2. NATURE AND EXTENT OF THE ENVIRONMENT AFFECTED BY ACTIVITY

The following section provides a description of the baseline or status quo environment as well as the social-economic parameters that characterise the region and the study area, and is derived from various specialist studies as well as data sources including aerial photographs, topo-cadastral maps and national and provincial databases.

2.1 Biophysical aspects affected

2.1.1 Geology

The site is underlain by transported silty and gravelly soils over residual soils developed over mudrock bedrock belonging to the Vryheid Formation from the Ecca group which forms part of the Karoo Supergroup. According to the Kruger report, dolomite and chert bedrock occurs at a deep below the surface of the site (Dolomite bedrock at a depth of 40m). The dolomite and chert bedrock belongs to the Malmani Subgroup, which forms part of the Transvaal Supergroup.

To determine the suitability of the proposed site for the construction of the pond and wetland wastewater treatment works, a site investigation was conducted by JOHANN VD MERWE (Pty) Ltd. (Consulting Applied Earth and Environmental Scientists). The full geotechnical report by Mr. Johann van der Merwe, entitled Factual Report on Geotechnical Investigation carried out for the proposed: Delmas Abattoir Waste Water Treatment Works on: Portion 21 of the farm Geluk 234-IR, Delmas District, Mpumalanga Province, can be viewed under Appendix D. The following information has been extracted from the report.

A site investigation was conducted on the proposed site in February 2010. The investigation was commissioned in order to determine the foundation conditions for the construction of the WWTW.

Twelve pits (Figure 20) were excavated using a backactor, supplied by Willem Groenewald from Delmas. These pits were entered, inspected and profiled by Mr. van der Merwe in accordance with the methods advocated by Jennings *et al.* (1973). Disturbed and undisturbed soil samples were taken and sent for analysis in Messrs SNALAB's Laboratory from Waltloo (JOHANN VD MERWE, 2011). The soil profiles are given as Figure 8 to Figure 19 at the end of this section.

The following geotechnical considerations were investigated:

2.1.2 Shear Strength Characteristics

An undisturbed and a remodelled sample (DA/1, DA/9) from the site were subjected to saturated consolidated drained direct shear tests. These tests simulate long-term conditions and a number of shear strength parameters were measured under normal stresses of 50, 100 and 200 kPa. The results of the tests are given below as Table 3.

Table 3: Shear Strength Test Results (JOHANN VD MERWE, 2011).

Hole nr.	Depth (m)	Dry density (kg/m^3)	Normal stress (kPa)	Cohesion (Kn/m^2)	Angle of friction (degrees)
DA/1	1.0	1 221	50, 100, 200	0.7	24.7
DA/9	2.2	1 637	50, 100, 200	1.1	28.1

The results of the tests indicate moderate friction angles and very low cohesion values for the remoulded and in situ clayey sand and gravelly silt that blanket the site.

2.1.3 Groundwater and soil chemistry

No water seepages were encountered during the investigation which was carried out toward the end of the wet season. However, season perched water conditions may possibly occur at the interface of the dense, ferruginised sandy silt and the overlying very loose gravelly and sandy materials.

Foundation materials are expected to be potentially chemically aggressive towards buried ferrous pipes with electrical conductivity values of 0.008 – 0.077S/m and pH values between 5.64 – 6.97. Non-ferrous metal or plastic pipes would therefore be more suitable for underground use on the site.

2.1.4 Soil permeability

Undisturbed (DA/1 and DA/9) and remodelled (DA/1 and DA/2) samples from the site were subjected to falling head permeability tests. The test results are given in the table below.

Table 4: Permeability tests (JOHANN VD MERWE, 2011).

Hole nr.	Depth (m)	Material type	Initial moisture content (%)	Dry density (kg/m^3)	Coefficient of permeability (cm/s)
DA/1	0.0-1.4*	8.9		1 995	1.9E-08
DA/1	1.0	11.4	1 337		9.03E-04
DA/2	1.4-2.8*	12.0		1 875	7.9E-09
DA/9	2.2	13.0	1 637		6.7E-09

*****Remoulded sample

The test results show that the coefficient of permeability for both the remoulded and lower lying (>1.8m deep) in situ samples is very low with a relative permeability of “very impervious” in its recompacted state. The in situ undisturbed samples of the soil horizons occurring above 1.8m have a high coefficient of permeability with a relative permeability of “pervious” in its undisturbed state (JOHANN VD MERWE, 2011).

As a result of the high coefficient of permeability found in the undisturbed samples of the soil horizons occurring above 1.8m, the WWTW will be completely lined with HDPE to prevent any seepage during treatment.

2.1.5 Excavation Characteristics

From the tests done it can be said that no problems should be encountered during excavations of the transported and residual soils down to a depth of 3.0 metres below the surface when using conventional earth-moving machines. During the duration of the dry season sidewalls of deep excavations are expected to remain stable, however instabilities may occur during the rainy season.

2.1.6 Earthworks

Upper site soils were tested to determine their compaction characteristics. The test results are given below in the table below.

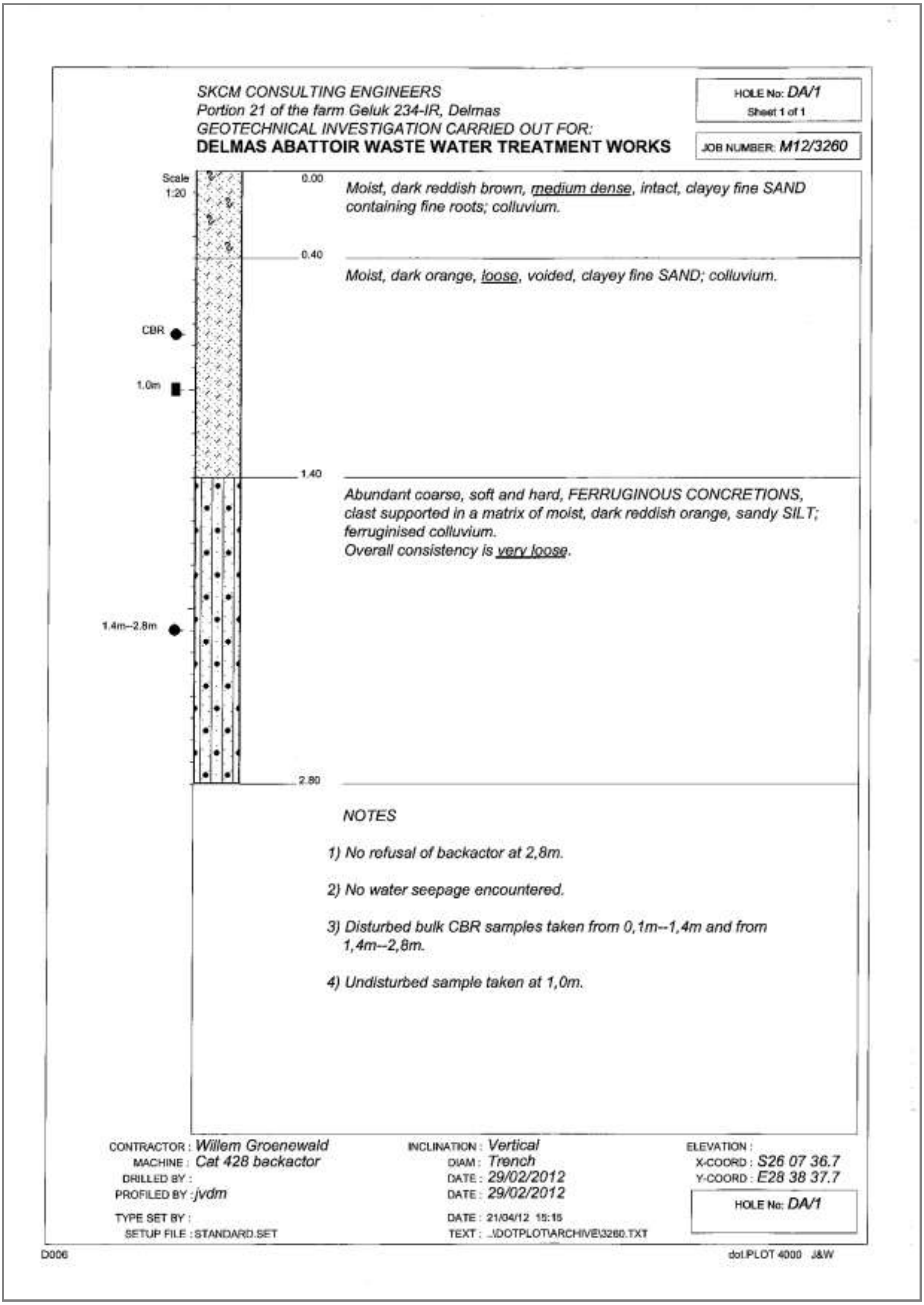
Table 5: Compaction tests (JOHANN VD MERWE, 2011).

Hole nr.	Depth (m)	Soil type	PI	GM	CBR	TRH14	SWELL
DA/1	0.0-1.4	Clayey SAND	8	0.59	12.1	G9	0.75
DA/1	1.4-2.8	Gravelly SILT	9	0.74	8.2	G9	-0.03

PI = Plasticity Index; GM = Grading Modulus; CBR = California Bearing Ration at 95% Mod AASHTO compaction

Based on the compaction tests, it is evident that the dark red and dark orange, clayey sand and gravelly silt have a fairly low compacted strength and a moderate to low predicted swell after compaction, respectively. Chemical stabilization or mechanical modification of these soils may improve the compacted strength thereof (JOHANN VD MERWE, 2011).

Please see Appendix D for more detail regarding the geotechnical study and in particular the tests performed.



SKCM CONSULTING ENGINEERS
Portion 21 of the farm Geluk 234-IR, Delmas
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
DELMAS ABATTOIR WASTE WATER TREATMENT WORKS

HOLE No: *DA/1*
Sheet 1 of 1

JOB NUMBER: *M12/3260*

Scale 1:20

0.00 *Moist, dark reddish brown, medium dense, intact, clayey fine SAND containing fine roots; colluvium.*

0.40 *Moist, dark orange, loose, voided, clayey fine SAND; colluvium.*

CBR

1.0m

1.40 *Abundant coarse, soft and hard, FERRUGINOUS CONCRETIONS, clast supported in a matrix of moist, dark reddish orange, sandy SILT; ferruginised colluvium.*
Overall consistency is very loose.

1.4m--2.8m

2.80

NOTES

1) No refusal of backactor at 2,8m.

2) No water seepage encountered.

3) Disturbed bulk CBR samples taken from 0,1m--1,4m and from 1,4m--2,8m.

4) Undisturbed sample taken at 1,0m.

CONTRACTOR : *Willem Groenewald*
MACHINE : *Cat 428 backactor*
DRILLED BY :
PROFILED BY : *jvdm*
TYPE SET BY :
SETUP FILE : STANDARD.SET

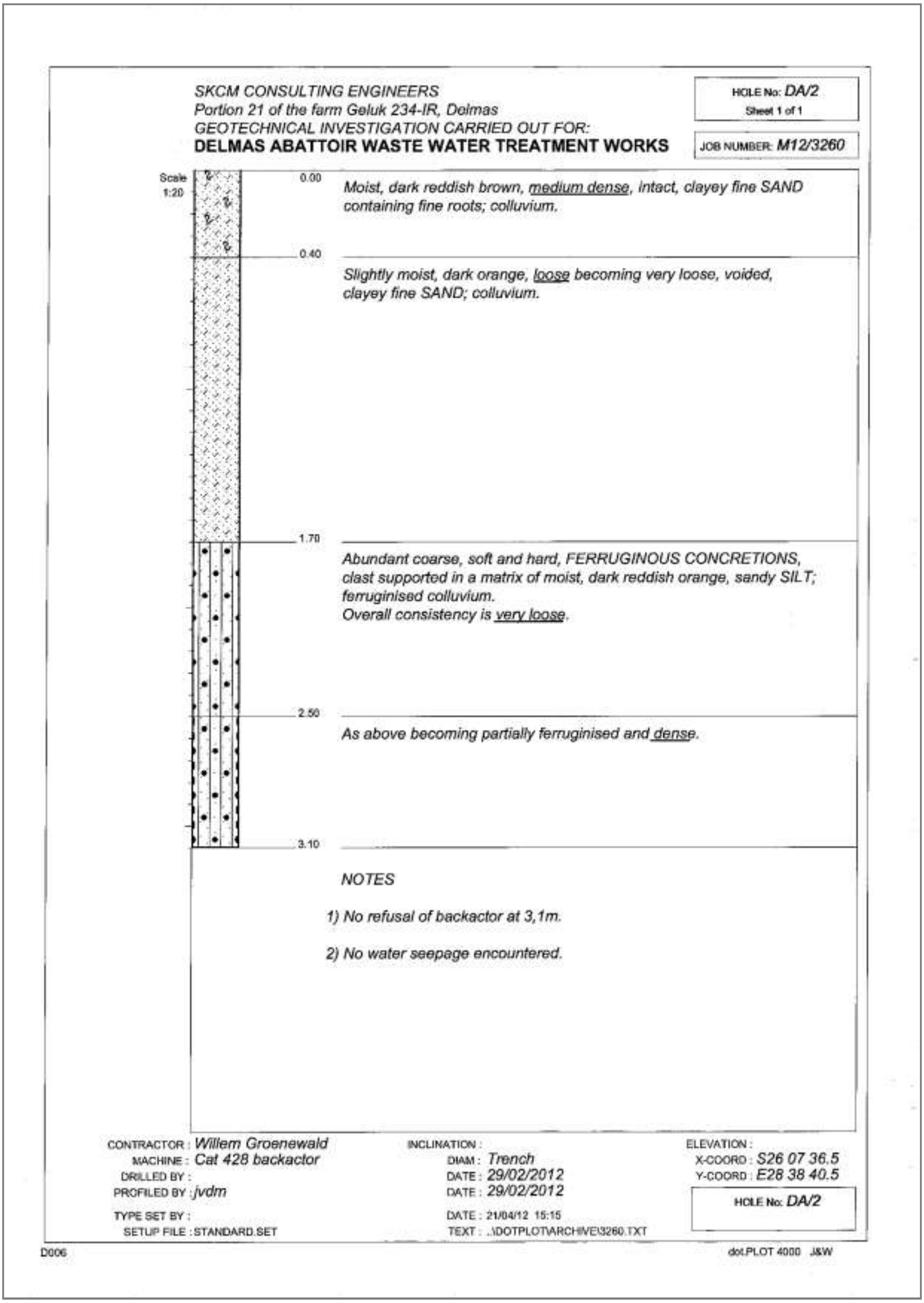
INCLINATION : *Vertical*
DIAM : *Trench*
DATE : *29/02/2012*
DATE : *29/02/2012*
DATE : 21/04/12 15:15
TEXT : ..\DOTPLOT\ARCHIVE\3260.TXT

ELEVATION :
X-COORD : *S26 07 36.7*
Y-COORD : *E28 38 37.7*
HOLE No: *DA/1*

D006

dot.PLOT 4000 J&W

Figure 8: Soil profile for hole DA/1 (v.d. Merwe, J., 2010).



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Portion 21 of the farm Geluk 234-IR, Delmas
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
DELMAS ABATTOIR WASTE WATER TREATMENT WORKS

HOLE No: DA/2
Sheet 1 of 1

JOB NUMBER: M12/3260

Scale
1:20

Depth	Description
0.00	Moist, dark reddish brown, medium dense, intact, clayey fine SAND containing fine roots; colluvium.
0.40	Slightly moist, dark orange, loose becoming very loose, voided, clayey fine SAND; colluvium.
1.70	Abundant coarse, soft and hard, FERRUGINOUS CONCRETIONS, clast supported in a matrix of moist, dark reddish orange, sandy SILT; ferruginised colluvium. Overall consistency is very loose.
2.50	As above becoming partially ferruginised and dense.
3.10	

NOTES

1) No refusal of backactor at 3,1m.

2) No water seepage encountered.

CONTRACTOR : Willem Groenewald
MACHINE : Cat 428 backactor
DRILLED BY :
PROFILED BY : jvdm

TYPE SET BY :
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM : Trench
DATE : 29/02/2012
DATE : 29/02/2012

DATE : 21/04/12 15:15
TEXT : ..\DOTPLOT\ARCHIVE\3260.TXT

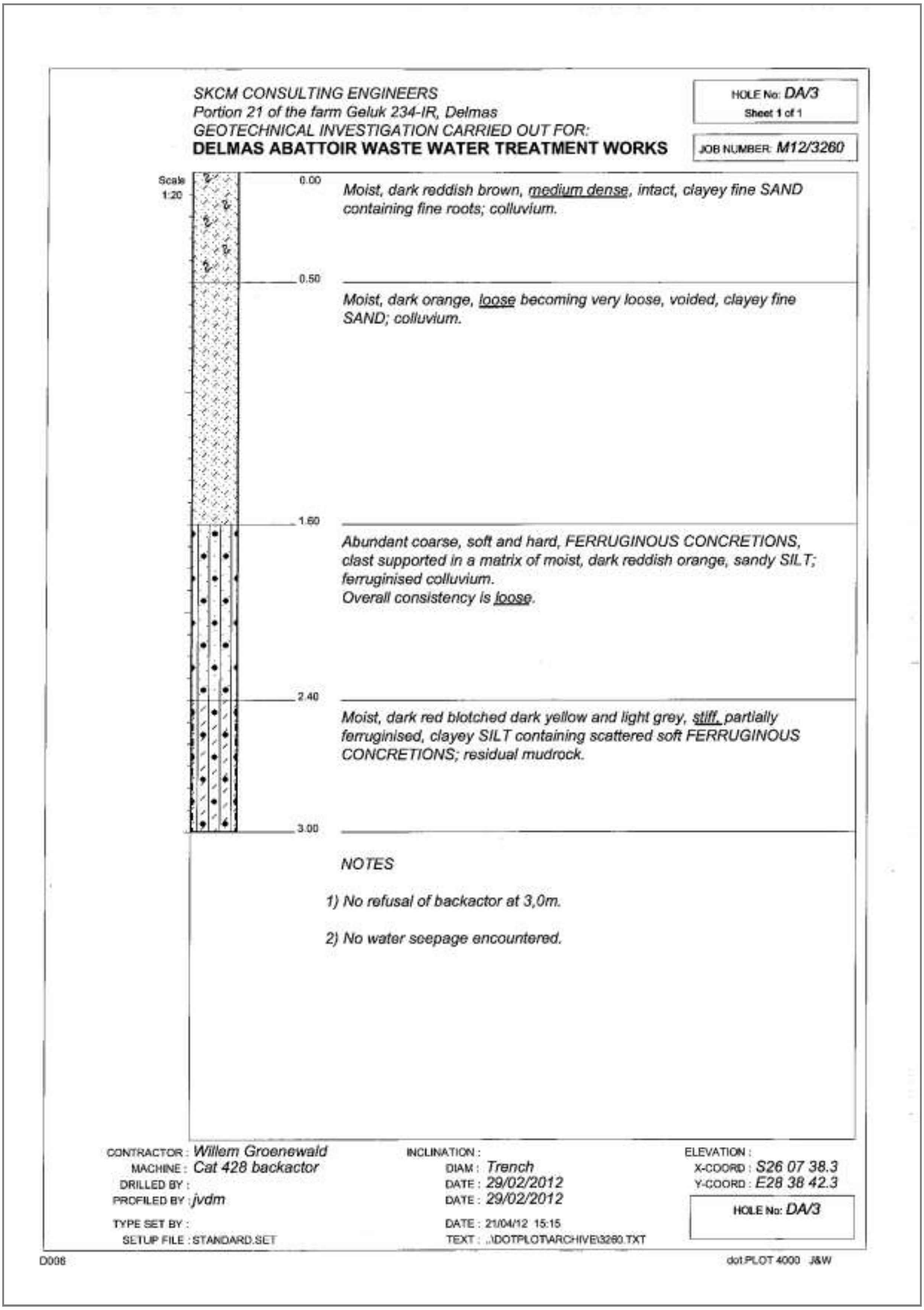
ELEVATION :
X-COORD : S26 07 36.5
Y-COORD : E28 38 40.5

HOLE No: DA/2

D006

dotPLOT 4000 J&W

Figure 9: Soil profile for hole DA/2 (v.d. Merwe, J., 2010).



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Portion 21 of the farm Geluk 234-IR, Delmas
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
DELMAS ABATTOIR WASTE WATER TREATMENT WORKS

HOLE No: DA/3
Sheet 1 of 1

JOB NUMBER: M12/3260

Scale
1:20

0.00	Moist, dark reddish brown, medium dense, intact, clayey fine SAND containing fine roots; colluvium.
0.50	Moist, dark orange, loose becoming very loose, voided, clayey fine SAND; colluvium.
1.60	Abundant coarse, soft and hard, FERRUGINOUS CONCRETIONS, clast supported in a matrix of moist, dark reddish orange, sandy SILT; ferruginised colluvium. Overall consistency is loose.
2.40	Moist, dark red blotched dark yellow and light grey, stiff, partially ferruginised, clayey SILT containing scattered soft FERRUGINOUS CONCRETIONS; residual mudrock.
3.00	

NOTES

1) No refusal of backactor at 3,0m.

2) No water seepage encountered.

CONTRACTOR : Willem Groenewald
MACHINE : Cat 428 backactor
DRILLED BY :
PROFILED BY : jvdm

TYPE SET BY :
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM : Trench
DATE : 29/02/2012
DATE : 29/02/2012

DATE : 21/04/12 15:15
TEXT : ..\DOTPLOT\ARCHIVE\3260.TXT

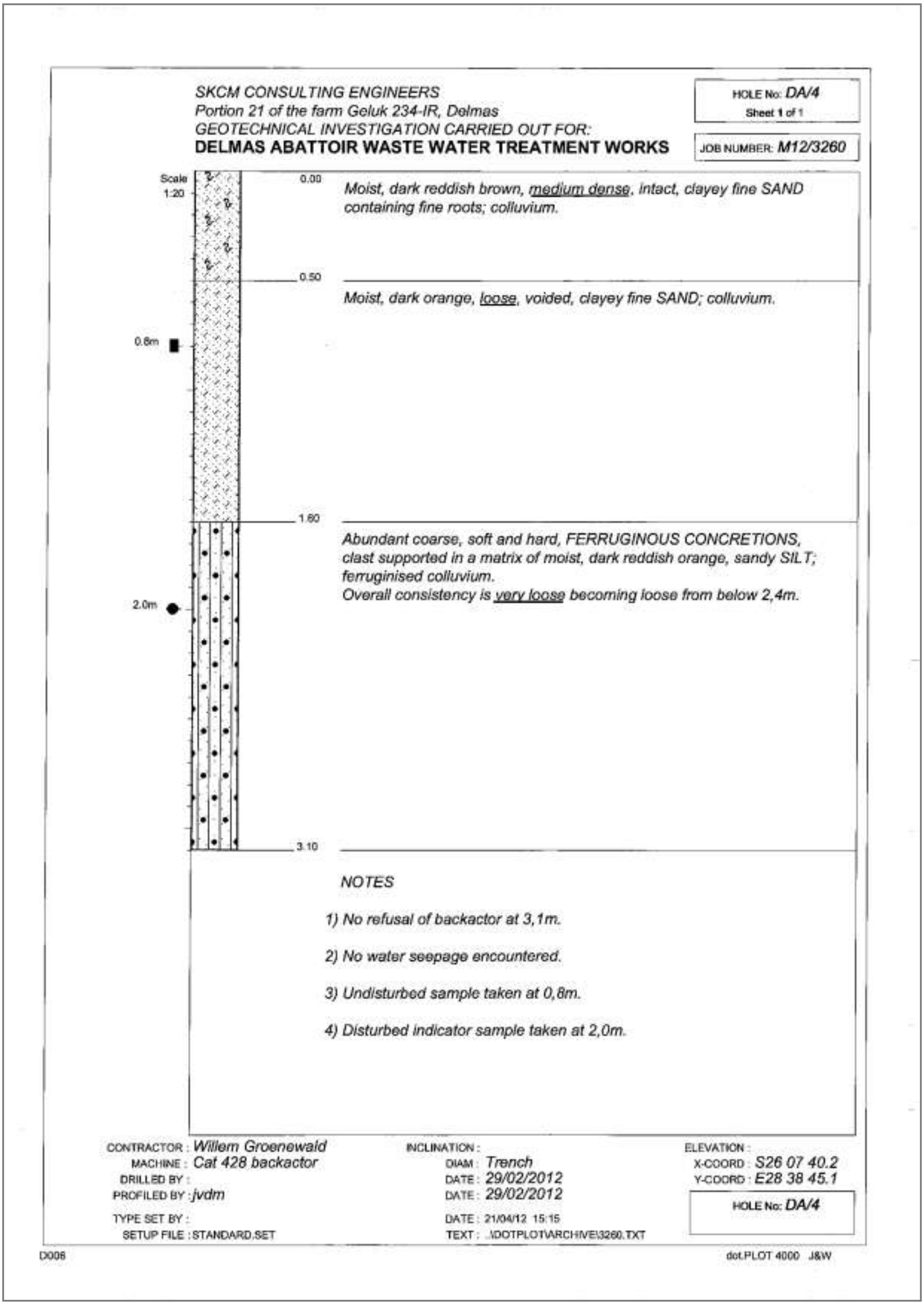
ELEVATION :
X-COORD : S26 07 38.3
Y-COORD : E28 38 42.3

HOLE No: DA/3

D006

dot.PLOT 4000 J&W

Figure 10: Soil profile for hole DA/3 (v.d. Merwe, J., 2010)



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GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
DELMAS ABATTOIR WASTE WATER TREATMENT WORKS

HOLE No: DA/4
Sheet 1 of 1

JOB NUMBER: M12/3260

Scale
1:20

0.00	Moist, dark reddish brown, medium dense, intact, clayey fine SAND containing fine roots; colluvium.
0.50	Moist, dark orange, loose, voided, clayey fine SAND; colluvium.
1.60	Abundant coarse, soft and hard, FERRUGINOUS CONCRETIONS, clast supported in a matrix of moist, dark reddish orange, sandy SILT; ferruginised colluvium. Overall consistency is very loose becoming loose from below 2,4m.
3.10	

NOTES

1) No refusal of backactor at 3,1m.

2) No water seepage encountered.

3) Undisturbed sample taken at 0,8m.

4) Disturbed indicator sample taken at 2,0m.

CONTRACTOR : Willem Groenewald
MACHINE : Cat 428 backactor
DRILLED BY :
PROFILED BY : jvdm

TYPE SET BY :
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM : Trench
DATE : 29/02/2012
DATE : 29/02/2012

DATE : 21/04/12 15:15
TEXT : ..\DOTPLOT\ARCHIVE\3260.TXT

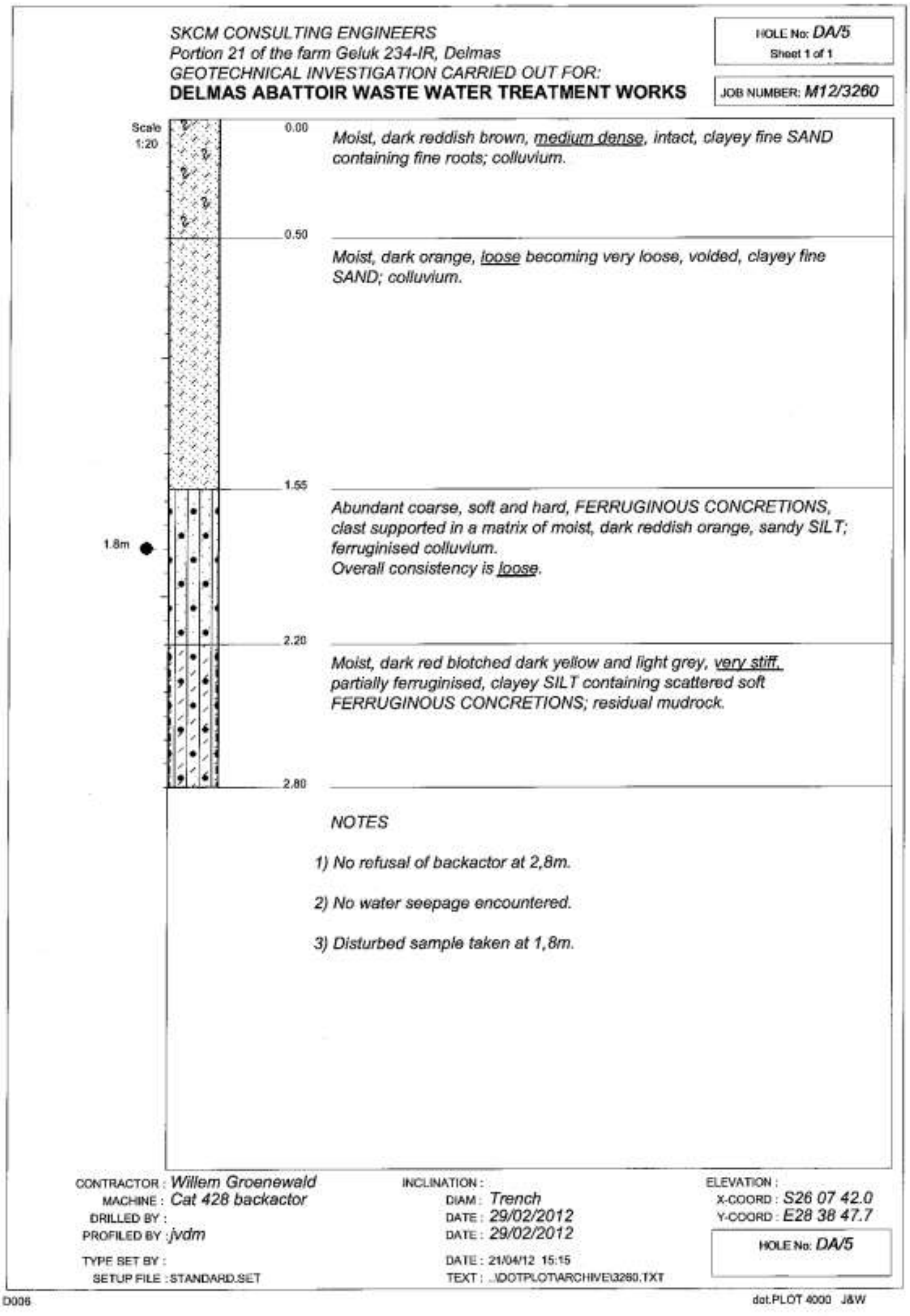
ELEVATION :
X-COORD : S26 07 40.2
Y-COORD : E28 38 45.1

HOLE No: DA/4

D008

dot.PLOT 4000 J&W

Figure 11: Soil profile for hole DA/4 (v.d. Merwe, J., 2010)



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Portion 21 of the farm Geluk 234-IR, Delmas
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
DELMAS ABATTOIR WASTE WATER TREATMENT WORKS

HOLE No: DA/5
Sheet 1 of 1

JOB NUMBER: M12/3260

Scale 1:20

0.00 Moist, dark reddish brown, medium dense, intact, clayey fine SAND containing fine roots; colluvium.

0.50 Moist, dark orange, loose becoming very loose, voided, clayey fine SAND; colluvium.

1.55 Abundant coarse, soft and hard, FERRUGINOUS CONCRETIONS, clast supported in a matrix of moist, dark reddish orange, sandy SILT; ferruginised colluvium.
Overall consistency is loose.

1.8m ●

2.20 Moist, dark red blotched dark yellow and light grey, very stiff, partially ferruginised, clayey SILT containing scattered soft FERRUGINOUS CONCRETIONS; residual mudrock.

2.80

NOTES

1) No refusal of backactor at 2,8m.

2) No water seepage encountered.

3) Disturbed sample taken at 1,8m.

CONTRACTOR : Willem Groenewald
MACHINE : Cat 428 backactor
DRILLED BY :
PROFILED BY : jvdm

TYPE SET BY :
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM : Trench
DATE : 29/02/2012
DATE : 29/02/2012

DATE : 21/04/12 15:15
TEXT : ..\DOTPLOT\ARCHIVE\3260.TXT

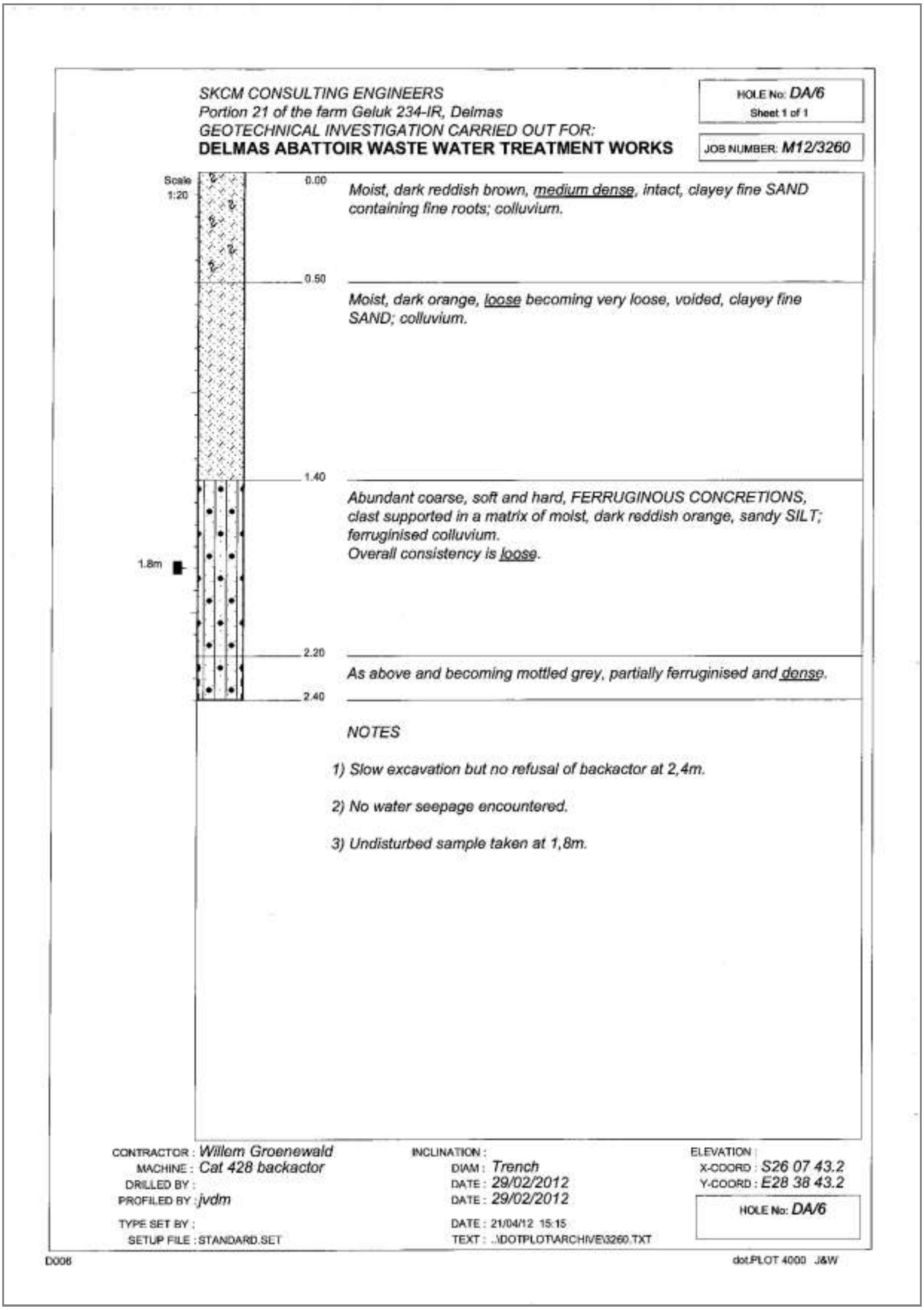
ELEVATION :
X-COORD : S26 07 42.0
Y-COORD : E28 38 47.7

HOLE No: DA/5

D006

dot.PLOT 4000 J&W

Figure 12: Soil profile for hole DA/5 (v.d. Merwe, J., 2010).



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Portion 21 of the farm Geluk 234-IR, Delmas
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
DELMAS ABATTOIR WASTE WATER TREATMENT WORKS

HOLE No: DA/6
Sheet 1 of 1

JOB NUMBER: M12/3260

Scale 1:20

0.00	Moist, dark reddish brown, medium dense, intact, clayey fine SAND containing fine roots; colluvium.
0.50	Moist, dark orange, loose becoming very loose, voided, clayey fine SAND; colluvium.
1.40	Abundant coarse, soft and hard, FERRUGINOUS CONCRETIONS, clast supported in a matrix of moist, dark reddish orange, sandy SILT; ferruginised colluvium. Overall consistency is loose.
2.20	As above and becoming mottled grey, partially ferruginised and dense.
2.40	

1.8m

NOTES

1) Slow excavation but no refusal of backactor at 2,4m.

2) No water seepage encountered.

3) Undisturbed sample taken at 1,8m.

CONTRACTOR : Willem Groenewald
MACHINE : Cat 428 backactor
DRILLED BY :
PROFILED BY : jvdm

TYPE SET BY :
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM : Trench
DATE : 29/02/2012
DATE : 29/02/2012

DATE : 21/04/12 15:15
TEXT : ..\DOTPLOT\ARCHIVE\3260.TXT

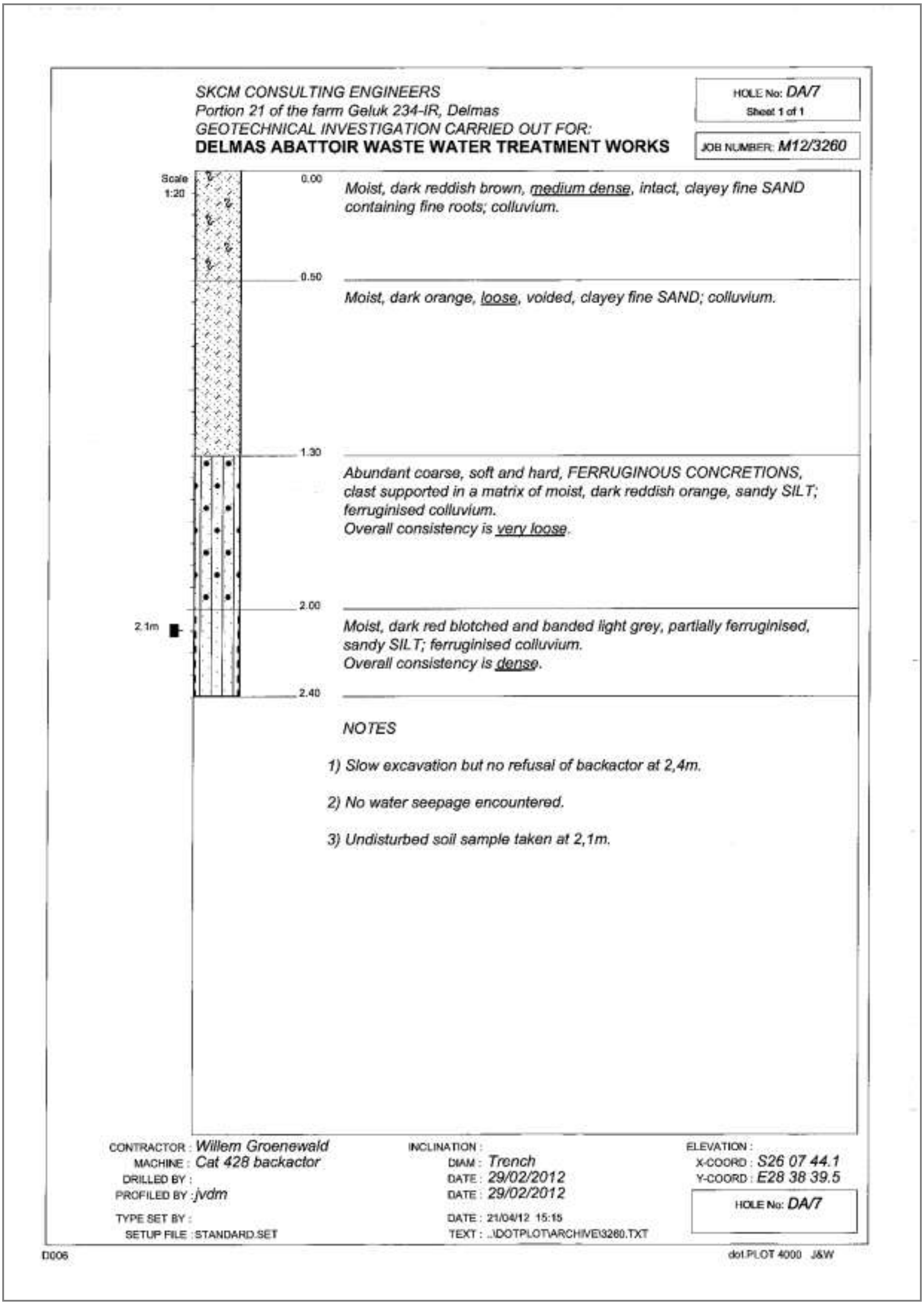
ELEVATION :
X-COORD : S26 07 43.2
Y-COORD : E28 38 43.2

HOLE No: DA/6

D006

dot.PLOT 4000 J&W

Figure 13: Soil profile for hole DA/6 (v.d. Merwe, J., 2010)



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Portion 21 of the farm Geluk 234-IR, Delmas
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
DELMAS ABATTOIR WASTE WATER TREATMENT WORKS

HOLE No: *DA/7*
Sheet 1 of 1

JOB NUMBER: *M12/3260*

Scale
1:20

0.00	*Moist, dark reddish brown, medium dense, intact, clayey fine SAND containing fine roots; colluvium.*
0.50	*Moist, dark orange, loose, voided, clayey fine SAND; colluvium.*
1.30	*Abundant coarse, soft and hard, FERRUGINOUS CONCRETIONS, clast supported in a matrix of moist, dark reddish orange, sandy SILT; ferruginised colluvium.* *Overall consistency is very loose.*
2.00	*Moist, dark red blotched and banded light grey, partially ferruginised, sandy SILT; ferruginised colluvium.* *Overall consistency is dense.*
2.40	

2.1m

NOTES

1) Slow excavation but no refusal of backactor at 2,4m.

2) No water seepage encountered.

3) Undisturbed soil sample taken at 2,1m.

CONTRACTOR : *Willem Groenewald*
MACHINE : *Cat 428 backactor*
DRILLED BY :
PROFILED BY : *jvdm*
TYPE SET BY :
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM : *Trench*
DATE : *29/02/2012*
DATE : *29/02/2012*
DATE : 21/04/12 15:15
TEXT : ..\DOTPLOT\ARCHIVE\3260.TXT

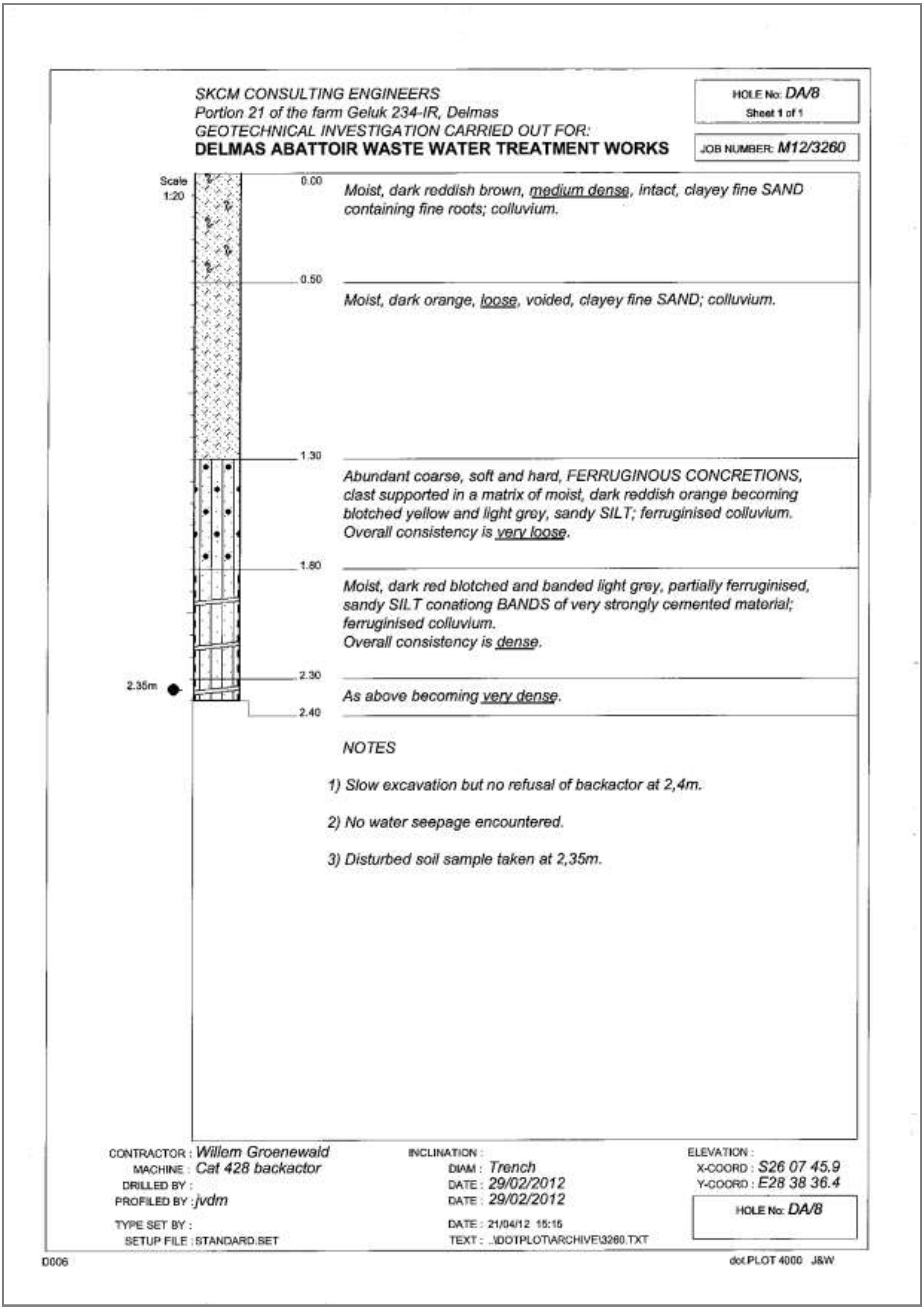
ELEVATION :
X-COORD : *S26 07 44.1*
Y-COORD : *E28 38 39.5*

HOLE No: *DA/7*

D006

dot.PLOT 4000 J&W

Figure 14: Soil profile for hole DA/7 (v.d. Merwe, J., 2010).



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Portion 21 of the farm Geluk 234-IR, Delmas
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
DELMAS ABATTOIR WASTE WATER TREATMENT WORKS

HOLE No: DA/8
Sheet 1 of 1
JOB NUMBER: M12/3260

Scale 1:20

0.00	Moist, dark reddish brown, medium dense, intact, clayey fine SAND containing fine roots; colluvium.
0.50	Moist, dark orange, loose, voided, clayey fine SAND; colluvium.
1.30	Abundant coarse, soft and hard, FERRUGINOUS CONCRETIONS, clast supported in a matrix of moist, dark reddish orange becoming blotched yellow and light grey, sandy SILT; ferruginised colluvium. Overall consistency is very loose.
1.80	Moist, dark red blotched and banded light grey, partially ferruginised, sandy SILT conationg BANDS of very strongly cemented material; ferruginised colluvium. Overall consistency is dense.
2.30	As above becoming very dense.
2.40	

2.35m ●

NOTES

1) Slow excavation but no refusal of backactor at 2,4m.

2) No water seepage encountered.

3) Disturbed soil sample taken at 2,35m.

CONTRACTOR : Willem Groenewald
MACHINE : Cat 428 backactor
DRILLED BY :
PROFILED BY : jvdm

TYPE SET BY :
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM : Trench
DATE : 29/02/2012
DATE : 29/02/2012

DATE : 21/04/12 15:15
TEXT : ..\DOTPLOT\ARCHIVE\3260.TXT

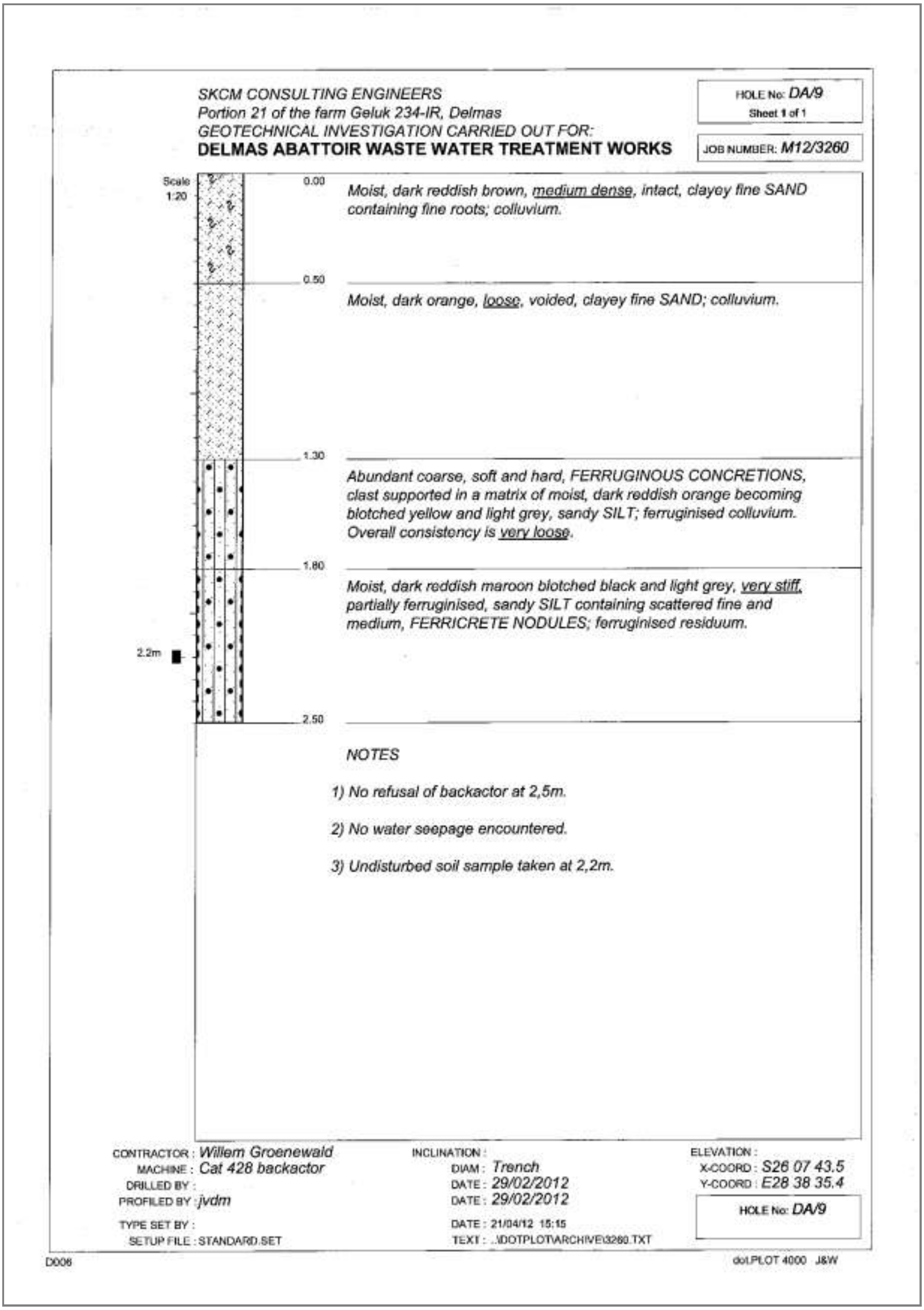
ELEVATION :
X-COORD : S26 07 45.9
Y-COORD : E28 38 36.4

HOLE No: DA/8

D006

dot.PLOT 4000 J&W

Figure 15: Soil profile for hole DA/8 (v.d. Merwe, J., 2010)



SKCM CONSULTING ENGINEERS
Portion 21 of the farm Geluk 234-IR, Delmas
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
DELMAS ABATTOIR WASTE WATER TREATMENT WORKS

HOLE No: DA/9
Sheet 1 of 1

JOB NUMBER: M12/3260

Scale 1:20

0.00	Moist, dark reddish brown, medium dense, intact, clayey fine SAND containing fine roots; colluvium.
0.50	Moist, dark orange, loose, voided, clayey fine SAND; colluvium.
1.30	Abundant coarse, soft and hard, FERRUGINOUS CONCRETIONS, clast supported in a matrix of moist, dark reddish orange becoming blotched yellow and light grey, sandy SILT; ferruginised colluvium. Overall consistency is very loose.
1.80	Moist, dark reddish maroon blotched black and light grey, very stiff, partially ferruginised, sandy SILT containing scattered fine and medium, FERRICRETE NODULES; ferruginised residuum.
2.50	

2.2m

NOTES

1) No refusal of backactor at 2,5m.

2) No water seepage encountered.

3) Undisturbed soil sample taken at 2,2m.

CONTRACTOR : Willem Groenewald
MACHINE : Cat 428 backactor
DRILLED BY :
PROFILED BY : jvdm
TYPE SET BY :
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM : Trench
DATE : 29/02/2012
DATE : 29/02/2012
DATE : 21/04/12 15:15
TEXT : ..\DOTPLOT\ARCHIVE\3260.TXT

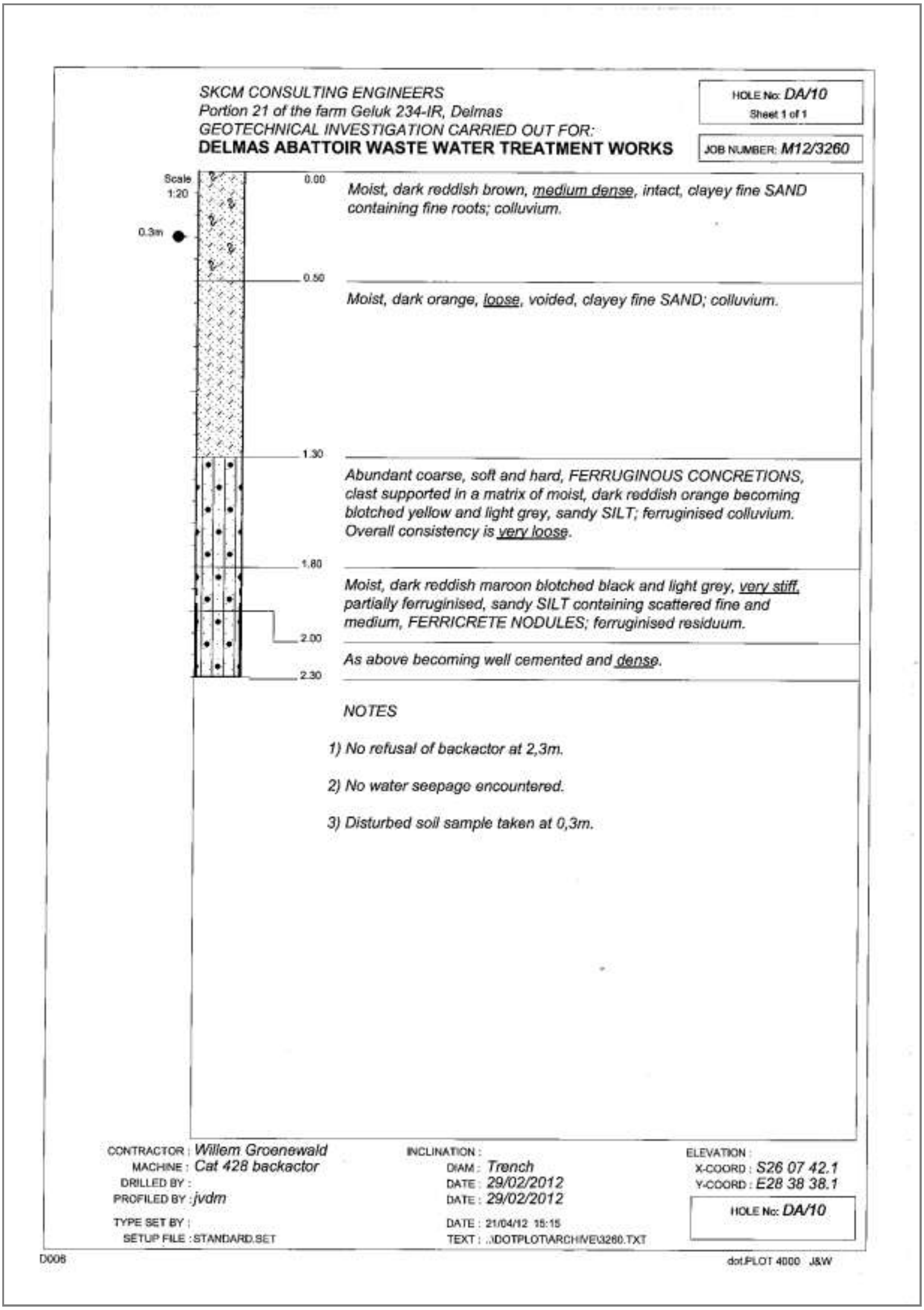
ELEVATION :
X-COORD : S26 07 43.5
Y-COORD : E28 38 35.4

HOLE No: DA/9

D006

dotPLOT 4000 J&W

Figure 16: Soil profile for hole DA/9 (v.d. Merwe, J., 2010)



SKCM CONSULTING ENGINEERS
Portion 21 of the farm Geluk 234-IR, Delmas
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
DELMAS ABATTOIR WASTE WATER TREATMENT WORKS

HOLE No: DA/10
Sheet 1 of 1
JOB NUMBER: M12/3260

Scale 1:20

0.3m ●

0.00	Moist, dark reddish brown, medium dense, intact, clayey fine SAND containing fine roots; colluvium.
0.50	Moist, dark orange, loose, voided, clayey fine SAND; colluvium.
1.30	Abundant coarse, soft and hard, FERRUGINOUS CONCRETIONS, clast supported in a matrix of moist, dark reddish orange becoming blotched yellow and light grey, sandy SILT; ferruginised colluvium. Overall consistency is very loose.
1.80	Moist, dark reddish maroon blotched black and light grey, very stiff, partially ferruginised, sandy SILT containing scattered fine and medium, FERRICRETE NODULES; ferruginised residuum.
2.00	As above becoming well cemented and dense.
2.30	

NOTES

1) No refusal of backactor at 2,3m.

2) No water seepage encountered.

3) Disturbed soil sample taken at 0,3m.

CONTRACTOR : Willem Groenewald
MACHINE : Cat 428 backactor
DRILLED BY :
PROFILED BY : jvdm
TYPE SET BY :
SETUP FILE : STANDARD.SET

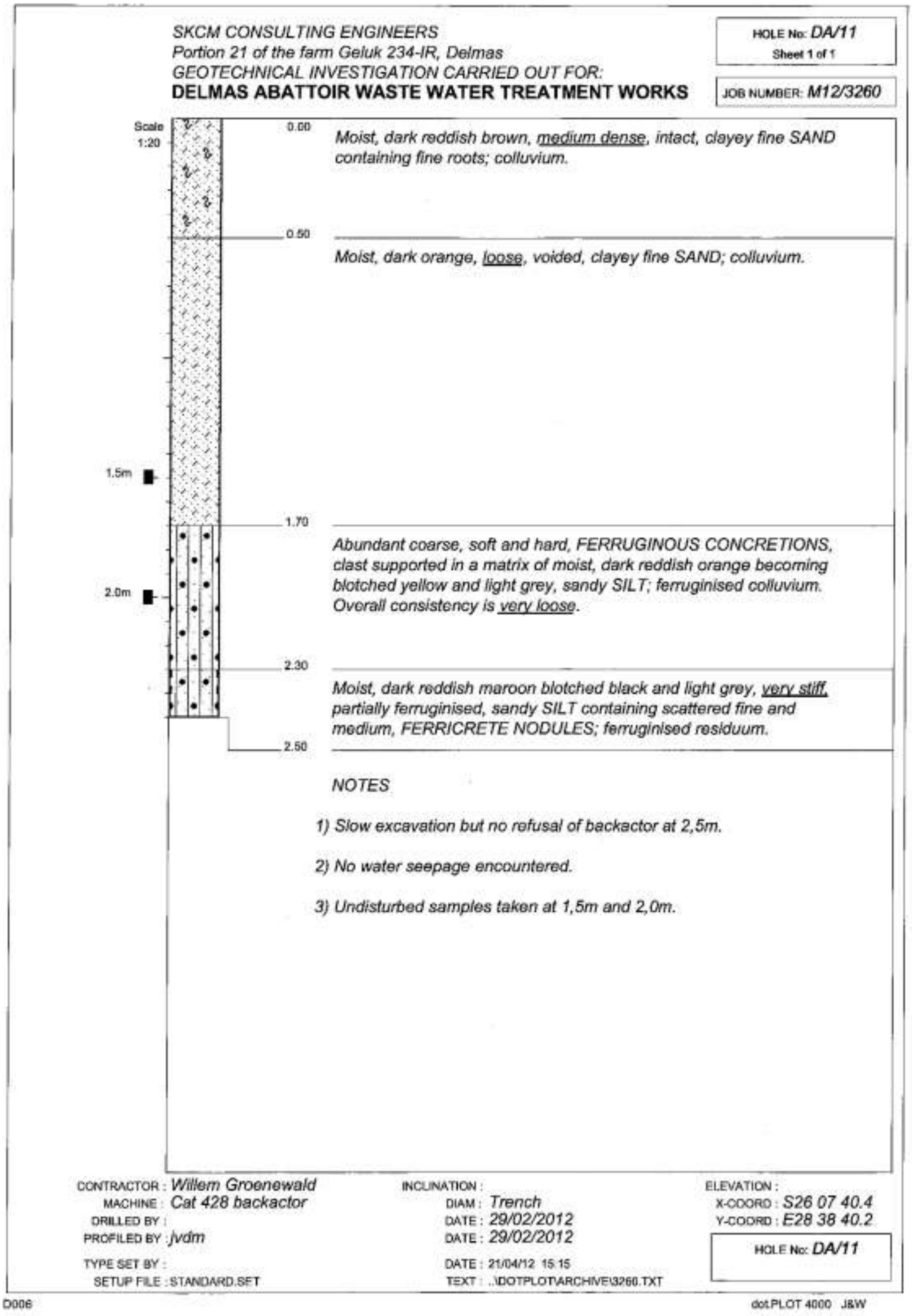
INCLINATION :
DIAM : Trench
DATE : 29/02/2012
DATE : 29/02/2012
DATE : 21/04/12 15:15
TEXT : ..\DOTPLOT\ARCHIVE\3260.TXT

ELEVATION :
X-COORD : S26 07 42.1
Y-COORD : E28 38 38.1
HOLE No: DA/10

D008

dotPLOT 4000 J&W

Figure 17: Soil profile for hole DA/10 (v.d. Merwe, J., 2010)



SKCM CONSULTING ENGINEERS
Portion 21 of the farm Geluk 234-IR, Delmas
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
DELMAS ABATTOIR WASTE WATER TREATMENT WORKS

HOLE No: *DA/11*
Sheet 1 of 1

JOB NUMBER: *M12/3260*

0.00

Moist, dark reddish brown, medium dense, intact, clayey fine SAND containing fine roots; colluvium.

0.50

Moist, dark orange, loose, voided, clayey fine SAND; colluvium.

1.70

Abundant coarse, soft and hard, FERRUGINOUS CONCRETIONS, clast supported in a matrix of moist, dark reddish orange becoming blotched yellow and light grey, sandy SILT; ferruginised colluvium. Overall consistency is very loose.

2.30

Moist, dark reddish maroon blotched black and light grey, very stiff, partially ferruginised, sandy SILT containing scattered fine and medium, FERRICRETE NODULES; ferruginised residuum.

2.50

NOTES

1) Slow excavation but no refusal of backactor at 2,5m.

2) No water seepage encountered.

3) Undisturbed samples taken at 1,5m and 2,0m.

CONTRACTOR : *Willem Groenewald*
MACHINE : *Cat 428 backactor*
DRILLED BY :
PROFILED BY : *jvdm*
TYPE SET BY :
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM : *Trench*
DATE : *29/02/2012*
DATE : *29/02/2012*
DATE : 21/04/12 15:15
TEXT : ..\DOTPLOT\ARCHIVE\3260.TXT

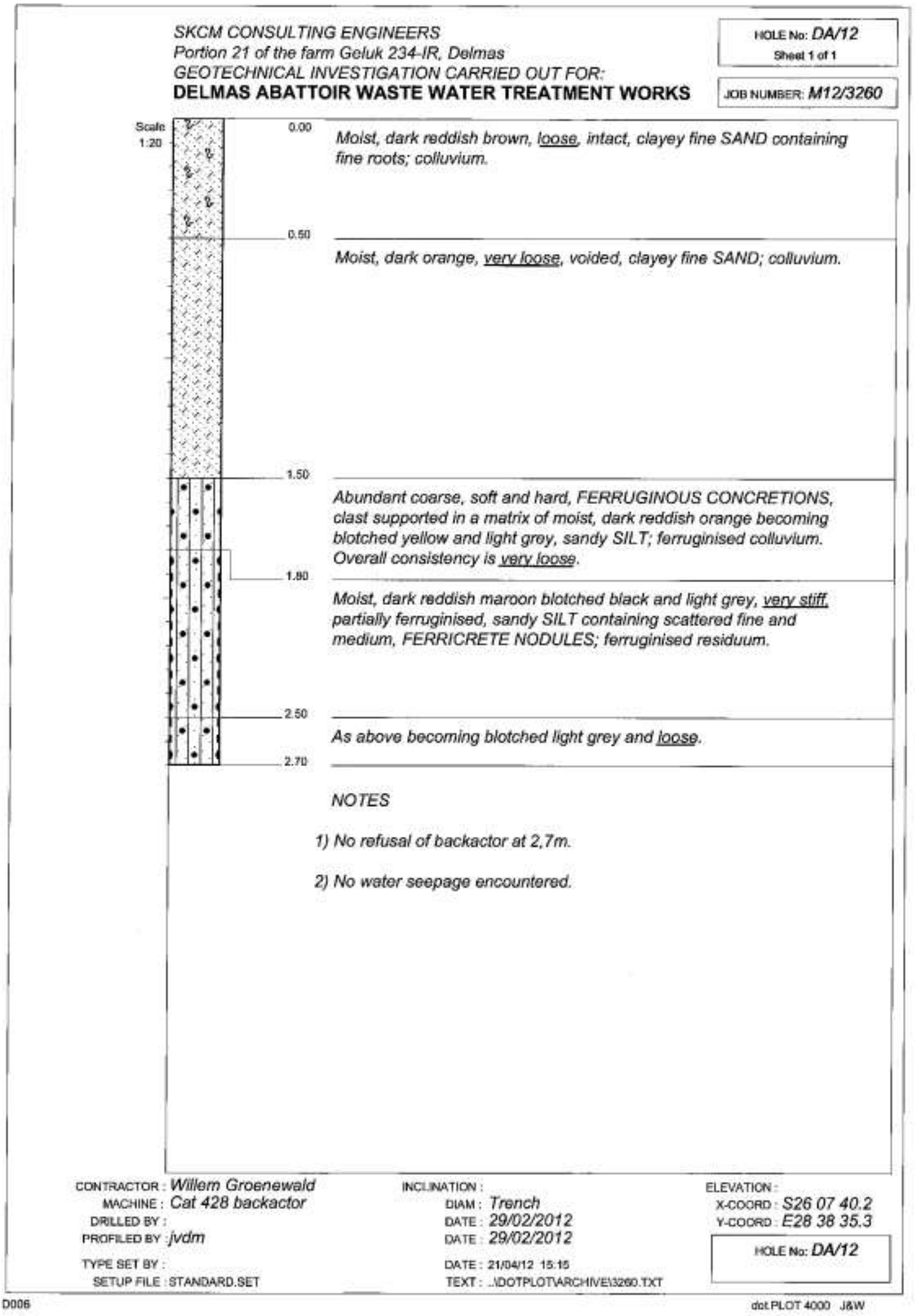
ELEVATION :
X-COORD : *S26 07 40.4*
Y-COORD : *E28 38 40.2*

HOLE No: *DA/11*

D006

dotPLOT 4000 J&W

Figure 18: Soil profile for hole DA/11 (v.d. Merwe, J., 2010).



SKCM CONSULTING ENGINEERS
Portion 21 of the farm Geluk 234-IR, Delmas
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
DELMAS ABATTOIR WASTE WATER TREATMENT WORKS

HOLE No: DA/12
Sheet 1 of 1

JOB NUMBER: M12/3260

Scale 1:20

0.00	Moist, dark reddish brown, loose, intact, clayey fine SAND containing fine roots; colluvium.
0.50	Moist, dark orange, very loose, voided, clayey fine SAND; colluvium.
1.50	Abundant coarse, soft and hard, FERRUGINOUS CONCRETIONS, clast supported in a matrix of moist, dark reddish orange becoming blotched yellow and light grey, sandy SILT; ferruginised colluvium. Overall consistency is very loose.
1.80	Moist, dark reddish maroon blotched black and light grey, very stiff, partially ferruginised, sandy SILT containing scattered fine and medium, FERRICRETE NODULES; ferruginised residuum.
2.50	As above becoming blotched light grey and loose.
2.70	

NOTES

1) No refusal of backactor at 2,7m.

2) No water seepage encountered.

CONTRACTOR : Willem Groenewald
MACHINE : Cat 428 backactor
DRILLED BY :
PROFILED BY : jvdm

TYPE SET BY :
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM : Trench
DATE : 29/02/2012
DATE : 29/02/2012

DATE : 21/04/12 15:15
TEXT : ..\DOTPLOT\ARCHIVE\3260.TXT

ELEVATION :
X-COORD : S26 07 40.2
Y-COORD : E28 38 35.3

HOLE No: DA/12

D006

dot.PLOT 4000 J&W

Figure 19: Soil profile for hole DA/12 (v.d. Merwe, J., 2010).

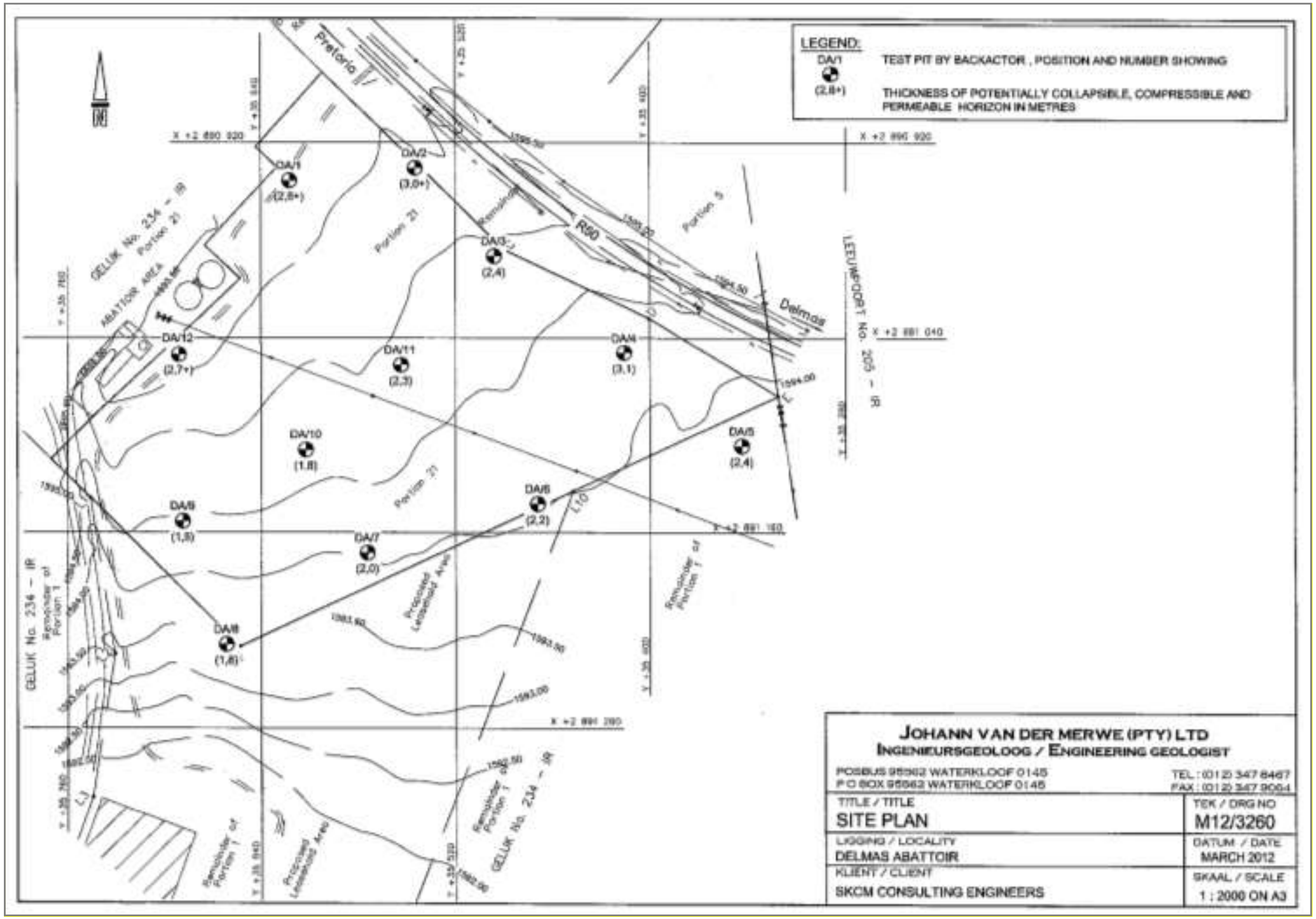


Figure 20: Location of test pits (Johann v.d. Merwe, 2010).

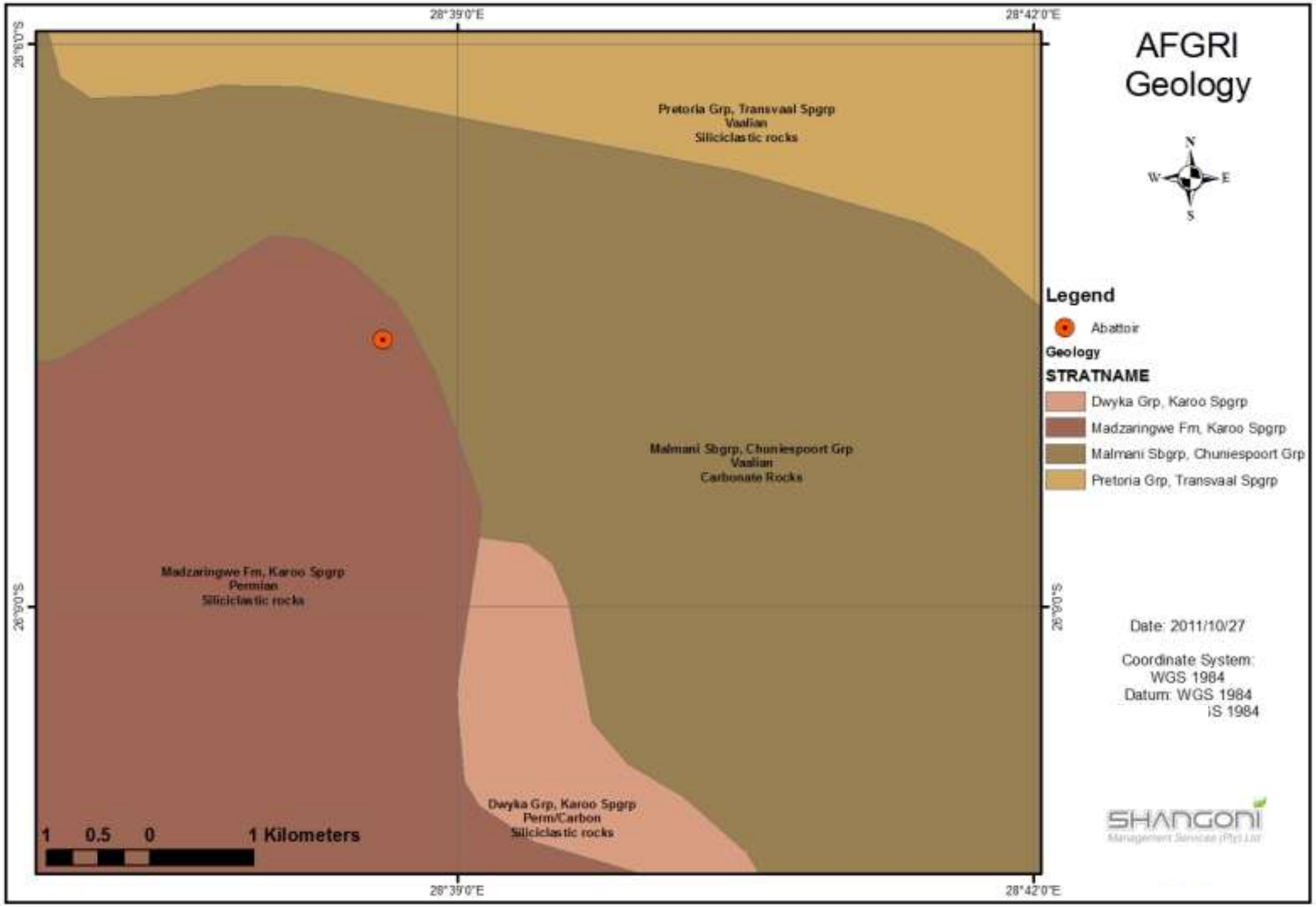


Figure 21: Geology of the site.

2.2 Regional climate

The climate of the site is typical of Highveld conditions with relatively warm to hot summers and fairly high rainfall, and moderate to cool winters with little or no rain. Valleys and wetlands are much cooler at night and more prone to frost than higher lying areas. The area experiences thunderstorms during the summer months, which usually occur in the late afternoons.

2.2.1 Rainfall

The site occurs in a summer rainfall area receiving a mean average annual rainfall of 426.3 mm. The average precipitation (taken over a period of 5 years from 2005 to 2009) is 127 mm in January and 6mm in July. The relative humidity varies between 12 % as minimum and 93 % as maximum.

The variability of rainfall as well as high intensity events will affect the construction phase of the project. It could hinder construction activities with potential soaking of cement mixtures or foundation concrete during the early phases of the construction process.

Construction should preferably be planned for the winter months to avoid construction delays that might have a negative socio-economic impact on the development.

The potential impact of the rainfall should be low if mitigated properly.

Figure 22 for the Average Monthly Rainfall of Delmas as provided by www.weathersa.com.
See Figure 23 for the Average Yearly Rainfall of Delmas as provided by www.weathersa.com.
See Figure 24 for the Mean Annual Precipitation for Mpumalanga.

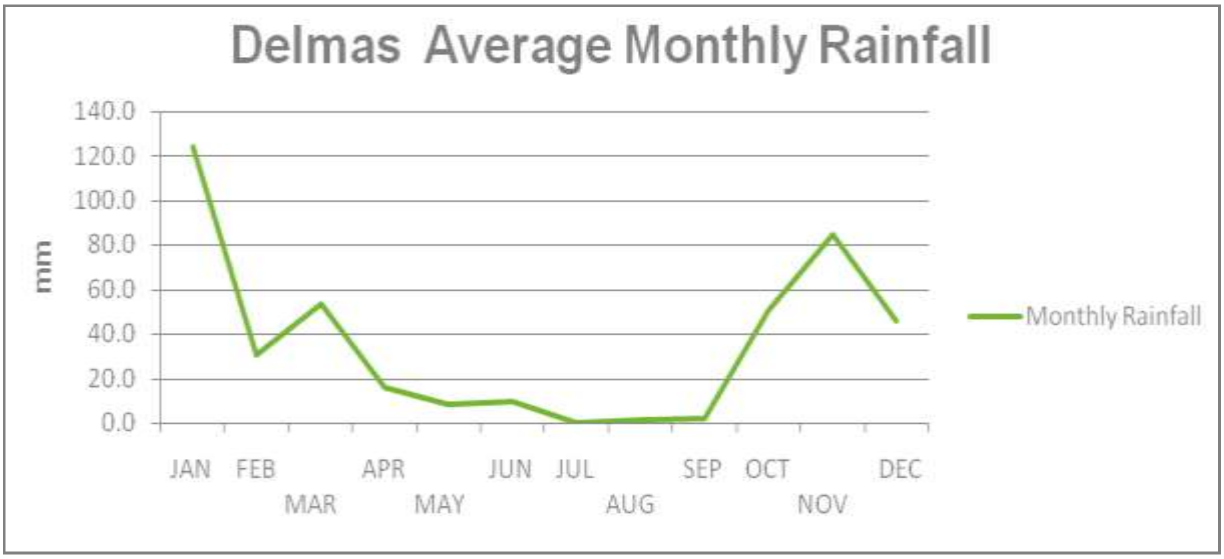


Figure 22: Delmas Average Monthly Rainfall.

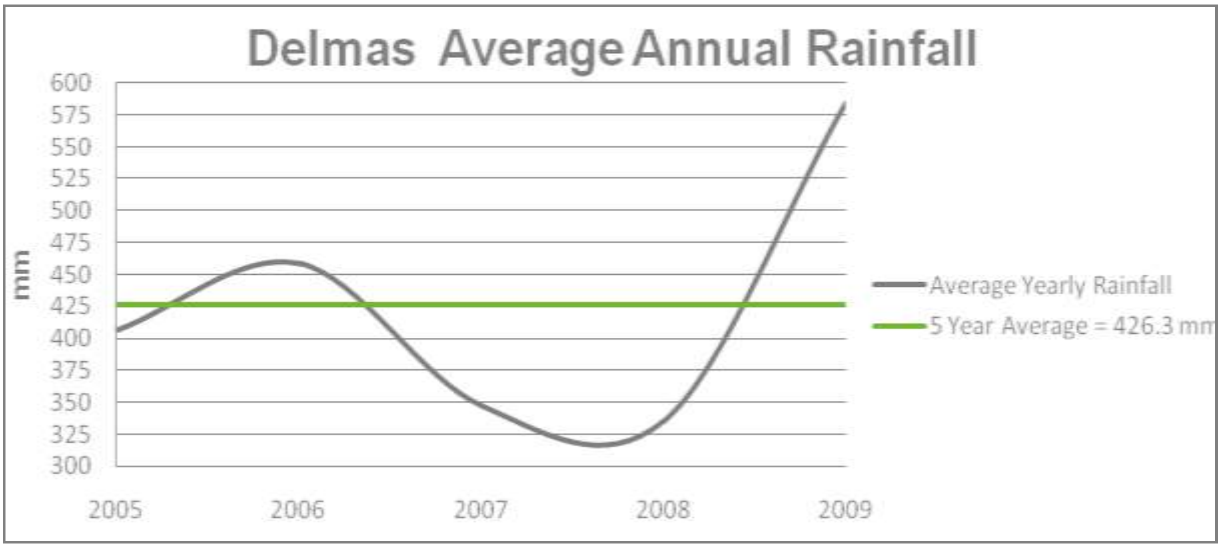


Figure 23: Delmas Average Annual Rainfall