower down. The geological conditions described in previous reports are based on the extensive drilling that has been conducted at the site since clay mining operations started in the area during the 1970's and several geological and geohydrological investigations conducted since 1985 for the development of waste disposal facilities. The geologiocal and geohydrological information available from the more than 80 percussion boreholes drilled across the Verref site over the years has resulted in a thorough geological understanding of the area as previously described by Venter *et al* (2012) and Meyer (2012). Only a brief summary of the geological conditions in the area is presented in this report.

The geological conditions present in the area represent a period of more than 2 000 Ma. The summarized geological stratigraphy is shown in Table 1 below. A significant geological unconformity and time gap is present between the Pretoria and Malmani Groups (approximate age around 2 400 Ma) and the base of the overlying Dwyka Group tillite (or diamictite) deposited approximately 320 Ma ago. During this approximately 2 000 Ma time gap, extensive erosion occurred and a karst topography was formed in places on the dolomite surface, much of which was eroded by glacial action during Dwyka times. The drilling results in the area indicate very little weathering of the dolomite surface underlying the Dwyka Tillite, although occasional highly weathered areas (also referred to as “wad”) near the dolomite contact are sometimes encountered manifesting as cavities during drilling. Such areas are interpreted as representing the Rooihoogte Formation at the base of the Pretoria Group. Furthermore, the drilling results also indicated highly

variable depth to the top of the dolomite and Dwyka across the area investigated. These two observations are interpreted as reflecting active glacial scouring during Dwyka times of the dolomite surface when portions of the weathered and karstified dolomite profile had been removed together with the formation of glacial valleys in a dolomite basement. The glacial valleys were then filled by tillite and shale representing the Dwyka Group and younger Karoo age sedimentary deposits.

With the ice sheets retreating, shale, sandstone, coal and mudstone layers of the Ecca Group (Karoo Supergroup) were deposited on a Dwyka and Malmani basement forming valuable brick-making quality clays that have been mined by Verref over many years. Drilling results indicate that the clay deposits can reach thicknesses of up to 35 m in some of the areas investigated.

An important linear and approximately NNW-SSE directed geological structural feature detected during earlier ground magnetic surveys, occurs just west of the western boundary of Area E. This feature is indicated on the official 1:250 000 geological map of the area (Sheet 2628 East Rand, Council for Geoscience, 1978) and described as representing a near vertical dolerite or diabase dyke based on drilling results. This dyke is believed to have an important influence on the groundwater movement patterns in the area. The position of the dyke is indicated on **Figure 1.**

Table 1: Simplified geological sequence occurring in the area around Springs. Light blue shaded areas represent geological formations present in the study area.

Supergroup	Group	Subgroup	Formation	Predominant lithology
Post-Karoo age				Dolerite, diabase and syenite dykes and sills (various ages)
Karoo	Ecca		Vryheid	Sandstone, siltstone and mudstone
	Dwyka			Diamictite, conglomerate, sandstone and mudstone
Transvaal	Pretoria		Rooihoogte	Manganese rich debris (“wad”), chert breccias, sandstone
	Chuniespoort	Malmani		Dolomite, chert, shale and sandstone
Ventersdorp				Sedimentary and volcanic sequences

4. GROUND WATER MONITORING BOREHOLES

The ground water quality monitoring boreholes were constructed according to the general guidelines presented in the two Minimum Requirement documents of the Department of Water and Sanitation (previously the Department of Water Affairs and Forestry): Waste Management Series: (i) Minimum Requirements for Waste Disposal by Landfill (DWAF, 1998), and (ii) Minimum Requirements for water monitoring at Waste Management Facilities (DWAF, 1998). The ground water quality monitoring facilities generally consist of both "Background" and "Detection" monitoring boreholes. A "Background" monitoring borehole position should be selected at a point where the ground water hydraulic pressure level is at an expected higher hydraulic pressure level compared to the hydraulic pressure level of the ground water under the waste disposal site. "Detection" monitoring boreholes on the other hand, should be positioned such as to intercept ground water flowing around and underneath the waste disposal area (Cell 1).



Figure 1: Locality map showing the extent of Area E (fenced area represented by white outline), the area where cell 1 is currently under construction, the four monitoring borehole positions (TM-1 to TM-4) and the position of the dolerite dyke to the west of Area E (red line).

The geohydrological results from earlier investigations in the area as described in the report by Meyer (2013) were used to select the monitoring borehole positions. Based on the results presented in this report, the general ground water flow direction in Areas E and to the east of the dolerite dyke intrusion described earlier is towards the north. To accommodate different geohydrological conditions in the area, it was recommended that two boreholes, one shallow and one deep, be constructed at each monitoring position. In selecting the four recommended monitoring borehole positions, the presence of the existing Rietfontein Landfill site of Ekurhuleni, the dolerite dyke to the west of Area E, potential for developing the existing clay quarries to the south of the currently constructed Cell 1 and the general ground water flow direction in the area, were taken into account. A total of eight borehole positions (four shallower and four deeper boreholes) were selected and recommended for construction. The proposed positions were accepted by the management of Tonk Meter Road Resource Facility. The four borehole positions are numbered as TM-1 to TM-4 and a further "D" or "S" is added to this number to represent the deeper and shallower borehole respectively drilled at each site. The coordinates and other information on each of the eight boreholes drilled is given in the Table 2 below. The shallow and deep boreholes at each site are approximately 3 metres apart.

Table 2: Monitoring borehole coordinates, depth drilled and water level information.

Borehole number	Coordinates (Lo29^0)		Collar elevation (mamsl)	Drilled depth (m)	Water level depth (mbc) 04/11/2024	Monitoring purpose
	Y (m)	X (m)				
TM-1-S	57 625.066	2 909 237.577	1 613.877	24	9.26	Background
TM-1-D	57 623.192	2 909 240.008	1 614.223	51	13.64	Background
TM-2-S	57 879.148	2 908 704.834	1 608.015	20	7.74	Detection
TM-2-D	57 877.913	2 908 703.080	1 608.114	41	9.02	Detection
TM-3-S	57 657.804	2 908 726.299	1 608.421	30	16.53	Detection
TM-3-D	57 660.575	2 908 725.010	1 608.377	51	16.45	Detection
TM-4-S	57 794.941	2 908 957.072	1 611.576	26	10.06	Detection
TM-4-D	57 793.190	2 908 959.851	1 611.655	41	17.31	Detection

All monitoring boreholes were drilled to a diameter of 165 mm. Solid and perforated uPVC casings with a 125 mm inside diameter were installed in each borehole to the depths indicated in the borehole descriptions in Appendix A. The annulus around the uPVC casing is filled with a ~10 mm gravel pack from the base of the borehole to ground level. The surveyed coordinates, elevation, borehole depth, geological description, uPVC casing installed, static ground water level (SWL), collar height and water level elevation for each borehole is included in the borehole description in Appendix A. Photographs of each of the borehole pairs are shown in Figures 2 to 5.



Boreholes TM-1-S (left) and TM-1-D (right).



Boreholes TM-2-D (left) and TM-2-S (right).



Boreholes TM-3-D (left) and TM-3-S (right).



Boreholes TM-4-S (left) and TM-4-D (right).

Figures 2 to 5: Completed boreholes shortly after drilling and before construction of concrete plinth around each borehole.

5. GROUND WATER QUALITY

Water samples from each borehole were collected on 4 November 2024 and submitted for chemical analyses to Aquatico Laboratories in Centurion. The analytical results are shown in Figure 6 and the Certificate of analyses is included as Appendix B. These results are to be used as reference values against which the analytical results of future ground water monitoring are to be compared.

Table 3: Analytical results of water samples collected from each borehole on 4 November 2024.

Aquatico Laboratory number		156331	156332	156333	156334	156335	156336	156337	156338
Borehole number		TM-1D	TM-1S	TM-2D	TM-2S	TM-3D	TM-3S	TM-4D	TM-4S
Analyses	Unit	01-Nov-2024	01-Nov-2024	01-Nov-2024	01-Nov-2024	01-Nov-2024	01-Nov-2024	01-Nov-2024	01-Nov-2024
pH @ 25°C	pH	7.29	6.96	7.86	6.67	7.3	6.78	6.85	6.47
Electrical Con-ductivity (EC)	mS/m	107	88.6	67.9	14.8	43.3	30.3	88.4	87.2
Total Dissolved Solids (TDS) Calc.	mg/l	752	622	402	105	275	208	603	618
Total Alkalinity (T.Alk)	mg $CaCO_3$/l	216	174	208	57.3	141	112	248	158
Chloride (Cl)	mg/l	48.2	23.6	80.3	6.44	28.9	22.8	32.2	37.6
Sulphate (SO_4)	mg/l	318	278	29.7	0.452	43.5	20.6	184	237
Nitrate (NO_3) as N	mg/l	0.195	-0.194	0.654	2.17	0.914	1.08	3.02	7.64
Total Oxidised Nitrogen (TON) as N	mg/l	0.195	-0.194	0.654	2.17	0.914	1.08	3.02	7.64
Ammonium (NH_4) as N	mg/l	0.03	0.015	0.018	0.008	0.022	0.028	0.044	0.195
Free and Saline Ammonia as N	mg/l	0.03	0.015	0.018	0.008	0.022	0.028	0.044	0.195
Orthophosphate (PO_4) as P	mg/l	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009
Fluoride (F)	mg/l	0.922	0.798	0.49	0.802	0.512	0.422	0.383	0.284
Calcium (Ca)	mg/l	114	89.1	57.1	13	42.5	27.8	96.8	91.7
Magnesium (Mg)	mg/l	62.9	48.7	34.7	5.23	19.1	14.4	48.9	47.8
Sodium (Na)	mg/l	36.3	34.4	29.3	5.93	16.9	11.5	29.7	26.9
Potassium (K)	mg/l	9.45	8.36	7.62	4	3.81	3.03	6.6	5.71
Aluminium (Al)	mg/l	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
Iron (Fe)	mg/l	0.008	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
Manganese (Mn)	mg/l	0.132	-0.001	0.024	-0.001	0.135	0.005	0.049	0.008
Chromium (Cr)	mg/l	-0.003	-0.003	-0.003	0.007	-0.003	-0.003	-0.003	-0.003
Hexavalent (Cr^{6+})	mg/l	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
Copper (Cu)	mg/l	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
Nickel (Ni)	mg/l	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
Zinc (Zn)	mg/l	0.062	-0.002	0.018	-0.002	-0.002	-0.002	-0.002	-0.002
Cadmium (Cd)	mg/l	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
Lead (Pb)	mg/l	-0.004	-0.004	0.037	-0.004	-0.004	-0.004	-0.004	-0.004
Tot. hardness (calculated)	mg $CaCO_3$/l	543	423	285	54	185	129	443	426
Chem. Oxyg. Dem. (unfiltered) (COD)	mg/l	39.5	24.6	29.4	38.1	26.3	37.5	73.6	40.6
Chem. Oxyg. Dem. (filtered) (COD)	mg/l	37.6	18.6	24.1	34.4	19.5	35.4	71.5	13
Free cyanide (CN)	mg/l	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008
Phenol	mg/l	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Arsenic (As)	mg/l	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006
Selenium (Se)	mg/l	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
Mercury (Hg)	mg/l	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Silicon (Si)	mg/l	10.7	12.1	12.1	9.1	11.1	12.6	14.5	15
Boron (B)	mg/l	-0.013	-0.013	-0.013	-0.013	-0.013	-0.013	-0.013	-0.013
Acidity (pH 8.3)	mg $CaCO_3$/l	44.8	50.4	31.1	24.1	24.5	27.5	53	70.9

Note: Negative values indicate concentration below detection limit of instrumentation used by laboratory.

6. REFERENCES

BKS (Pty) Ltd (2013). Final Environmental Impact Assessment report: Proposed Tonk Meter Road GLB$^+$ / Class B Waste Disposal Facility at Rietfontein, Springs. Report submitted to Verref on 13 June 2013.

Department of Water Affairs and Forestry (1998). Waste Management Series. Minimum Requirements for Waste Disposal by Landfill. Second Edition. Department of Water Affairs and Forestry, Pretoria.

Council for Geoscience (1978). 1:250 000 scale Geological map Sheet 2628 East Rand. Council for Geoscience, Silverton.

Meyer, R (2012). An assessment of the geohydrological conditions at the proposed new Klinkerstene landfill site east of Delmas, Mpumalanga Province. Appendix 9 of the Environmental Impact Assessment Report submitted to the Department of Economic Development, Environment and Tourism, Mpumalanga Provincial Government.

Venter, J P, Meyer, R and Stiff, J D (2012). Tonk Meter Road Landfill - Geotechnical Report. J P Venter Consulting Services Report No.: 2012/01 submitted to Vereeniging Refractories (Pty) Ltd., October 2012.

Report prepared by:



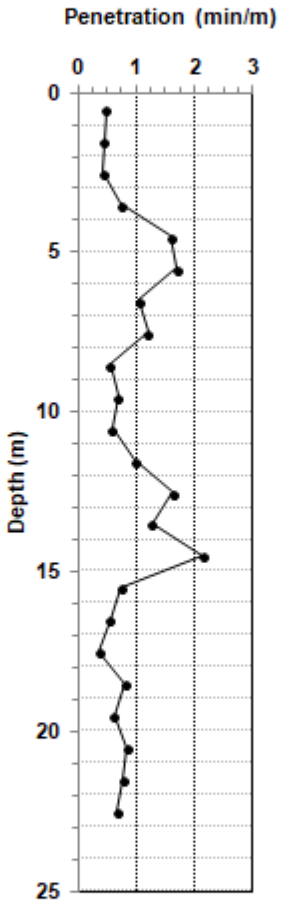
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17 December 2024

APPENDIX A

GEOLOGICAL DESCRIPTIONS OF GROUND WATER MONITORING BOREHOLES

Borehole description

Client:	Tonk Meter Road Resource Facility
Site:	Tonk Meter Road Landfill
Borehole no.:	TM-1S
Coordinates: (Lo29°, WGS84)	Latitude (Y): 57 625.066m
	Longitude (X): 2 909 237.577m
	Collar elevation: 1 613.88 mamsl
Date drilled:	30 October 2024
Drilling contractor:	Tomahawk Borehole Drilling
Profiled by:	R Meyer

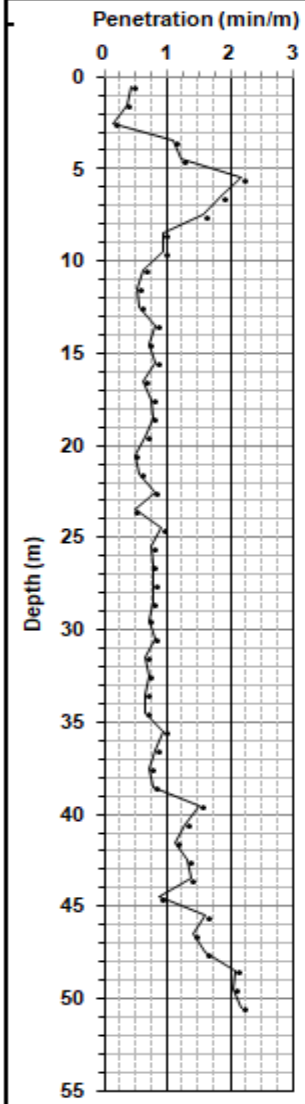


Borehole TM-1S

Depth	Sample description
4m	Soil, brown/red, ferricrete nodules present in upper 2m, clayey from 2m - 4m.
6m	Mudrock, dark brown, highly weathered. Vryheid Formation.
7m	Mudrock, white to light yellow, clayey. Vryheid Formation.
12m	Mudrock, light brown/yellow, fine layering sometimes vissible, weathered. Vryheid Formation.
17m	Mudrock, brown, sandy between 16-17m, weathered. Vryheid Formation.
24m	Mudrock, weathered, soft, slightly carbonaceous at 22m, purple colour between 22-24m. Vryheid Formation
EoH	Total depth: 24m

Notes:	1. Static water level depth: 9.26 mbc on 04/11/2024
	2. Water level elevation: 1 604.62 mamsl on 04/11/2024
	3. No water intersected during drilling.
	4. Clay cutter used from 0 to 24m.
	5. Casing installed: 0-12m: Solid 125 mm ID uPVC.
	12-21m : Perforated 125mm ID uPVC.
	21-24m : Solid 125mm ID uPVC.
	6. Gravel pack: 0-24m approx. 10mm gravel.
	7. 1m x 1m concrete block with bentonite seal around upper part of standpipe still to be constructed.
	8. 6m x 165mm OD Steel standpipe with lockable cap.
	9. Water sample for chemical analysis collected on 04/11/2024.

Borehole description	
Client:	Tonk Meter Road Resource Facility
Site:	Tonk Meter Road Landfill
Borehole no.:	TM-1D
Coordinates: (Lo29°, WGS84)	Latitude (Y): 57 623.192m
	Longitude (X): 2 909 240.008m
	Collar elevation: 1 614.22 mamsl
Date drilled:	30 October 2024
Drilling contractor:	Tomahawk Borehole Drilling
Profiled by:	R Meyer

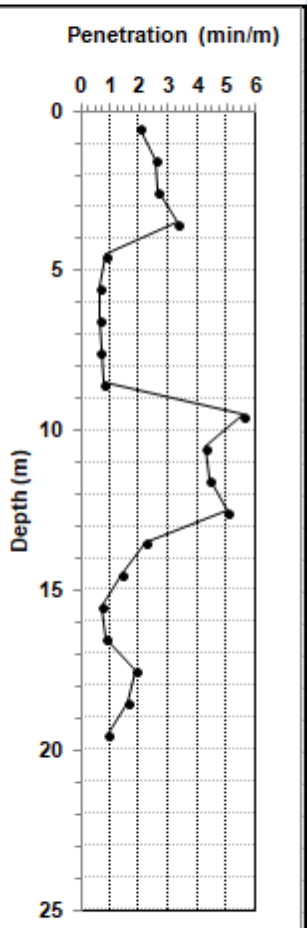


Borehole TM-1D

Depth	Sample description
2m	Soil, red/brown
5m	Soil, red/brown, clayey with some ferricrete in places.
11m	Mudrock, highly weathered, soft, colour ranges from dark brown (@6m), light grey/yellow to brown (@ 8-9m). Vryheid Foprmation
16m	Mudrock, weathered, brown. Vryheid Formation
24m	Mudrock, weathered, soft, slightly sandy @ 17m, slightly carbonaceous@ 22m, purpler cplour between 23-24m. Vryheid Formation.
26m	Shale, carbonaceous. Vryheid Formation
31m	Shale, grey, soft; at 31m slightly carbonaceous. Vryheid Formation
38m	Shale, carbonaceous in places. Vryheid Formation
40m	Chert, water strike at chert/shale contact. Rooihoogte Formation?
51m	Dolomite. Malmani Subgroup
EoH	Total depth: 51m

Notes:	
	1. Static water level = 13.64 mbc on 04/11/2024
	2. Water level elevation 1 600.58 mamsl
	3. Water strikes and approx. yield (l/s): 25m (approx. 0.1 l/s).
	4. Total blow yield at completion of borehole approx. 0.1 l/s
	5. Casing installed: 0-36m: Solid 250 mm ID uPVC
	36-48m: Perforated 125 mm ID uPVC
	48-51m: Solid 125 mm ID uPVC
	6. Gravel pack: 0-51m approx. 10mm gravel chips.
	7. 1m x 1m concrete block with bentonite seal around steel casing still t o be installed.
	8. 6m x 165mm OD Steel standpipe with lockable cap. secured in 1 m x 1 m concrete block
	9. Water sample for chemical analysis collected on 04/11/2024.

Borehole description	
Client:	Tonk Meter Road Resource Facility
Site:	Tonk Meter Road Landfill
Borehole no.:	TM-2S
Coordinates: (Lo29°, WGS84)	Latitude (Y): 57 879.148m
	Longitude (X): 2 908 704.834m
	Collar elevation: 1 608.015 mamsl
Date drilled:	28 October 2024
Drilling contractor:	Tomahawk Borehole Drilling
Profiled by:	R Meyer

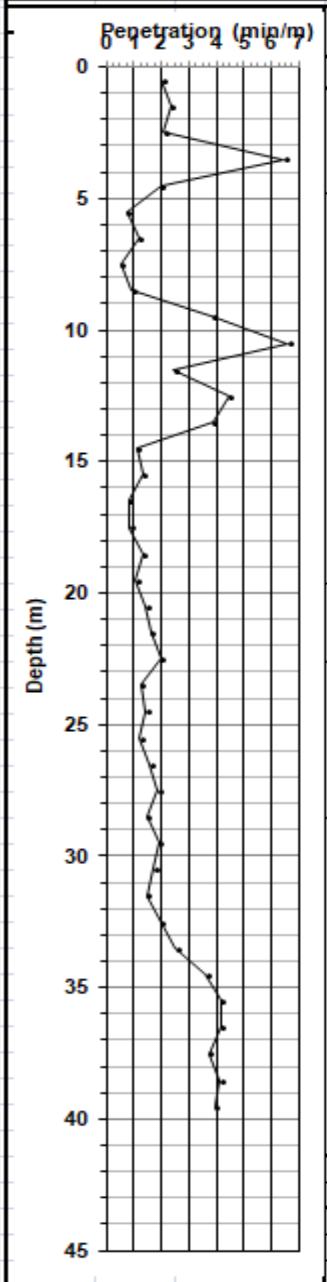


Borehole TM-2S

Depth	Sample description
4m	Soil, red, dry with some ferricrete pieces
7m	Mudrock, light brown, highly weathered (Vryheid Formation)
12m	Mudrock, light brown to purple in places, sandy between 8-10m, weathered (Vryheid Form.)
17m	Mudrock, light grey,, more sandy in places (thin sandstone layering present?) (Vryheid Form.)
19m	Mudrock, light grey, more sandy in places, weathered. (Vryheid Formation)
20m	Chert, weathered, "wad" (Rooihoogte Formation?)
EoH	Total deprth drilled: 20m

Notes:	1. Static water level depth: 7.74 mbc on 04/11/2024
	2. Water level elevation = 1 600.28 mamsl on 04/11/2024
	3. No water intersected during drilling.
	4. Casing installed: 0-8m: Solid 125 mm ID uPVC.
	8-17m: Perforated 125mm ID uPVC.
	17-20m: Solid 125mm ID uPVC.
	5. Gravel pack: 0-20m approx. 10mm gravel.
	6. 1 m x 1m concrete block with bentonite seal around upper part of standpipe to be constru
	7. 6m x 165mm OD Steel standpipe at top with lockable cap.
	8. Water sample for chemical analysis collected on 04/11/2024.

Borehole description	
Client:	Tonk Meter Road Resource Facility
Site:	Tonk Meter Road Landfill
Borehole no.:	TM-2D
Coordinates:	Latitude (Y): 5877.913m
(Lo29°, WGS84)	Longitude (X): 2 908 703.080m
	Collar elevation: 1 608.114mamsl
Date drilled:	28 October 2024
Drilling contractor:	Tomahawk Borehole Drilling
Profiled by:	R Meyer



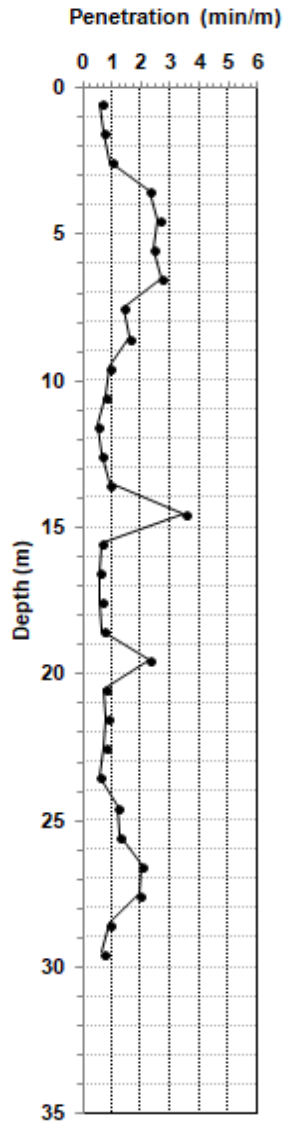
Borehole TM-2D

Depth	Sample description
4m	Soil, red, dry with some ferricrete pieces
19m	Mudrock, light brown to grey, soft, weathered, slightly carbonaceous between 17-19m. Vryheid Formation
22m	Chert, at 20m highly weathered (wad?). Rooihoogte Formation
28m	Dolomite , slightly weathered. Malmani Subgroup
41m	Dolomite, frsh. Malmani Subgroup.
EoH	Total depth: 41m

Notes:	1. Static water level: 9.02 mbc on 04/11/2024
	2. Water level elevation: 1599.09 mamsl
	3. No water intersected during drilling..
	4. Casing installed: 0-36m: Solid 250 mm ID uPVC
	36-48m: Perforated 125 mm ID uPVC
	48-51m: Solid 125 mm ID uPVC
	5. Gravel pack: 0-51m approx. 10mm gravel chips.
	6. 1m x 1m concrete block with bentonite seal around steel casing still t o be installed.
	7. 6m x 165mm OD Steel standpipe with lockable cap. secured in 1 m x 1 m concrete block.
	8. Water sample for chemical analysis collected on 04/11/2024.

Borehole description

Client:	Tonk Meter Road Resource Facility
Site:	Tonk Meter Road Landfill
Borehole no.:	TM-3S
Coordinates: (Lo29°, WGS84)	Latitude (Y): 57 657.804m
	Longitude (X): 2 908 726.299m
	Collar elevation: 1 608.421 mamsl
Date drilled:	29 October 2024
Drilling contractor:	Tomahawk Borehole Drilling
Profiled by:	R Meyer



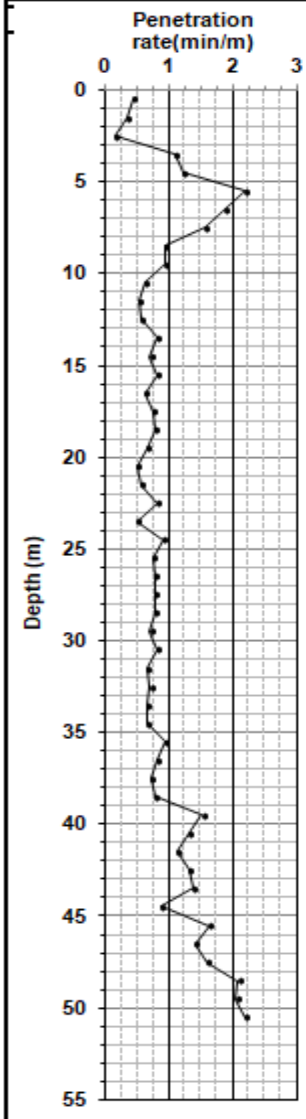
Borehole TM-3S

Depth	Sample description
6m	Soil, red/brown, some ferricrete nodule present in upper 2m, weatherd shale from 2-6m?
14m	Mudrock, brown, weathered. Vryheid Formation
18m	Mudrock, light brown. Vryheid Formation
23m	Mudrock, dark brown becoming carbonaceous from 22-23m. Vryheid Formation
24m	Sandstone, Vryheid Formation
26m	Mudrock,light grey to grey. Vryheid Formation
30m	Mudrock and sandstone. Vryheid Formation
EoH	Total depth: 30m

Notes:	1. Static water level depth: 16.53 mbc on 04/11/2024
	2. Water level elevation = 1 591.89 mamsl on 04/11/2024
	3. No water intersected during drilling.
	4. Clay cutter used from 0 to 24m.
	5. Casing installed: 0-15m: Solid 125 mm ID uPVC.
	15-27m : Perforated 125mm ID uPVC.
	27-30m : Solid 125mm ID uPVC.
	6. Gravel pack: 0-30m approx. 10mm gravel.
	7. 1m x 1m concrete block with bentonite seal around upper part of standpipe to be constru
	8. 6m x 165mm OD Steel standpipe with lockable cap.
	9. Water sample for chemical analysis collected on 04/11/2024.

Borehole description

Client:	Tonk Meter Road Resource Facility
Site:	Tonk Meter Road Landfill
Borehole no.:	TM-3D
Coordinates: (Lo29°, WGS84)	Latitude (Y): 57 660.575m Longitude (X): 2 908 725.010m Collar elevation: 1 608.377mamsl
Date drilled:	28-29 October 2024
Drilling contractor:	Tomahawk Borehole Drilling
Profiled by:	R Meyer



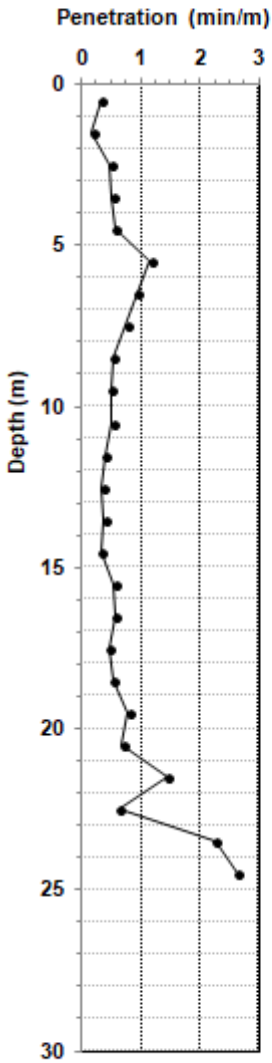
Borehole TM-3D

Depth	Sample description
6m	Soil, red/brown, some ferricrete nodule present in upper 2m, weatherd shale from 2-6m?
14m	Mudrock, brown, weathered. Vryheid Formation
18m	Mudrock, light brown. Vryheid Formation
23m	Mudrock, dark brown becoming carbonaceous from 22-23m. Vryheid Formation
24m	Sandstone, Vryheid Formation
26m	Mudrock,light grey to grey. Vryheid Formation
30m	Mudrock and sandstone. Vryheid Formation
35 m	this section of borehole TM-3D at this depth as is the case at depth of 31 to 33m in borehole TM-3S only 3m north of borehole TM-3D. This section represents the Rooihoogte Formation
41m	Dolomite, weathered, possibly some wad in places. Wad could still represent Rooihoogte Formation; dolomite represents Malmani Subgroup.
51m	Dolomite. fresh and hard, penetratioon rate >1m/min. Malmani Subgroup.
EoH	Total depth: 51m

Notes:	1. Static water level = 16.45 mbc on 04/11/2024
	2. Water level elevation 1591.93mamsl
	3. Water intersected at 41-42m depth near contact with solid dolomite; yielld estimated to be <0.2l
	4. Casing installed: 0-36m: Solid 250 mm ID uPVC
	36-48m: Perforated 125 mm ID uPVC
	48-51m: Solid 125 mm ID uPVC
	5. Gravel pack: 0-51m approx. 10mm gravel chips.
	6. 1m x 1m concrete block with bentonite seal around steel casing still t o be installed.
	7. 6m x 165mm OD Steel standpipe with lockable cap. secured in 1m x 1m concrete block.
	8. Water sample for chemical analysis collected on 04/11/2024.

Borehole description

Client:	Tonk Meter Road Resource Facility
Site:	Tonk Meter Road Landfill
Borehole no.:	TM-4S
Coordinates: (Lo29°, WGS84)	Latitude (Y): 57 794.941m
	Longitude (X): 2 908 957.072m
	Collar elevation: 1 611.576mamsl
Date drilled:	29 October 2024
Drilling contractor:	Tomahawk Borehole Drilling
Profiled by:	R Meyer



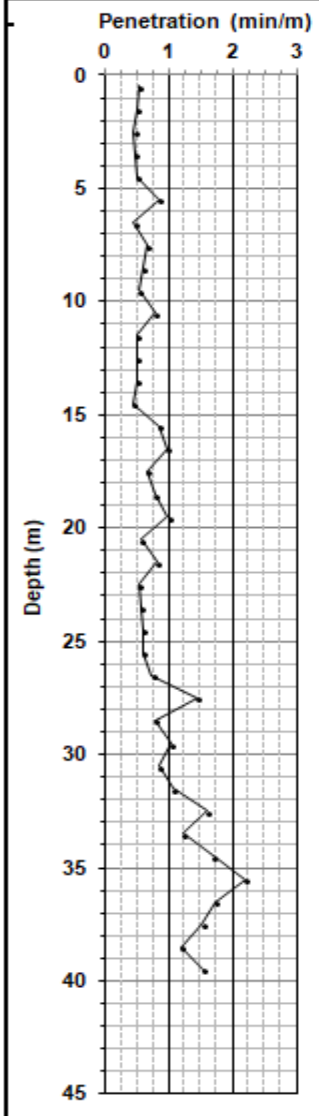
Borehole TM-4S

Depth	Sample description
3m	Soil, red, some ferricrete present (Back filled material?)
6m	Sandstone, highly weathered, Vryheid Formation
14m	Mudrock, grey/brown, weathered, Vryheid Formation
19m	Mudrock, grey/purple, Vryheid Formation
22m	Mudrock, grey, some black carbonaceous material present that increases to 22m depth, Vryheid Formation
26m	Sandstone, grey, Vryheid Formation
EoH	Total depth: 26m

Notes:

1. Static water level depth: 10.06 mbc on 04/11/2024
2. Water level elevation = 1 601.52 mamsl on 04/11/2024
3. No water intersected during drilling.
4. Clay cutter used from 0 to 24m.
5. Casing installed: 0-12m: Solid 125 mm ID uPVC.
   12-21m : Perforated 125mm ID uPVC.
   21-24m : Solid 125mm ID uPVC.
6. Gravel pack: 0-24m approx. 10mm gravel.
7. 1m x 1m concrete block and bentonite seal around upper part of standpipe to be construct
8. 6m x 165mm OD Steel standpipe with lockable cap.
9. Water sample for chemical analysis collected on 04/11/2024.

Borehole description	
Client:	Tonk Meter Road Resource Facility
Site:	Tonk Meter Road Landfill
Borehole no.:	TM-4D
Coordinates: (Lo29°, WGS84)	Latitude (Y): 57 793.190m Longitude (X): 2 908 959.851m Collar elevation: 1 611.655mamsl
Date drilled:	29 October 2024
Drilling contractor:	Tomahawk Borehole Drilling
Profiled by:	R Meyer



Borehole TM-4D

Depth	Sample description
3m	Soil, red, some ferricrete present (Back filled material?)
6m	Sandstone, highly weathered, Vryheid Formation
14m	Mudrock, grey/brown, weathered, Vryheid Formation
19m	Mudrock, grey/purple, Vryheid Formation
22m	Mudrock, grey, some black carbonaceous material present that increases to 22m depth, Vryheid Formation
27m	Sandstone, grey, Vryheid Formation
31m	Chert and sandstone, Rooihoogte Formation?
41m	Dolomite, fresh, Malmani Subgroup
EoH	Total depth: 41m

Notes:
1. Static water level depth: 17.31mbc on 04/11/2024
2. Water level elevation: 1 594.35mamsl
3. No water intersected during drilling.
4. Casing installed: 0-26m: Solid 125 mm ID uPVC
   26-38m: Perforated 125mm ID uPVC
   38-41m: Solid 125mm ID uPVC
5. Gravel pack: 0-41m; approx.10mm gravel chips.
6. 1m x 1m concrete block with bentonite seal around steel casing to be installed
7. 6m x 165mm OD Steel standpipe with lockable cap.
8. Water sample for chemical analysis collected on 04/11/2024.

APPENDIX B

CERTIFICATE OF ANALYSES:

CHEMICAL ANALYSES OF GROUND WATER SAMPLES COLLECTED ON 4 NOVEMBER 2024 FROM ALL NEWLY DRILLED MONITORING BOREHOLES AT THE NEW TONK METER ROAD WASTE DISPOSAL FACILITY, SPRINGS BEFORE ANY WASTE DISPOSAL OPERATIONS WILL COMMENCE

aquatico Laboratories (Pty). Ltd.

ilac-MRA sanas Testing Laboratory T0685

Test Report

Client: Reinie Meyer
Address: 66 Riemland place, Wapadrand, Pretoria
Report no: 201229
Project: Tonk Meter Road

Date of report: 12 November 2024
Date accepted: 04 November 2024
Date completed: 12 November 2024
Date received: 04 November 2024

Lab no:				156331	156332	156333	156334	156335	156336	156337
Date sampled:				01-Nov-24	01-Nov-24	01-Nov-24	01-Nov-24	01-Nov-24	01-Nov-24	01-Nov-24
Aquatico sampled:				No	No	No	No	No	No	No
Sample type:				Water	Water	Water	Water	Water	Water	Water
Locality description:				TM-1D	TM-1S	TM-2D	TM-2S	TM-3D	TM-3S	TM-4D
		Analyses	**Unit**	**Method**						
A	AQL	pH @ 25°C	pH	ALM 20	7.29	6.96	7.86	6.67	7.30	6.78	6.85
A	AQL	Electrical conductivity (EC) @ 25°C	mS/m	ALM 20	107	88.6	67.9	14.8	43.3	30.3	88.4
A	AQL	Total dissolved solids (TDS)	mg/l	ALM 26	752	622	402	105	275	208	603
A	AQL	Total Alkalinity	mg $CaCO_3$/l	ALM 01	216	174	208	57.3	141	112	248
A	AQL	Chloride (Cl)	mg/l	ALM 02	48.2	23.6	80.3	6.44	28.9	22.8	32.2
A	AQL	Sulphate (SO_4)	mg/l	ALM 03	318	278	29.7	0.452	43.5	20.6	184
A	AQL	Nitrate (NO_3) as N	mg/l	ALM 06	0.195	<0.194	0.654	2.17	0.914	1.08	3.02
A	AQL	Total oxidised nitrogen as N	mg/l	ALM 06	0.195	<0.194	0.654	2.17	0.914	1.08	3.02
A	AQL	Ammonium (NH_4) as N	mg/l	ALM 05	0.030	0.015	0.018	0.008	0.022	0.028	0.044
A	AQL	Orthophosphate (PO_4) as P	mg/l	ALM 12	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
A	AQL	Fluoride (F)	mg/l	ALM 08	0.922	0.798	0.490	0.802	0.512	0.422	0.383
A	AQL	Calcium (Ca)	mg/l	ALM 30	114	89.1	57.1	13.0	42.5	27.8	96.8
A	AQL	Magnesium (Mg)	mg/l	ALM 30	62.9	48.7	34.7	5.23	19.1	14.4	48.9
A	AQL	Sodium (Na)	mg/l	ALM 30	36.3	34.4	29.3	5.93	16.9	11.5	29.7
A	AQL	Potassium (K)	mg/l	ALM 30	9.45	8.36	7.62	4.00	3.81	3.03	6.60
A	AQL	Aluminium (Al)	mg/l	ALM 31	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
A	AQL	Iron (Fe)	mg/l	ALM 31	0.008	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
A	AQL	Manganese (Mn)	mg/l	ALM 31	0.132	<0.001	0.024	<0.001	0.135	0.005	0.049
A	AQL	Chromium (Cr)	mg/l	ALM 31	<0.003	<0.003	<0.003	0.007	<0.003	<0.003	<0.003
A	AQL	Hexavalent chromium (Cr^{6+})	mg/l	ALM 09	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
A	AQL	Copper (Cu)	mg/l	ALM 31	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
A	AQL	Nickel (Ni)	mg/l	ALM 31	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
A	AQL	Zinc (Zn)	mg/l	ALM 31	0.062	<0.002	0.018	<0.002	<0.002	<0.002	<0.002
A	AQL	Cadmium (Cd)	mg/l	ALM 31	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
A	AQL	Lead (Pb)	mg/l	ALM 31	<0.004	<0.004	0.037	<0.004	<0.004	<0.004	<0.004

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M. Swanepoel
Technical Signatory

aquatico Laboratories (Pty). Ltd.

ilac-MRA sanas Testing Laboratory T0685

Test Report

Client: Reinie Meyer
Address: 66 Riemland place, Wapadrand, Pretoria
Report no: 201229
Project: Tonk Meter Road

Date of report: 12 November 2024
Date accepted: 04 November 2024
Date completed: 12 November 2024
Date received: 04 November 2024

Lab no:					156331	156332	156333	156334	156335	156336	156337
Date sampled:					01-Nov-24	01-Nov-24	01-Nov-24	01-Nov-24	01-Nov-24	01-Nov-24	01-Nov-24
Aquatico sampled:					No	No	No	No	No	No	No
Sample type:					Water	Water	Water	Water	Water	Water	Water
Locality description:					TM-1D	TM-1S	TM-2D	TM-2S	TM-3D	TM-3S	TM-4D
		Analyses	**Unit**	**Method**							
A	AQL	Total hardness	mg $CaCO_3$/l	ALM 26	543	423	285	54	185	129	443
A	AQL	Chemical oxygen demand (COD)	mg/l	ALM 10	39.5	24.6	29.4	38.1	26.3	37.5	73.6
N	AQL	COD filtered	mg/l	ALM 10	37.6	18.6	24.1	34.4	19.5	35.4	71.5
A	AQL	Free Cyanide (CN)	mg/l	ALM 14	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008
N	AQL	Phenol	mg/l	ALM 71	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
A	AQL	Arsenic (As)	mg/l	ALM 34	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
A	AQL	Selenium (Se)	mg/l	ALM 34	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
A	AQL	Mercury (Hg)	mg/l	ALM 34	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
A	AQL	Silicon (Si)	mg/l	ALM 33	10.7	12.1	12.1	9.10	11.1	12.6	14.5
A	AQL	Boron (B)	mg/l	ALM 33	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013
N	AQL	Acidity pH 8.3	mg $CaCO_3$/l	ALM 60	44.8	50.4	31.1	24.1	24.5	27.5	53.0
A	AQL	Free and Saline Ammonia as N	mg/l	ALM 26	0.030	0.015	0.018	0.008	0.022	0.028	0.044

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Test Report

Client: Reinie Meyer
Address: 66 Riemland place, Wapadrand, Pretoria
Report no: 201229
Project: Tonk Meter Road

Date of report: 12 November 2024
Date accepted: 04 November 2024
Date completed: 12 November 2024
Date received: 04 November 2024

Lab no:	156338
Date sampled:	01-Nov-24
Aquatico sampled:	No
Sample type:	Water
Locality description:	TM-4S

		Analyses	Unit	Method	
A	AQL	pH @ 25°C	pH	ALM 20	6.47
A	AQL	Electrical conductivity (EC) @ 25°C	mS/m	ALM 20	87.2
A	AQL	Total dissolved solids (TDS)	mg/l	ALM 26	618
A	AQL	Total Alkalinity	mg $CaCO_3$/l	ALM 01	158
A	AQL	Chloride (Cl)	mg/l	ALM 02	37.6
A	AQL	Sulphate (SO_4)	mg/l	ALM 03	237
A	AQL	Nitrate (NO_3) as N	mg/l	ALM 06	7.64
A	AQL	Total oxidised nitrogen as N	mg/l	ALM 06	7.64
A	AQL	Ammonium (NH_4) as N	mg/l	ALM 05	0.195
A	AQL	Orthophosphate (PO_4) as P	mg/l	ALM 12	<0.009
A	AQL	Fluoride (F)	mg/l	ALM 08	0.284
A	AQL	Calcium (Ca)	mg/l	ALM 30	91.7
A	AQL	Magnesium (Mg)	mg/l	ALM 30	47.8
A	AQL	Sodium (Na)	mg/l	ALM 30	26.9
A	AQL	Potassium (K)	mg/l	ALM 30	5.71
A	AQL	Aluminium (Al)	mg/l	ALM 31	<0.002
A	AQL	Iron (Fe)	mg/l	ALM 31	<0.004
A	AQL	Manganese (Mn)	mg/l	ALM 31	0.008
A	AQL	Chromium (Cr)	mg/l	ALM 31	<0.003
A	AQL	Hexavalent chromium (Cr^{6+})	mg/l	ALM 09	<0.002
A	AQL	Copper (Cu)	mg/l	ALM 31	<0.002
A	AQL	Nickel (Ni)	mg/l	ALM 31	<0.002
A	AQL	Zinc (Zn)	mg/l	ALM 31	<0.002
A	AQL	Cadmium (Cd)	mg/l	ALM 31	<0.002
A	AQL	Lead (Pb)	mg/l	ALM 31	<0.004

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Test Report

Client: Reinie Meyer
Address: 66 Riemland place, Wapadrand, Pretoria
Report no: 201229
Project: Tonk Meter Road

Date of report: 12 November 2024
Date accepted: 04 November 2024
Date completed: 12 November 2024
Date received: 04 November 2024

Lab no:	156338
Date sampled:	01-Nov-24
Aquatico sampled:	No
Sample type:	Water
Locality description:	TM-4S

		Analyses	Unit	Method	
A	AQL	Total hardness	mg $CaCO_3$/l	ALM 26	426
A	AQL	Chemical oxygen demand (COD)	mg/l	ALM 10	40.6
N	AQL	COD filtered	mg/l	ALM 10	13.0
A	AQL	Free Cyanide (CN)	mg/l	ALM 14	<0.008
N	AQL	Phenol	mg/l	ALM 71	<0.01
A	AQL	Arsenic (As)	mg/l	ALM 34	<0.006
A	AQL	Selenium (Se)	mg/l	ALM 34	<0.002
A	AQL	Mercury (Hg)	mg/l	ALM 34	<0.005
A	AQL	Silicon (Si)	mg/l	ALM 33	15.0
A	AQL	Boron (B)	mg/l	ALM 33	<0.013
N	AQL	Acidity pH 8.3	mg $CaCO_3$/l	ALM 60	70.9
A	AQL	Free and Saline Ammonia as N	mg/l	ALM 26	0.195

A = Accredited N = Non accredited Sub = Sub-contracted NR = Not requested RTF = Results to follow NATD = Not able to determine ATR = Alternative test report ; Results relate only to the items received and tested ; Results reported against the limit of detection; Results marked 'Non SANAS Accredited' in this report are not included in the SANAS Schedule of Accreditation for this laboratory; Uncertainty of measurement available on request for all methods included in the SANAS Schedule of Accreditation; The report shall not be reproduced except in full without approval of the laboratory

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