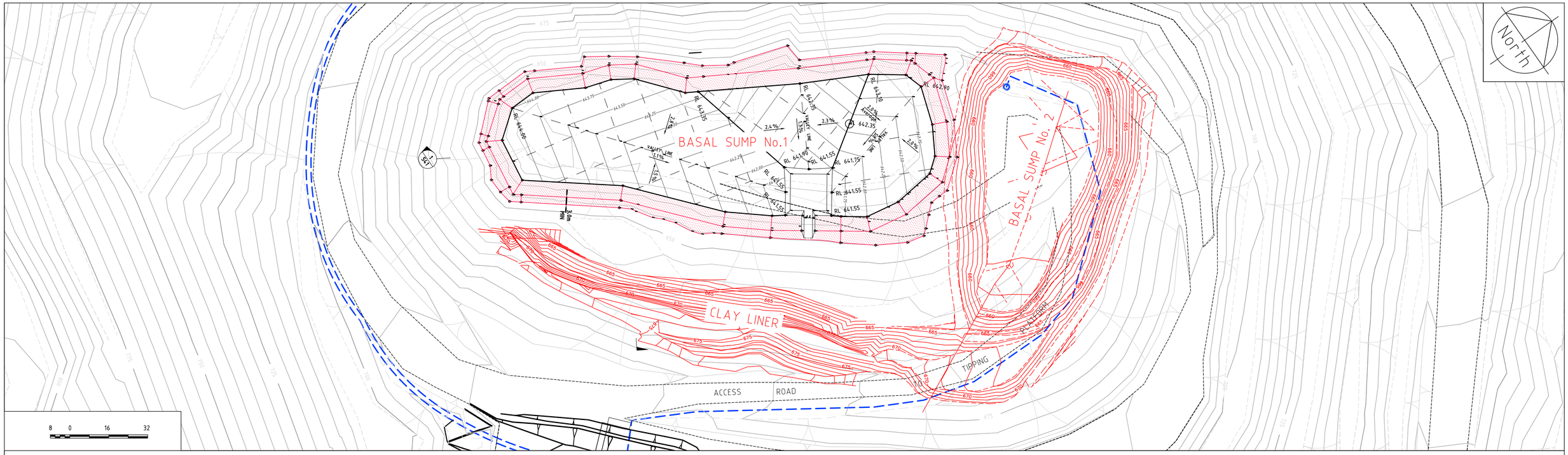

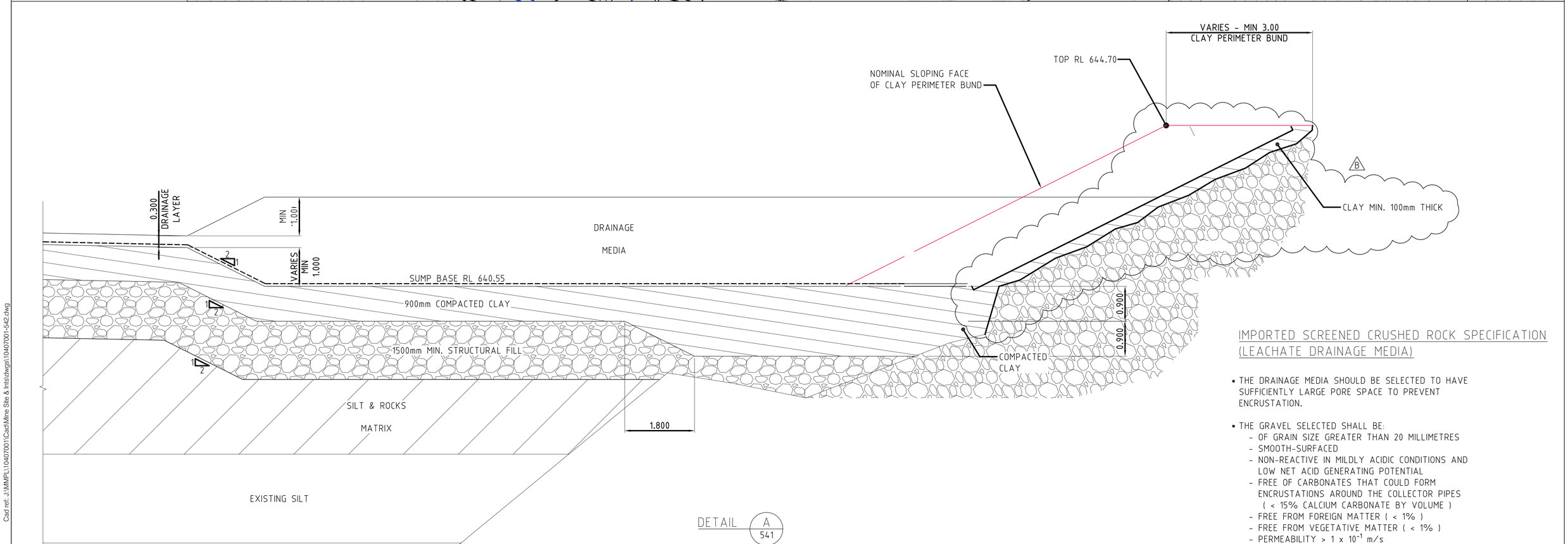

IMPORTED SCREENED CRUSHED ROCK SPECIFICATION (LEACHATE DRAINAGE MEDIA)

- THE DRAINAGE MEDIA SHOULD BE SELECTED TO HAVE SUFFICIENTLY LARGE PORE SPACE TO PREVENT ENCRUSTATION.
- THE GRAVEL SELECTED SHALL BE:
  - OF GRAIN SIZE GREATER THAN 20 MILLIMETRES
  - SMOOTH-SURFACED
  - NON-REACTIVE IN MILDLY ACIDIC CONDITIONS AND LOW NET ACID GENERATING POTENTIAL
  - FREE OF CARBONATES THAT COULD FORM ENCRUSTATIONS AROUND THE COLLECTOR PIPES (< 15% CALCIUM CARBONATE BY VOLUME)
  - FREE FROM FOREIGN MATTER (< 1%)
  - FREE FROM VEGETATIVE MATTER (< 1%)
  - PERMEABILITY > 1 x 10^{-1} m/s

Cad ref: J:\MMPL\10407001\Cad\Mine Site & Inits\dwgs\10407001-542.dwg

Last modified: 29 Oct 04 - 08:24

File Name: J:\Surveyors\Jobs\Veolia\Woodlawn Engineering\Drawings-As_Built\Mine_Vol\10407001-542 MK.dwg

REVISIONS

No.	BY	DATE	DESCRIPTION	APPD
Z	LT	13.04.16	REDUNDANT DRAINAGE DETAILS REMOVED	
B	SGG	18.03.04	BENTONITE ADDED	
A	SGG	29.1.04	AS BUILT	RBY

Before commencing work, all controlling dimensions on the drawings must be verified on the site, particularly those relative to property alignments, other structures, and services.

Figured dimensions take preference over scaled. If in doubt, ask.

SCALES

0.5 0 1 2m

	PREPARED	CHECKED
DESIGN	SRH	RBY
DRAFTING	AJC	NG

PASSED Original signed by M.D BROWN

DATE 7.06.02

VEOLIA ENVIRONMENTAL SERVICES

WOODLAWN BIOREACTOR ALLIANCE

WOODLAWN BIOREACTOR
BASAL LINER SYSTEM
COLLECTOR ROAD, TARAGO

10407001-542 | Z

	HEIGHT DATUM : AHD CONTOUR INTERVAL : 5m	PLAN	Sheet No. 1
	0 15 30 45 60 METRES SCALE 1:1250	WOODLAWN BIOREACTOR CLAY LINING MARCH 2011	No. of Sheets: 1 Date: 22/11/2011 Ref. No: 16700 Drawing No. 35 / Issue A

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GOULBURN NSW 2580 f: (02) 4821 7238
e: goulburn@landteam.com.au

MGA

715

750

740

ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	30/01/2012

SCALE 1:1250

0 15 30 45 60 75

Metres

Liability limited by a scheme approved under Professional Standards Legislation.

A2 SHEET

VEOLIA ENVIRONMENTAL SERVICES

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VEOLIA ENVIRONMENTAL SERVICES

WOODLAWN BIOREACTOR
CLAY LINING LOCATION
JANUARY 2012

DATUM: AHD | ORIGIN: PILLAR 713 | CONTOUR INTERVAL: 20m

DATE: 30/01/2012
SURVEYED: S McD
DRAWN: S McD
CHECKED: MK
ISSUE A

DRAWING No.

16700-41

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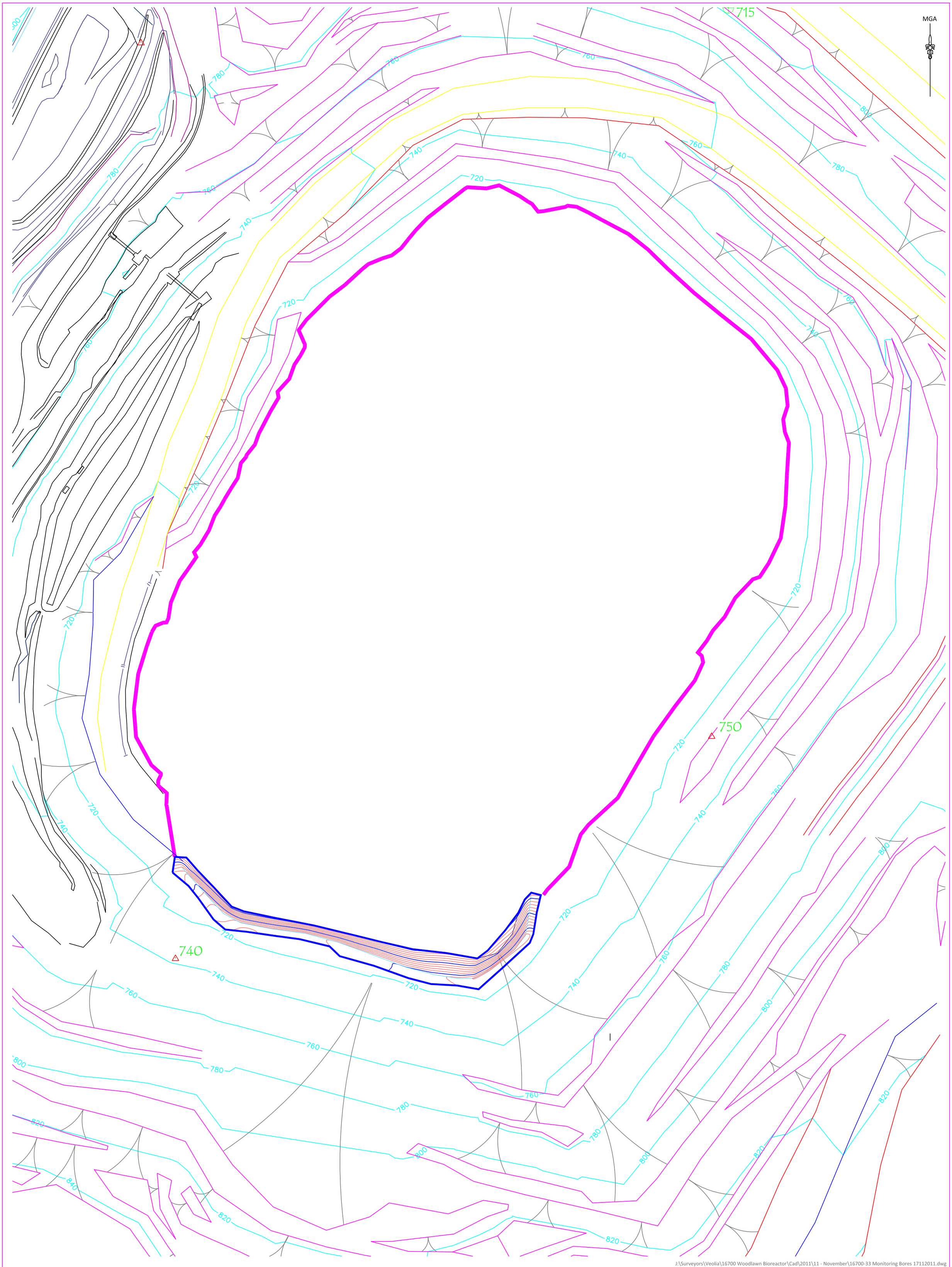

ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	29/10/2012

SCALE 1:1250

0 15 30 45 60 75

Metres

Liability limited by a scheme approved under Professional Standards Legislation.

A2 SHEET

VEOLIA ENVIRONMENTAL SERVICES

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VEOLIA ENVIRONMENTAL SERVICES

WOODLAWN BIOREACTOR
CLAY LINING LOCATION
OCTOBER 2012

DATUM: AHD | ORIGIN: PILLAR 713 | CONTOUR INTERVAL: 20m

DATE: 29/10/2012
SURVEYED: S McD
DRAWN: S McD
CHECKED: MK
ISSUE A

DRAWING No.

16700-60

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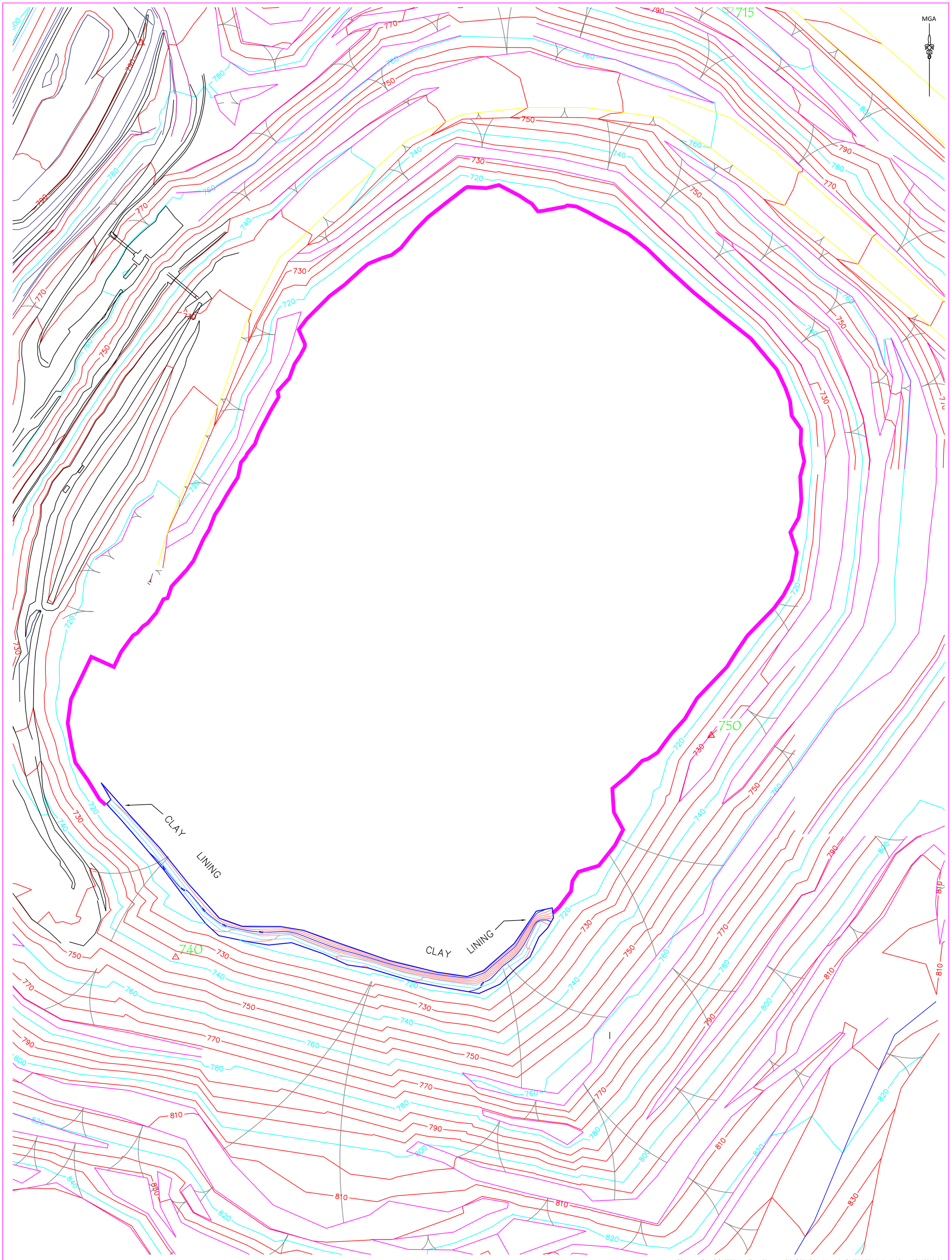

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	03/11/2013

SCALE 1:1250

0 15 30 45 60 75

Metres

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A2 SHEET

VEOLIA ENVIRONMENTAL SERVICES

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VEOLIA ENVIRONMENTAL SERVICES

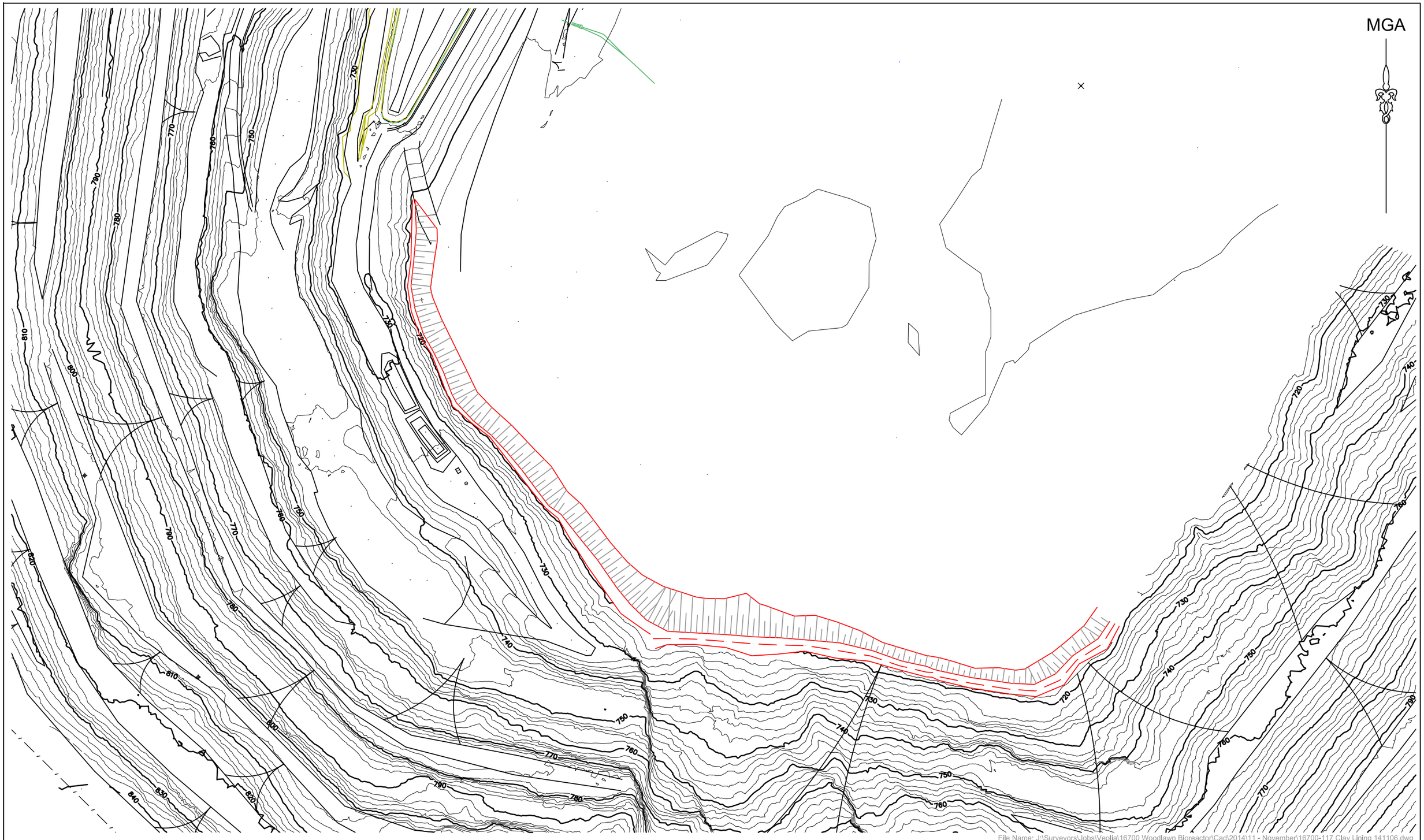
WOODLAWN BIOREACTOR
CLAY LINING LOCATION
OCTOBER 2013

DATUM: AHD | ORIGIN: PILLAR 713 | CONTOUR INTERVAL: 20m

DATE: 03/11/2013
SURVEYED: S McD
DRAWN: S McD
CHECKED: MK
ISSUE A

DRAWING No.

16700-93



File Name: J:\Surveyors\Jobs\Veolia\16700 Woodlawn Bioreactor\Cad\2014\11 - November\16700-117 Clay Lining 141106.dwg

ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	12/11/2014

SCALE 1:1250

0 15 30 45 60 75

Metres

A3 SHEET

COVER OF EXCELLENCE

Liability limited by a scheme approved under Professional Standards Legislation.

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w: www.landteam.com.au

Integrated Management System

VEOLIA ENVIRONMENTAL SERVICES

PLAN SHOWING
LOCATION OF NEW CLAY LINER
AT SOUTHERN SECTION OF VOID
WOODLAWN BIOREACTOR
COLLECTOR ROAD, TARAGO

DATUM	N/A	CONTOUR INTERVAL	N/A

SURVEY DATE: 06/11/2014

SURVEYED: MK

DRAWN: MK

CHECKED: JK

ISSUE A

DRAWING No. 16700-117

ELEVATION AS VIEWED ON DRG 16800 - 03

STAGGERED JOINT BETWEEN STAGE 1 & STAGE 2 (REFER SEPARATE DETAIL)

EXISTING HAUL ROAD

LINE OF SLURRY WALL

STAGE 1 CLAY LINER

STAGE 3 CLAY LINER

STAGE 4 FILL LINE

STAGE 2 CLAY LINER

STAGE 2 FILL LINE

STAGE 3 FILL LINE

EXTENT OF STAGE 3 CLAY LINER

EXTENT OF STAGE 1 CLAY LINER

EXTENT OF STAGE 2 CLAY LINER

POND

CLAY LINING WORKS AS EXECUTED

Rev.	Description	By	Date
A	TENDER ISSUE	JR	07.10.05
	WORKS AS EXECUTED		03.01.07

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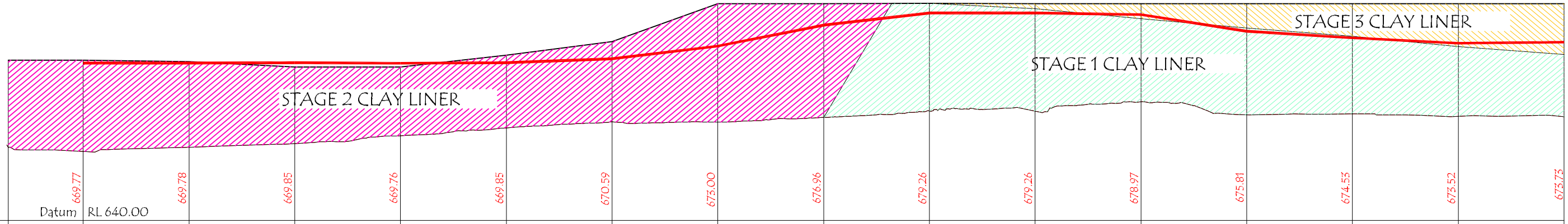
REDUCTION RATIO 1:400 (0 4 8 16 32)

SURVEYED	B.R.
DRAWN	J.A.
CHECKED	J.R.
APPROVED	

WOODLAWN BIOREACTOR
CLAY LINER CONSTRUCTION PLAN

DATUM: AHD
ORIGIN OF LEVELS:
DRAWING No. 16800 - 01
REV. A



	Datum	RL 640.00												
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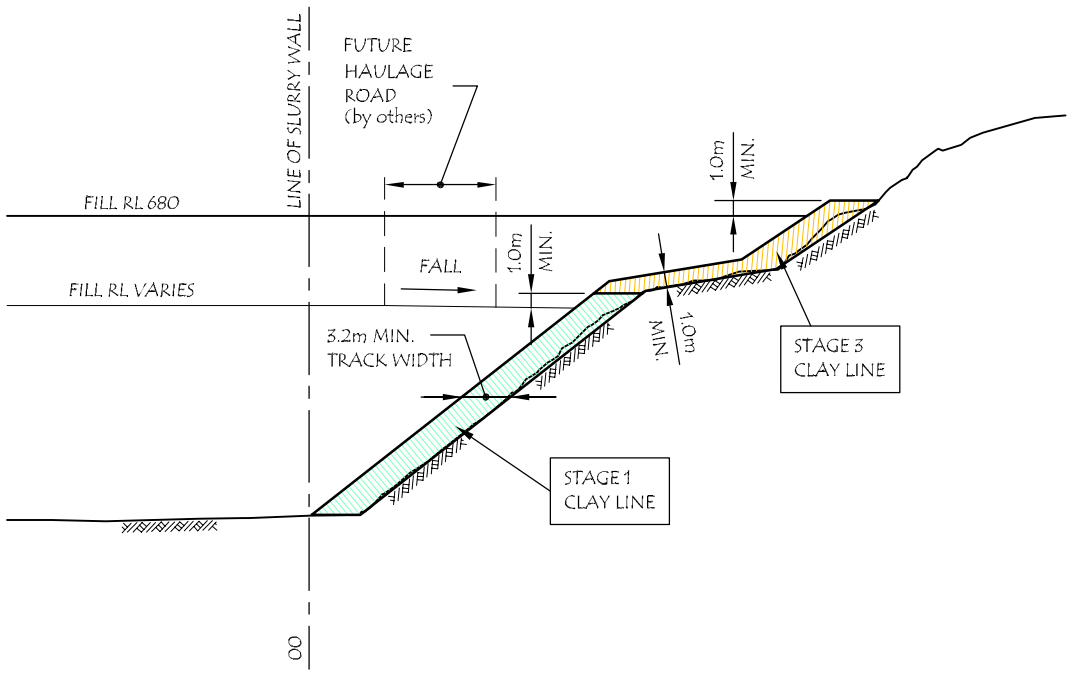
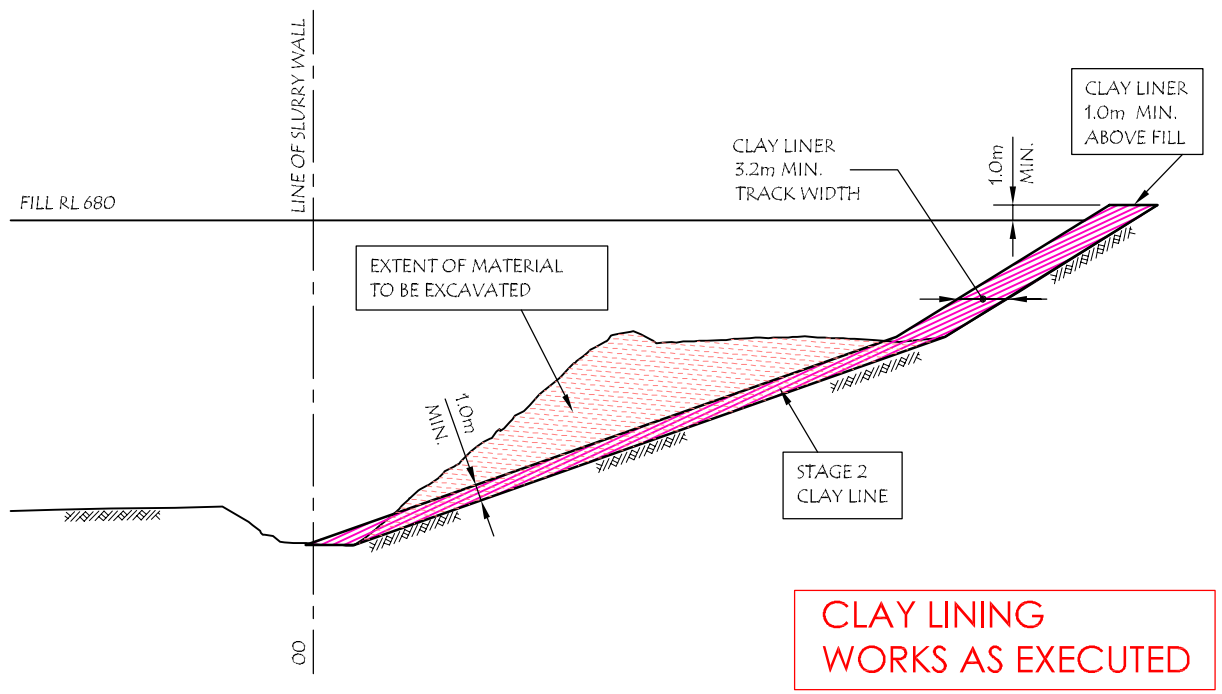
STAGE 2 & 3 CLAY LINER LEVEL	670.31	670.07	669.63	669.05	671.24	673.82	681.00	681.00	681.12	681.00	681.00	681.00	681.00	681.00	681.00
STAGE 1 CLAY LINER LEVEL									681.12	680.06	678.20	676.42	674.88	672.92	671.37
SLURRY WALL LEVEL	653.77	655.04	653.85	654.53	656.01	657.50	658.66	658.60	659.47	660.70	660.67	662.45	659.98	660.16	659.70	659.65
CHAINAGE	294.19	280.00	260.00	240.00	220.00	200.00	180.00	160.00	140.00	120.00	100.00	80.00	60.00	40.00	20.00	0.00

CLAY LINER ELEVATION



TYPICAL SECTION THROUGH STAGE 1 & 3 LINER



CLAY LINING WORKS AS EXECUTED

TYPICAL SECTION THROUGH STAGE 2 LINER

Rev.	Description	By	Date
A	TENDER ISSUE	JR	07.10.05
	WORKS AS EXECUTED		03.01.07

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REDUCTION RATIO

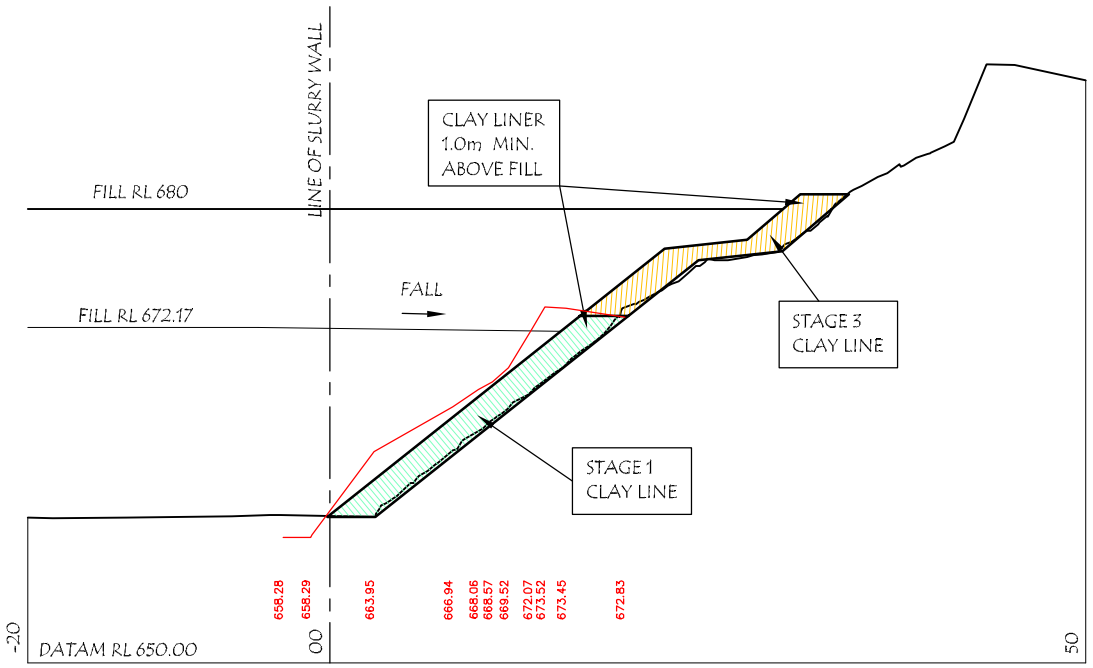
1:400 0 4 8 16 32

1:250 0 2.5 5 10 20

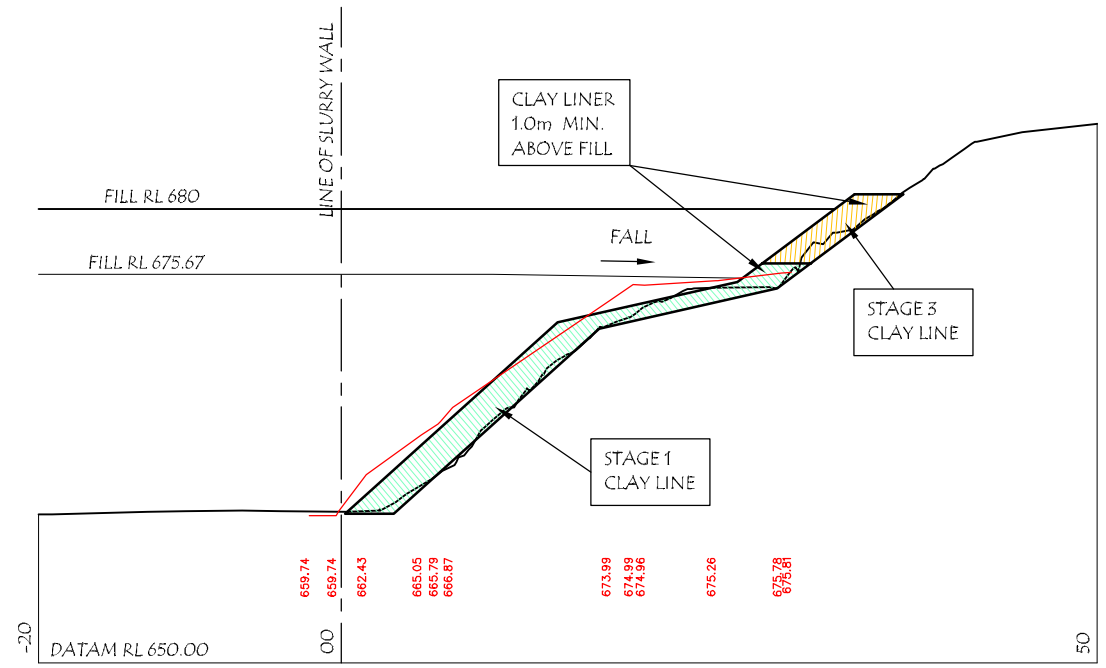
SURVEYED	B.R.
DRAWN	J.A.
CHECKED	J.R.
APPROVED	

WOODLAWN BIOREACTOR
CLAY LINER ELEVATION
AND TYPICAL CROSS SECTIONS

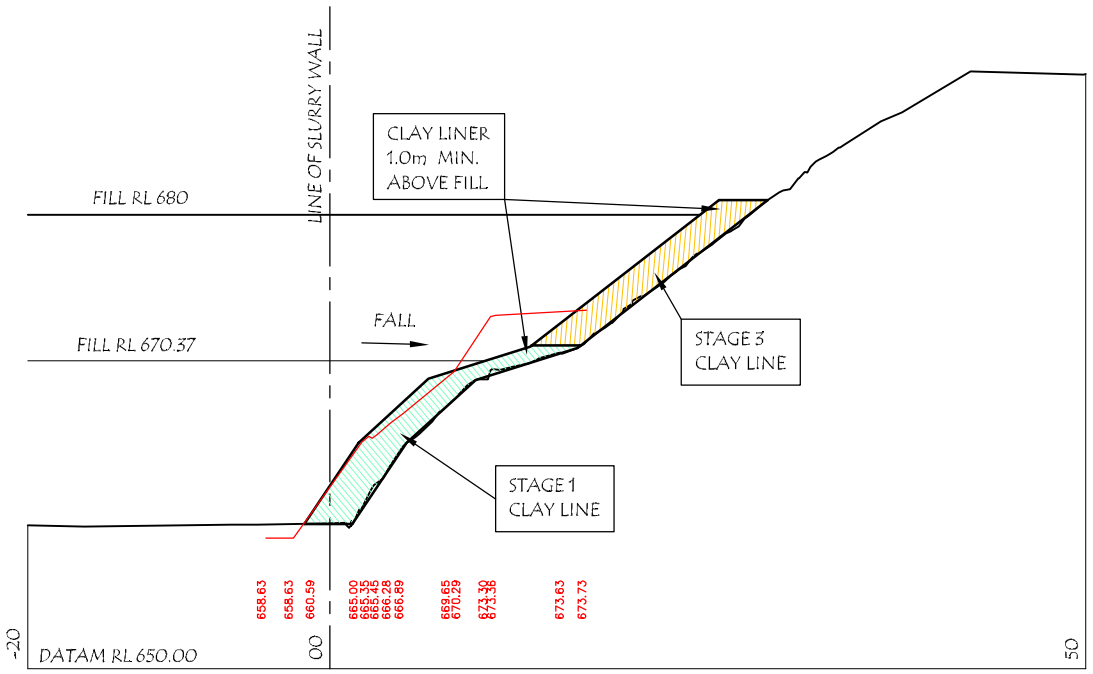
DATUM:	AHD
ORIGIN OF LEVELS:	
DRAWING No.	REV.
16800 - 03	A



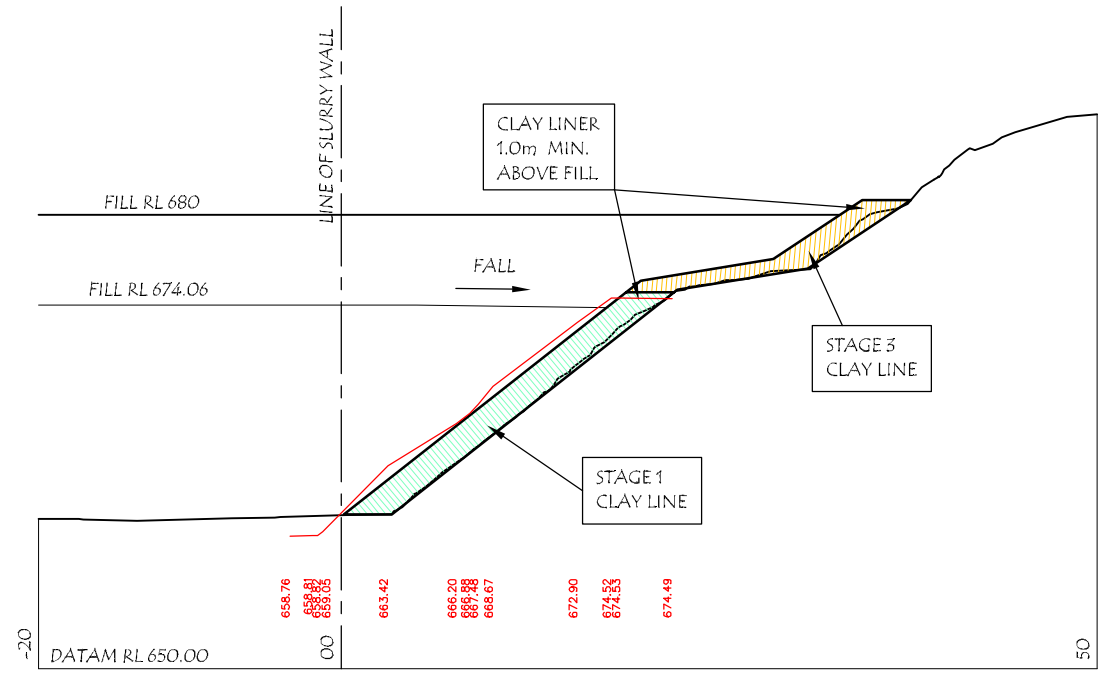
CH 20



CH 60



CH 00



CH 40

CLAY LINING
WORKS AS EXECUTED

Rev.	Description	By	Date
A	TENDER ISSUE	JR	07.10.05
	WORKS AS EXECUTED		03.01.07

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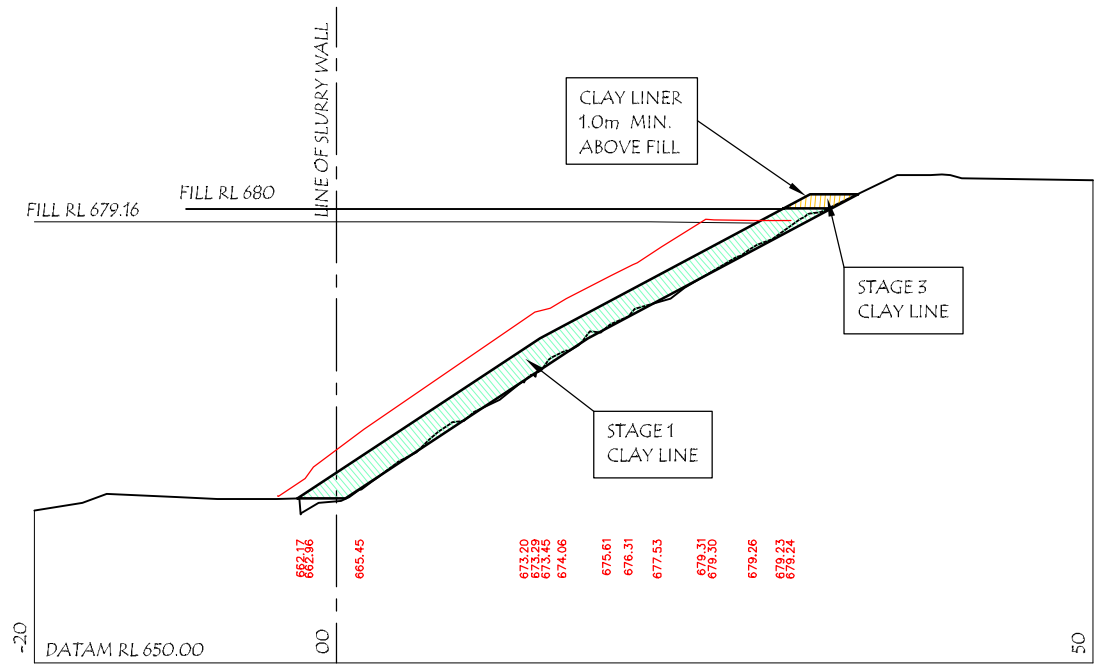
REDUCTION RATIO
1:250
0 2.5 5 10 20

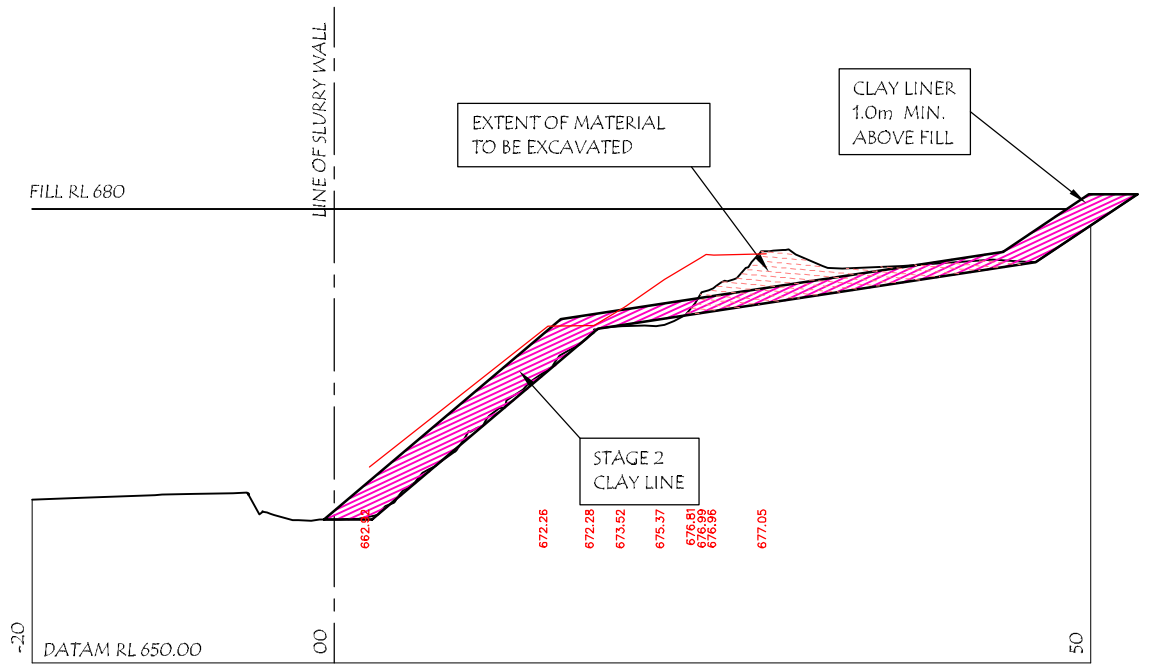
SURVEYED	B.R.
DRAWN	J.A.
CHECKED	J.R.
APPROVED	

WOODLAWN BIOREACTOR
CLAY LINER CROSS SECTIONS
SHEET 1 OF 4

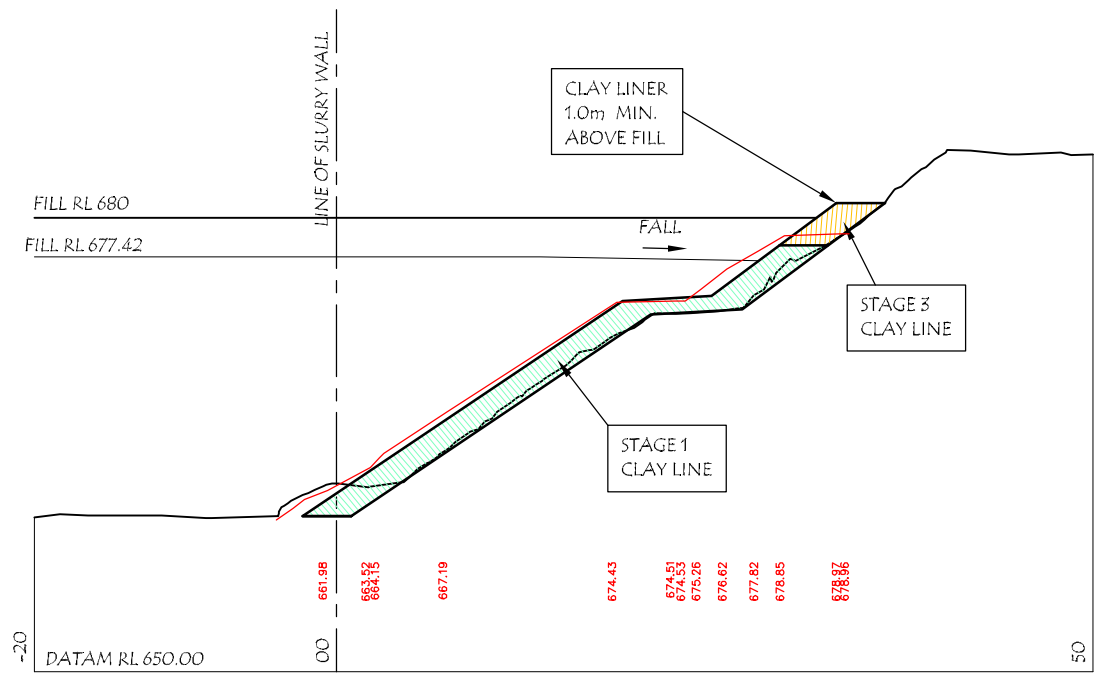
DATUM: AHD
ORIGIN OF LEVELS:
DRAWING No. 16800 - 04
REV. A



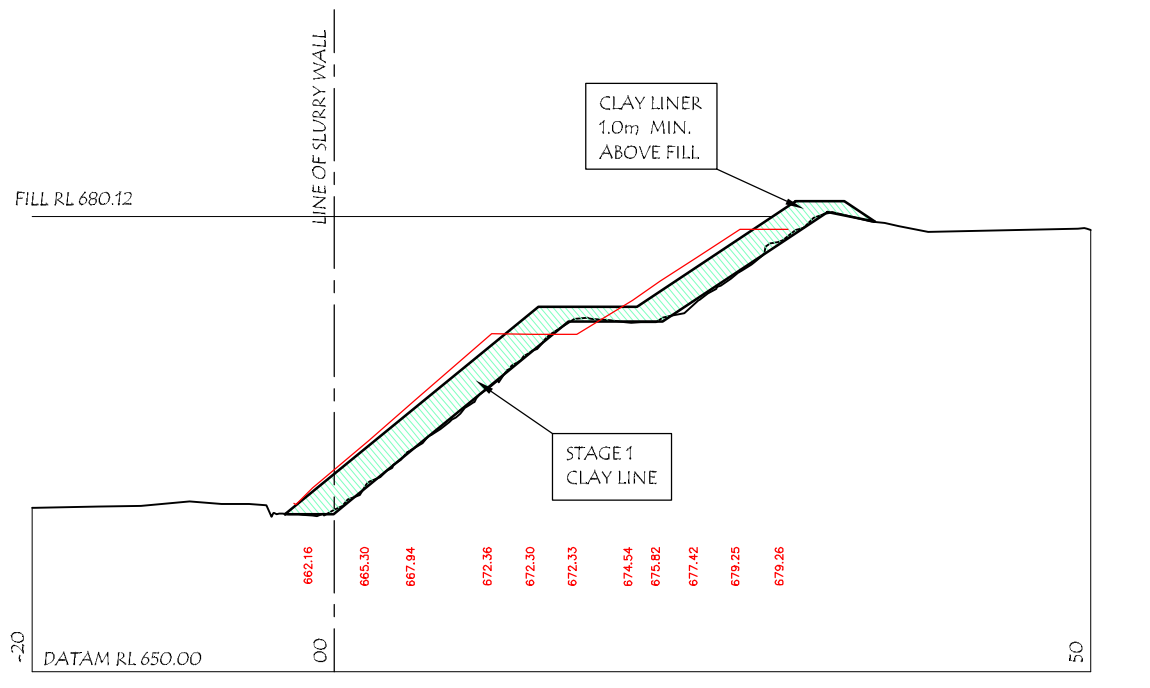
CH 100



CH 140



CH 80



CH 120

CLAY LINING
WORKS AS EXECUTED

Rev.	Description	By	Date
A	TENDER ISSUE	JR	07.10.05
	WORKS AS EXECUTED		03.01.07

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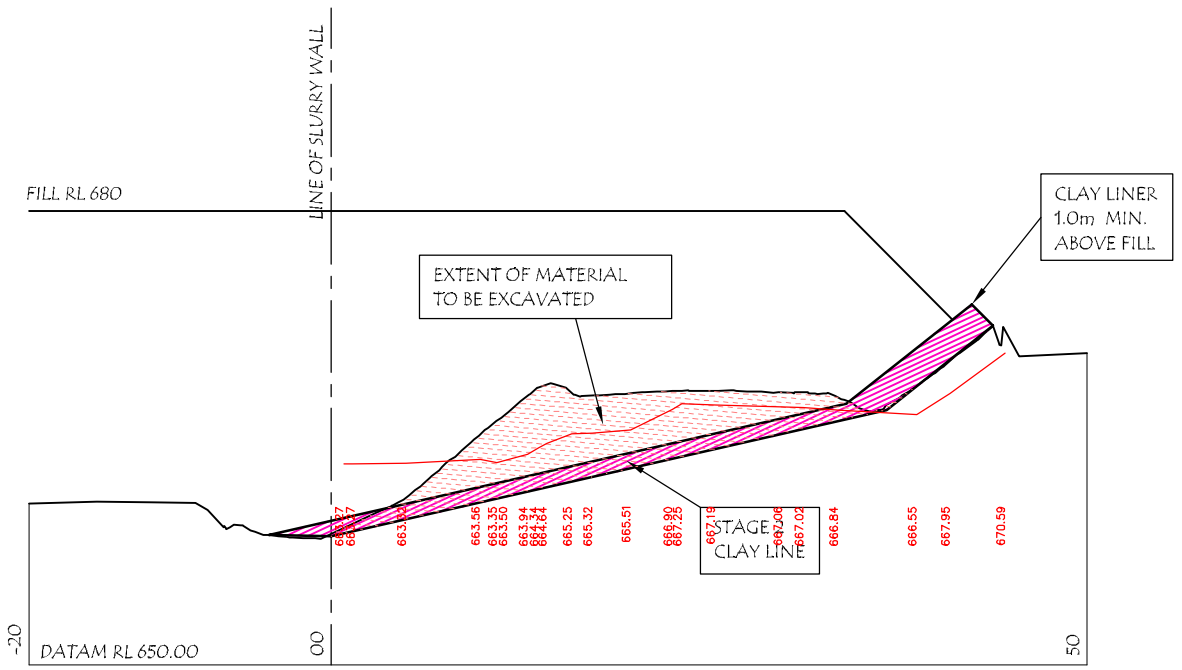
REDUCTION RATIO
1:250
0 2.5 5 10 20

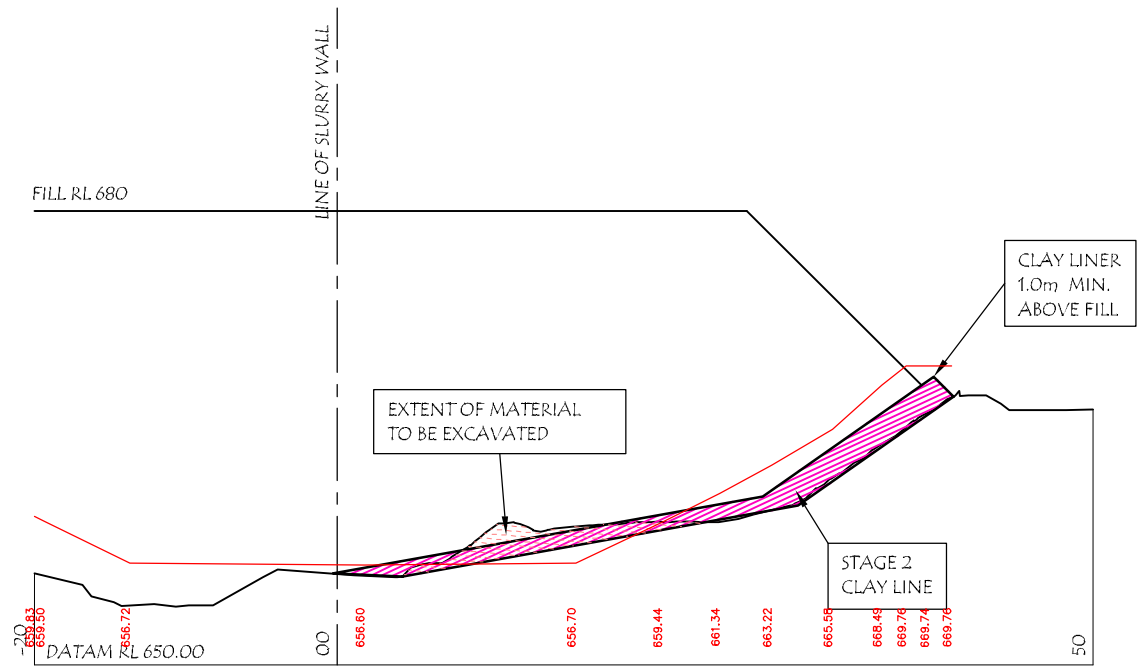
SURVEYED	B.R.
DRAWN	J.A.
CHECKED	J.R.
APPROVED	

WOODLAWN BIOREACTOR
CLAY LINER CROSS SECTIONS
SHEET 2 OF 4

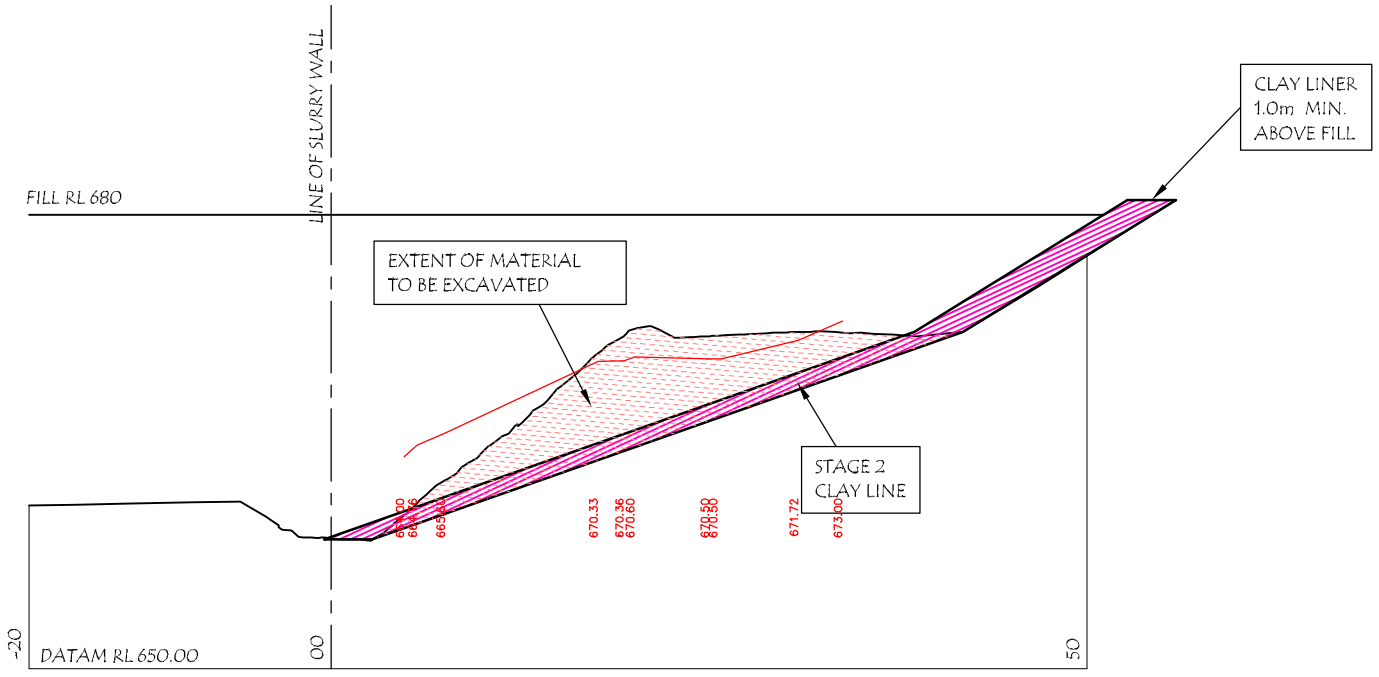
DATUM: AHD
ORIGIN OF LEVELS:
DRAWING No. 16800 - 05
REV. A



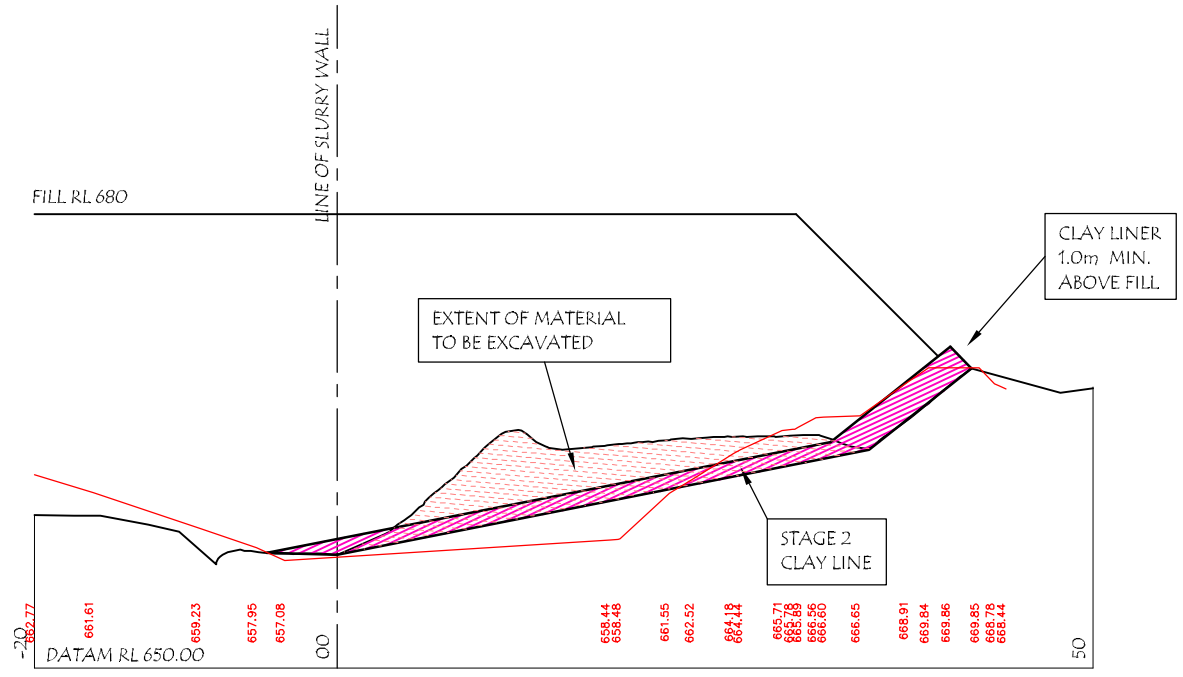
CH 180



CH 220



CH 160



CH 200

CLAY LINING
WORKS AS EXECUTED

Rev.	Description	By	Date
A	TENDER ISSUE	JR	07.10.05
	WORKS AS EXECUTED		03.01.07

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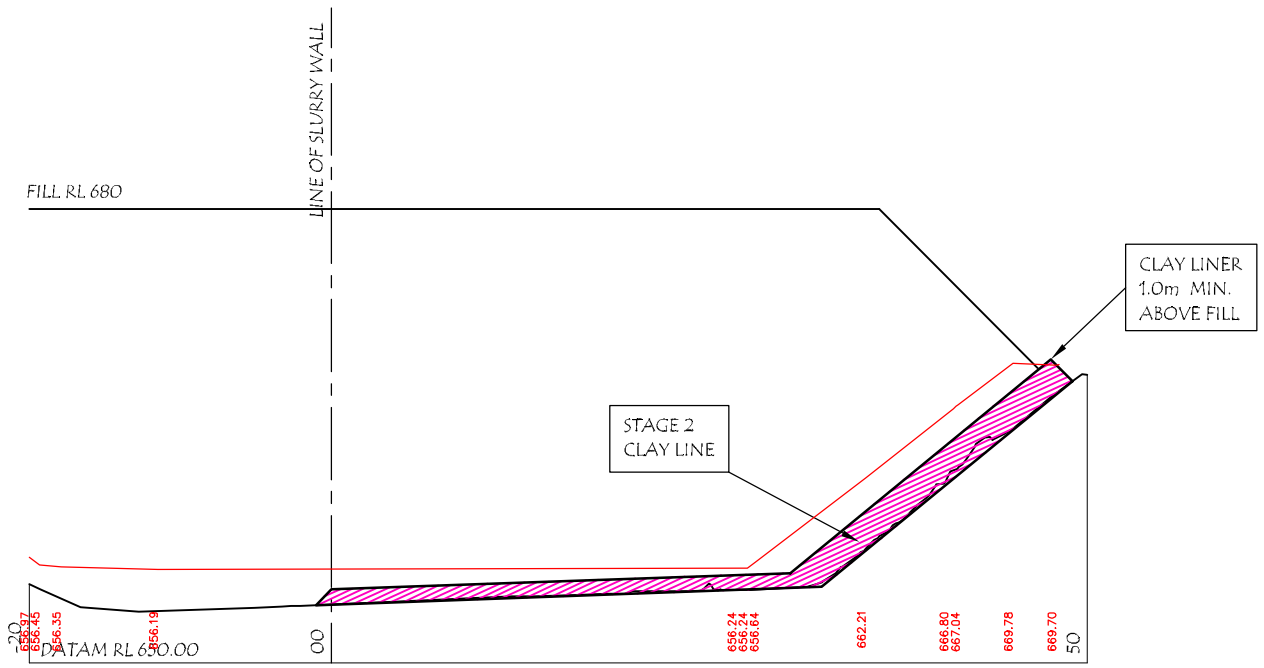
REDUCTION RATIO
1:250
0 2.5 5 10 20

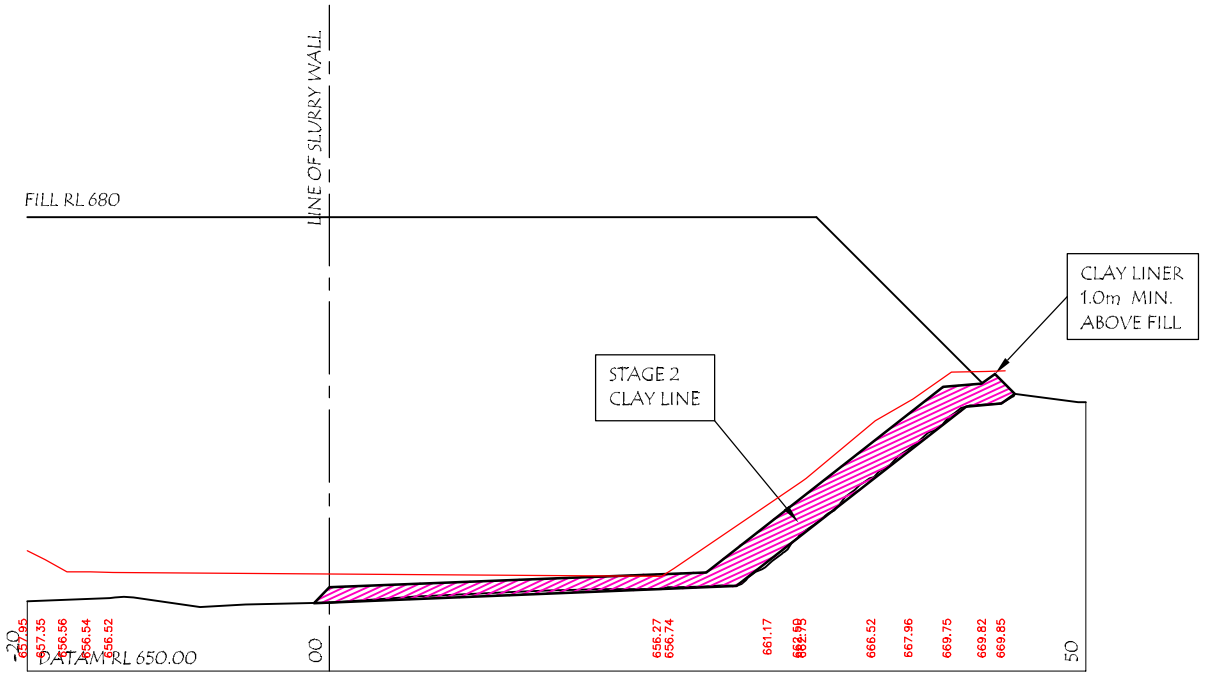
SURVEYED	B.R.
DRAWN	J.A.
CHECKED	J.R.
APPROVED	

WOODLAWN BIOREACTOR
CLAY LINER CROSS SECTIONS
SHEET 3 OF 4

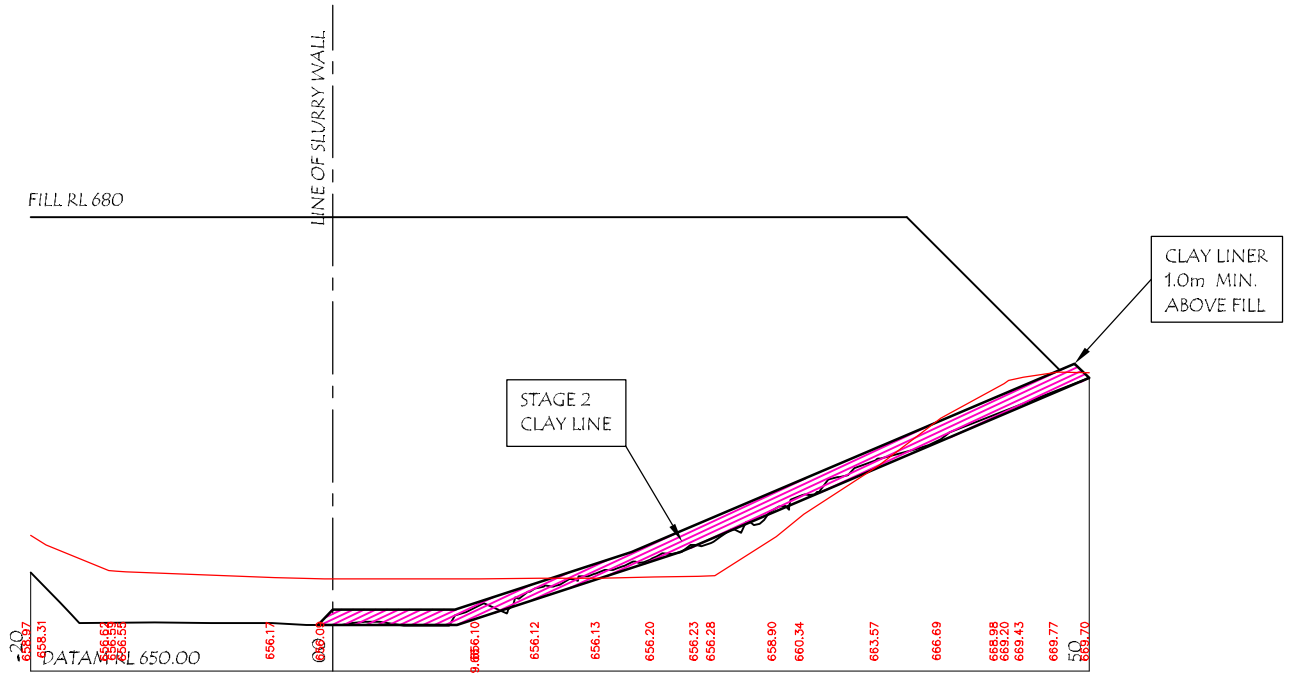
DATUM: AHD
ORIGIN OF LEVELS:
DRAWING No. 16800 - 06
REV. A



CH 260



CH 240



CH 280

CLAY LINING
WORKS AS EXECUTED

Rev.	Description	By	Date
A	TENDER ISSUE	JR	07.10.05
	WORKS AS EXECUTED		03.01.07

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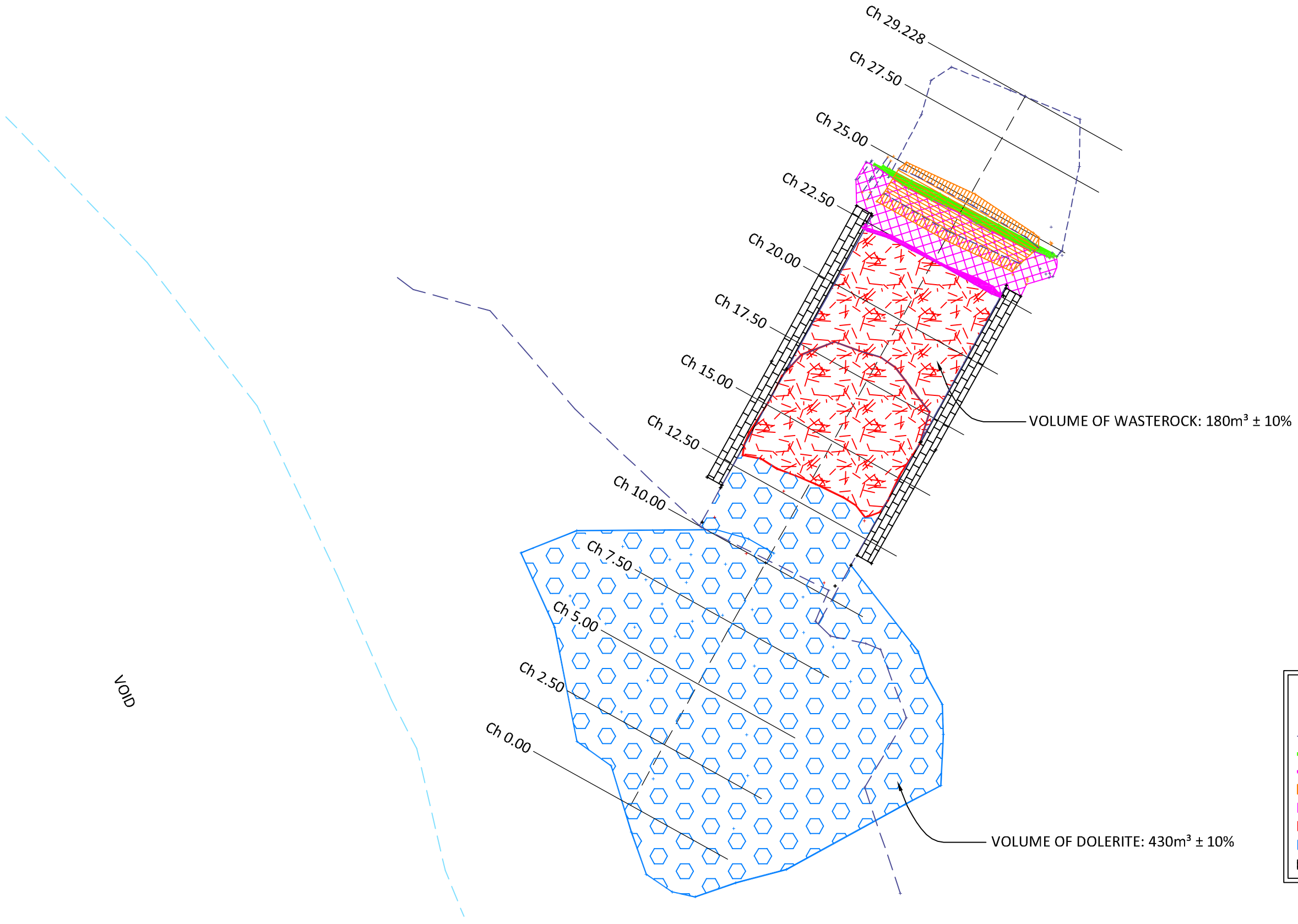
REDUCTION RATIO
1:250
0 2.5 5 10 20

SURVEYED	B.R.
DRAWN	J.A.
CHECKED	J.R.
APPROVED	

WOODLAWN BIOREACTOR
CLAY LINER CROSS SECTIONS
SHEET 4 OF 4

DATUM: AHD
ORIGIN OF LEVELS:
DRAWING No. 16800 - 07
REV. A

MGA



LEGEND

- FLOOR LEVEL OBSERVATIONS
- BREAKLINES (MISCELLANEOUS)
- FACE OF FORMWORK STRUCTURE
- FACE OF SHOTCRETE WALL
- EXCAVATED KEY IN ROCK FLOOR
- EXTENT OF SHOTCRETE WALL
- EXTENT OF WASTEROCK FILL
- EXTENT OF DOLERITE FILL
- EXISTING BRICK WALL

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VEOLIA
ENVIRONMENTAL SERVICES

SCALE 1:150

0 2 4 6 8 10
Metres

DRAWN BY: M KADZIELA

DATUM: MGA & AHD

ORIGIN OF LEVELS: PILLAR 740

CONTOUR INTERVAL: N/A

NOTE : DIMENSIONS AND AREAS ARE SUBJECT TO SURVEY

NORTHERN PORTAL PROJECT

PLAN VIEW
OF NORTHERN PORTAL FILLING COMPONENTS
WOODLAWN BIOREACTOR
COLLECTOR ROAD, TARAGO
PARISH OF WERRIWA
COUNTY OF MURRAY

Sheet No. 1

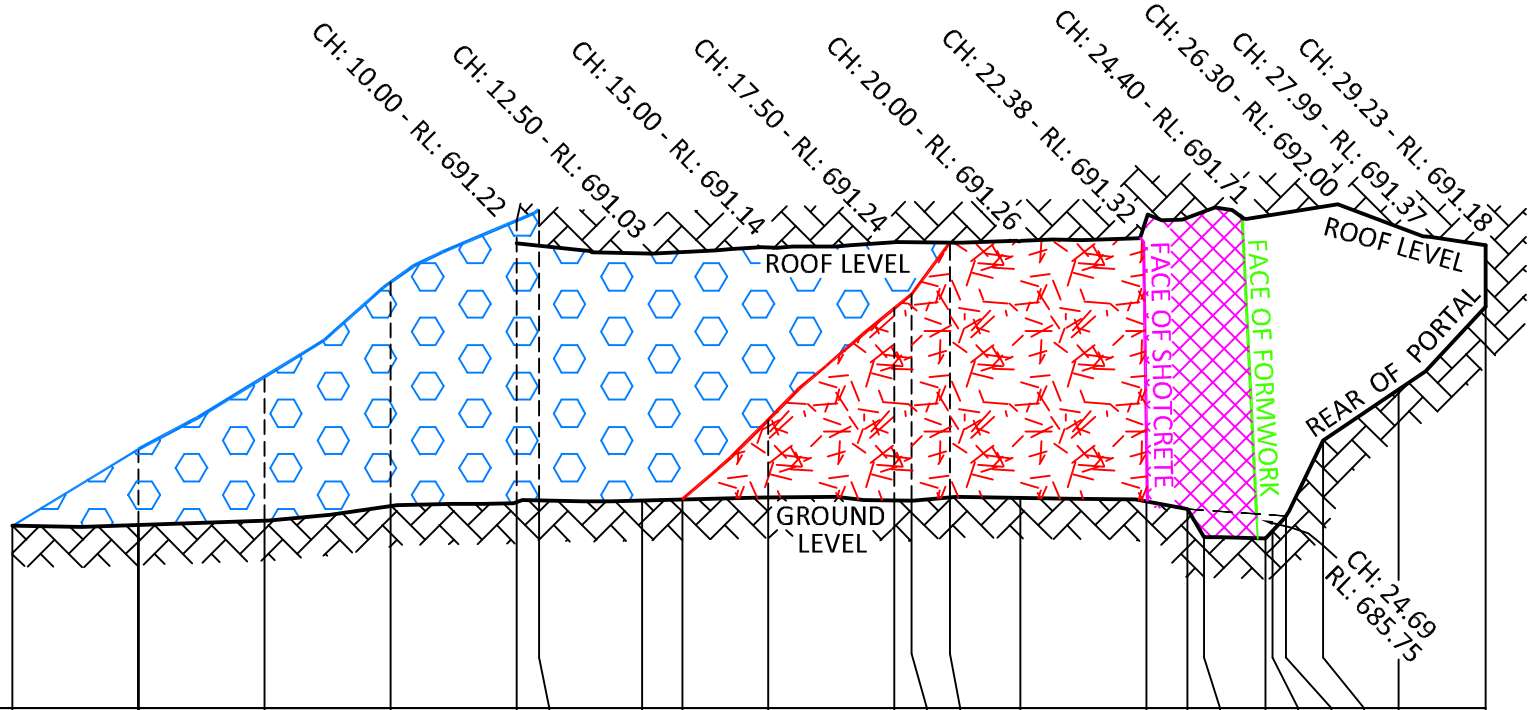
No. of Sheets: 4

Date: 3/06/2009

Ref. No: 16700

Dwg No. NP01 | Rev. A

LEVELS OF EXISTING ROOF STRUCTURE



DATUM: 682.00

FACE OF DOLERITE	685.62	687.14	688.58	690.45	691.67	691.89	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FACE OF WASTE ROCK	---	---	---	---	---	---	---	686.14	687.72	689.94	690.22	691.24	---	---	---	---	---	---	---	---	---	---
FINISHED GROUND SURFACE	685.62	685.64	685.73	686.01	686.09	686.12	686.12	686.14	686.18	686.12	686.12	686.19	686.17	686.10	685.95	685.93	685.84	685.84	685.78	687.29	688.32	689.96
NATURALSURFACE	685.62	685.64	685.73	686.01	686.09	686.12	686.12	686.14	686.18	686.12	686.12	686.19	686.17	686.10	685.95	685.40	685.36	685.51	685.78	687.29	688.32	
CHAINAGE	0.00	2.50	5.00	7.50	10.00	10.45	12.50	13.29	15.00	17.50	17.85	18.60	20.00	22.50	23.31	23.64	24.86	25.00	25.27	26.01	27.50	29.23

LEGEND

- SHOTCRETE WALL
- WASTEROCK FILL
- DOLERITE FILL

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VEOLIA
ENVIRONMENTAL SERVICES

SCALE 1:150

0 2 4 6 8 10
Metres

DRAWN BY: M KADZIELA

DATUM: AHD

ORIGIN OF LEVELS: PILLAR 740

CONTOUR INTERVAL: N/A

NOTE : DIMENSIONS AND AREAS ARE SUBJECT TO SURVEY

NORTHERN PORTAL PROJECT

LONGITUDINAL SECTION
OF NORTHERN PORTAL FILLING COMPONENTS
WOODLAWN BIOREACTOR
COLLECTOR ROAD, TARAGO
PARISH OF WERRIWA
COUNTY OF MURRAY

Sheet No. 2

No. of Sheets: 4

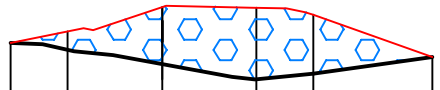
Date: 3/06/2009

Ref. No: 16700

Dwg No. NP02 | Rev. A

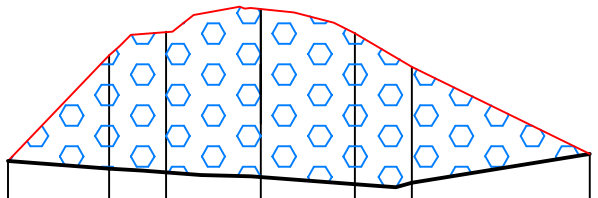
LEGEND

- SHOTCRETE WALL
- WASTEROCK FILL
- DOLERITE FILL



FILL MATERIAL SURFACE	686.20	686.49	687.14	687.13	686.94	685.19
FLOOR LEVEL SURFACE	686.20	686.02	685.64	685.23	685.37	685.19
OFFSET	-4.01	-2.50	0.00	2.50	4.00	7.15

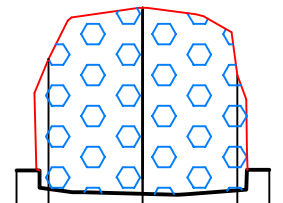
Ch 2.500



DATUM LEVEL 684.00

FILL MATERIAL SURFACE	689.44	689.22	689.84	690.45	689.82	688.92	686.625
FLOOR LEVEL SURFACE	686.44	686.23	686.13	686.01	685.81	685.85	686.63
OFFSET	-6.68	-4.00	-2.50	0.00	2.50	4.00	8.71

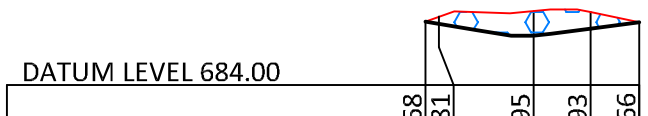
Ch 7.500



DATUM LEVEL 684.00

FILL MATERIAL SURFACE	689.68	691.04	689.25	
FLOOR LEVEL SURFACE	686.73	686.25	686.12	686.21	686.75
OFFSET	-3.34	-2.50	0.00	2.50	3.35

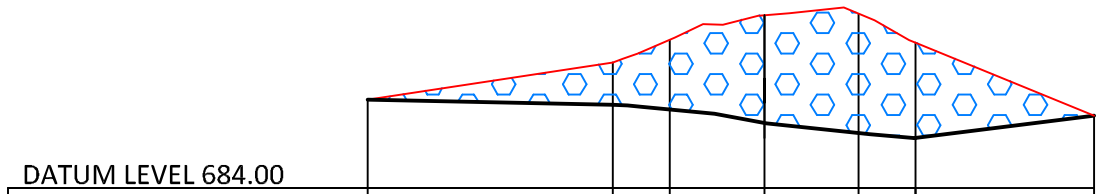
Ch 12.500



DATUM LEVEL 684.00

FILL MATERIAL SURFACE	685.68	685.81	685.95	685.93	685.66
FLOOR LEVEL SURFACE	685.68	685.62	685.31	685.50	685.66
OFFSET	-0.37	0.00	2.50	4.00	5.66

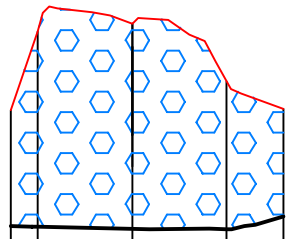
Ch 0.000



DATUM LEVEL 684.00

FILL MATERIAL SURFACE	686.34	687.32	687.92	688.58	688.61	687.85	685.92
FLOOR LEVEL SURFACE	686.34	686.21	686.08	685.73	685.45	685.32	685.92
OFFSET	-6.49	-4.00	-2.50	0.00	2.50	4.00	8.72

Ch 5.000



DATUM LEVEL 684.00

FILL MATERIAL SURFACE	689.24	691.32	691.52	689.99	689.26
FLOOR LEVEL SURFACE	689.17	686.16	686.09	686.09	686.42
OFFSET	-3.22	-2.50	0.00	2.50	4.00

Ch 10.000

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VEOLIA ENVIRONMENTAL SERVICES

SCALE 1:200

0 3 6 9 12
Metres

DRAWN BY: M KADZIELA

DATUM: AHD

ORIGIN OF LEVELS: PILLAR 740

CONTOUR INTERVAL: N/A

NOTE : DIMENSIONS AND AREAS ARE SUBJECT TO SURVEY

NORTHERN PORTAL PROJECT

CROSS SECTIONS: CH 0.00 TO CH 12.50
OF NORTHERN PORTAL FILLING COMPONENTS
WOODLAWN BIOREACTOR
COLLECTOR ROAD, TARAGO
PARISH OF WERRIWA
COUNTY OF MURRAY

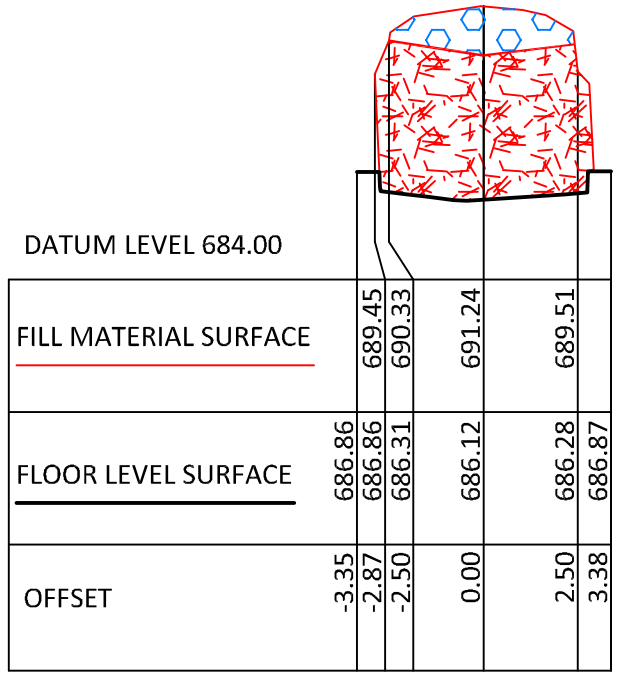
Sheet No. 3

No. of Sheets: 4

Date: 3/06/2009

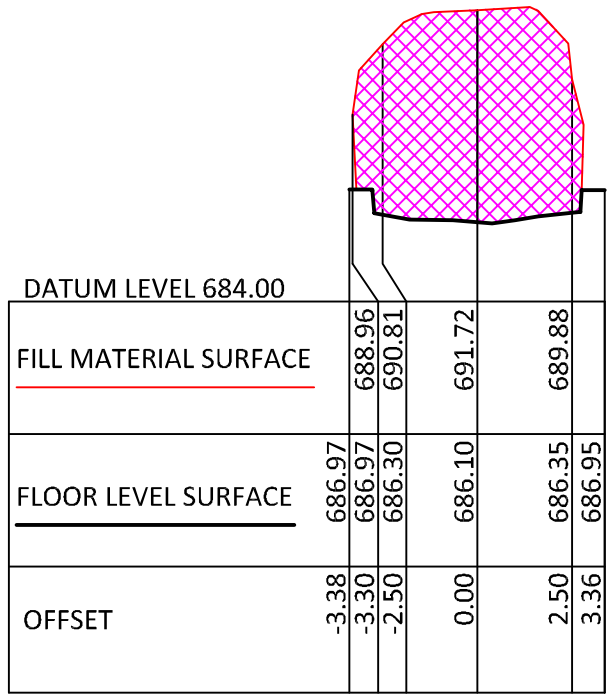
Ref. No: 16700

Dwg No. NP03 Rev. A



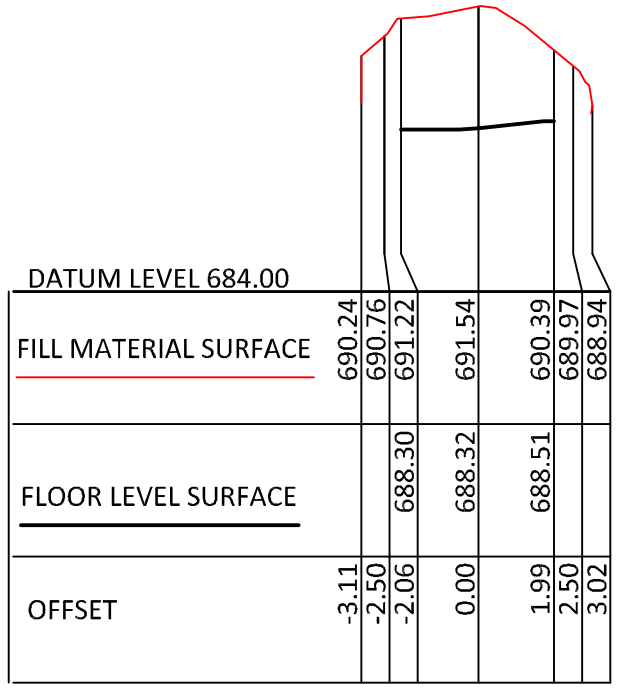
DATUM LEVEL 684.00					
FILL MATERIAL SURFACE	689.45	690.33	691.24		689.51
FLOOR LEVEL SURFACE	686.86	686.86	686.31	686.12	686.28	686.87
OFFSET	-3.35	-2.87	-2.50	0.00	2.50	3.38

Ch 17.500



DATUM LEVEL 684.00					
FILL MATERIAL SURFACE	688.96	690.81	691.72		689.88
FLOOR LEVEL SURFACE	686.97	686.97	686.30	686.10	686.35	686.95
OFFSET	-3.38	-3.30	-2.50	0.00	2.50	3.36

Ch 22.500

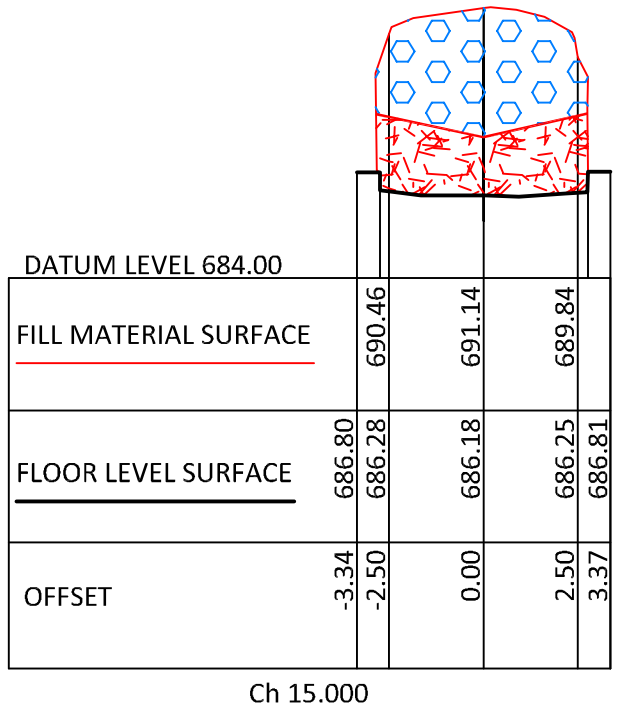


DATUM LEVEL 684.00							
FILL MATERIAL SURFACE	690.24	690.76	691.22	691.54	690.39	689.97	688.94
FLOOR LEVEL SURFACE			688.30	688.32	688.51		
OFFSET	-3.11	-2.50	-2.06	0.00	1.99	2.50	3.02

Ch 27.500

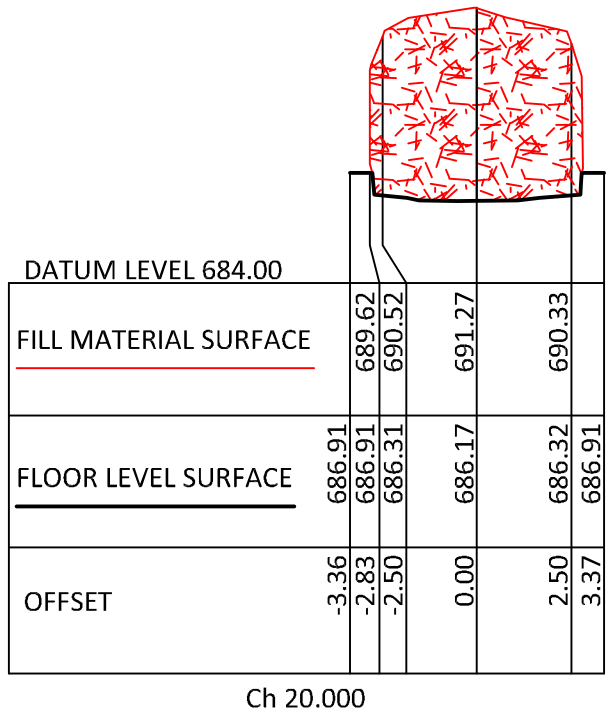
LEGEND

- SHOTCRETE WALL
- WASTEROCK FILL
- DOLERITE FILL



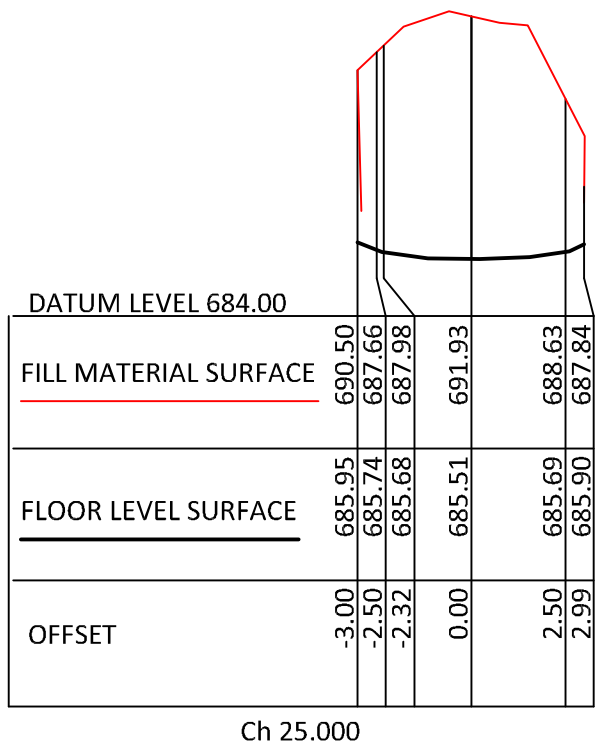
DATUM LEVEL 684.00					
FILL MATERIAL SURFACE	690.46		691.14		689.84
FLOOR LEVEL SURFACE	686.80	686.28		686.18	686.25	686.81
OFFSET	-3.34	-2.50		0.00	2.50	3.37

Ch 15.000



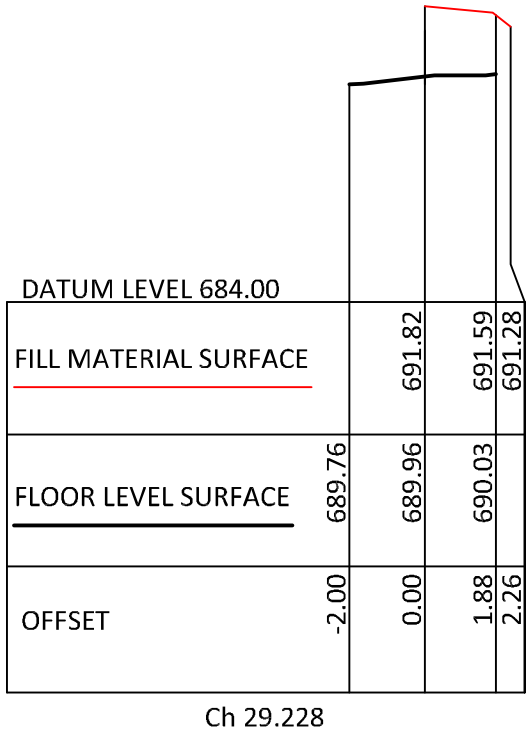
DATUM LEVEL 684.00					
FILL MATERIAL SURFACE	689.62	690.52	691.27		690.33
FLOOR LEVEL SURFACE	686.91	686.91	686.31	686.17	686.32	686.91
OFFSET	-3.36	-2.83	-2.50	0.00	2.50	3.37

Ch 20.000



DATUM LEVEL 684.00							
FILL MATERIAL SURFACE	690.50	687.66	687.98	691.93	688.63	687.84	
FLOOR LEVEL SURFACE	685.95	685.74	685.68	685.51	685.69	685.90	
OFFSET	-3.00	-2.50	-2.32	0.00	2.50	2.99	

Ch 25.000



DATUM LEVEL 684.00				
FILL MATERIAL SURFACE		691.82	691.59	691.28
FLOOR LEVEL SURFACE	689.76	689.96	690.03	
OFFSET	-2.00	0.00	1.88	2.26

Ch 29.228

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VEOLIA
ENVIRONMENTAL SERVICES

SCALE 1:200

0 3 6 9 12
Metres

DRAWN BY: M KADZIELA

DATUM: AHD

ORIGIN OF LEVELS: PILLAR 740

CONTOUR INTERVAL: N/A

NOTE : DIMENSIONS AND AREAS ARE SUBJECT TO SURVEY

NORTHERN PORTAL PROJECT

CROSS SECTIONS: CH 15.00 TO CH 29.228
OF NORTHERN PORTAL FILLING COMPONENTS
WOODLAWN BIOREACTOR
COLLECTOR ROAD, TARAGO
PARISH OF WERRIWA
COUNTY OF MURRAY

Sheet No. 4

No. of Sheets: 4

Date: 3/06/2009

Ref. No: 16700

Dwg No. NP04 | Rev. A

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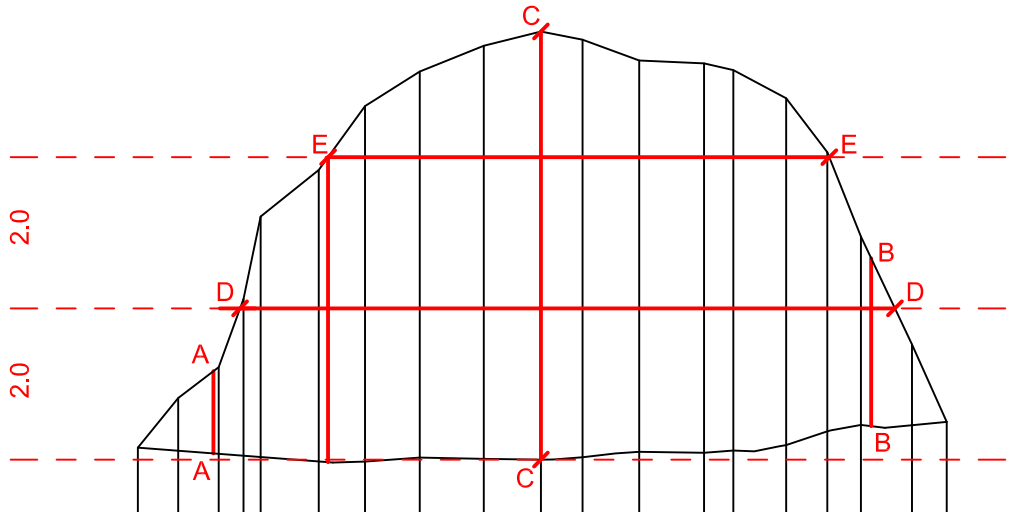


Datum 706.210m

Cut/Fill							4.702	5.105	5.462	5.663	5.522	5.174	5.151	5.033	4.588	3.691	2.489				
ROCK_KEY_PROPOSED	708.16	708.81	709.22	710.12	711.21	711.83	712.67	713.13	713.47	713.66	713.55	713.28	713.24	713.15	712.78	712.06	710.95	709.52	708.50		
PORTAL_FLOOR							707.97	708.03	708.01	708.00	708.03	708.10	708.09	708.12	708.19	708.37	708.46				
Chainage	0.00	0.53	1.07	1.40	1.62	2.39	3.00	3.73	4.57	5.33	5.88	6.63	7.49	7.87	8.57	9.12	9.56	10.24	10.70		

SECTION DIMENSIONS:

A - A: 1·09
B - B: 2·22
C - C: 5·66
D - D: 8·66
E - E: 6·63

Scale 1:100
Ref. No: 16700
Date: 31 May 2013

J:\Surveyors\Jobs\Veolia\16700 Woodlawn Bioreactor\Veolia Southern Portal\Cad\16700-SP1 Key Profile.dwg

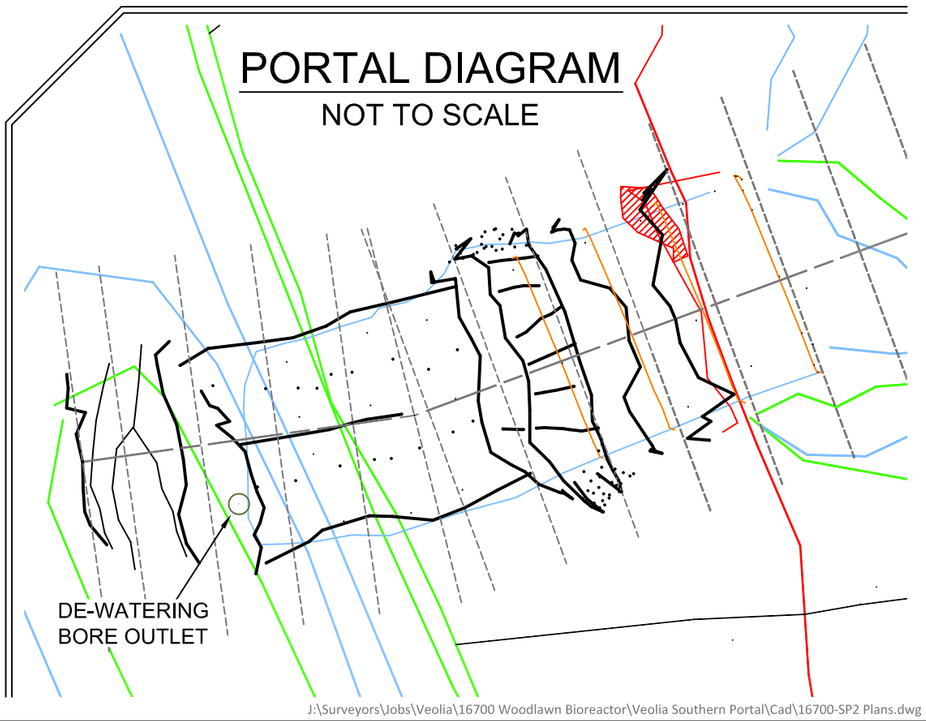
MGA

LEGEND

- TOP OF BANK
- TOE OF BANK
- FACE OF ROCK
- UNDERSIDE OF ROCK
- PORTAL IRON FRAMES

PORTAL DIAGRAM

NOT TO SCALE



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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	3/06/2013

SCALE 1:400

0 5 10 15 20 25

Metres

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A3 SHEET

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FS550318

SOUTHERN PORTAL SEALING PROJECT

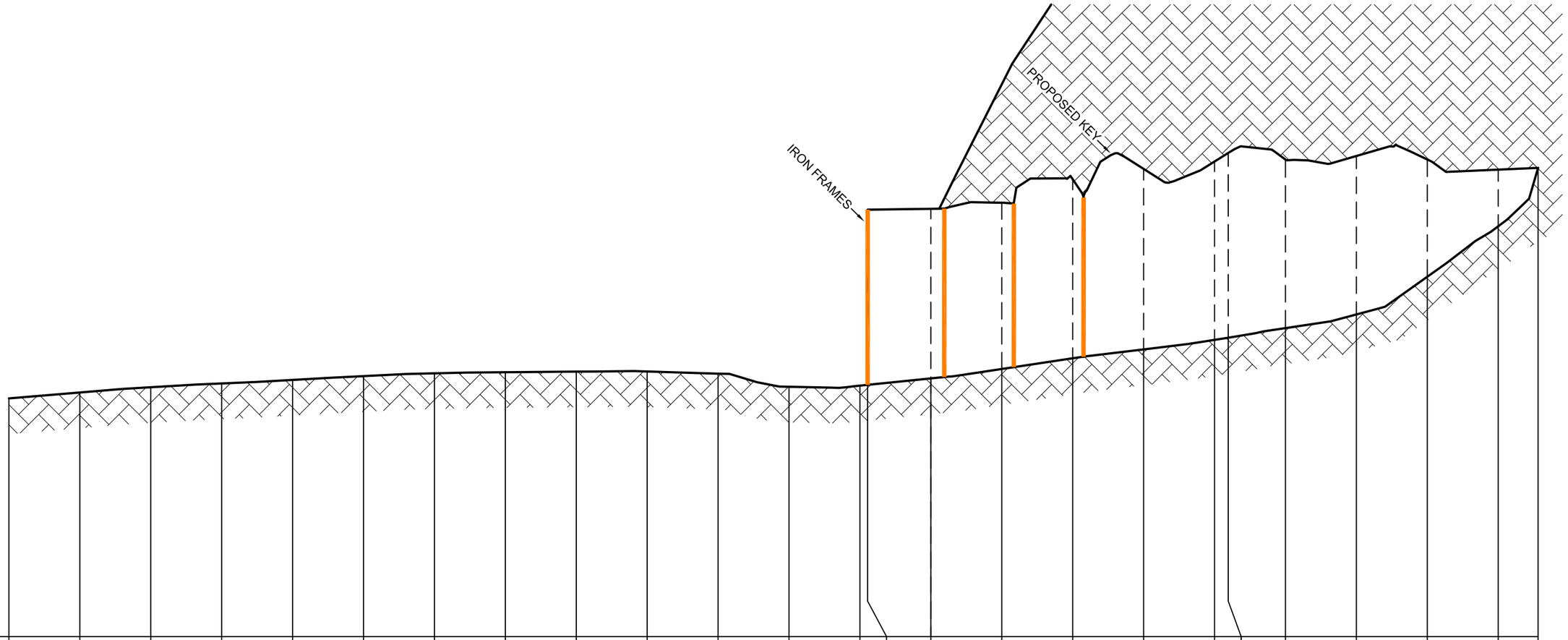
PLAN VIEW
SURVEY OF EXISTING SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE: 3/06/2013
SURVEYED: MK
DRAWN: MK
CHECKED: JK
ISSUE A

DRAWING No.

16700-SP01



DATUM 700.000

CUT/FILL												4.94	4.78	4.68	5.04	5.09	5.02	5.21	4.75	4.46	3.30	1.60	0.000
UNDERSIDE OF ROCK												712.03	712.05	712.22	712.89	713.18	713.39	713.63	713.44	713.54	713.44	713.16	713.21
PORTAL FLOOR	706.71	706.88	707.02	707.13	707.23	707.34	707.42	707.45	707.47	707.47	707.41	707.04	707.07	707.09	707.27	707.54	707.84	708.09	708.36	708.42	708.69	709.08	710.14	711.56	713.21
CHAINAGE	0.000	2.000	4.000	6.000	8.000	10.000	12.000	14.000	16.000	18.000	20.000	22.000	24.000	24.217	26.000	28.000	30.000	32.000	34.000	34.386	36.000	38.000	40.000	42.000	43.125

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	3/06/2013

SCALE 1:400

0 5 10 15 20 25

Metres

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A3 SHEET

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SOUTHERN PORTAL SEALING PROJECT

LONGITUDINAL SECTION
SURVEY OF EXISTING SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE: 3/06/2013
SURVEYED: MK
DRAWN: MK
CHECKED: JK
ISSUE A

DRAWING No.
16700-SP02

DATUM 705.41

PORTAL FLOOR	706.67	706.74	706.80	706.87	706.95	707.02	707.10	707.17	707.25	707.33	707.41
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

CH4.000

DATUM 705.81

PORTAL FLOOR	707.05	707.10	707.16	707.21	707.28	707.34	707.40	707.46	707.52	707.58	707.64
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

CH10.000

DATUM 705.26

PORTAL FLOOR	706.49	706.56	706.64	706.73	706.80	706.88	706.95	707.03	707.11	707.20	707.29
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

CH2.000

DATUM 705.68

PORTAL FLOOR	706.92	706.98	707.04	707.10	707.17	707.23	707.30	707.36	707.42	707.48	707.54
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

CH8.000

DATUM 705.80

PORTAL FLOOR	706.80	706.86	706.95	707.04	707.13	707.21	707.30	707.39	707.47	707.55
OFFSET	1.19	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00

CH0.000

DATUM 705.55

PORTAL FLOOR	706.79	706.86	706.92	706.99	707.07	707.13	707.20	707.26	707.33	707.41	707.48
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

CH6.000

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	3/06/2013

SCALE 1:200

0 3 6 9 12

Metres

Liability limited by a scheme approved under Professional Standards Legislation.

A3 SHEET

VEOLIA ENVIRONMENTAL SERVICES

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FS550318

SOUTHERN PORTAL SEALING PROJECT

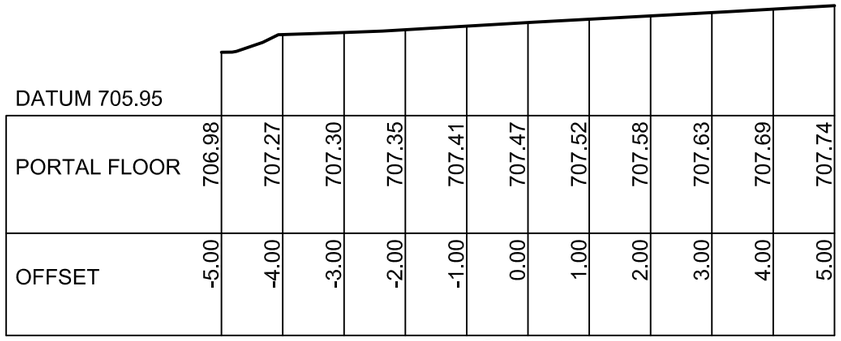
CROSS SECTIONS: CH0.000 - CH10.000
SURVEY OF EXISTING SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE: 3/06/2013
SURVEYED: MK
DRAWN: MK
CHECKED: JK
ISSUE A

DRAWING No.

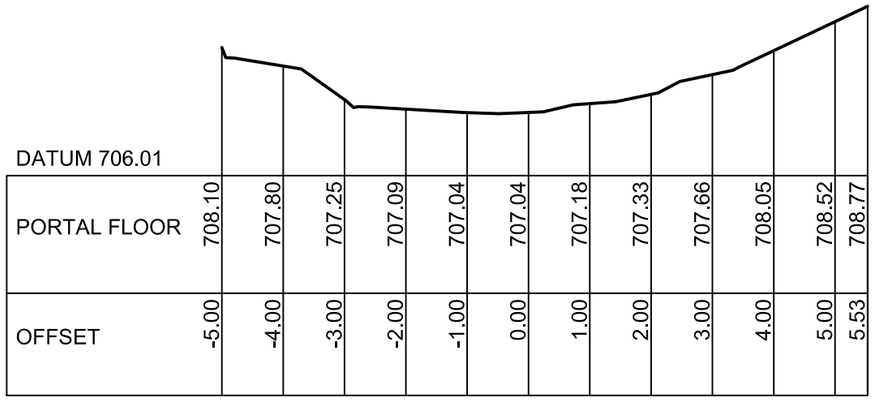
16700-SP03



DATUM 705.95

PORTAL FLOOR	706.98	707.27	707.30	707.35	707.41	707.47	707.52	707.58	707.63	707.69	707.74
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

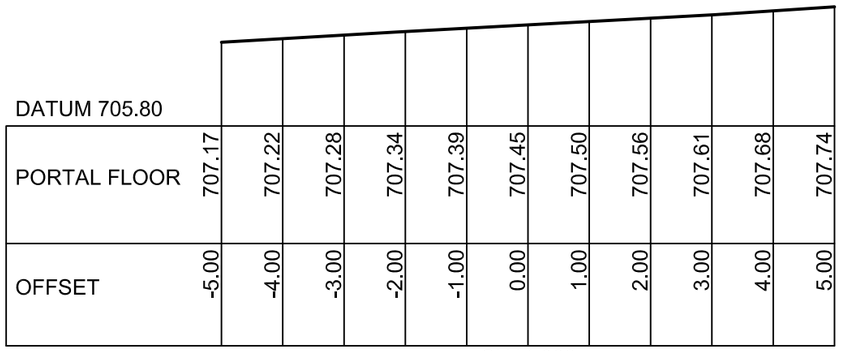
CH16.000



DATUM 706.01

PORTAL FLOOR	708.10	707.80	707.25	707.09	707.04	707.04	707.18	707.33	707.66	708.05	708.52	708.77
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00	5.53

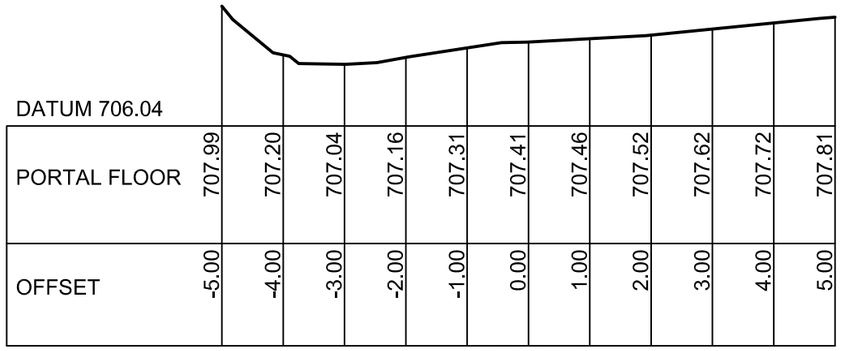
CH22.000



DATUM 705.80

PORTAL FLOOR	707.17	707.22	707.28	707.34	707.39	707.45	707.50	707.56	707.61	707.68	707.74
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

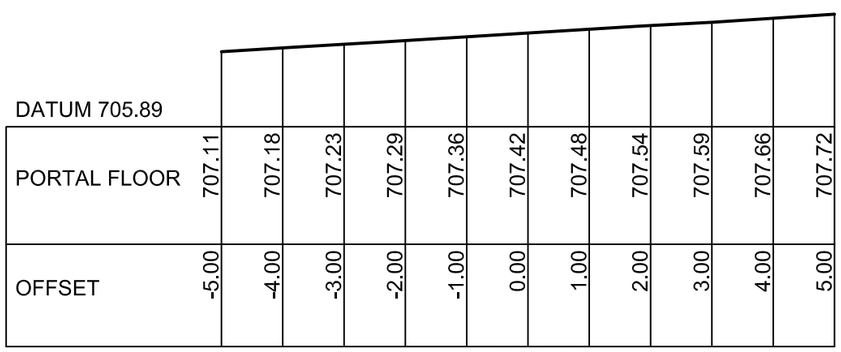
CH14.000



DATUM 706.04

PORTAL FLOOR	707.99	707.20	707.04	707.16	707.31	707.41	707.46	707.52	707.62	707.72	707.81
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

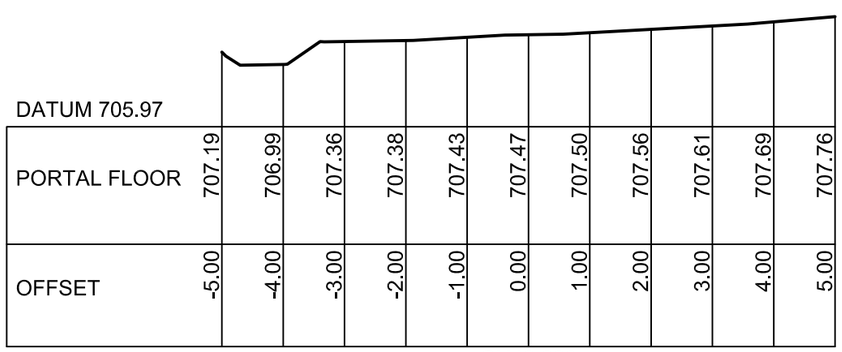
CH20.000



DATUM 705.89

PORTAL FLOOR	707.11	707.18	707.23	707.29	707.36	707.42	707.48	707.54	707.59	707.66	707.72
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

CH12.000



DATUM 705.97

PORTAL FLOOR	707.19	706.99	707.36	707.38	707.43	707.47	707.50	707.56	707.61	707.69	707.76
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

CH18.000

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	3/06/2013

SCALE 1:200

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Metres

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A3 SHEET

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SOUTHERN PORTAL SEALING PROJECT

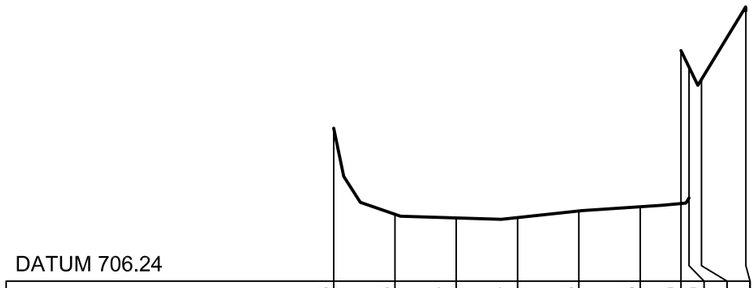
CROSS SECTIONS: CH12.000 - CH22.000
SURVEY OF EXISTING SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE: 3/06/2013
SURVEYED: MK
DRAWN: MK
CHECKED: JK
ISSUE A

DRAWING No.

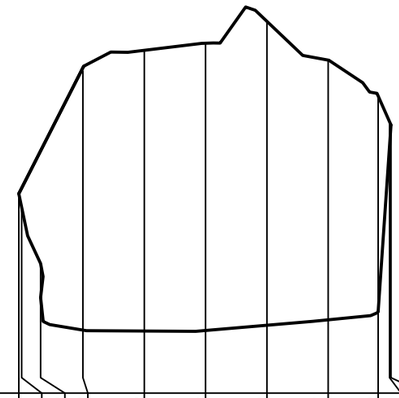
16700-SP04



DATUM 706.24

PORTAL FLOOR	708.73	707.33	707.27	707.27	707.38	707.45	707.50	707.60	
UNDERSIDE OF ROCK							710.00	709.73	709.53	710.68
OFFSET	-3.00	-2.00	-1.00	0.00	1.00	2.00	2.67	2.80	3.00	3.72

CH26.000



DATUM 706.52

PORTAL FLOOR		708.08	707.55	707.53	707.54	707.63	707.72	707.85		
UNDERSIDE OF ROCK	709.77	709.55	708.62	711.77	712.11	712.22	712.58	711.95	711.36	710.94	710.89
OFFSET	-3.05	-3.00	-2.69	-2.00	-1.00	0.00	1.00	2.00	2.81	3.00	3.02

CH28.000

DATUM 706.02

PORTAL FLOOR	708.82	708.01	707.64	707.12	707.04	707.07	707.17	707.26	707.31
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	2.44

CH24.000

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	3/06/2013

SCALE 1:200

0 3 6 9 12

Metres

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SOUTHERN PORTAL SEALING PROJECT

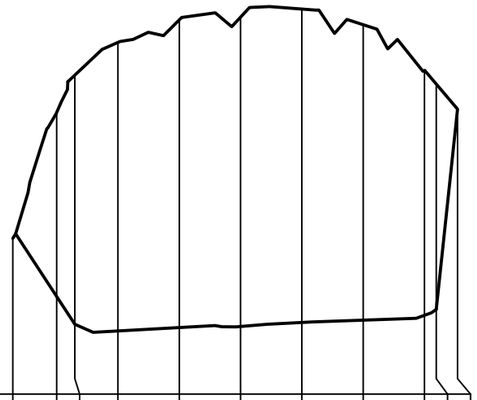
CROSS SECTIONS: CH24.000 - CH28.000
SURVEY OF EXISTING SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE: 3/06/2013
SURVEYED: MK
DRAWN: MK
CHECKED: JK
ISSUE A

DRAWING No.

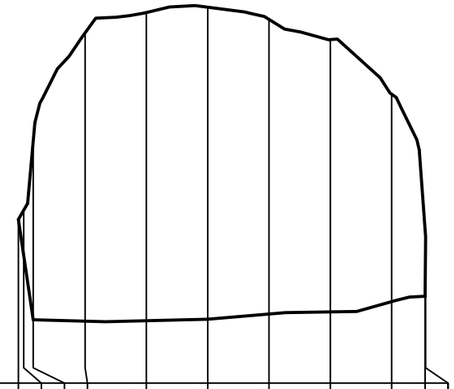
16700-SP05



DATUM 706.74

PORTAL FLOOR		707.88	707.77	707.82	707.84	707.91	707.94	708.02	708.12		
UNDERSIDE OF ROCK	709.28	711.33	711.94	712.47	712.84	712.89	713.02	712.76	712.01	711.79	711.38
OFFSET	-3.71	-3.00	-2.70	-2.00	-1.00	0.00	1.00	2.00	3.00	3.19	3.54

CH30.000



DATUM 707.05

PORTAL FLOOR		708.08	708.06	708.07	708.09	708.18	708.21	708.38	708.47		
UNDERSIDE OF ROCK	709.72	709.87	710.99	712.76	713.09	713.18	712.98	712.65	711.76	708.47	709.44
OFFSET	-3.09	-3.00	-2.85	-2.00	-1.00	0.00	1.00	2.00	3.00	3.55	3.55

CH32.000

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	3/06/2013

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SOUTHERN PORTAL SEALING PROJECT

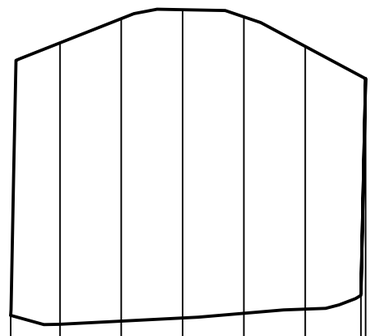
CROSS SECTIONS: CH30.000 - CH32.000
SURVEY OF EXISTING SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE: 3/06/2013
SURVEYED: MK
DRAWN: MK
CHECKED: JK
ISSUE A

DRAWING No.

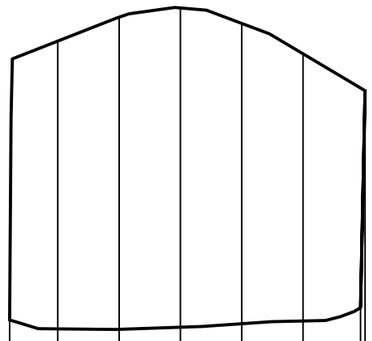
16700-SP06



DATUM 707.25

PORTAL FLOOR	708.40	708.26	708.31	708.36	708.44	708.51	708.73	
UNDERSIDE OF ROCK	708.40	712.85	713.24	713.39	713.27	712.79	708.73	712.26
OFFSET	-2.80	-2.00	-1.00	0.00	1.00	2.00	2.91	2.99

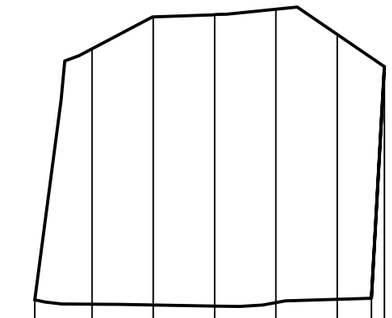
CH34.000



DATUM 707.38

PORTAL FLOOR	708.54	708.40	708.39	708.42	708.48	708.52	708.74	
UNDERSIDE OF ROCK	708.54	713.09	713.48	713.63	713.37	712.88	708.74	712.28
OFFSET	-2.79	-2.00	-1.00	0.00	1.00	2.00	2.94	3.01

CH34.386



DATUM 707.68

PORTAL FLOOR	708.79	708.72	708.71	708.69	708.75	708.80	708.82	
UNDERSIDE OF ROCK	708.79	712.88	713.41	713.44	713.53	711.01	708.82	712.59
OFFSET	-2.93	-2.00	-1.00	0.00	1.00	2.00	2.56	2.77

CH36.000

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	3/06/2013

SCALE 1:200

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SOUTHERN PORTAL SEALING PROJECT

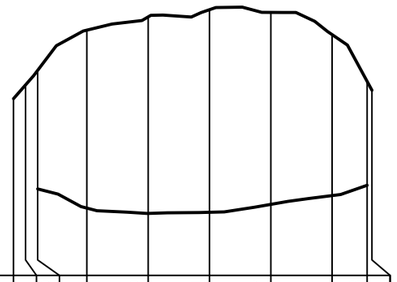
CROSS SECTIONS: CH34.000 - CH36.000
SURVEY OF EXISTING SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE:	3/06/2013	
SURVEYED:	MK	ISSUE
DRAWN:	MK	A
CHECKED:	JK	

DRAWING No.

16700-SP07



DATUM 709.11

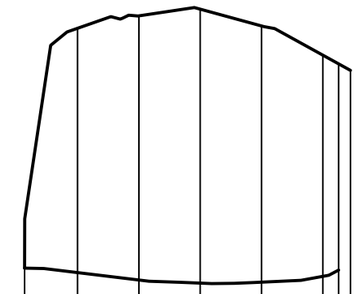
PORTAL FLOOR		710.52	710.21	710.12	710.14	710.27	710.41	710.58		
UNDERSIDE OF ROCK	711.99	712.22	712.45	713.11	713.32	713.44	713.40	713.03	712.27	712.13
OFFSET	-3.20	-3.00	-2.80	-2.00	-1.00	0.00	1.00	2.00	2.57	2.65

CH40.000

DATUM 711.76

PORTAL FLOOR	712.97	712.95	713.21	713.21	712.91	712.78	
UNDERSIDE OF ROCK	712.97	713.15	713.21	713.21	712.96		
OFFSET	-1.72	-1.00	0.00	1.00	2.00	2.32	

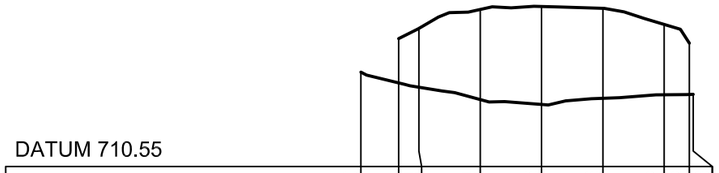
CH43.125



DATUM 708.06

PORTAL FLOOR	709.32	709.25	709.13	709.08	709.09	709.19	709.29	
UNDERSIDE OF ROCK	709.32	713.23	713.43	713.54	713.27	712.79	712.65	712.54
OFFSET	-2.87	-2.00	-1.00	0.00	1.00	2.00	2.26	2.45

CH38.000



DATUM 710.55

PORTAL FLOOR	712.09	711.91	711.84	711.64	711.56	711.66	711.72	711.73
UNDERSIDE OF ROCK		712.63	712.80	713.11	713.16	713.13	712.86	712.56
OFFSET	-2.95	-2.33	-2.00	-1.00	0.00	1.00	2.00	2.41	2.47

CH42.000

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	3/06/2013

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SOUTHERN PORTAL SEALING PROJECT

CROSS SECTIONS: CH38.000 - CH43.125
SURVEY OF EXISTING SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE: 3/06/2013
SURVEYED: MK
DRAWN: MK
CHECKED: JK
ISSUE A

DRAWING No.

16700-SP08

MGA

710.50 710.39 710.28
709.42 709.43 709.44
708.59 708.56 708.62
709.61 710.52
708.65 710.43
710.60
708.71
709.62 710.63
710.67
708.78

FLOOR LEVEL APPROX 709.1

FLOOR LEVEL APPROX 709.4

FLOOR LEVEL APPROX 707.8

711.23 710.27
710.25 708.76
711.25
708.80
710.26
711.31
710.29
708.98
711.29
711.38
711.40 709.12 709.12
710.23 710.28
709.08
710.33
711.46 709.01

FLOOR LEVEL APPROX 708.2

CH22.000
CH24.000
CH26.000
CH28.000
CH30.000
CH32.000
CH34.000
CH34.3
CH36.
CH3
CH

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	2/08/2013

SCALE 1:60

0 1 2 3 4

Metres

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SOUTHERN PORTAL SEALING PROJECT

PLAN VIEW
SHOWING SOUTHERN PORTAL SIDE WALL KEYS
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

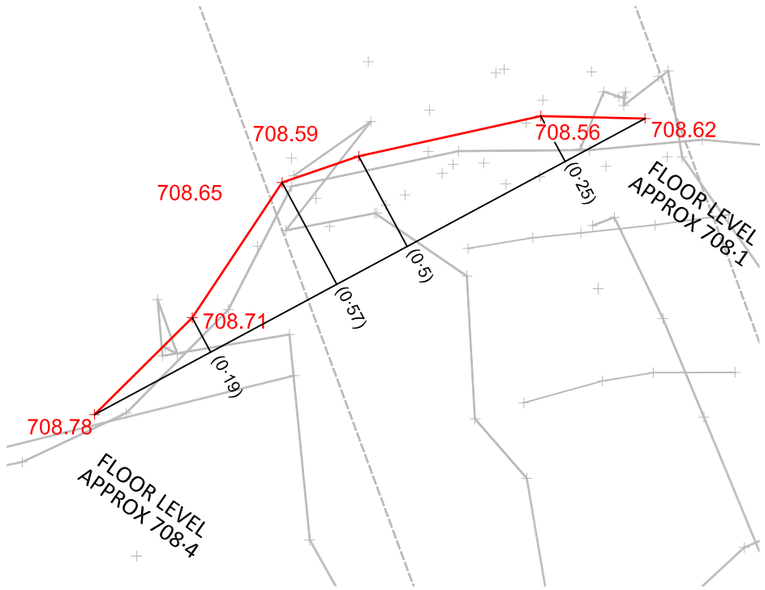
DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE: 2/08/2013
SURVEYED: SM
DRAWN: MK
CHECKED: JK
ISSUE A

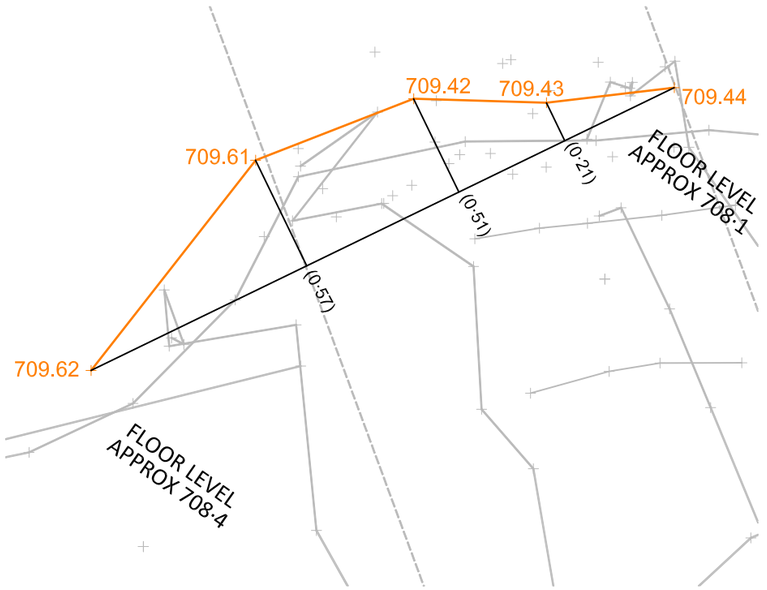
DRAWING No.

16700-SP3-1

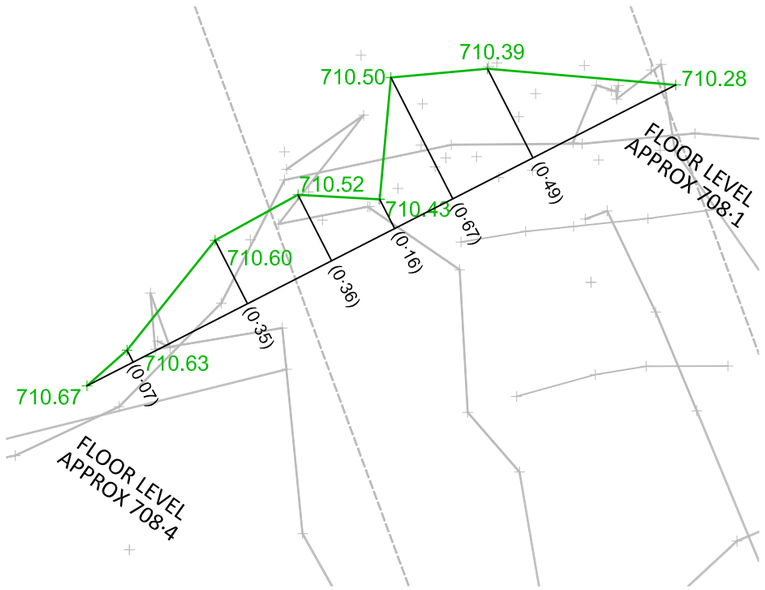
MGA



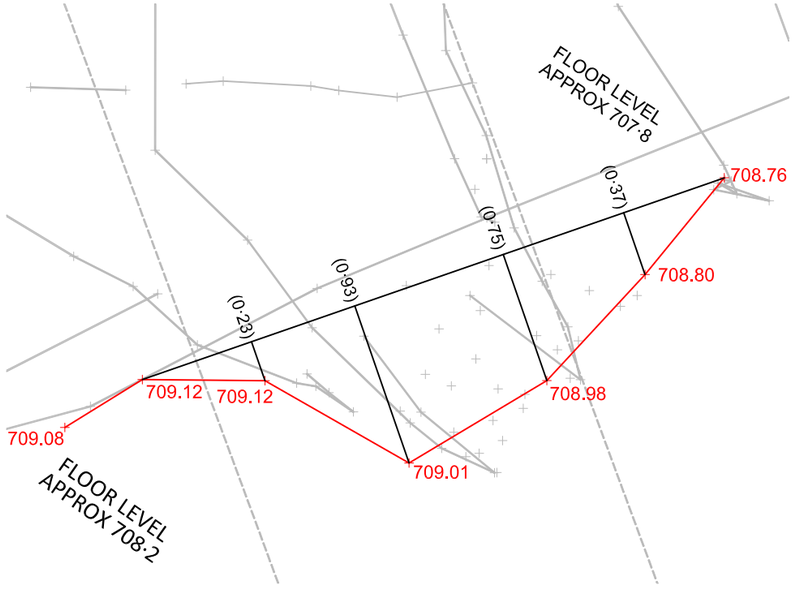
NORTHERN SIDE - LOWER SECTION



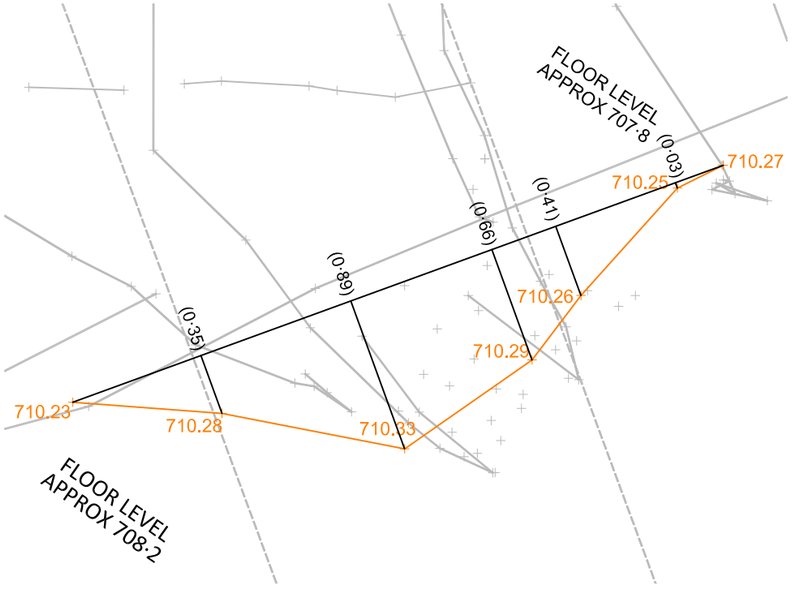
NORTHERN SIDE - MID SECTION



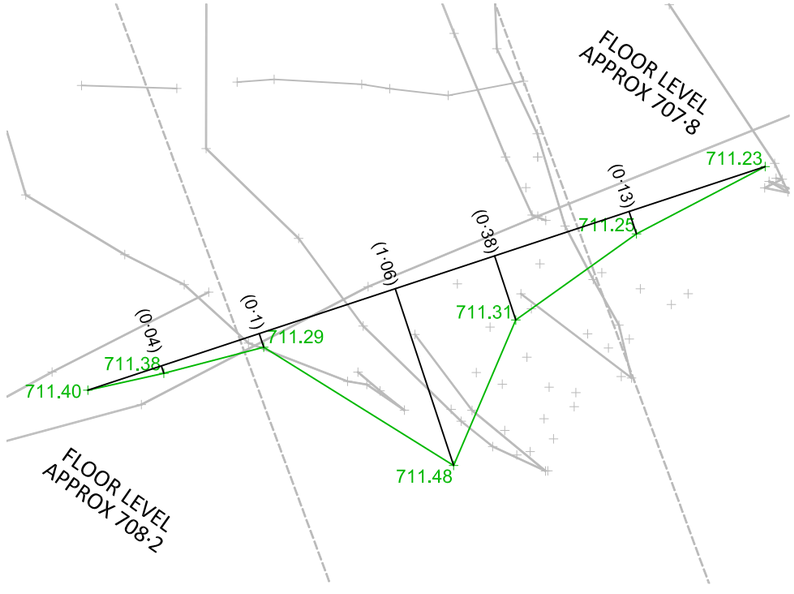
NORTHERN SIDE - HIGHER SECTION



SOUTHERN SIDE - LOWER SECTION



SOUTHERN SIDE - MID SECTION



SOUTHERN SIDE - HIGHER SECTION

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	2/08/2013

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SOUTHERN PORTAL SEALING PROJECT

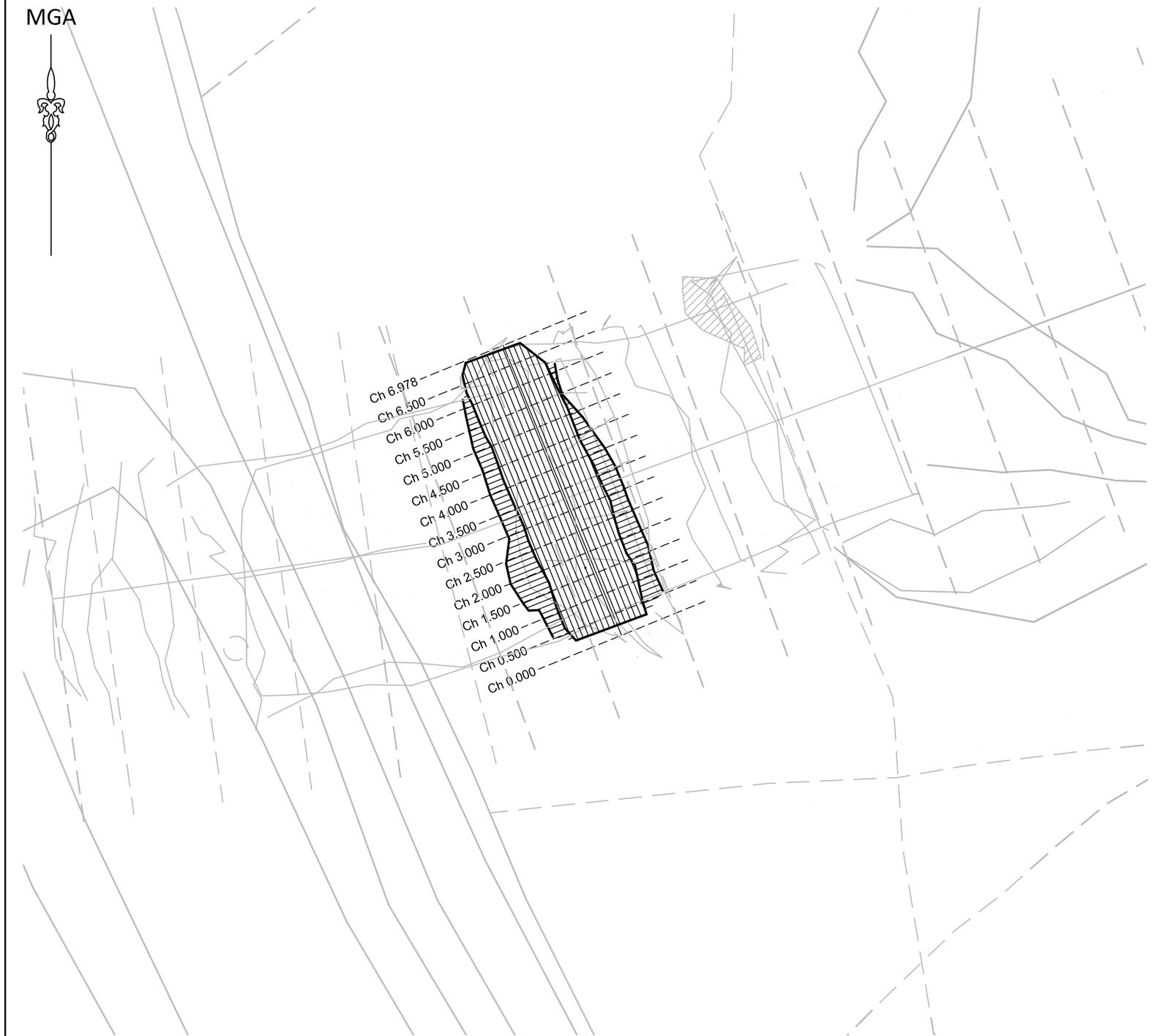
PLAN VIEW
SHOWING SOUTHERN PORTAL SIDE WALL KEYS
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

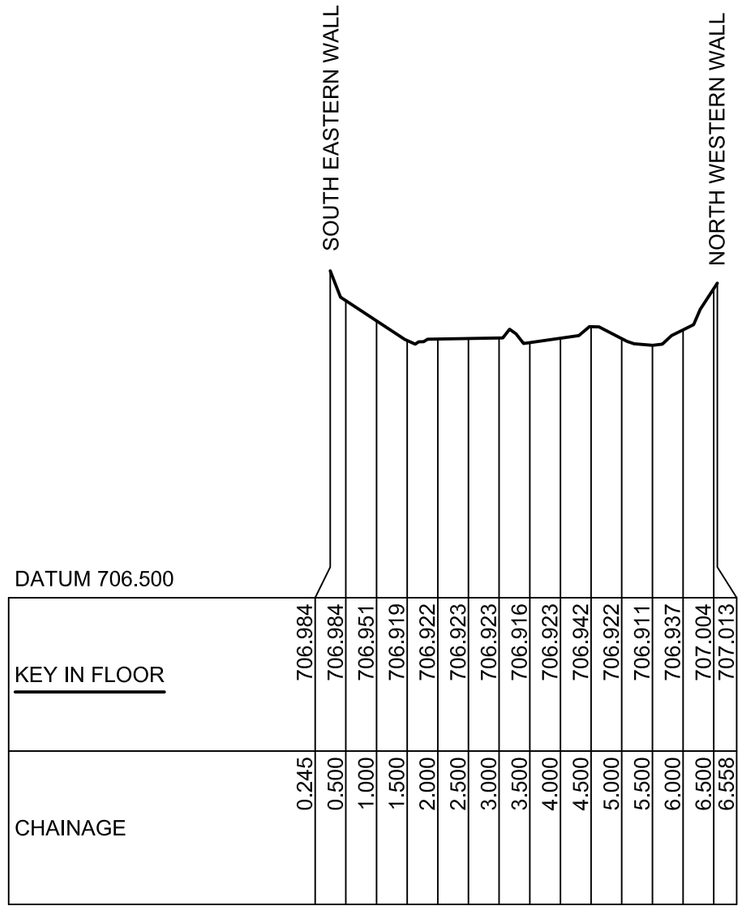
DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE: 2/08/2013
SURVEYED: SM
DRAWN: MK
CHECKED: JK
ISSUE A

DRAWING No. 16700-SP3-2

MGA





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CHAINAGE	0.245	0.500	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500	5.000	5.500	6.000	6.500	6.558

LONGITUDINAL SECTION OF FLOOR KEY
SCALE 1:100 HORIZONTAL
SCALE 1:10 VERTICAL

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	15/08/2013

SCALE 1:100

0 1.2 2.4 3.6 4.8 6

Metres

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SOUTHERN PORTAL SEALING PROJECT

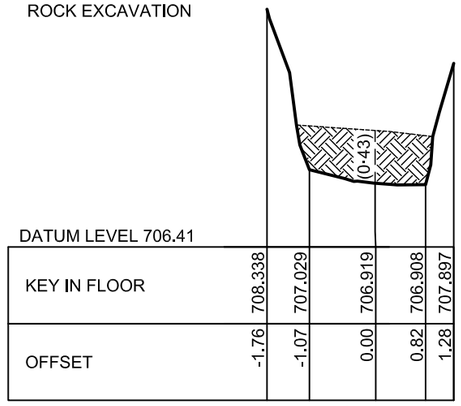
PLAN SHOWING
CONSTRUCTED KEY IN FLOOR
WOODLAWN BIOREACTOR
COLLECTOR ROAD, TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE: 15/08/2013
SURVEYED: MK
DRAWN: MK
CHECKED: JK
ISSUE A

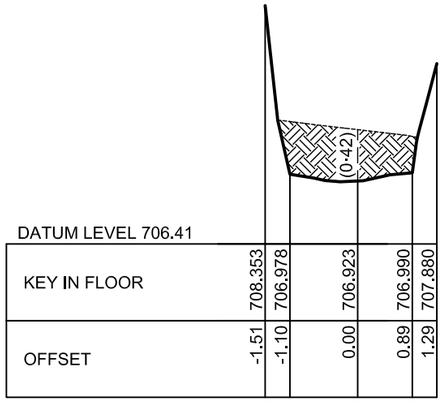
DRAWING No.
16700-SP4-1

DENOTES AREA OF SOLID ROCK EXCAVATION



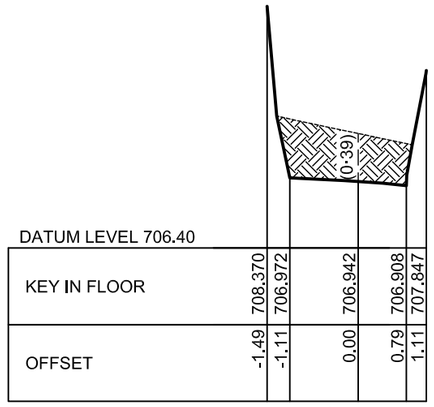
DATUM LEVEL 706.41					
KEY IN FLOOR	708.338	707.029	706.919	706.908	707.897
OFFSET	-1.76	-1.07	0.00	0.82	1.28

Ch 1.500



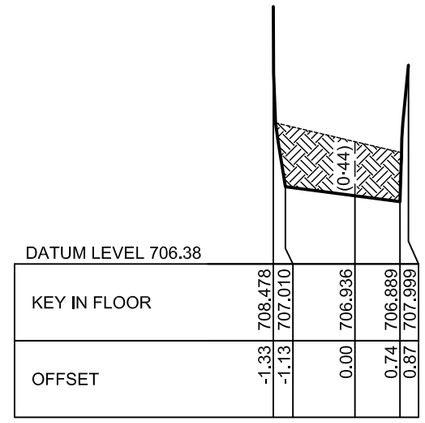
DATUM LEVEL 706.41					
KEY IN FLOOR	708.353	706.978	706.923	706.990	707.880
OFFSET	-1.51	-1.10	0.00	0.89	1.29

Ch 3.000



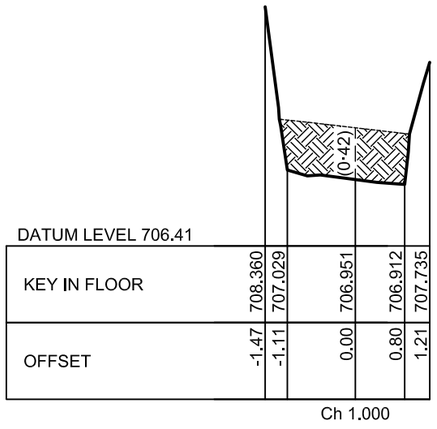
DATUM LEVEL 706.40					
KEY IN FLOOR	708.370	706.972	706.942	706.908	707.847
OFFSET	-1.49	-1.11	0.00	0.79	1.11

Ch 4.500



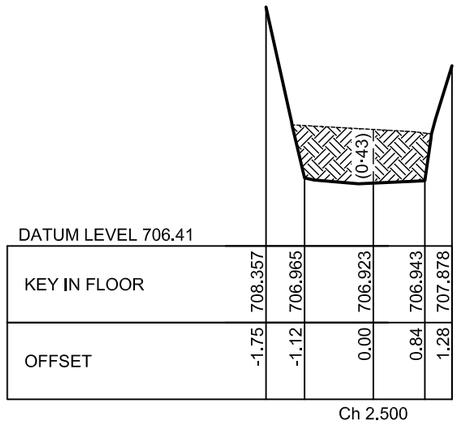
DATUM LEVEL 706.38					
KEY IN FLOOR	708.478	707.010	706.936	706.889	707.999
OFFSET	-1.33	-1.13	0.00	0.74	0.87

Ch 6.000



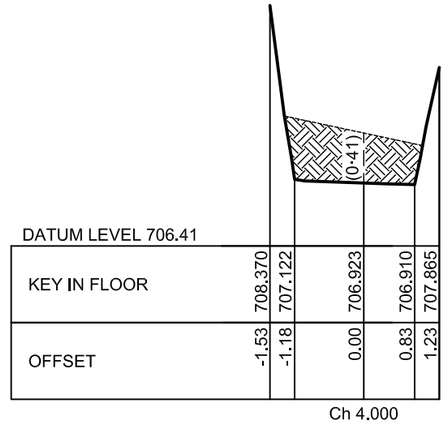
DATUM LEVEL 706.41					
KEY IN FLOOR	708.360	707.029	706.951	706.912	707.735
OFFSET	-1.47	-1.11	0.00	0.80	1.21

Ch 1.000



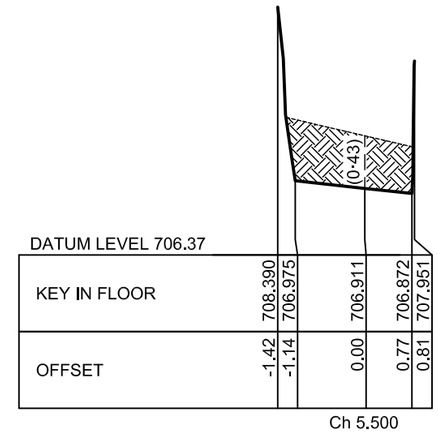
DATUM LEVEL 706.41					
KEY IN FLOOR	708.357	706.965	706.923	706.943	707.878
OFFSET	-1.75	-1.12	0.00	0.84	1.28

Ch 2.500



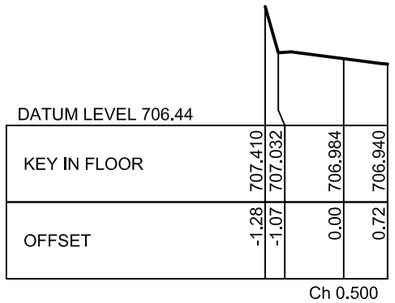
DATUM LEVEL 706.41					
KEY IN FLOOR	708.370	707.122	706.923	706.910	707.865
OFFSET	-1.53	-1.18	0.00	0.83	1.23

Ch 4.000



DATUM LEVEL 706.37					
KEY IN FLOOR	708.390	706.975	706.911	706.872	707.951
OFFSET	-1.42	-1.14	0.00	0.77	0.81

Ch 5.500



DATUM LEVEL 706.44				
KEY IN FLOOR	707.410	707.032	706.984	706.940
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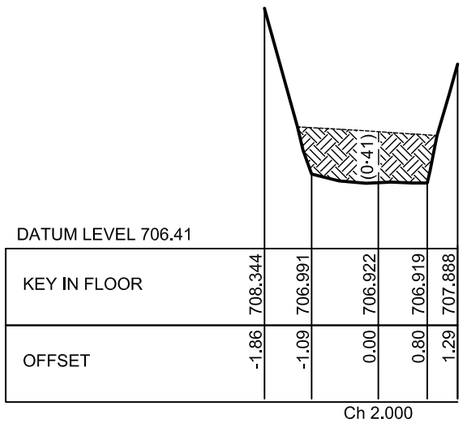
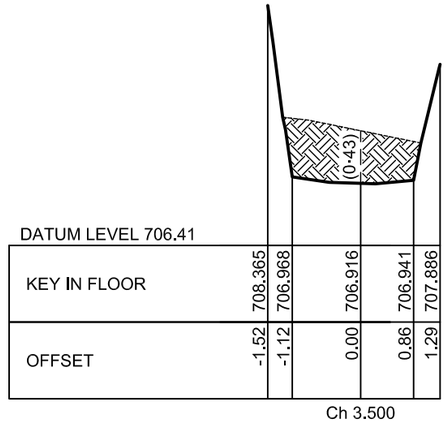
Ch 0.500



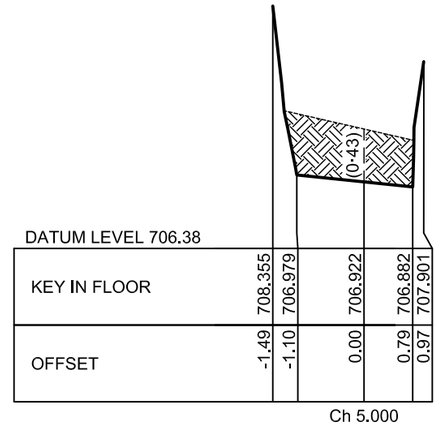
DATUM LEVEL 706.41					
KEY IN FLOOR	708.344	706.991	706.922	706.919	707.888
OFFSET	-1.86	-1.09	0.00	0.80	1.29

Ch 2.000



DATUM LEVEL 706.41					
KEY IN FLOOR	708.365	706.968	706.916	706.941	707.886
OFFSET	-1.52	-1.12	0.00	0.86	1.29

Ch 3.500



DATUM LEVEL 706.38					
KEY IN FLOOR	708.355	706.979	706.922	706.882	707.901
OFFSET	-1.49	-1.10	0.00	0.79	0.97

Ch 5.000

J:\Surveyors\Jobs\Veolia\16700 Woodlawn Bioreactor\Veolia Southern Portal\Cad\16700-SP4 - Final Key.dwg

ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	15/08/2013

SCALE 1:100

1:100 HORIZ 0 1.2 2.4 3.6 4.8

1:50 VERT 0 0.6 1.2 1.8 2.4

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SOUTHERN PORTAL SEALING PROJECT

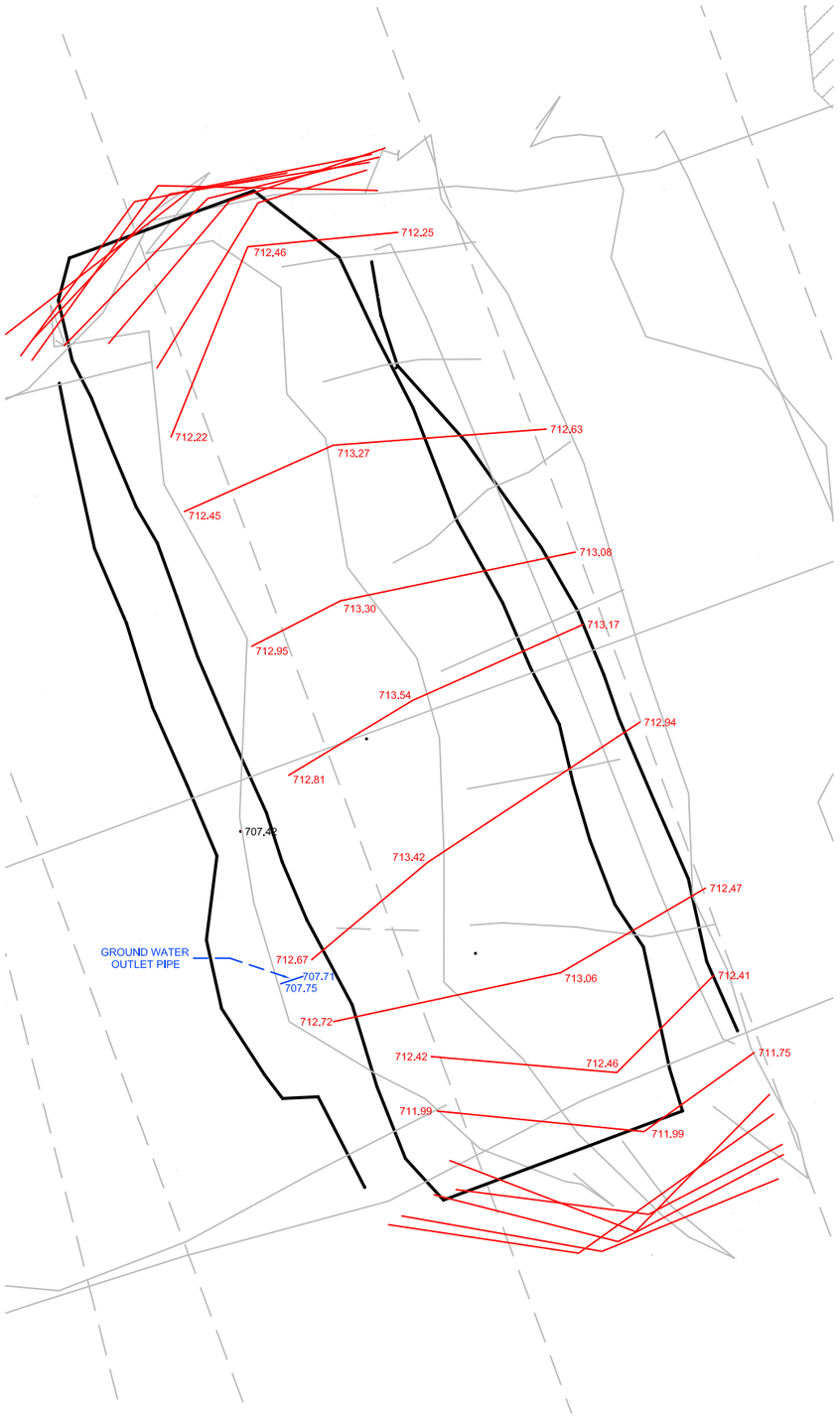
PLAN SHOWING
CROSS SECTIONS OF CONSTRUCTED KEY IN FLOOR
WOODLAWN BIOREACTOR
COLLECTOR ROAD, TARAGO

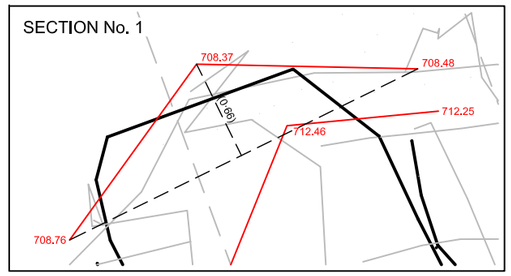
DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

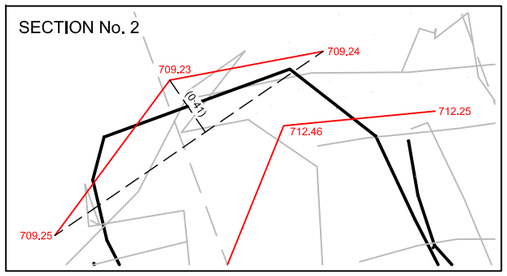
DATE:	15/08/2013
SURVEYED:	MK
DRAWN:	MK
CHECKED:	JK

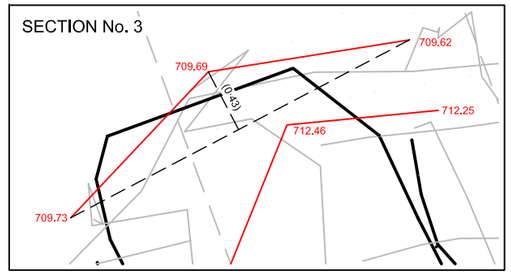
ISSUE A

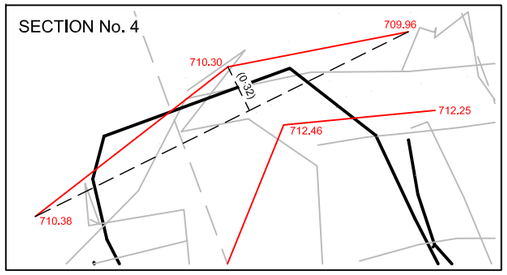
DRAWING No. 16700-SP4-2

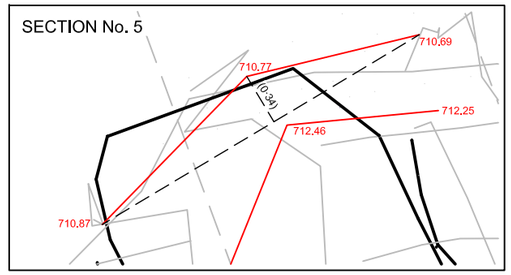


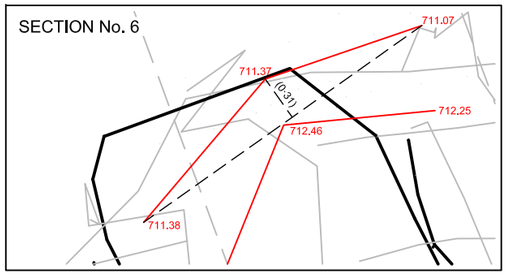


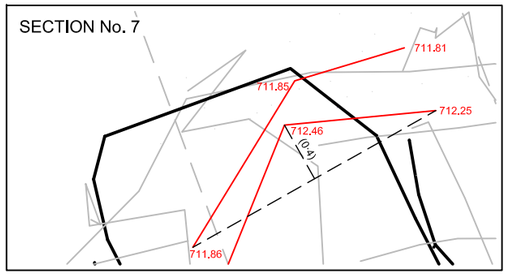






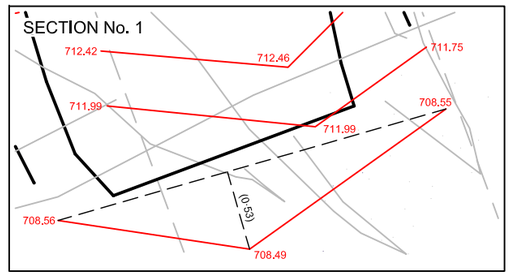


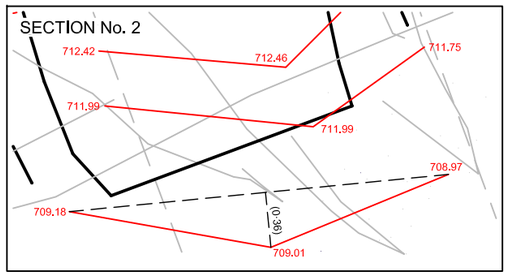


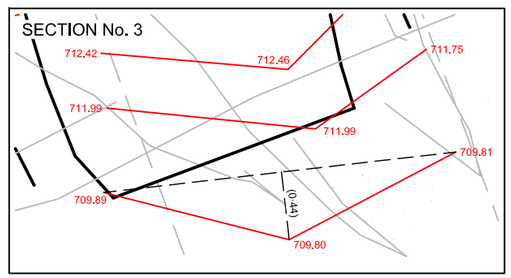


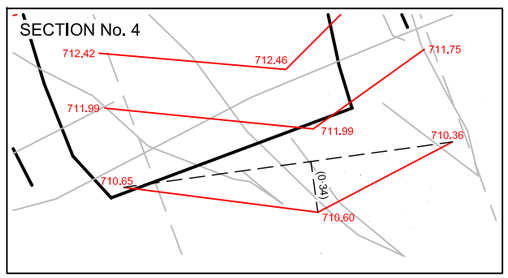
NORTH WESTERN WALL SECTIONS

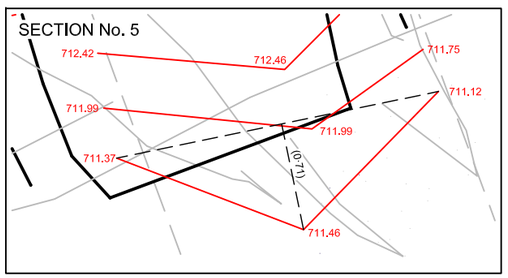
LOWER SECTION No. 1
HIGHER SECTION No. 7











SOUTH EASTERN WALL SECTIONS

LOWER SECTION No. 1
HIGHER SECTION No. 5

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	15/08/2013

SCALE 1:40

0 0.5 1.0 1.5 2.0 2.5

Metres

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SOUTHERN PORTAL SEALING PROJECT

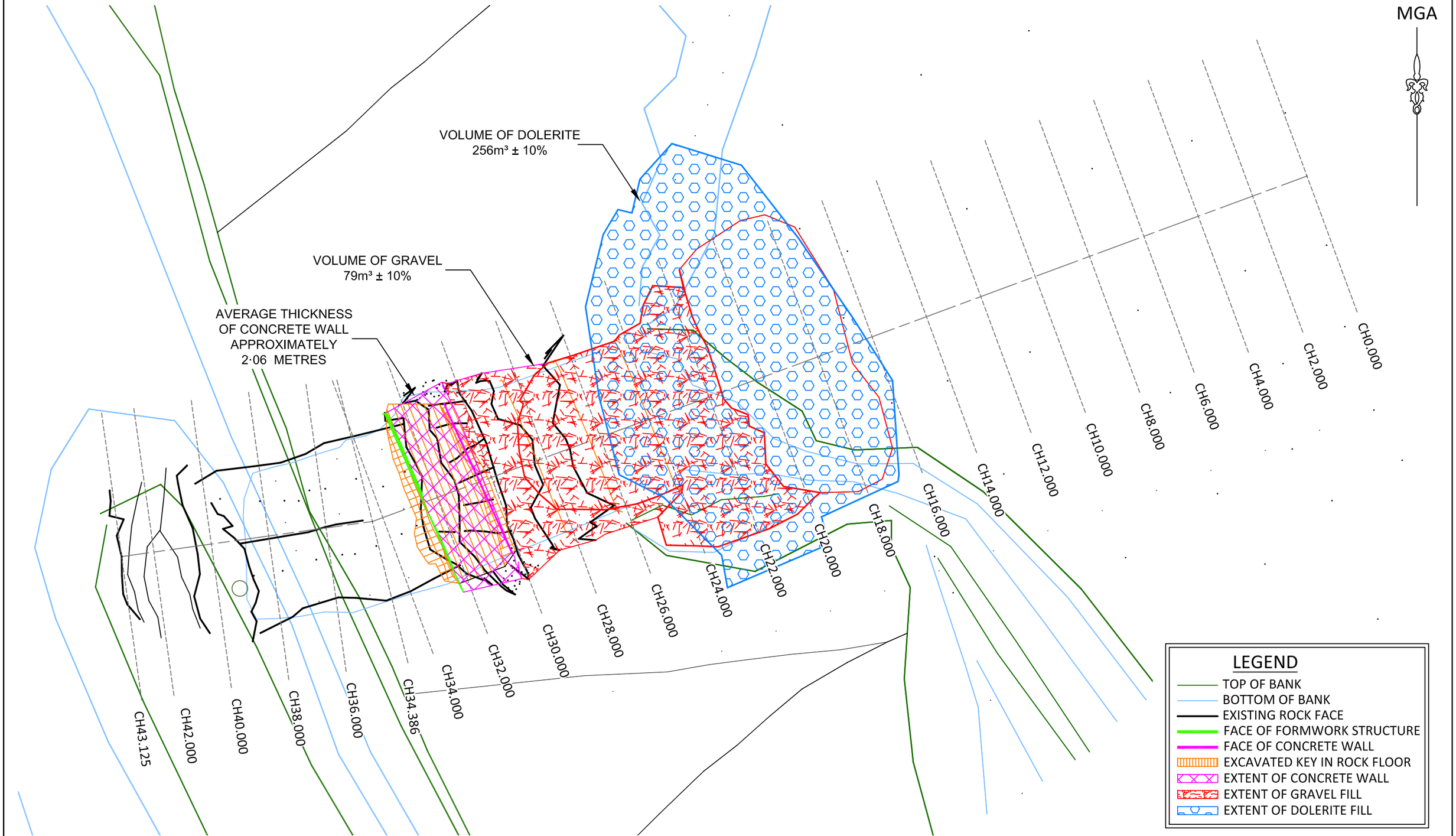
PLAN SHOWING
DETAILS OF KEY IN WALLS & CEILING
WOODLAWN BIOREACTOR
COLLECTOR ROAD, TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE:	15/08/2013	ISSUE
SURVEYED:	MK	A
DRAWN:	MK	
CHECKED:	JK	

DRAWING No.

16700-SP4-3



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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	18/09/2013

SCALE 1:125

0 2 4 6 8

Metres

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A3 SHEET

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SOUTHERN PORTAL SEALING PROJECT

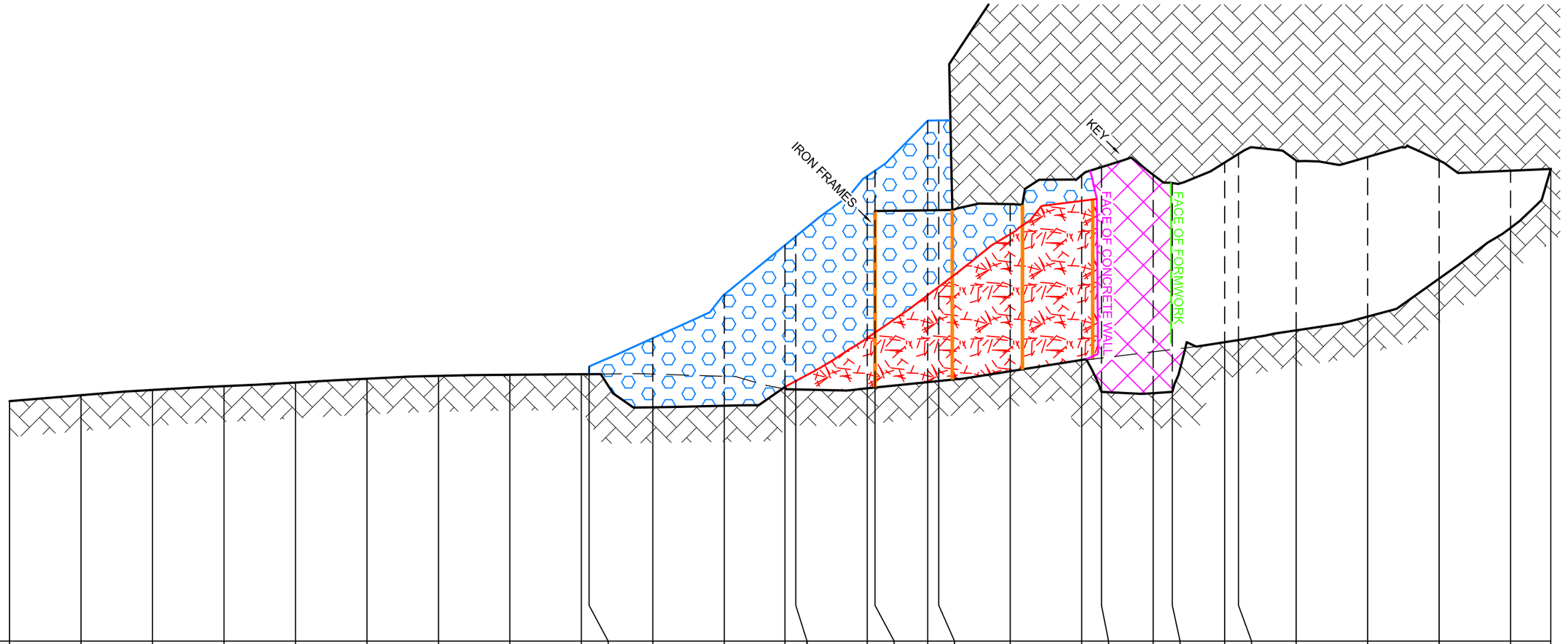
PLAN VIEW
COMPLETED SEALING WORKS OF SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE: 18/09/2013
SURVEYED: MK/SH
DRAWN: MK
CHECKED: JK
ISSUE A

DRAWING No.

16700-SP5-1



DATUM 700.000																													
FACE OF DOLERITE	-------	-------	-------	-------	-------	-------	-------	-------	-------	707.47	707.68	708.47	709.69	711.08	711.32	713.01	713.16	714.56	714.57	712.22	713.04	-------	-------	-------	-------	-------	-------	-------	-------
FACE OF GRAVEL	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	707.11	707.28	708.48	708.63	709.68	709.91	711.39	712.31	-------	-------	-------	-------	-------	-------	-------	-------
FINAL GROUND LEVELS	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	706.54	706.58	707.11	-------	-------	-------	-------	-------	-------	-------	-------	706.97	706.93	706.97	-------	-------	-------	-------	-------
UNDERSIDE OF ROCK	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	712.03	712.05	712.05	712.22	712.89	713.26	713.18	712.81	713.39	713.63	713.44	713.54	713.44	713.16	713.21
PORTAL FLOOR	706.71	706.88	707.02	707.13	707.23	707.34	707.42	707.45	707.47	707.47	707.47	707.41	707.05	707.04	707.07	707.09	707.24	707.27	707.54	707.84	707.92	708.09	708.16	708.36	708.42	708.69	709.08	710.14	711.56	713.21
CHAINAGE	0.000	2.000	4.000	6.000	8.000	10.000	12.000	14.000	16.000	16.217	18.000	20.000	21.669	22.000	24.000	24.217	25.691	26.000	28.000	30.000	30.553	32.000	32.533	34.000	34.386	36.000	38.000	40.000	42.000	43.125

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	18/09/2013

SCALE 1:125

0 2 4 6 8

Metres

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SOUTHERN PORTAL SEALING PROJECT

LONGITUDINAL SECTION
COMPLETED SEALING WORKS OF SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE: 18/09/2013
SURVEYED: MK/SH
DRAWN: MK
CHECKED: JK
ISSUE A

DRAWING No. 16700-SP5-2

DATUM 705.41

PORTAL FLOOR	706.67	706.74	706.80	706.87	706.95	707.02	707.10	707.17	707.25	707.33	707.41
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

CH4.000

DATUM 705.81

PORTAL FLOOR	707.05	707.10	707.16	707.21	707.28	707.34	707.40	707.46	707.52	707.58	707.64
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

CH10.000

DATUM 705.26

PORTAL FLOOR	706.49	706.56	706.64	706.73	706.80	706.88	706.95	707.03	707.11	707.20	707.29
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

CH2.000

DATUM 705.68

PORTAL FLOOR	706.92	706.98	707.04	707.10	707.17	707.23	707.30	707.36	707.42	707.48	707.54
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

CH8.000

DATUM 705.80

PORTAL FLOOR	706.80	706.86	706.95	707.04	707.13	707.21	707.30	707.39	707.47	707.55
OFFSET	1.19	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00

CH0.000

DATUM 705.55

PORTAL FLOOR	706.79	706.86	706.92	706.99	707.07	707.13	707.20	707.26	707.33	707.41	707.48
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

CH6.000

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	18/09/2013

SCALE 1:200

0 3 6 9 12

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SOUTHERN PORTAL SEALING PROJECT

CROSS SECTIONS: CH0.000 - CH10.000
COMPLETED SEALING WORKS OF SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

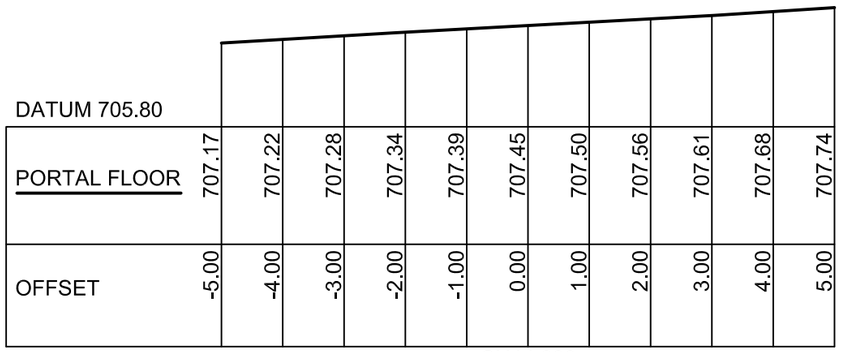
DATE:	18/09/2013	
SURVEYED:	MK/SH	ISSUE
DRAWN:	MK	A
CHECKED:	JK	

DRAWING No.

16700-SP5-3

FILL MATERIAL LEGEND

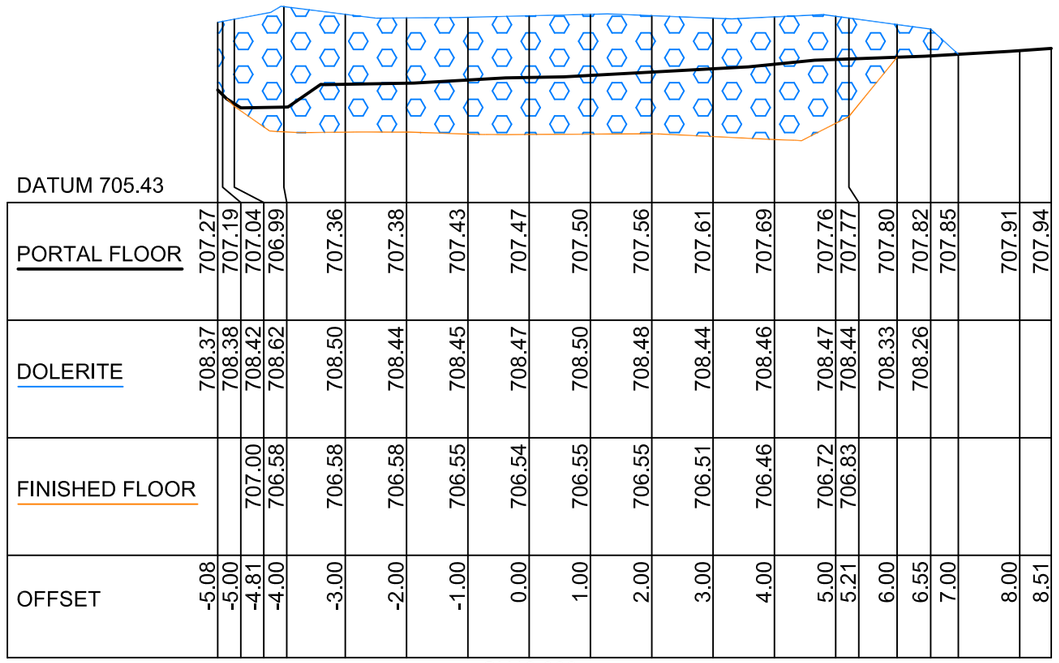
- DOLERITE
- GRAVEL
- CONCRETE



DATUM 705.80

PORTAL FLOOR	707.17	707.22	707.28	707.34	707.39	707.45	707.50	707.56	707.61	707.68	707.74
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

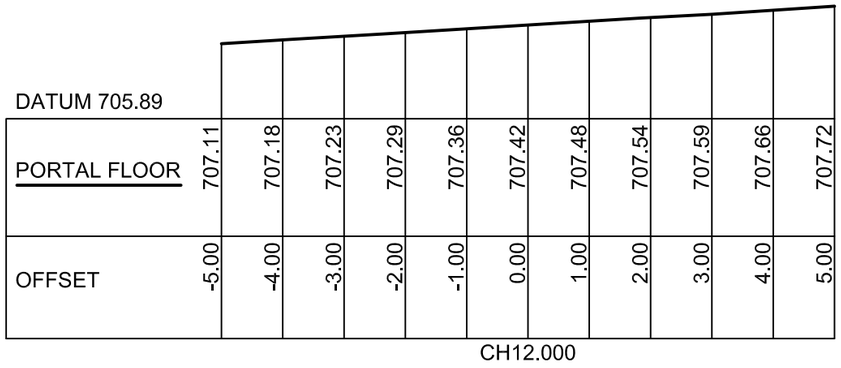
CH14.000



DATUM 705.43

PORTAL FLOOR	707.27	707.19	707.04	706.99	707.36	707.38	707.43	707.47	707.50	707.56	707.61	707.69	707.76	707.77	707.80	707.82	707.85	707.91	707.94
DOLERITE	708.37	708.38	708.42	708.62	708.50	708.44	708.45	708.47	708.50	708.48	708.44	708.46	708.47	708.44	708.33	708.26			
FINISHED FLOOR			707.00	706.58	706.58	706.58	706.55	706.54	706.55	706.55	706.51	706.46	706.72	706.83					
OFFSET	-5.08	-5.00	-4.81	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00	5.21	6.00	6.55	7.00	8.00	8.51

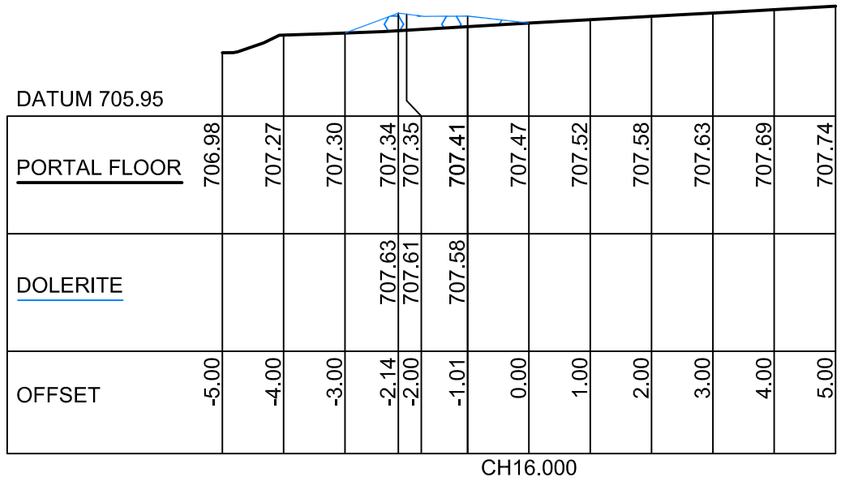
CH18.000



DATUM 705.89

PORTAL FLOOR	707.11	707.18	707.23	707.29	707.36	707.42	707.48	707.54	707.59	707.66	707.72
OFFSET	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00

CH12.000



DATUM 705.95

PORTAL FLOOR	706.98	707.27	707.30	707.34	707.35	707.41	707.47	707.52	707.58	707.63	707.69	707.74
DOLERITE				707.63	707.61	707.58						
OFFSET	-5.00	-4.00	-3.00	-2.14	-2.00	-1.01	0.00	1.00	2.00	3.00	4.00	5.00

CH16.000

J:\Surveyors\Jobs\Veolia\16700 Woodlawn Bioreactor\Veolia Southern Portal\Cad\16700-SP5 Final Plans.dwg

ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	18/09/2013

SCALE 1:200

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Metres

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A3 SHEET

VEOLIA ENVIRONMENTAL SERVICES

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FS550318

SOUTHERN PORTAL SEALING PROJECT

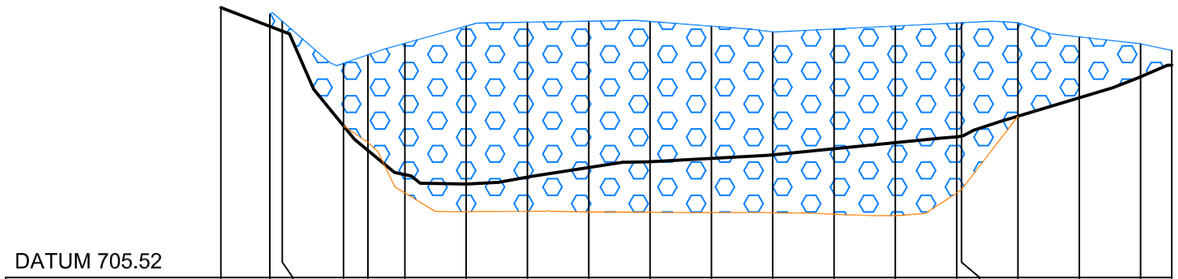
CROSS SECTIONS: CH12.000 - CH18.000
COMPLETED SEALING WORKS OF SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE:	18/09/2013
SURVEYED:	MK/SH
DRAWN:	MK
CHECKED:	JK
ISSUE	A
DRAWING No.	16700-SP5-4

FILL MATERIAL LEGEND

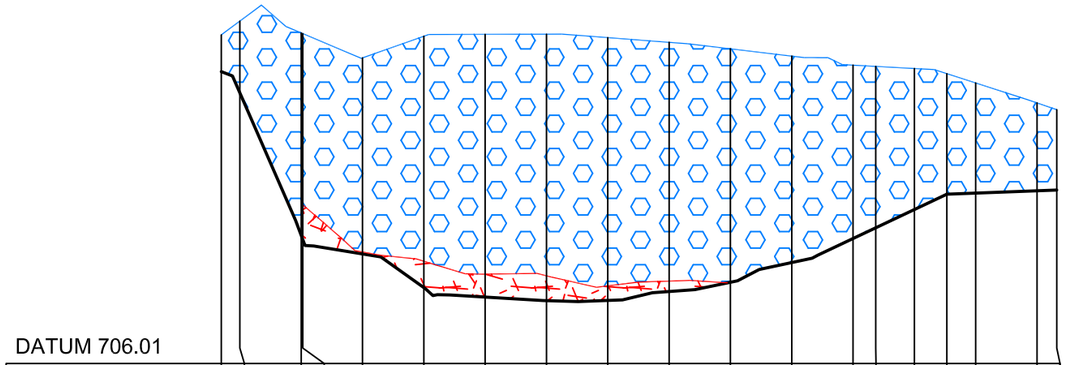
- DOLERITE
- GRAVEL
- CONCRETE



DATUM 705.52

PORTAL FLOOR	709.92	709.62	709.54	707.99	707.59	707.20	707.04	707.16	707.31	707.41	707.46	707.52	707.62	707.72	707.81	707.83	708.15	708.45	708.79	708.98
DOLERITE		709.81	709.70	709.01	709.15	709.34	709.62	709.68	709.70	709.69	709.62	709.53	709.57	709.62	709.67	709.67	709.67	709.44	709.33	709.22
FINISHED FLOOR					707.72	706.90	706.59	706.60	706.59	706.58	706.58	706.58	706.55	706.53	706.90	706.95				
OFFSET	-7.00	-6.20	-6.00	-5.00	-4.60	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00	5.08	6.00	7.00	8.00	8.51

CH20.000



DATUM 706.01

PORTAL FLOOR	710.77	710.42	708.10	708.03	707.80	707.25	707.09	707.04	707.04	707.18	707.33	707.66	708.05	708.22	708.52	708.77			
DOLERITE	711.37	711.59	711.40	711.39	710.99	711.35	711.38	711.38	711.32	711.25	711.14	711.02	710.87	710.85	710.82	710.74	710.58	710.26	710.15
GRAVEL				708.59	707.83	707.68	707.47	707.44	707.28	707.35	707.32	707.27	707.37	707.41					
OFFSET	-6.30	-6.00	-5.00	-4.97	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	4.37	5.00	5.53	6.00	7.00	7.32

CH22.000

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	18/09/2013

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A3 SHEET

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SOUTHERN PORTAL SEALING PROJECT

CROSS SECTIONS: CH20.000 - CH22.000
COMPLETED SEALING WORKS OF SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

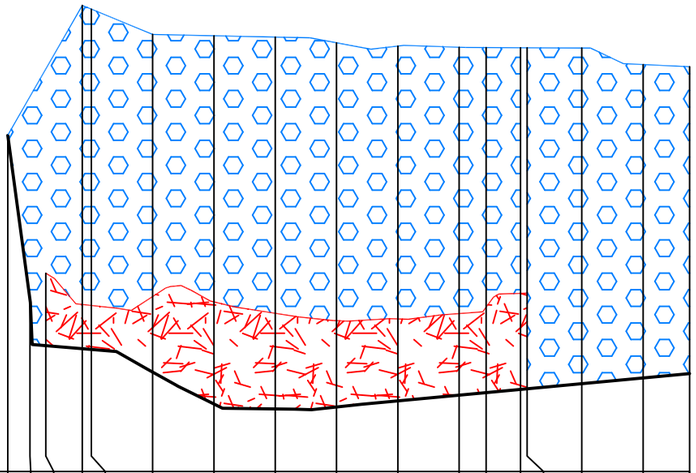
DATE:	18/09/2013
SURVEYED:	MK/SH
DRAWN:	MK
CHECKED:	JK
ISSUE	A

DRAWING No.

16700-SP5-5

FILL MATERIAL LEGEND

- DOLERITE
- GRAVEL
- CONCRETE

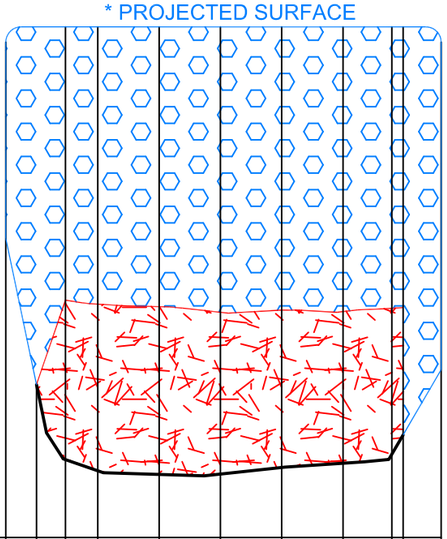


DATUM 706.02

PORTAL FLOOR	711.50	708.82	708.07	708.02	708.01	707.64	707.12	707.04	707.07	707.17	707.26	707.31					
DOLERITE				713.62	713.56	713.15	713.12	713.10	713.01	712.96	712.94	712.93	712.93	712.93	712.92	712.65	712.62
GRAVEL	708.82		709.25	708.74	708.73	708.87	708.79	708.60	708.48	708.51	708.60	708.70	708.92	708.93			
OFFSET	-5.36	-5.00	-4.74	-4.15	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	2.44	3.00	3.11	4.00	5.00	5.76

CH24.000

* PROJECTED SURFACE



DATUM 706.24

PORTAL FLOOR		708.73	707.51	707.33	707.27	707.27	707.38	707.45	707.60
DOLERITE	714.57	714.57	714.57	714.57	714.57	714.57	714.57	714.57	714.57
GRAVEL		708.73	710.11	710.04	710.00	709.91	709.95	709.92	709.98
OFFSET	-3.50	-3.00	-2.53	-2.00	-1.00	0.00	1.00	2.00	2.80

CH26.000

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A	INITIAL ISSUE	18/09/2013

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SOUTHERN PORTAL SEALING PROJECT

CROSS SECTIONS: CH24.000 - CH26.000
COMPLETED SEALING WORKS OF SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

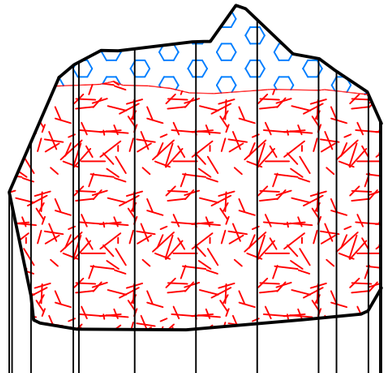
DATE:	18/09/2013
SURVEYED:	MK/SH
DRAWN:	MK
CHECKED:	JK
ISSUE	A

DRAWING No.

16700-SP5-6

FILL MATERIAL LEGEND

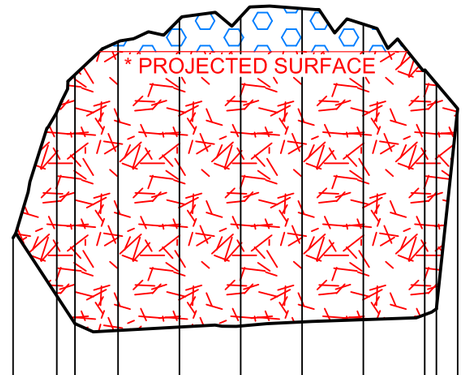
- DOLERITE
- GRAVEL
- CONCRETE



DATUM 706.52

PORTAL FLOOR			708.08	707.55	707.54	707.53	707.54	707.63	707.72	707.74	707.85		
UNDERSIDE OF ROCK	709.77	709.55	710.59	711.84	711.89	712.11	712.22	712.58	711.95	711.74	711.36	710.94	710.89
GRAVEL					711.51	711.51	711.39	711.43	711.43	711.42			
OFFSET	-3.05	-3.00	-2.69	-2.00	-1.91	-1.00	0.00	1.00	2.00	2.29	2.81	3.00	3.02

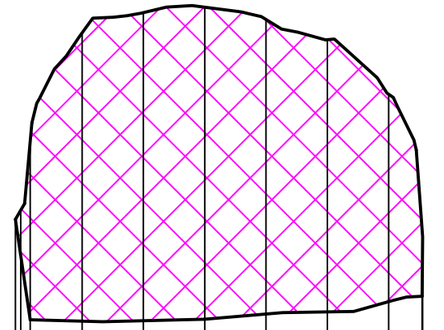
CH28.000



DATUM 706.74

PORTAL FLOOR			707.88	707.77	707.82	707.84	707.91	707.94	708.02	708.12			
UNDERSIDE OF ROCK	709.28	711.33	711.94	712.47	712.84	712.89	713.02	712.76	712.01	711.79	711.38		
GRAVEL				712.31	712.31	712.31	713.31	712.31					
OFFSET	-3.71	-3.00	-2.70	-2.00	-1.00	0.00	1.00	2.00	3.00	3.19	3.54		

CH30.000



DATUM 707.05

PORTAL FLOOR			708.08	708.06	708.07	708.09	708.18	708.21	708.38	708.47			
UNDERSIDE OF ROCK	709.72	709.87	710.99	712.76	713.09	713.18	712.98	712.65	711.76	708.47	709.44		
OFFSET	-3.09	-3.00	-2.85	-2.00	-1.00	0.00	1.00	2.00	3.00	3.55	3.55		

CH32.000

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	18/09/2013

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FS550318

SOUTHERN PORTAL SEALING PROJECT

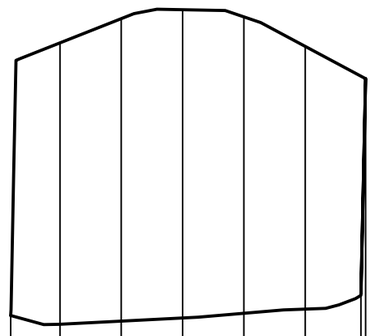
CROSS SECTIONS: CH28.000 - CH32.000
COMPLETED SEALIG WORKS OF SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE:	18/09/2013	
SURVEYED:	MK/SH	ISSUE
DRAWN:	MK	A
CHECKED:	JK	

DRAWING No.

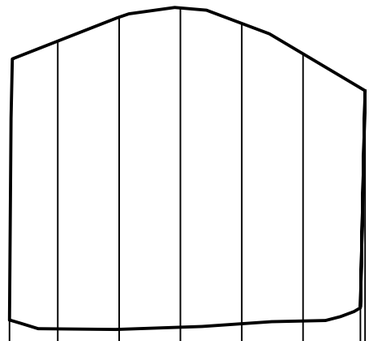
16700-SP5-7



DATUM 707.25

PORTAL FLOOR	708.40	708.26	708.31	708.36	708.44	708.51	708.73	
UNDERSIDE OF ROCK	708.40	712.85	713.24	713.39	713.27	712.79	708.73	712.26
OFFSET	-2.80	-2.00	-1.00	0.00	1.00	2.00	2.91	2.99

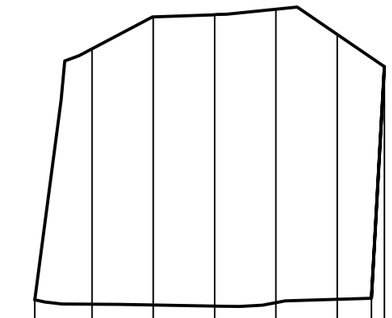
CH34.000



DATUM 707.38

PORTAL FLOOR	708.54	708.40	708.39	708.42	708.48	708.52	708.74	
UNDERSIDE OF ROCK	708.54	713.09	713.48	713.63	713.37	712.88	708.74	712.28
OFFSET	-2.79	-2.00	-1.00	0.00	1.00	2.00	2.94	3.01

CH34.386



DATUM 707.68

PORTAL FLOOR	708.79	708.72	708.71	708.69	708.75	708.80	708.82	
UNDERSIDE OF ROCK	708.79	712.88	713.41	713.44	713.53	711.01	708.82	712.59
OFFSET	-2.93	-2.00	-1.00	0.00	1.00	2.00	2.56	2.77

CH36.000

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	18/09/2013

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FS550318

SOUTHERN PORTAL SEALING PROJECT

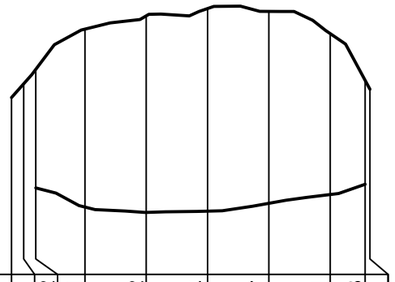
CROSS SECTIONS: CH34.000 - CH36.000
COMPLETED SEALING WORKS OF SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE: 18/09/2013
SURVEYED: MK/SH
DRAWN: MK
CHECKED: JK
ISSUE A

DRAWING No.

16700-SP5-8



DATUM 709.11

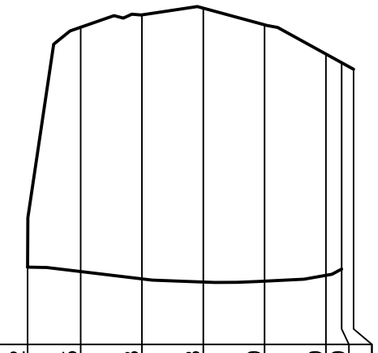
PORTAL FLOOR		710.52	710.21	710.12	710.14	710.27	710.41	710.58	
UNDERSIDE OF ROCK	711.99	712.22	712.45	713.11	713.32	713.44	713.40	713.03	712.27	712.13
OFFSET	-3.20	-3.00	-2.80	-2.00	-1.00	0.00	1.00	2.00	2.57	2.65

CH40.000

DATUM 711.76

PORTAL FLOOR	712.97	712.95	713.21	713.21	712.91	712.78	
UNDERSIDE OF ROCK	712.97	713.15	713.21	713.21	712.96		
OFFSET	-1.72	-1.00	0.00	1.00	2.00	2.32	

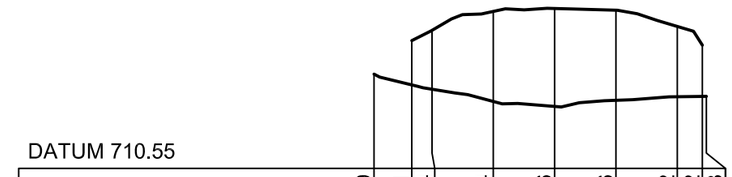
CH43.125



DATUM 708.06

PORTAL FLOOR	709.32	709.25	709.13	709.08	709.09	709.19	709.29	
UNDERSIDE OF ROCK	709.32	713.23	713.43	713.54	713.27	712.79	712.65	712.54
OFFSET	-2.87	-2.00	-1.00	0.00	1.00	2.00	2.26	2.45

CH38.000



DATUM 710.55

PORTAL FLOOR	712.09	711.91	711.84	711.64	711.56	711.66	711.72	711.73
UNDERSIDE OF ROCK		712.63	712.80	713.11	713.16	713.13	712.86	712.56
OFFSET	-2.95	-2.33	-2.00	-1.00	0.00	1.00	2.00	2.41	2.47

CH42.000

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ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	18/09/2013

SCALE 1:200

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A3 SHEET

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SOUTHERN PORTAL SEALING PROJECT

CROSS SECTIONS: CH38.000 - CH43.125
COMPLETED SEALING WORKS OF SOUTHERN PORTAL
WOODLAWN BIOREACTOR
COLLECTOR ROAD
TARAGO

DATUM: AHD | ORIGIN: PILLAR 715 | CONTOUR INTERVAL: N/A

DATE: 18/09/2013
SURVEYED: MK/SH
DRAWN: MK
CHECKED: JK
ISSUE: A

DRAWING No. 16700-SP5-9

MGA

EVAPORATION DAM ED2

ED1
COFFER DAM 2

EVAPORATION DAM ED1

9 x EVAPORATION
UNITS IN ED1CD1

7 x SPRAY NOZZLES FOR
TREATED LEACHATE FROM
CURRENT LEACHATE
TREATMENT DAM

PROPOSED EFFLUENT
DISCHARGE LINE FROM LTP
TO ED1 COFFER DAM 2

HOLDING TANK

ED1
COFFER DAM 1

DISCHARGE LINE FROM LTP
TO ED1 COFFER DAM 1

2 x 110mm HDPE
PN12.5

LEACHATE
TREATMENT PLANT

ED3N4

ED3N2

EVAPORATION UNITS
5 x 30kW TURBO MIST
1 x 30kW PUMP

ED3N3

DISCHARGE LINE
FROM LTD TO ED3

2 x10,000L TRANSFER TANK
TREATED EFFLUENT
PUMP - 4~5 L/s

FeCl3 & POLYMER DOSING SYSTEM

ED3N1

SETTLEMENT TANKS

7 x EVAPORATION UNITS
3 IN ED3N4, 2 IN ED3N1
AND 1 EACH IN ED3N2-ED3N3

LEACHATE TREATMENT DAM
SEPARATED INTO AERATION
ZONE & ANOXIC ZONES BY
BARRIER IN THE MIDDLE

VIEWING PLATFORM
RL 805.50

ED3 SOUTH
STORMWATER

3 X AERATORS

110mm HDPE
PN12.5

5 x EVAPORATION
UNITS IN ED3S-S

ED3S-S

2 x 25,000L LEACHATE TRANSFER
TANK FROM WASTE MASS
2 x PUMPS - 6L/sec EACH

LEACHATE EXTRACTION
FROM GAS WELLS AND IN
LINE KNOCK OUT POTS

2 x 160mm HDPE
PN12.5

STATION 714
RL 823.337

WHEEL WASH LOCATION

TOP OF OLD FLARE SLAB
RL 806.00

TO TAILINGS DAMS

STATION 713
RL 843.743

COLLECTOR ROAD
MAIN ENTRANCE
FROM TARAGO / CANBERRA / GOULBURN / INTERMODEL

VISITORS ENTRANCE
VISITORS CARPARK
RECEPTION
GATE HOUSE
EMERGENCY ASSEMBLY POINT
MAIN OFFICE
SUBSTATION
LABORATORY
PLANT AREA SILETRAPS FOR SURFACE WATER RUNOFF
PLANT DAM
POWER STATION
MESSING ROOM
WORKSHOP

LEGEND

LEACHATE TRANSFER LINE

NOTE: REFER ALSO TO
LANDTEAM DRAWING No's. 16800-451 AND 201146-CAT1 FOR
SURFACE WATER DRAINAGE AND SUB-CATCHMENT DETAILS

VEOLIA ENVIRONMENTAL SERVICES

SCALE 1:2500

0 50 100 150 200 250
Metres

ISSUE	AMENDMENT	DRAWN	DATE
B	EVAPORATION DAMS ED3 ADDED	JA	6/2006
C	CEA CONSTRUCTION AREA UPDATED	JA	1/2007
D	GENERAL REVISION & REMOVAL OF REDUNDANT DETAIL	MK	14/04/2016
E	NOTE REGARDING LEACHATE EXTRACTION ADDED	MK	14/04/2016
F	MINOR ADDITIONS AND AMENDMENTS	MK	21/07/2016
G	GENERAL AMENDMENTS AND RE-ISSUE	MK	24/07/2018
H	ED1CD2 ADDED & VARIOUS AMENDMENTS	MK	18/01/2023

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A1 SHEET

VEOLIA ENVIRONMENTAL SERVICES

WOODLAWN BIOREACTOR
COLLECTOR ROAD, TARAGO

LEACHATE TRANSFER SYSTEM
WOODLAWN BIOREACTOR

SURVEYED: N/A
DRAWN: MK
CHECKED: JK
ISSUE H

DRAWING No.
16800-180

DATUM AHD | CONTOUR INTERVAL 1m | DATE 18/01/2023

File Name: J:\Surveyors\Jobs\Veolia\16800 Engineering\CAD\16800-180 Leachate Transfer System Issue H.dwg

Mechanical Evaporator Operation Protocol
Woodlawn Bioreactor

Protocol Objective

This protocol outlines the specific operational requirements for use of mechanical evaporation units to assist in evaporating leachate that has been treated through the onsite leachate treatment system.

Background

Veolia utilise mechanical evaporation to assist in volume reduction of leachate onsite. These units are a critical part of the leachate treatment infrastructure in order to meet the zero discharge conditions under the site Environment Protection Licence 11436 – Condition L1.3. In order to maintain sufficient freeboard in onsite storage dams, mechanical evaporation is required.

Mechanical evaporators (shown below) operate by pumping liquid to a unit, where the liquid is blown through a misting fan and is then dispersed through a chute into the atmosphere. Moisture loss is increased through the phase transition of liquid water to water vapor (evaporation).

Figure 1: Evaporator units in action

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Veolia Operating Protocol

The following set of conditions will need to be satisfied in order to operate the evaporators. These conditions apply to all evaporators, as defined in Figure 2.

1. Evaporation must only be undertaken on leachate that has been treated through a leachate treatment system.

   Under no circumstances is untreated leachate to be pumped into evaporators. All leachate pumped from the waste must first pass through the leachate treatment system prior to storage in the ED3 storage dam system.

2. If monitoring results indicate that leachate treatment targets are not being achieved, any evaporators operating must cease immediately.

   Recommencement of the evaporators from the direct discharge pond will occur once monitoring results indicate that the leachate treatment targets are being achieved.

3. Automated control of the evaporators will be dictated by current weather conditions, specifically wind direction, wind speed and relative humidity.

   Operation of the evaporators is automated by onsite sensors which records, wind speed and wind direction. Veolia have the evaporator units set up to operate under the following conditions

   - Wind direction – Must be directing any spray back over the dams (the actual direction will depend on the location of the evaporators and will be controlled by the onsite weather station).
   - Wind Speed – Must be more than 0.2m/s

   If weather conditions do not meet the criteria specified, then the evaporators will automatically switch off. Once favourable weather conditions return, the evaporators will automatically recommence operation. The automation is based on a timer, where the parameters must reach these criteria before switching on/off.

4. The evaporators must not be run under any circumstances while works adjacent to the ED3 System are being undertaken.

   Veolia will switch control from “automated” to “off” whilst any works are being undertaken in the vicinity of the evaporators. Control will be switched back to automated when works are complete unless otherwise agreed.

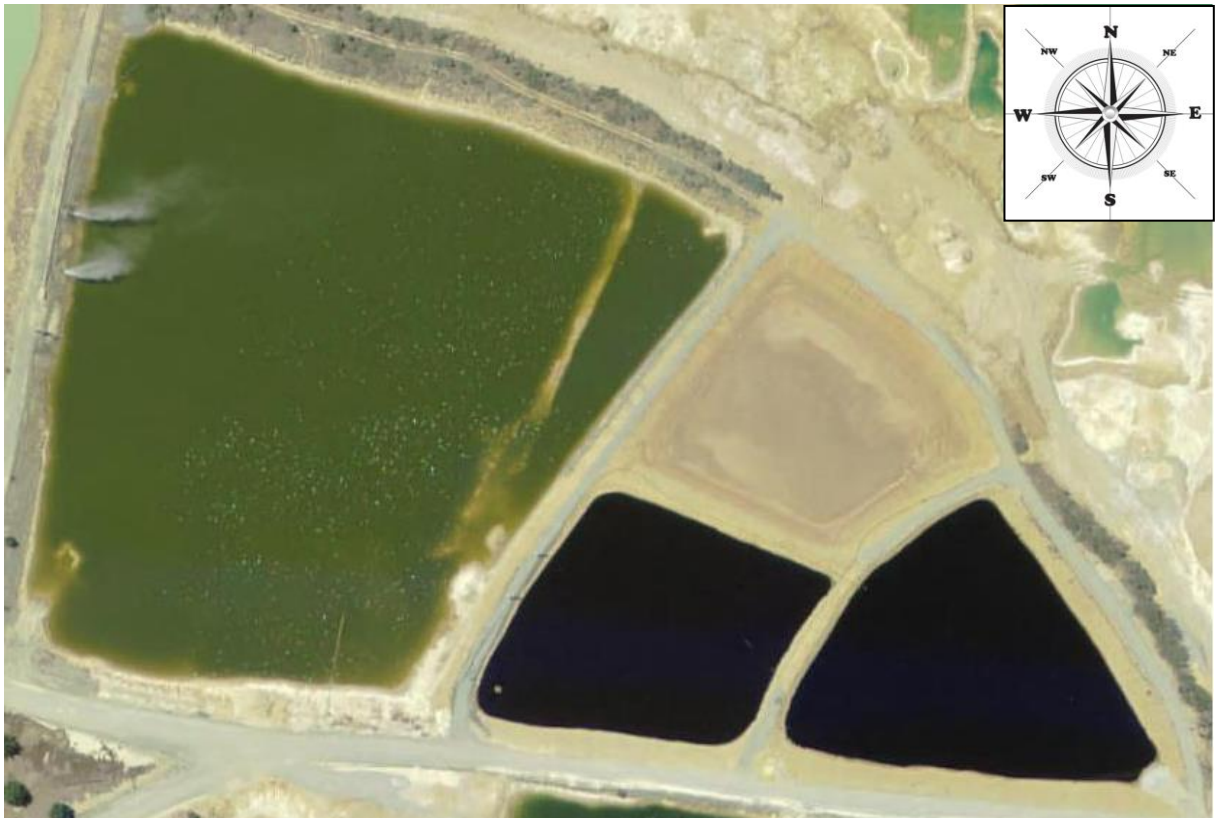
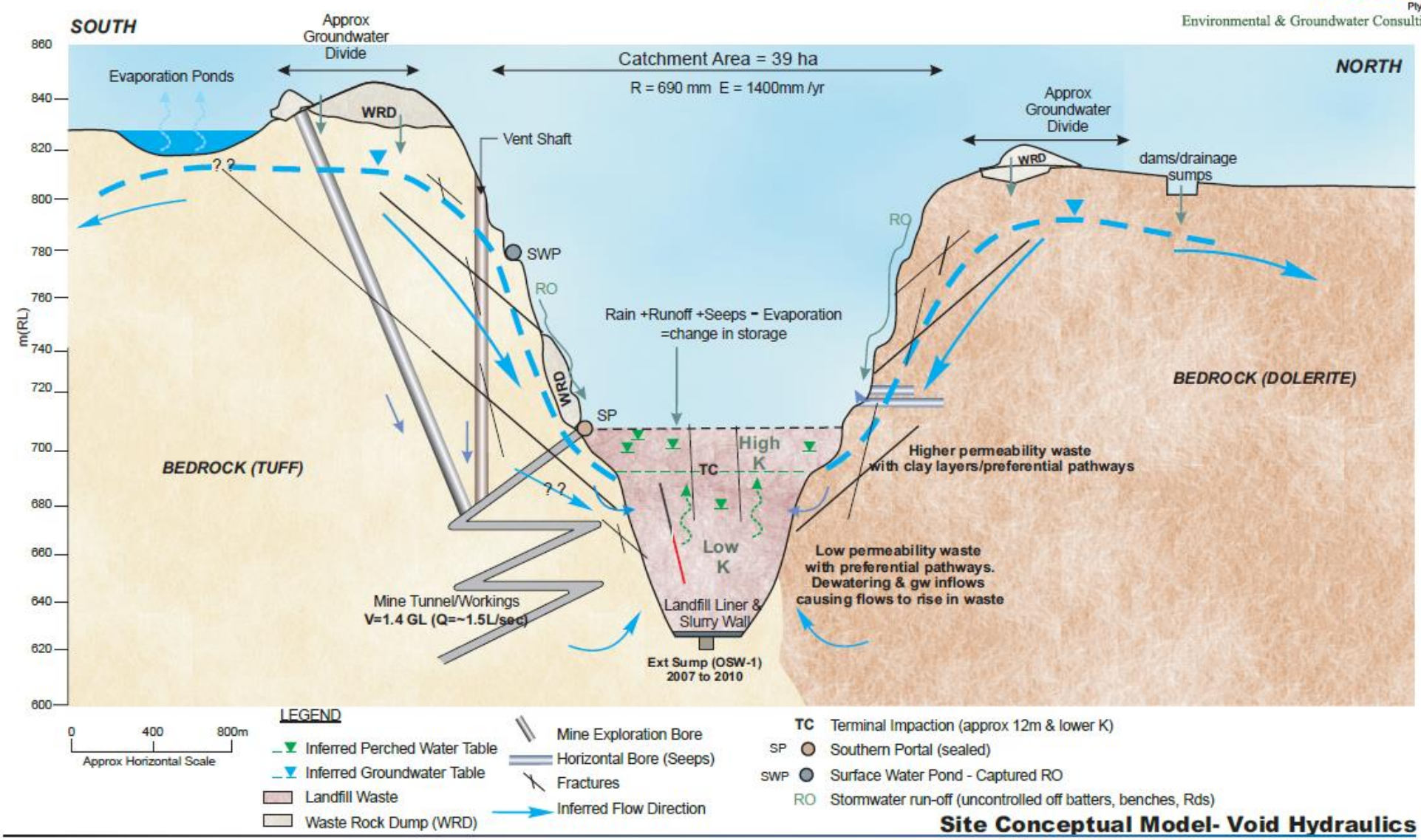


Figure 2 – Woodlawn ED3 North system

earth2water Pty Ltd
Environmental & Groundwater Consulting



Site Conceptual Model- Void Hydraulics

Date: 17 December 2015

Veolia Australia & New Zealand

Woodlawn Bioreactor Facility Odour Modelling Study

Long-term Treated Leachate Solution

July 2016

Final Report

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Project Number: N1806L.06

Report Revision		
Revision Number	**Date**	**Description**
Draft report	21.07.2016	Internal review
Final report (unsigned)	22.07.2016	Issued to client for review
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Report Preparation		
Report Prepared By: M. Assal & S. Hayes		**Approved By:** M. Assal
Report Title: Veolia Australia & New Zealand Woodlawn Bioreactor Facility Odour Modelling Study – Long-term Treated Leachate Solution		

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APPENDICES

1 INTRODUCTION

In June 2016, Veolia Australia & New Zealand (Veolia) engaged The Odour Unit Pty Ltd (TOU) to carry out an odour dispersion model study to evaluate the odour profile contribution and assess compliance against the New South Wales Environment Protection Authority (NSW EPA) odour performance criteria of the addition of the proposed Evaporation Dam 1 (ED1) System to the Leachate Management System (LMS) at the Woodlawn Bioreactor Facility located at Collector Road, Tarago, NSW (the Site).

The basis for this additional pond system is to create the necessary reserve capacity for the storage of treated leachate from the future Membrane Bioreactor (MBR) Treatment Plant. This is part of Veolia's long term strategy for managing leachate at the Site. The MBR Treatment Plant will see the decommissioning of the existing Leachate Aeration Dam (LAD) and storage in Evaporation Dam 3 South (ED3S), once it fully operation. The expected date of this decommissioning is end of 2017. Overall, this is considered to represent a significant upgrade in the Leachate Management System (LMS) and aims to improve the stored treated leachate quality at the Woodlawn Bioreactor Facility.

1.1 SCOPE OF WORKS

The scope of works for the odour dispersion model study consisted of:

- Sourcing and setting up the original odour dispersion model used in the *Environmental Assessment Woodlawn Expansion Report* dated August 2010 (EA). Some meteorology-based revisions to this model were necessary given the year that the model was completed (see **Section 3** for details);
- Inclusion of the proposed ED1 System into the EA odour dispersion model;
- Undertaking of a regression analysis for the purposes of developing a mathematical function that can project the expected specific odour emission rate (SOER) based on the final treated leachate quality generated by the proposed MBR Treatment Plant. This analysis was based on an extensive dataset pertaining to leachate quality and odour emissions from the LMS obtained during the previous four odour audits, conducted annually, at the Woodlawn Bioreactor Facility since 2012; and
- Odour dispersion modelling projection of the individual off-site odour impact from the inclusion of the proposed ED1 System. In addition, the cumulative off-site odour impact with the other modelled emission sources in the EA were

undertaken to assess site-wide compliance with the relevant NSW EPA odour performance criterion.

The following report details the methodology and findings from the odour dispersion model in the context of the quality of treated leachate from the MBR Treatment Plant and storage in ED1 system.

2 STUDY METHODOLOGY

The odour dispersion modelling study methodology required the need to setup and carry out new modelling runs of the original EA odour dispersion model, developed by the former Heggies Pty Ltd, now operating as SLR Consulting, to evaluate the contribution and assess compliance of the proposed addition of ED1 system to the LMS and other modelled emissions. The original dispersion modelling configuration and the adopted odour emission rates used in the EA odour dispersion model can be found in *Section 5* of the EA's *Odour and Dust Impact Assessment (Rev 7)* report dated February 2011. Moreover, the modelling study from TOU reports titled *Proposed Addition of ED3S to Leachate Management System* dated May 2016 should be read in conjunction with this report.

2.1 PROJECTED ED3S SYSTEM ODOUR EMISSION RATES

The projected ED3S System odour emission rates adopted from the May 2016 study were used as part of this modelling study. For convenience, the derived odour emission rates have been presented in **Table 2.1**.

Table 2.1 - Projected Odour Emission Rates for ED3S

ED3N System 2015			
Source ID	**Dam Surface Area (m^2)**	**SOER ($ou.m^3/m^2/s$)**	**OER ($ou.m^3/s$)**
ED3N-1	6,000	0.132	794
ED3N-2	5,500	0.145	797
ED3N-3	5,500	0.091	500
ED3N-4	25,000	0.269	6,720
ED3N Total	**42,000**	**0.159 (mean)**	**8,810**
Projected ED3S System			
ED3S	89,435	0.159	14,200
ED3S-S	28,330		4,510
ED3S Total	**118,000**		**18,700**

The modelling was carried out on the basis of ED3S-S at total water level (TWL). This is considered to be a conservative approach as ED3S-S is planned to receive treated leachate until the end of 2017, after which it will be decommissioned and replacement with the MBR Treatment Plant and ED1 System.

2.2 ED1 TREATED LEACAHE QUALITY TARGET VALUES

The treated leachate quality target values were supplied by Veolia on 5 July 2016, understood to be from the designer and installer of the MBR Treatment Plant. These are summarised in **Table 2.2**.

Table 2.2 – Final treated leachate quality target values by the MBR Treatment Plant

Parameter	Units	Minimum	Average	Maximum
pH	--	--	--	7 - 7.5
Conductivity	µS/cm	--	36,000	--
COD	mg/L	--	--	2,500
BOD	mg/L	--	--	10
Total Phosphorus	mg/L	--	--	13
Ammonia	mg/L	--	--	10
Nitrate	mg/L	--	--	500
TSS	mg/L	--	--	5
TDS	mg/L	--	--	30,000
Chloride	mg/L	--	--	5,000

2.3 REGRESSION ANALYSIS

As previously mentioned in **Section 1**, a regression analysis for the purposes of developing a mathematical function that can project the expected SOER based on the final treated leachate quality generated by the proposed MBR Treatment Plant. This analysis is considered to be important for the purposes of inputting reliable odour emissions data in the dispersion model and undertaking of a sensitivity analysis, where the effect of fluctuations in the final effluent quality can be examined and the resultant odour impact assessed.

The regression analysis involved three key steps:

1. Evaluation of key leachate parameters that are likely to have the most significant impact to odour emission from stored leachate, based on an extensive dataset pertaining to leachate quality and odour emissions from the LMS obtained during the previous four odour audits, conducted annually, at the Woodlawn Bioreactor Facility since 2012. A summary of the processed data is provided in **Appendix A.** The raw dataset can be provided upon request. The parameters examined included: pH, Biological Oxygen Demand (BOD), Total phosphorus, Ammonia, Nitrate, Total Suspended Solids, Total Dissolved Solids, Chloride and Volatile Fatty Acids (VFAs);

2. Once a positive and confident correlation was developed between odour and the leachate quality parameter, a regression function was developed; and

3. Undertaking of a sensitivity analysis with leachate quality parameters at:

    - The final effluent target design values (see **Table 2.2**); and
    - Leachate quality values above the final target design values (see **Table 2.4**).

Upon completion of the regression analysis, the mean of the projected SOERs between leachate quality parameter was undertaken. For example, if the BOD regression model produced a SOER of 1 ou.$m^3/m^2/s$ and Ammonia of 2 ou.$m^3/m^2/s$, the arithmetic mean was computed (i.e. 1.5 ou.$m^3/m^2/s$ in this hypothetical example). A nominal multiplicity factor was then applied to the mean value at 2, 5, and 10 times above the final target design values.

2.3.1 Leachate quality parameters selected

From the list of leachate quality parameters listed in **Section 2.3**, the following parameters were selected for a covariance and correlation analysis: pH, BOD, Ammonia, Sulphide, and VFAs. These parameters are well known to be a contributing factor for the generation of adverse levels of odour from wastewater, if they are not adequately managed.

The covariance analysis conducted (see **Appendix A**) indicated a positive covariance suggesting that a relationship existed between SOER and BOD, Ammonia, Sulphide and VFAs. pH was found to have a negative covariance, suggesting that a relationship between SOER and pH is not likely. From there, a correlation analysis was undertaken, the result of which are summarised in **Table 2.3** below. The result shows the coefficient of determination (R^2). Put simply, the closer the R^2 value is to 1 the stronger the statistical relationship between the two variables, in this case the SOER and leachate quality parameter.

Table 2.3 – Coefficient of determination for leachate quality parameters

Leachate quality parameter	R^2
BOD	0.89
Sulphide	0.35
Ammonia	0.94
VFAs	0.86

The detailed analysis worksheet is appended as **Appendix A.** On the basis of the results in **Table 2.3**, BOD and Ammonia were selected as the parameters for further analysis.

2.3.2 Leachate quality parameter regression results

The regression results between SOER and the leachate quality parameters including BOD and Ammonia are illustrated in **Figure 2.1 & Figure 2.2**, respectively. As can be seen, for both regression results for BOD and Ammonia, there exists a strong exponential correlation with SOER.

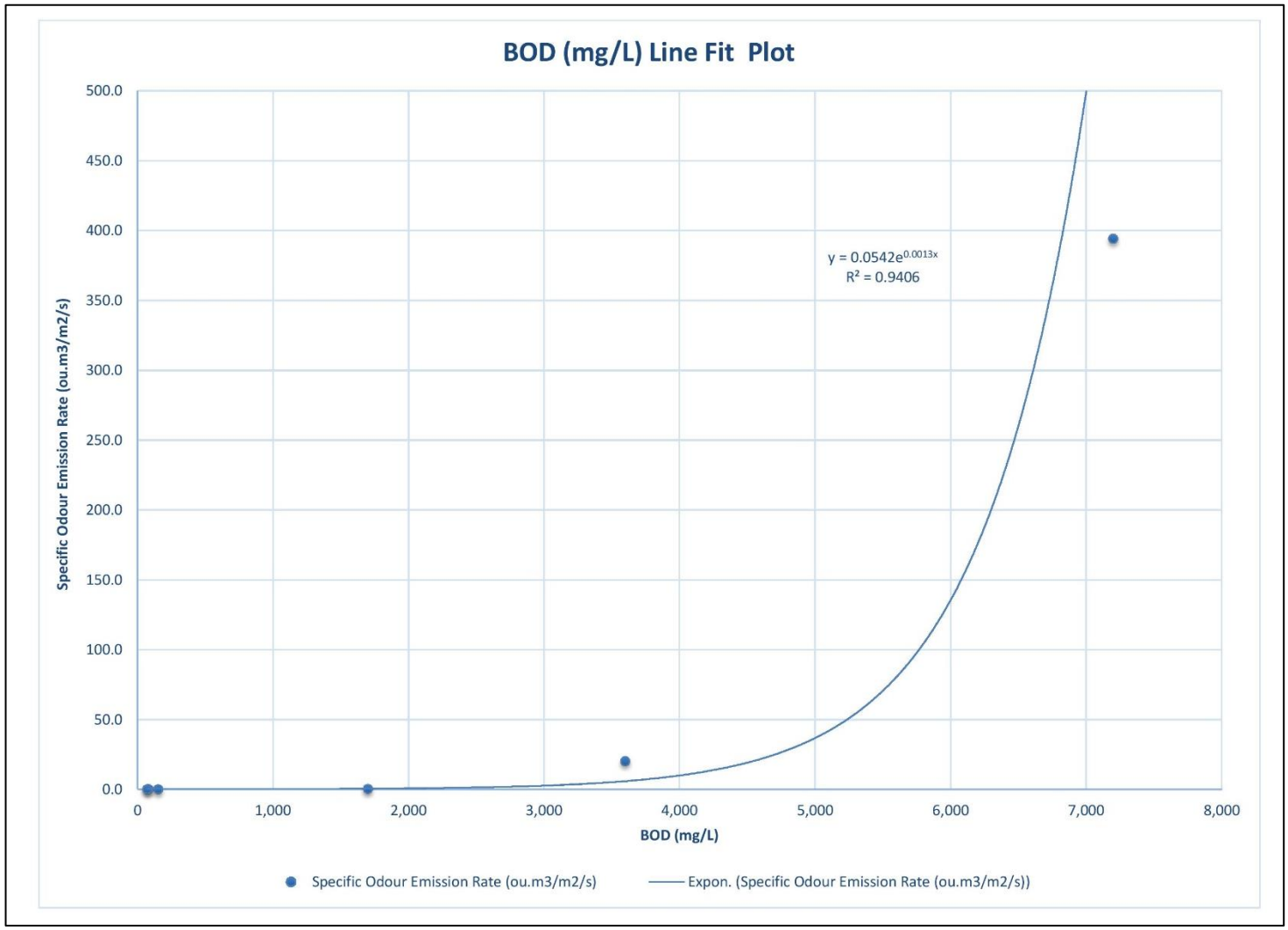

Figure 2.1 - SOER and BOD SOER regression projection results

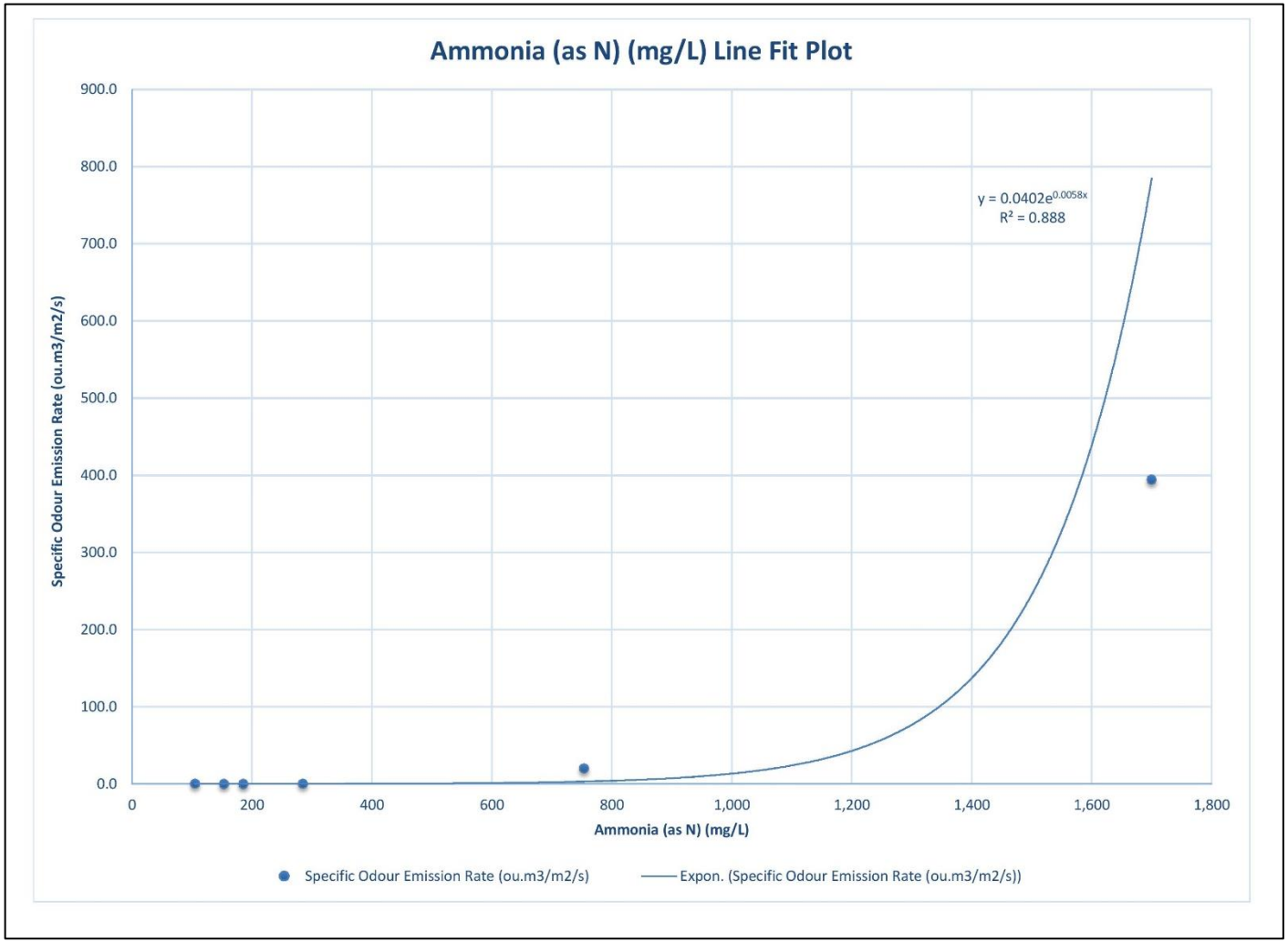

Figure 2.2 - SOER and Ammonia regression projection results

2.3.3 Projected SOERs values

Based on the regression analysis results presented in **Section 2.3.2**, the selected leachate quality parameters for further analysis (i.e. BOD and Ammonia) were entered into the regression function and resultant SOERs calculated. The results from this computation are summarised in **Table 2.4.**

Table 2.4 – Projected SOER results for ED1 under varying target values

Scenario No.	BOD (mg/L)	Ammonia (mg/L)	Scenario Description (Factor)	Mean SOER (ou.m^3/m^2/s)	Comments
1	10	10	Design	0.0488	Design target, as indicated
2	20	20	2 x	0.0504	Treated leachate 2 x above design target
3	50	50	5 x	0.0558	Treated leachate 5 x above design target
4	100	100	10 x	0.0668	Treated leachate 10 x above design target

When compared to the results from **Table 2.1** where a derived SOER for treated leachate of 0.159 ou.m^3/m^2/s is used, the values in **Table 2.4** suggest that the quality of treated leachate from the proposed MBR Treatment Plant will be superior and of a higher quality than that possible under the existing LMS. This is consistent with the stringent final effluent targets shown in **Table 2.2**. From an odour performance viewpoint, this is considered to be a good outcome for the long-term and sustainable management of leachate at the Site.

2.3.4 Regression Results Discussion

The regression results are based on observable and real leachate quality and odour emissions data. It is considered that the data used is a reasonable basis for the projected SOERs values generated in this study, for the following reasons:

- The odour emissions data used was collected from different leachate quality including untreated, partially leachate and fully treated leachate over four audits i.e. equivalent to four years' worth of data. This provided a span of different operationally scenarios from best case to worst case; and

- It was possible to obtain data from Veolia on leachate quality that was close to the time of the odour sampling. This meant the odour emissions could be closely related to leachate quality.

The correlation made in this study are considered to be unique to the Site. Therefore, any correlations presented in this study are not necessarily transposable to other facilities, particularly other waste management facilities.

3 ODOUR DISPERSION MODELLING METHODOLOGY

3.1 NSW ODOUR CRITERIA AND DISPERSION MODEL GUIDELINES

Regulatory authority guidelines for odorous impacts of gaseous process emissions are not designed to satisfy a 'zero odour impact criteria', but rather to minimise the nuisance effect to acceptable levels of these emissions to a large range of odour sensitive receptors within the local community.

The odour impact assessment for this project has been carried out in accordance with the methods outlined by the documents:

- Environment Protection Authority, 2005, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*;
- Environment Protection Authority, 2006, *Technical Framework (and Notes): Assessment and Management of Odour from Stationary Sources in NSW;* and
- Barclay & Scire, 2011. *Generic Guidance and Optimum Model Settings for the CALPUFF Modeling System for Inclusion into the 'Approved Methods for the Modeling and Assessments of Air Pollutants in NSW, Australia'.*

The documents specify that the odour modelling for Level 3 impact assessments, upon which this study has been conducted, be based on the use of:

- The 99.0th percentile dispersion model predictions;
- 1-hour averaging times with built–in peak-to-mean ratios to adjust the averaging time to a 1-second nose-response-time;
- Odour emission rates multiplied by the peak-to-mean ratios as outlined in **Table 3.1**;
- The near field distance, defined typically as 10 times the largest source dimension, either height or width; and
- The appropriate odour unit performance criterion, based on the population of the affected community in the vicinity of the development.

Table 3.1 - EPA peak-to-mean factors			
Source type	**Pasquill-Gifford stability class**	**Near-field P/M60***	**Far-field P/M60***
Area	A, B, C, D	2.5	2.3
	E, F	2.3	1.9
Line	A-F	6	6
Surface wake-free point	A, B, C	12	4
	D, E, F	25	7
Tall wake-free point	A, B, C	17	3
	D, E, F	35	6
Wake-affected point	A-F	2.3	2.3
Volume	A-F	2.3	2.3

* Ratio of peak 1-second average concentrations to mean 1-hour average concentrations
Source: Environment Protection Authority, 2005 – Table 6.1

The impact assessment criteria (IAC) for complex mixtures of odours are designed to include receptors with a range of sensitivities. Therefore a statistical approach is used to determine the acceptable ground level concentration of odour at the nearest sensitive receptor. This criterion is determined by the following equation (Environment Protection Authority, 2005, p. 37):

$$IAC = \frac{\log_{10}(p) - 4.5}{-0.6}$$ **Equation 3.1**

where,

IAC = Impact Assessment Criteria (ou)

***p* =** population

Based on **Equation 3.1**, **Table 3.2** outlines the odour performance criteria for six different affected population density categories. It states that higher odour concentrations are permitted in lower population density applications.

Table 3.2 - Odour Performance Criteria under Various Population Densities	
Population of affected community	**Odour performance criterion (ou)**
Urban Area (≥ ~2000)	2.0
~500	3.0
~125	4.0
~30	5.0
~10	6.0
Single rural residence (≤ ~2)	7.0

Source: Environment Protection Authority, 2005 – Table 7.5

The original odour impact assessment (Heggies, 2010) had adopted the IAC of **6 ou** "*given the low number of sensitive receptor locations in the vicinity of the Woodlawn site*" (PAE Holmes, 2010). TOU has maintained consistency with this approach as conditions have not significantly changed.

3.2 ODOUR DISPERSION MODEL SELECTION

The odour dispersion modelling assessment was carried out using the CALPUFF System (Version 6.42). CALPUFF is a puff dispersion model that is able to simulate the effects of time- and three dimensional space-varying meteorological conditions on pollutant transport (Environment Protection Authority, 2005). CALMET is a meteorological model that produces three dimensional gridded wind and temperature fields to be fed into CALPUFF (Atmospheric Studies Group, 2011). The primary output from CALPUFF is hourly pollutant concentrations evaluated at gridded and/or discrete receptor locations. CALPOST processes the hourly pollutant concentration output to produce tables at each receptor and contour plots across the modelling domain. For further technical information about the CALPUFF modelling system refer to the document *CALPUFF Modeling System Version 6 User Instructions* (Atmospheric Studies Group, 2011).

The CALPUFF system can account for a variety of effects such as non-steady-state meteorological conditions, complex terrain, varying land uses, plume fumigation and low wind speed dispersion (Environment Protection Authority, 2005). CALPUFF is considered an appropriate dispersion model for impact assessment by EPA in their document - *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales* in one or more of the following applications:

- complex terrain, non-steady-state conditions,
- buoyant line plumes,
- coastal effects such as fumigation,

- high frequency of stable calm night-time conditions,
- high frequency of calm conditions, and
- inversion break-up fumigation conditions.

In the case of the this odour impact assessment, CALPUFF was required in order to handle the complexity of surrounding terrain features. Under calm and very light winds, non-steady-state conditions such as accumulation of odour and/or downslope movement with drainage air flow would almost certainly occur.

For this study, the air contaminant was odour and ground level concentrations in odour units (ou) have been projected.

3.3 GEOPHYSICAL AND METEOROLOGICAL CONFIGURATION

A CALMET hybrid three-dimensional meteorological data file for Tarago, NSW was produced that incorporated of gridded numerical meteorological data supplemented by surface observation data, topography and land use over the domain area.

3.3.1 Terrain configuration

Terrain elevations were sourced from 1 Second Shuttle Radar Topography Mission (SRTM) Derived Smoothed Digital Elevation Model (DEM-S). The SRTM data was treated with several processes including but not limited to removal of stripes, void filling, tree offset removal and adaptive smoothing (Gallant, et al., 2011). The DEM-S was used as input into TERREL processor to produce a 400 km^2 grid at 0.15 km resolution. A map of the terrain is illustrated in **Figure 3.1.**

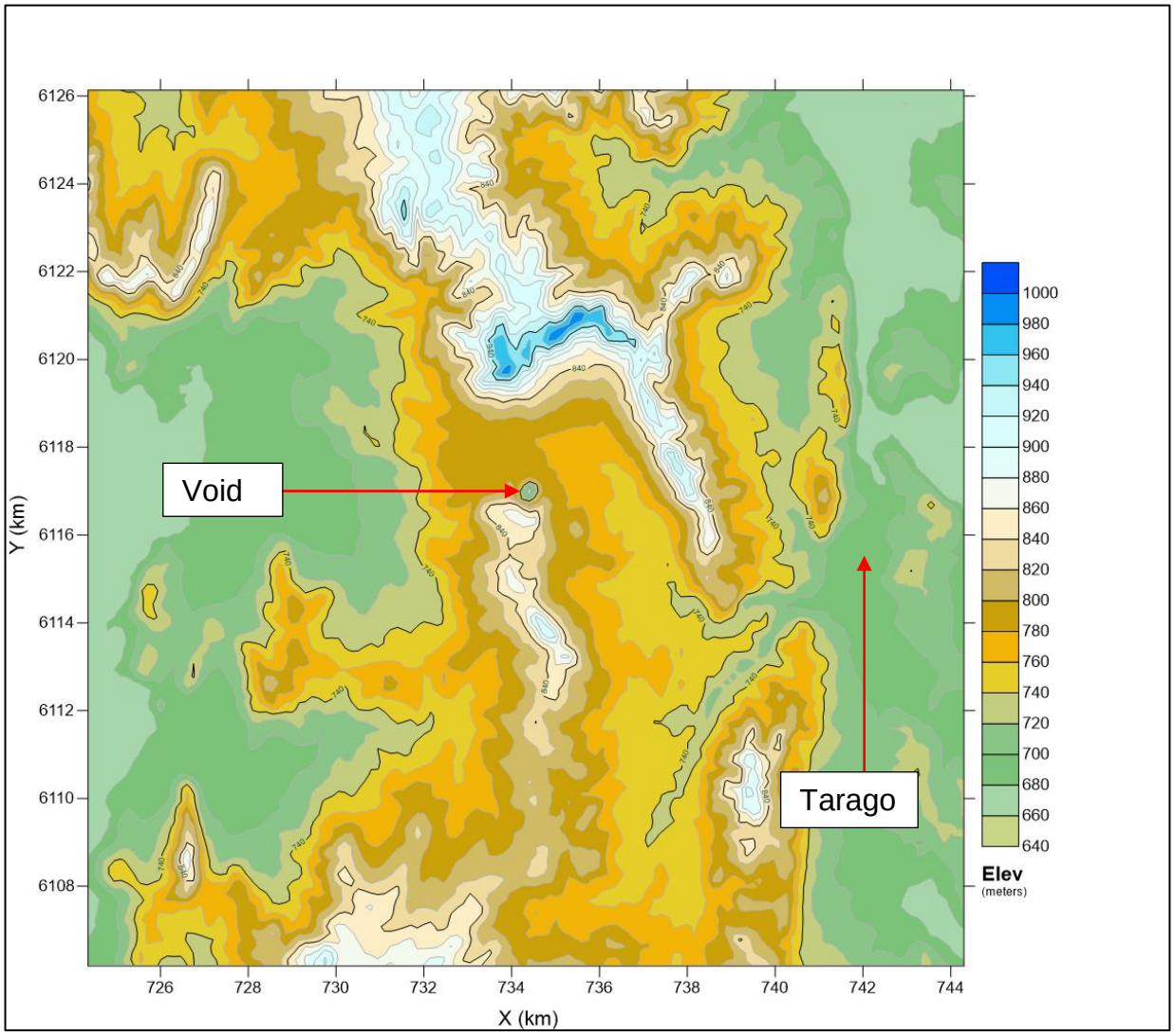

Figure 3.1 - Terrain map of Woodlawn and surrounds

3.3.2 Land use configuration

Land use was sourced from the United States Geological Survey (USGS) Global Land Cover Characteristics Data Base for the Australia-Pacific Region (USGS, 1997). The data was used as input into CTGPROC processor to produce a 400 km^2 grid at 0.15 km resolution. A map of the land use is illustrated in **Figure 3.2**.

3.3.3 Geophysical configuration

The geophysical data file was created using the MAKEGEO processor. Land use data from CTGPROC and terrain data from TERREL was used as input to produce a 400 km^2 geophysical grid at 0.15 km resolution.

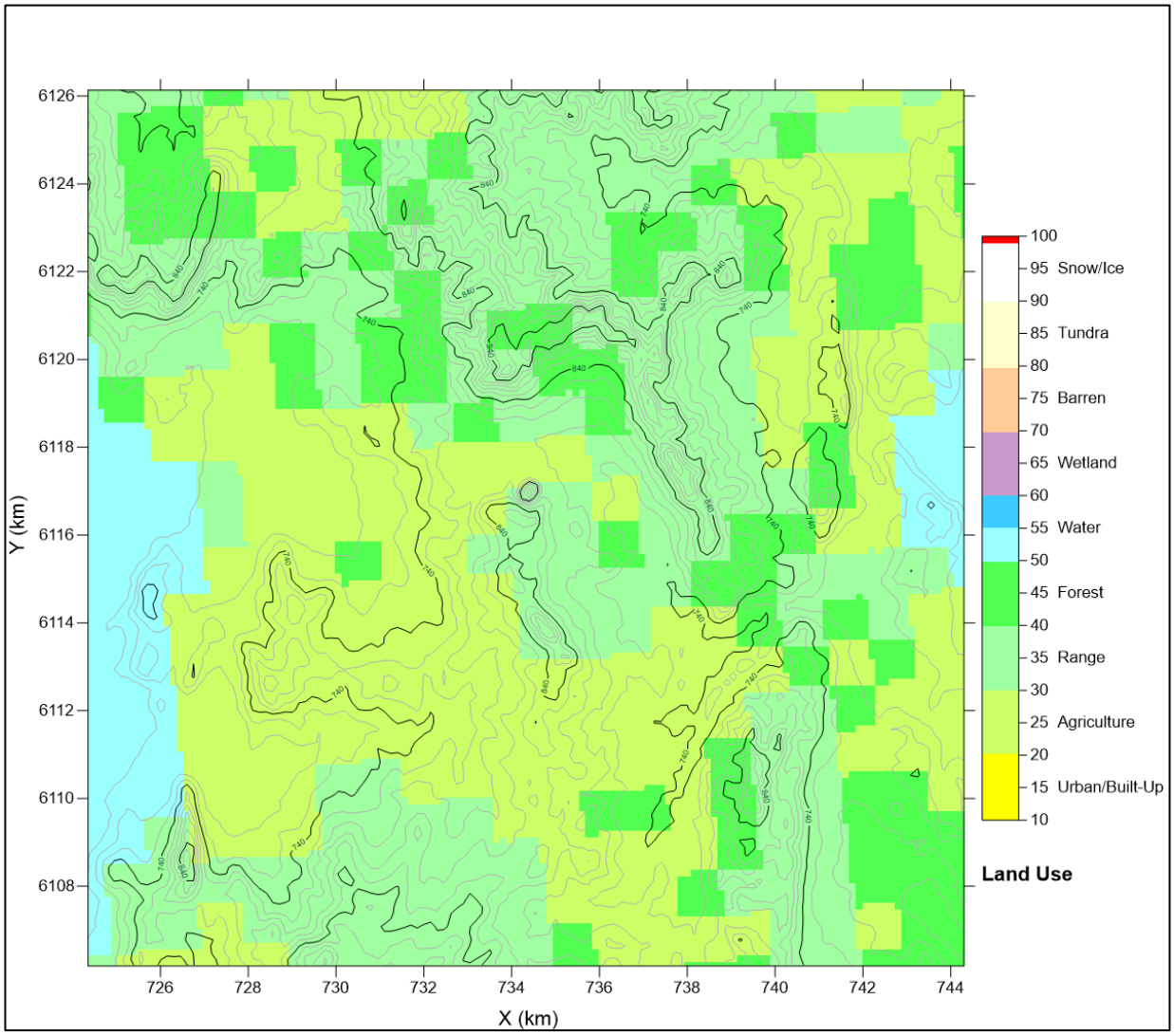

Figure 3.2 - Land use map of Woodlawn and surrounds

3.3.4 Meteorological configuration

3.3.4.1 Input data

One-hour average observed meteorological surface data for the latest representative year (2015) was sourced from Goulburn Airport maintained by Bureau of Meteorology (BOM). The location of Goulburn Airport surface station and other metadata are available in **Appendix B**. The BOM data was formatted into generic format and was processed with SMERGE to produce a surface meteorological data file.

Numerical meteorological data was produced as a 3D data tile from The Air Pollution Model (v4.0.5) and processed it with CALTAPM (v7.0.0) into a suitable format. TAPM was run using multiple nested grids, at least three nests and 35 vertical levels centred over the Woodlawn site. TAPM innermost nest was 33 km by 33 km at 1 km resolution. The nested grid resolutions were close to a ratio of three as possible.

3.3.4.2 CALMET meteorological model configuration

CALMET was run using the hybrid option that uses geophysical data, surface station data from Bundaberg Airport and upper air data from the TAPM 3D data tile. The data was used to initialise the diagnostic functions of the CALMET module to produce a full 3D meteorology data for input into CALPUFF. **Table 3.3** shows key variable fields selected.

3.3.4.3 Meteorological data analysis

Observed 2015 BOM surface data was compared with longer term climate (2011 – 2015) from Goulburn Airport to gauge how representative and suitable the year is for the purpose of air quality dispersion modelling. For reference, meteorological data was also extracted from the CALMET model for the location directly nearby the Woodlawn site office. The annual windroses for Goulburn Airport show very good agreement with west to northwest winds dominating (**Figure 3.3**). The Woodlawn windroses (**Figure 3.4**) show bias to lighter winds and greater frequency of east to south-easterly winds, perhaps due influences from the nearby valley and ridgelines. A more conservative bias is expected relative to the observations at Goulburn Airport.

Both monthly average (**Figure 3.5**) and diurnal temperature (**Figure 3.6**) profiles for the long term and 2015 are in very good agreement. Diurnal mixing heights and stability class frequencies over the Woodlawn site are shown in **Figure 3.7** and **Figure 3.8** respectively.

Table 3.3 - CALMET key variable fields												
Grid Configuration (WGS-84 UTM Zone 55S)												
134											**NX Cells**	
134											**NY Cells**	
0.15											**Cell Size (km)**	
724.277					6106.107						**SW Corner (km)**	
11											**Vertical Layers**	
ZFACE (m)	0	20	40	80	160	320	640	1000	1500	2000	2500	3000
LAYER	1	2	3	4	5	6	7	8	9	10	11	
MID-PT (m)	10	30	60	120	240	480	820	1250	1750	2250	2750	

Critical Wind Field Settings			
Value	**Found**	**Typical**	**Values**
TERRAD	4	None	Terrain scale (km) for terrain effects
IEXTRP	-4	4,-4	Similarity extrap. of wind (-4 ignore upper stn sfc)
ICALM	0	0	Do Not extrapolate calm winds
RMAX1	6	None	MAX radius of influence over land in layer 1 (km)
RMAX2	8	None	MAX radius of influence over land aloft (km)
R1	3	None	Distance (km) where OBS wt = IGF wt in layer 1
R2	4	None	Distance (km) where OBS wt = IGF wt aloft

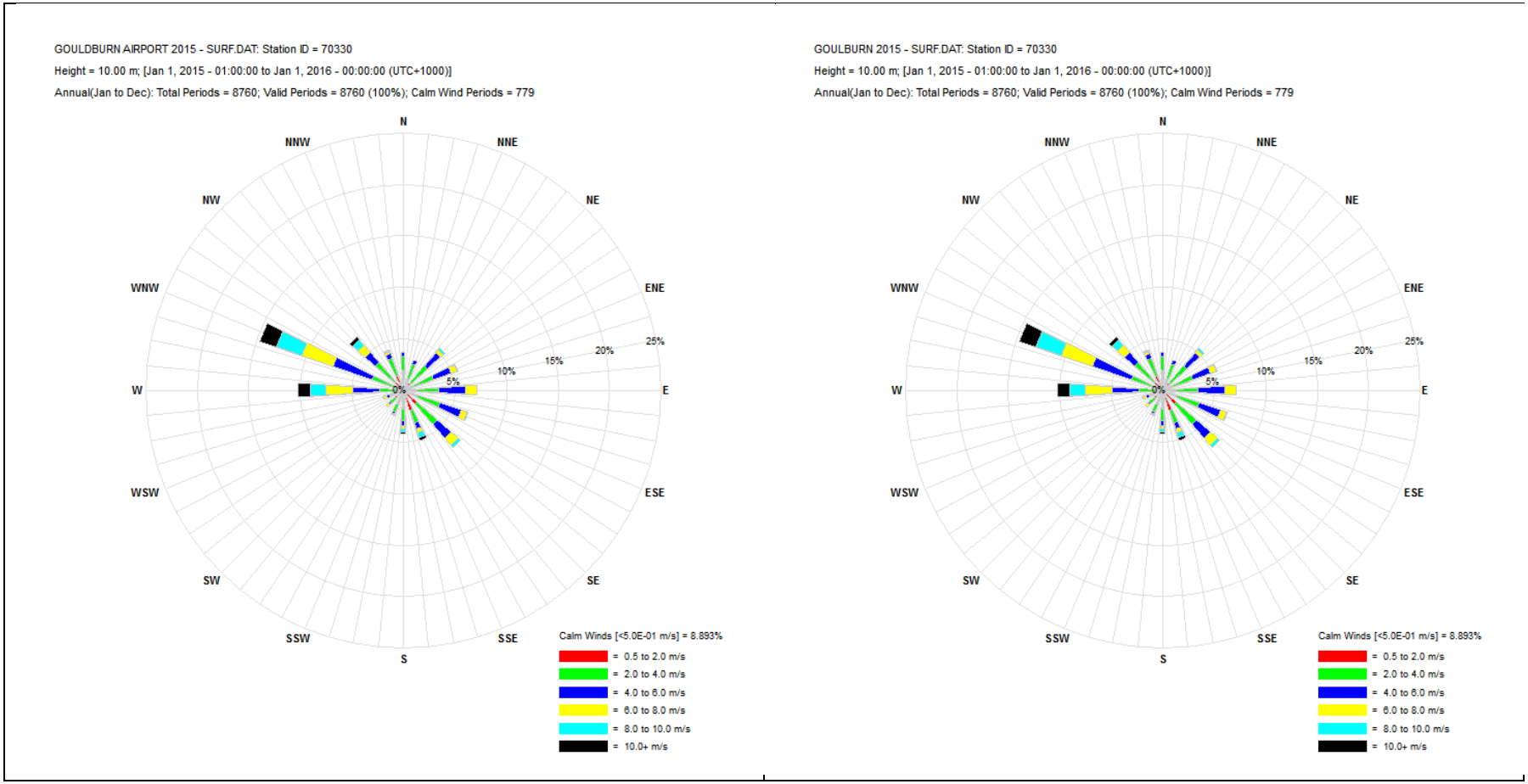

Figure 3.3 - Annual windroses for Goulburn Airport 5 years and 2015 only

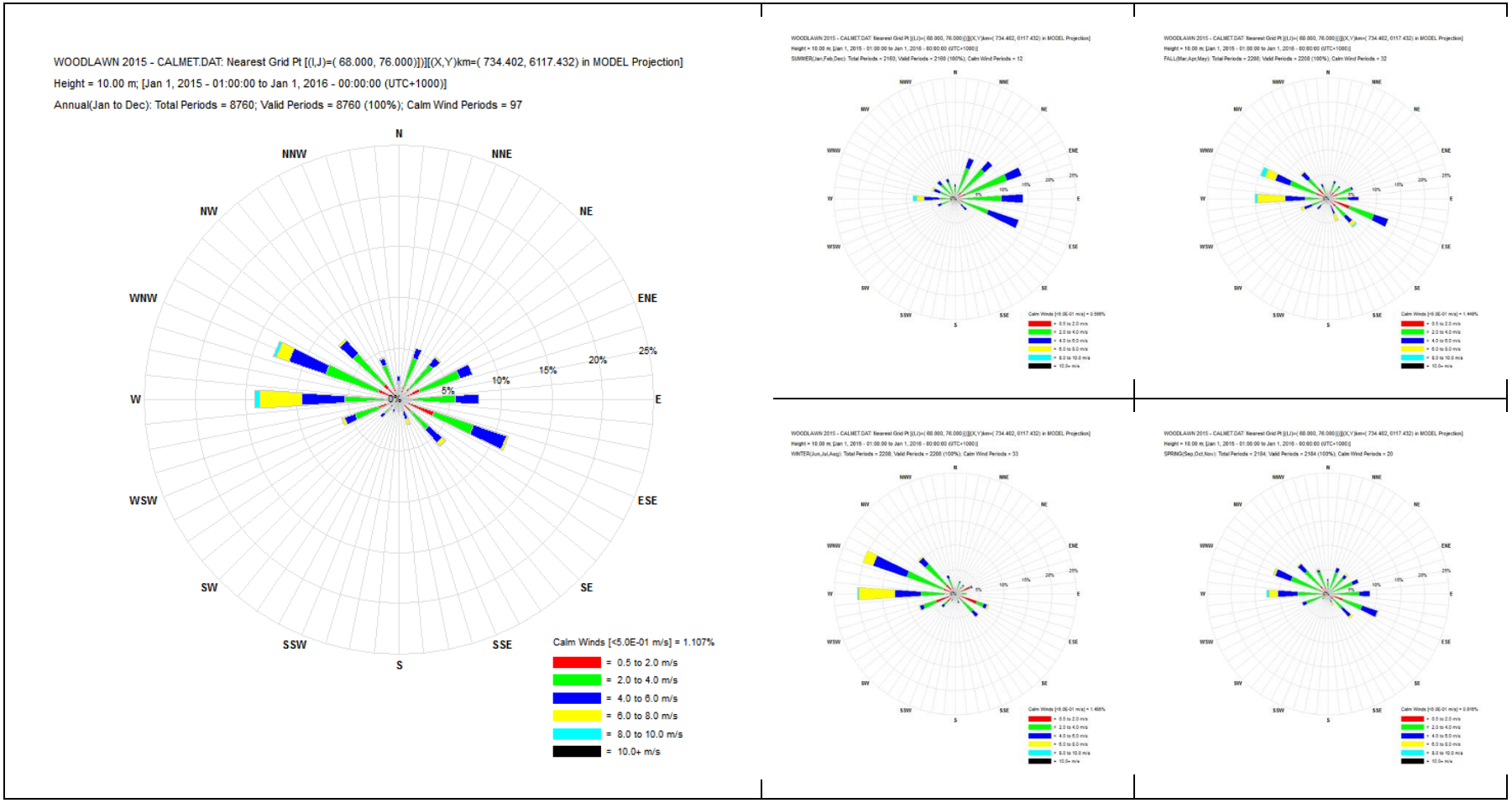

Figure 3.4 - Annual and seasonal windroses for Woodlawn 2015 (modelled)

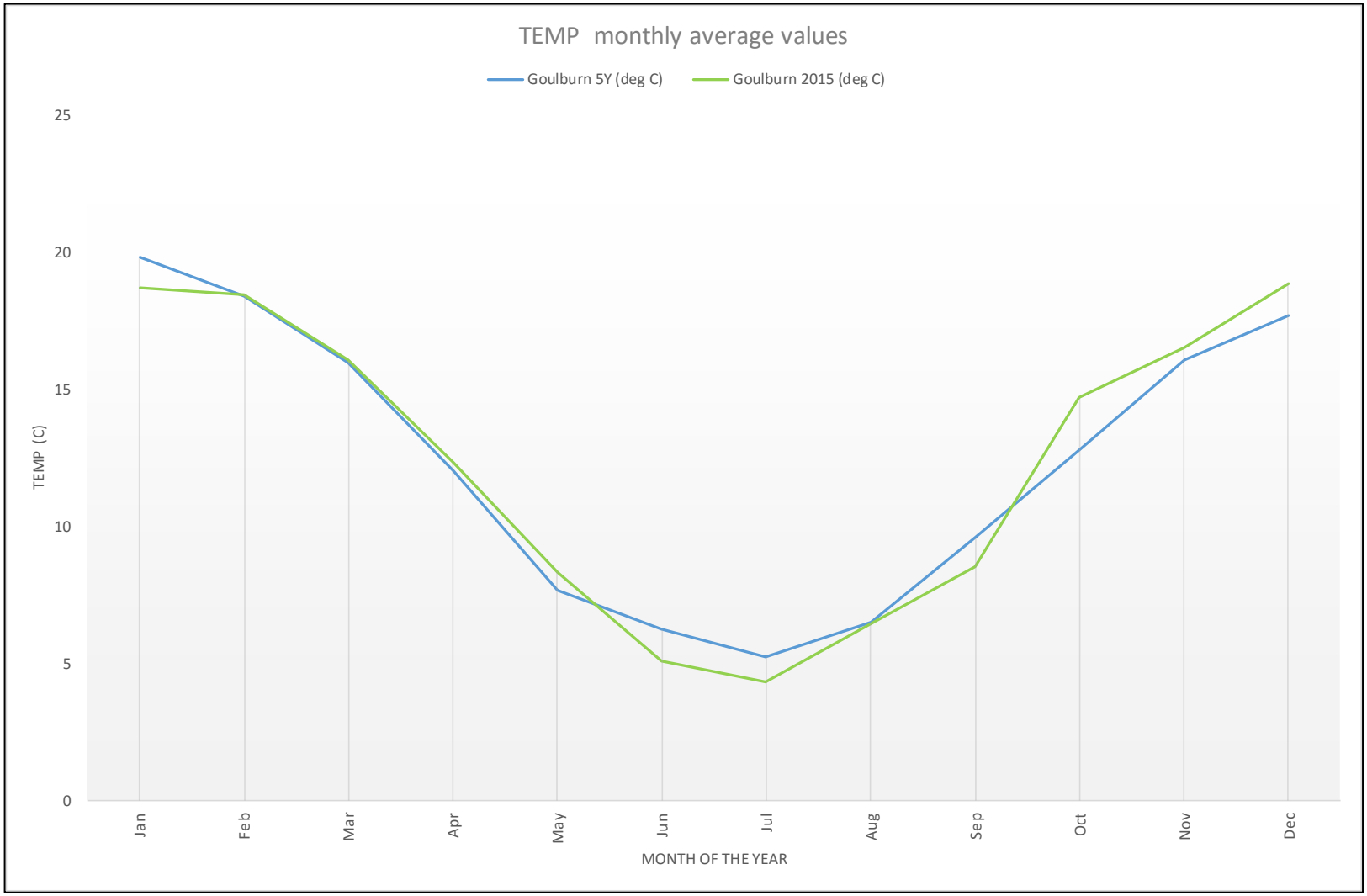

Figure 3.5 - Monthly average temperatures for Goulburn Airport 5 years and 2015 only

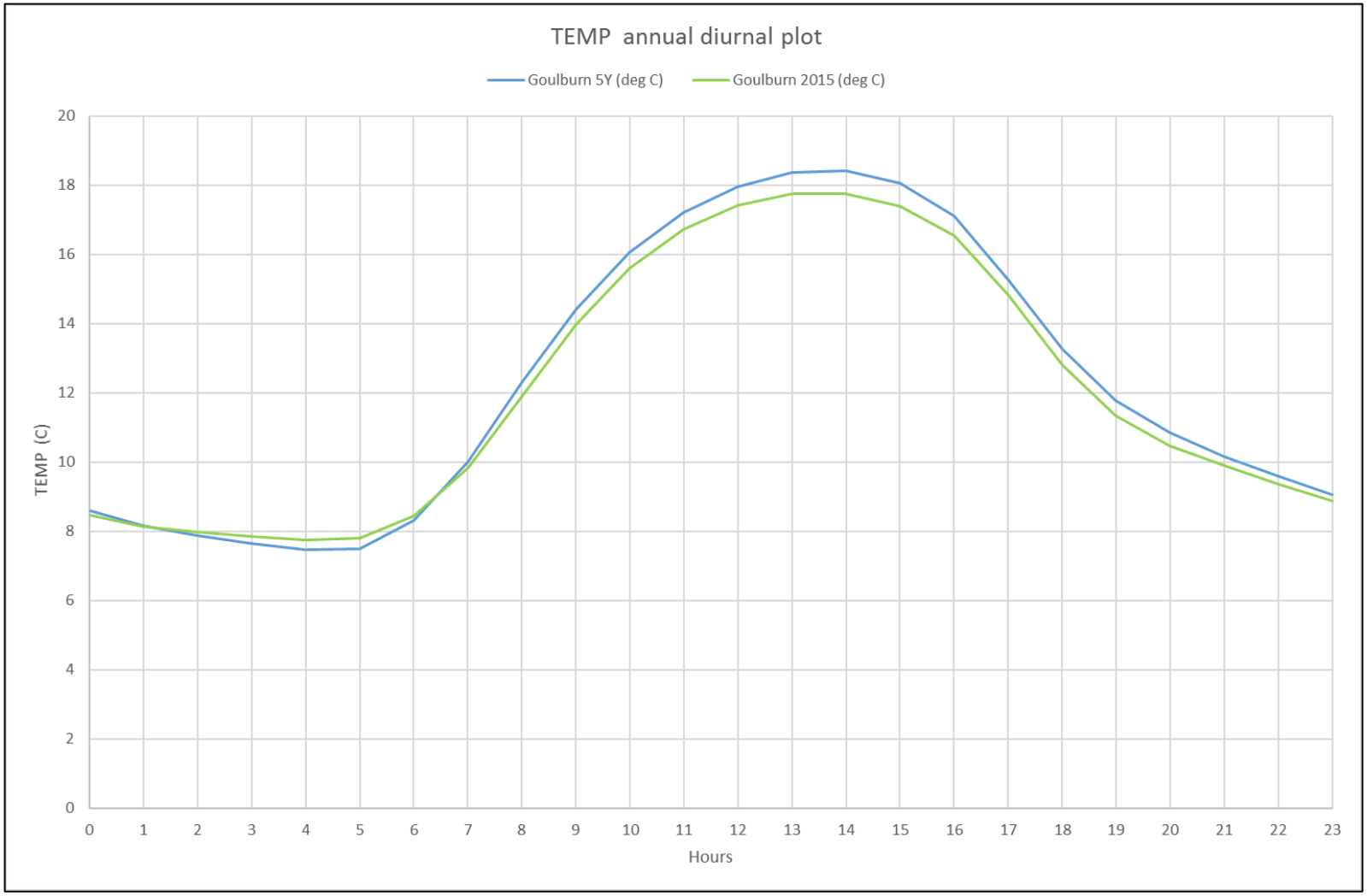

Figure 3.6 - Annual diurnal temperature for Goulburn Airport 5 years and 2015 only

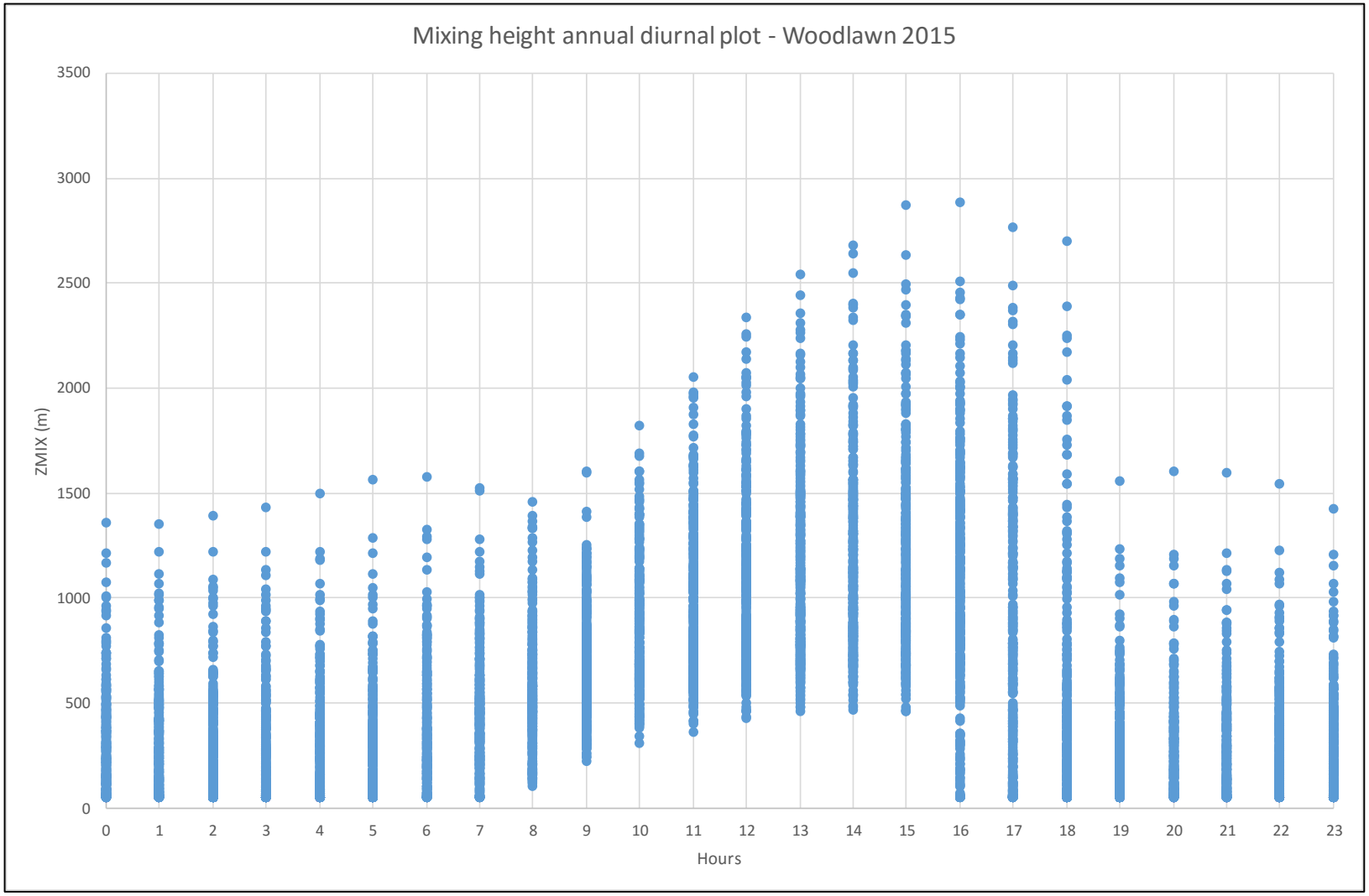

Figure 3.7 - Annual X-Y scatter plot diurnal mixing height for Woodlawn 2015 (modelled)

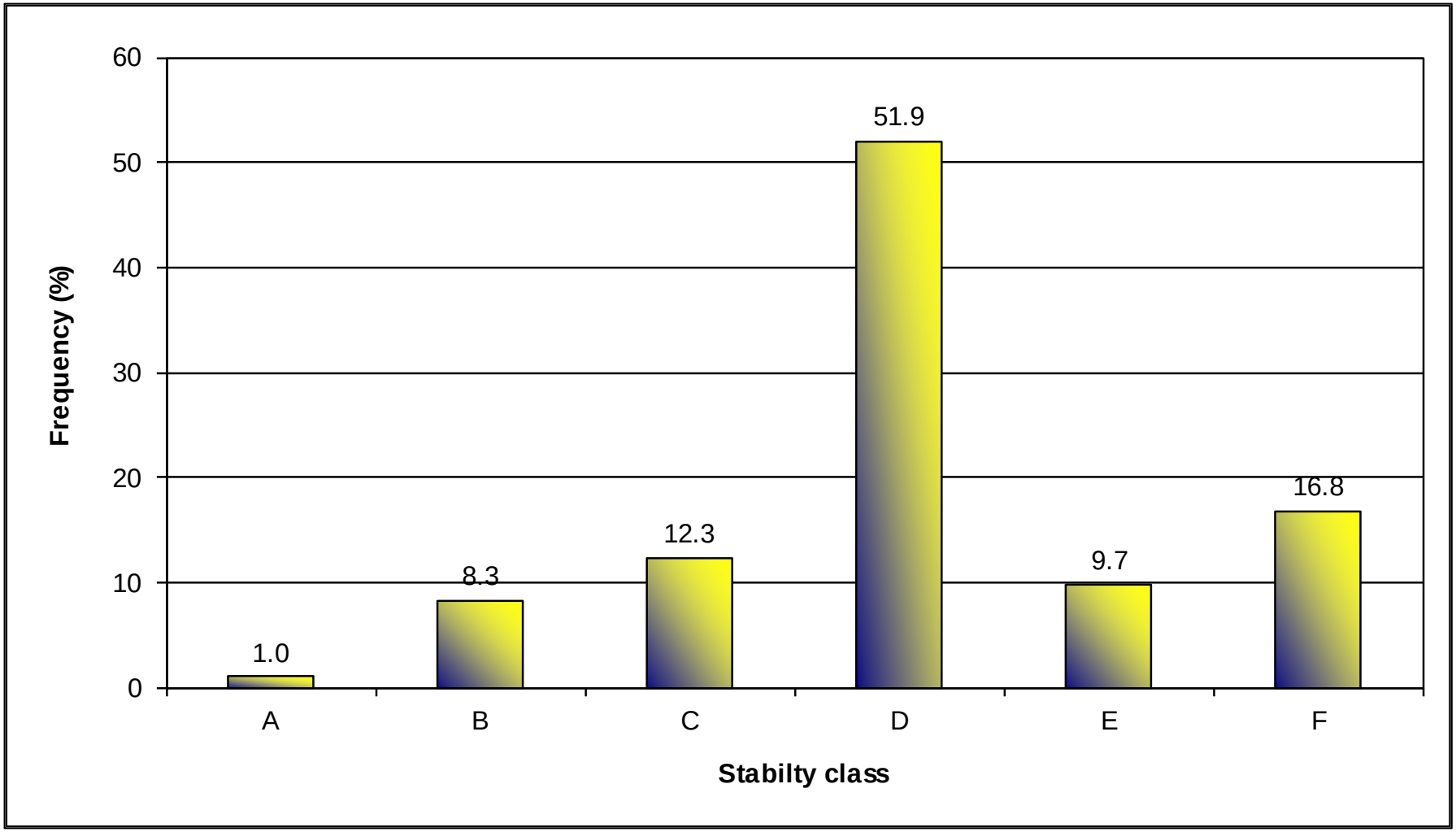

Figure 3.8 - Annual stability class frequency for Woodlawn 2015 (modelled)

3.4 CALPUFF DISPERSION MODEL CONFIGURATION

3.4.1 Computational domain

The computational domain was set to the same parameters as the meteorological domain.

3.4.2 Receptor configuration

Three groups of arbitrary discrete receptors were configured over the modelling domain. Four sensitive discrete receptors were placed at ground level at the same locations identified by the previous EA modelling (Heggies, 2010). A receptor grid was created with a fine resolution inner nest of 9.6 km by 9.6 km by 0.15 km spacing; and an outer nest of 19.35 km by 19.35 km by 0.45 km spacing.

3.4.3 Source Configuration and Emission Rates

See **Appendix C** for full odour source and emission rate configurations. The CALPUFF model text output files can be produced upon request.

3.4.4 CALPUFF Model Options

CALPUFF default model options were set except for the following as recommended in *Table A*-4 contained and explained within *Barclay and Scire (2011)*:

- Dispersion coefficients (MDISP) = dispersion coefficients from internally calculated sigma v, sigma w using micrometeorological variables (2);
- Probability Density Function used for dispersion under convective conditions (MPDF) = Yes (1); and
- Minimum turbulence velocities sigma v for each stability class over land and water (SVMIN) = 0.2 m/s for A, B, C, D, E, F (0.200, 0.200, … , 0.200).

3.5 MODELLING SENSITIVITY TEST SCENARIOS

The following sensitivity test scenarios were simulated with CALPUFF:

- **Scenario #1:** design target values;
- **Scenario #2:** if leachate quality is exceeded by a factor of 2 times from the design target value;
- **Scenario #3:** if leachate quality is exceeded by a factor of 5 times from the design target value; and
- **Scenario #4:** if leachate quality is exceeded by a factor of 10 times from the design target value.

A total surface area of 47.6 hectares (ha) was used for the ED1 system in the modelling. This represents the top water level (TWL) of ED1, when the maximum exposed surface area will occur. This is considered to represent a conservative approach and necessary as to assess the long term feasibility of treated leachate stored in the ED1 System from an odour performance viewpoint.

4 ODOUR DISPERSION MODELLING RESULTS

The odour dispersion modelling results are visually shown in **Figure 4.1**. These plots illustrate the isopleth of the projected ground level odour concentration against the 6 ou odour performance criterion concentration based on 1-hour averaging at the 99.0th percentile frequency at the nearest sensitive receptor.

The sensitivity analysis conducted for the long-term treated leachate solution under each modelled scenario show a negligible change in the extent of odour impact, even if the leachate quality target is exceeded by an order of magnitude. The results are considered conservative and were modelled on the basis of TWL i.e. when ED3S and ED1 Systems are full and are at their maximum exposed surface area.

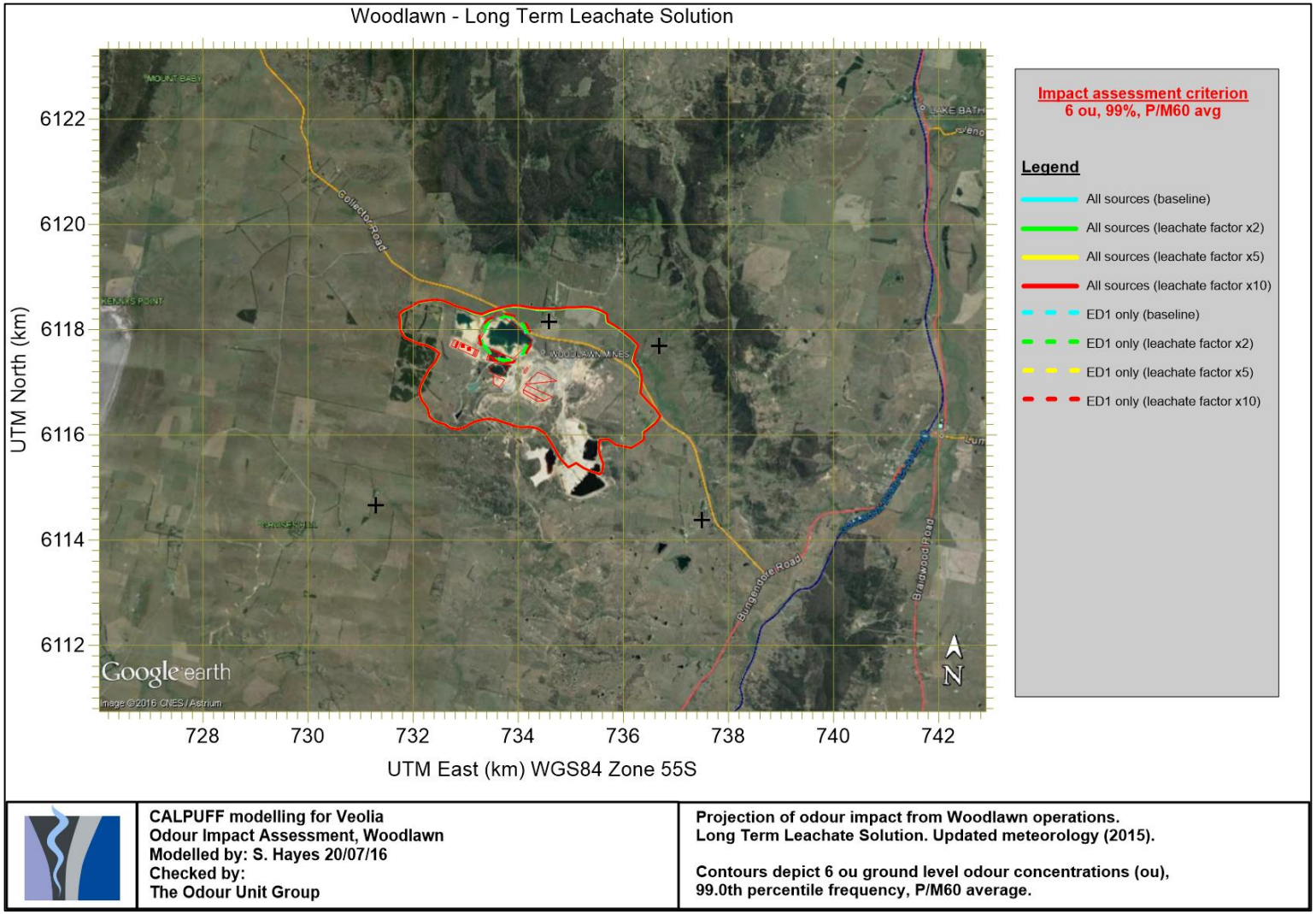

Figure 4.1 – Long-term treated leachate solution (Scenarios #1 to #4)

5 MODELLING STUDY FINDINGS & CONCLUSION

The aim of the odour dispersion modelling study was to evaluate the odour profile contribution and assess compliance against the NSW EPA odour performance criteria of the addition of the proposed ED1 System to the LMS at the Site. This also includes the proposed ED3S System, as discussed in **Section 2.1**. The modelling was conducted with the 6 ou odour performance criterion ground level concentration based on 1-hour averaging at the 99.0th percentile frequency at the nearest sensitive receptor. The modelling projection results demonstrate compliance with this criterion at the nearest sensitive receptor and minimal sensitivity to possible fluctuations in leachate quality of 2, 5 and 10 times above the target design value at TWL. On this basis, it can be safely concluded that the proposed MBR Treatment Plant and subsequent storage of the treated leachate flow in ED1 system will not result in any significant increase to off-site odour impacts, have negligible change on the existing surrounding off-site amenity, and is in compliance with the relevant NSW EPA odour performance criterion. This is attributable to the high leachate treatment quality criteria proposed (see **Table 2.2**).

Overall, the modelling study finds that the proposed MBR Treatment Plant and subsequent storage of the final treated effluent will not result in any adverse levels of odour impact, and represents a sustainable, long term solution for the management and storage of leachate at the Site.

6 BIBLIOGRAPHY

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REPORT SIGNATURE PAGE

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THE ODOUR UNIT

VEOLIA

Veolia Australia & New Zealand

Woodlawn Bioreactor Facility Odour Modelling Study

Long-term Treated Leachate Solution

July 2016

Appendices

Veolia Australia & New Zealand

APPENDIX A:

LEACHATE AND ODOUR QUALITY CORRELATION ANALYSIS WORKSHEET

Long-term Treated Leachate Solution

July 2016

Job No. N1806L06

Document Title Appendix A - Veolia Woodlawn Odour Treatment Long Term Solution: Leachate and odour quality correlation analysis worksheet

Sample Location	Specific Odour Emission Rate (ou.m³/m²/s)	H_2S (ppm)	pH	BOD (mg/L)	Sulphide (mg/L)	Ammonia (as N) (mg/L)	VFA (mg/L)	Odour character
Untreated	394.2	180	7.8	7,200	0.4	1,700	6,100	rotten egg
Partially Treated	20.1	8.0	8.0	3,600	0.3	754	3,690	rotten egg, onion, cabbage
LAD -1	0.323	0.000	8.9	1,700	0.1	285	285	sweet, garbage, ammonia
LAD -2	0.0259	0.000	8.6	154	0.02	186	980	stale water
Treated & Stored - 1	0.187	0.000	8.7	81	0.5	105	338	stagnant water, dirty water, fatty, greast, sweet onion, grain wheat
Treated & Stored - 2	0.0364	0.003	8.3	73	0.3	153	646	musty, soil, rubber, stale water, burnt, nutty, sewage, cooking oil, fat, rubbery, dusty, stale air

Sample Location	Specific Odour Emission Rate (ou.m³/m²/s)	H_2S (ppm)
Untreated	394.2	180
Partially Treated	20.1	8.0
LAD -1	0.323	0.000
LAD -2	0.0259	0.000
Treated & Stored - 1	0.187	0.000
Treated & Stored - 2	0.0364	0.003

Covariance statistics

	Specific Odour Emission Rate (ou.m3/m2/s)	H2S (ppm)
Specific Odour Emission Rate (ou.m3/m2/s)	21187.47519	
H2S (ppm)	9686.93475	4429.056443

Correlation Statistics

	Specific Odour Emission Rate (ou.m3/m2/s)	H2S (ppm)
Specific Odour Emission Rate (ou.m3/m2/s)	1	
H2S (ppm)	0.999979653	1

Sample Location	Specific Odour Emission Rate (ou.m³/m²/s)	pH
Untreated	394.2	7.8
Partially Treated	20.1	8.0
LAD -1	0.323	8.9
LAD -2	0.0259	8.6
Treated & Stored - 1	0.187	8.7
Treated & Stored - 2	0.0364	8.3

Covariance statistics

	Specific Odour Emission Rate (ou.m3/m2/s)	pH
Specific Odour Emission Rate (ou.m3/m2/s)	21187.47519	
pH	-38.79843801	0.150242284

Correlation Statistics

	Specific Odour Emission Rate (ou.m3/m2/s)	pH
Specific Odour Emission Rate (ou.m3/m2/s)	1	
pH	-0.687667579	1

Sample Location	Specific Odour Emission Rate (ou.m³/m²/s)	BOD (mg/L)
Untreated	394.2	7,200
Partially Treated	20.1	3,600
LAD -1	0.323	1,700
LAD -2	0.0259	154
Treated & Stored - 1	0.187	81
Treated & Stored - 2	0.0364	73

Covariance statistics

	Specific Odour Emission Rate (ou.m3/m2/s)	BOD (mg/L)
Specific Odour Emission Rate (ou.m3/m2/s)	21187.47519	
BOD (mg/L)	337620.1624	6731165.225

Correlation Statistics

	Specific Odour Emission Rate (ou.m3/m2/s)	BOD (mg/L)
Specific Odour Emission Rate (ou.m3/m2/s)	1	
BOD (mg/L)	0.894012612	1

Sample Location	Specific Odour Emission Rate (ou.m³/m²/s)	Sulphide (mg/L)
Untreated	394.2	0.4
Partially Treated	20.1	0.3
LAD -1	0.323	0.1
LAD -2	0.0259	0.02
Treated & Stored - 1	0.187	0.5
Treated & Stored - 2	0.0364	0.3

Covariance statistics

	Specific Odour Emission Rate (ou.m3/m2/s)	Sulphide (mg/L)
Specific Odour Emission Rate (ou.m3/m2/s)	21187.47519	
Sulphide (mg/L)	8.582545027	0.028070139

Correlation Statistics

	Specific Odour Emission Rate (ou.m3/m2/s)	Sulphide (mg/L)
Specific Odour Emission Rate (ou.m3/m2/s)	1	
Sulphide (mg/L)	0.351928312	1

Sample Location	Specific Odour Emission Rate (ou.m³/m²/s)	Ammonia (as N) (mg/L)
Untreated	394.2	1,700
Partially Treated	20.1	754
LAD -1	0.323	285
LAD -2	0.0259	186
Treated & Stored - 1	0.187	105
Treated & Stored - 2	0.0364	153

Covariance statistics

	Specific Odour Emission Rate (ou.m3/m2/s)	Ammonia (as N) (mg/L)
Specific Odour Emission Rate (ou.m3/m2/s)	21187.47519	
Ammonia (as N) (mg/L)	77561.36675	319982.4849

Correlation Statistics

	Specific Odour Emission Rate (ou.m3/m2/s)	Ammonia (as N) (mg/L)
Specific Odour Emission Rate (ou.m3/m2/s)	1	
Ammonia (as N) (mg/L)	0.941982309	1

Sample Location	Specific Odour Emission Rate (ou.m³/m²/s)	VFA (mg/L)
Untreated	394.2	6,100
Partially Treated	20.1	3,690
LAD -1	0.323	285
LAD -2	0.0259	980
Treated & Stored - 1	0.187	338
Treated & Stored - 2	0.0364	646

Covariance statistics

	Specific Odour Emission Rate (ou.m3/m2/s)	VFA (mg/L)
Specific Odour Emission Rate (ou.m3/m2/s)	21187.47519	
VFA (mg/L)	27444.7055	4707211.875

Correlation Statistics

	Specific Odour Emission Rate (ou.m3/m2/s)	VFA (mg/L)
Specific Odour Emission Rate (ou.m3/m2/s)	1	
VFA (mg/L)	0.869027221	1

Veolia Australia & New Zealand

APPENDIX B:

BUREAU OF METEOROLOGY BASIC CLIMATOLOGICAL STATION METADATA – GOULBURN AIRPORT (COMPLIED 26 NOVEMBER 2015)

Long-term Treated Leachate Solution

July 2016

Australian Government
Bureau of Meteorology

Basic Climatological Station Metadata

Current status

Metadata compiled: 26 NOV 2015

Station: GOULBURN AIRPORT AWS

Bureau of Meteorology station number: 070330
Bureau of Meteorology district name: Sthn Tablelands Gburn-Monaro
State: NSW

World Meteorological Organization number: 95716
Identification: YGLB

Network Classification: National Benchmark Network for Agrometeorology
Station purpose: Synoptic, Aeronautical
Automatic Weather Station: Almos

Current Station Location				
Latitude	**Decimal**	-34.8085	**Hour Min Sec**	34°48'31"S
Longitude	**Decimal**	149.7312	**Hour Min Sec**	149°43'52"E
Station Height	640 m	**Barometer Height**	640.8 m	
Method of station geographic positioning			GPS	

Year opened: 1988
Status: Open

Station summary

No summary for this site has been written as yet.

Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

Australian Government
Bureau of Meteorology

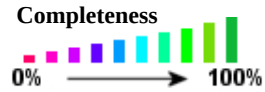
Basic Climatological Station Metadata

Current status

Station:	GOULBURN AIRPORT AWS			**Location:**	GOULBURN AIRPORT AWS			**State:**	NSW
Bureau No.:	070330	**WMO No.:**	95716	**Aviation ID:**	YGLB	**Opened:**	07 Nov 1988	**Current Status:**	Still open
Latitude:	-34.8085	**Longitude:**	149.7312	**Elevation:**	640 m	**Barometer Elev:**	640.8 m	**Metadata compiled:**	26 NOV 2015

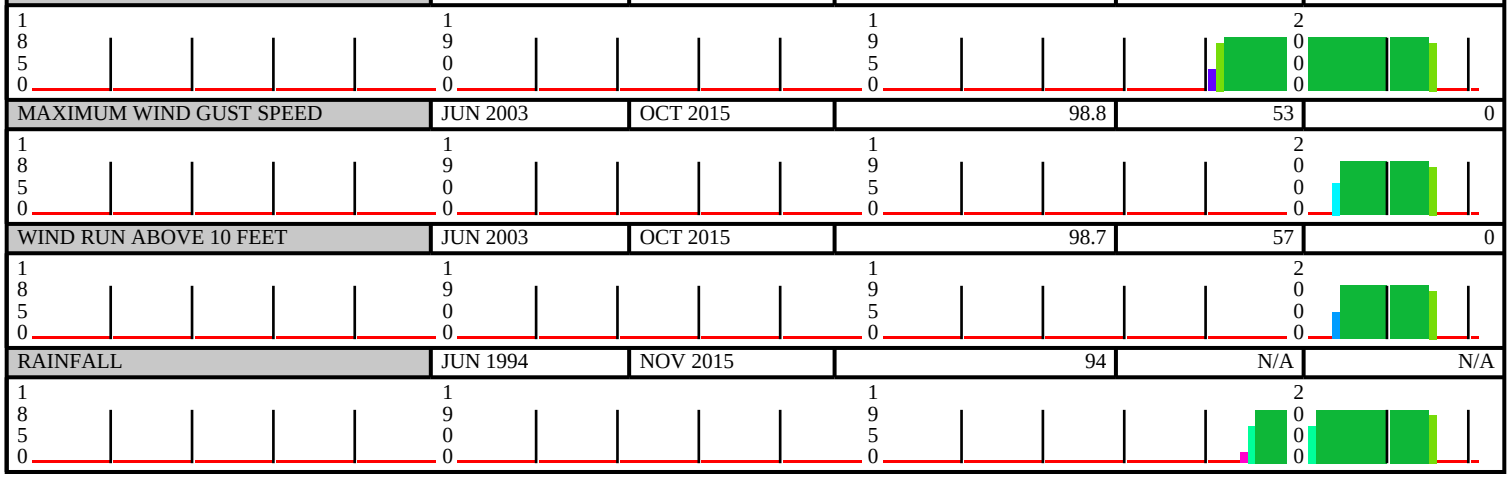
Observation summary

The table below indicates the approximate completeness of the record for individual element types within the Australian Data Archive for Meteorology. For elements not listed see the note below.



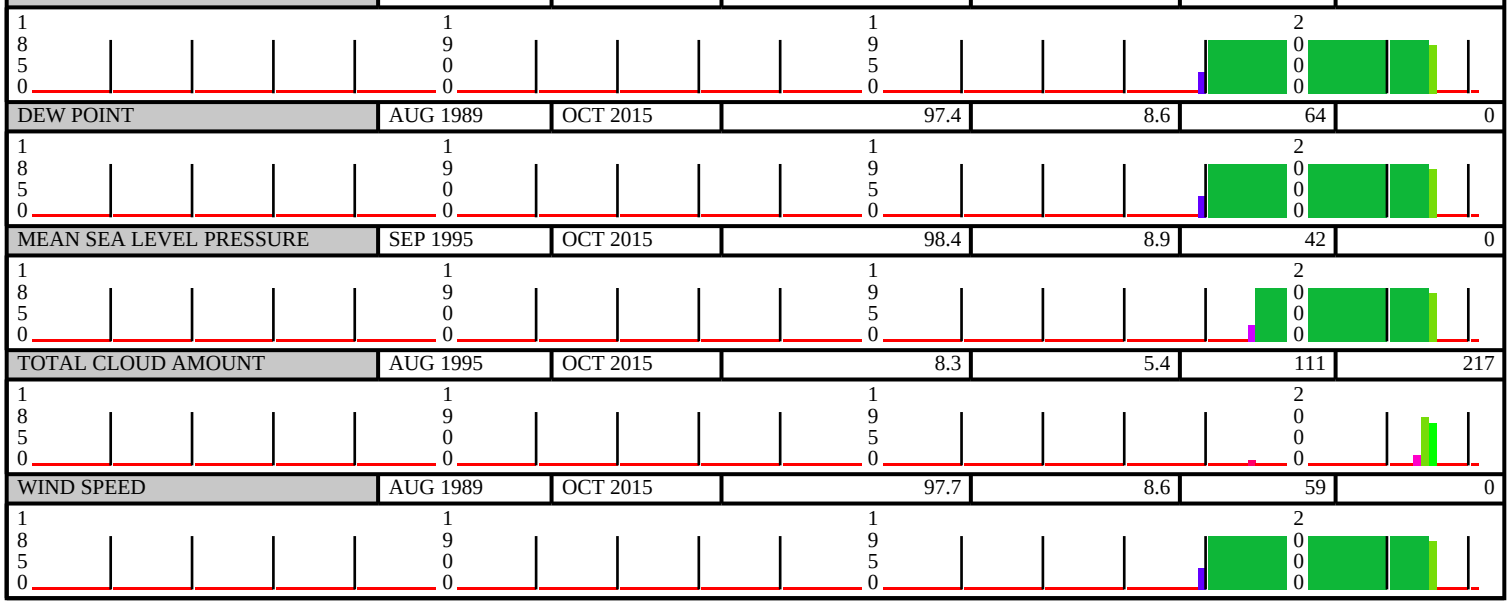
DAILY DATA HOLDINGS

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	SINGLE DAYS MISSED	FULL MONTHS MISSED
MAXIMUM AIR TEMPERATURE	JUL 1990	OCT 2015	95.9	372	0
MAXIMUM WIND GUST SPEED	JUN 2003	OCT 2015	98.8	53	0
WIND RUN ABOVE 10 FEET	JUN 2003	OCT 2015	98.7	57	0
RAINFALL	JUN 1994	NOV 2015	94	N/A	N/A



HOURLY DATA HOLDINGS - from 1 to 24 observations per day

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	FREQUENCY average daily	SINGLE DAYS MISSED	FULL MONTHS MISSED
AIR TEMPERATURE	AUG 1989	OCT 2015	97.7	8.6	61	0
DEW POINT	AUG 1989	OCT 2015	97.4	8.6	64	0
MEAN SEA LEVEL PRESSURE	SEP 1995	OCT 2015	98.4	8.9	42	0
TOTAL CLOUD AMOUNT	AUG 1995	OCT 2015	8.3	5.4	111	217
WIND SPEED	AUG 1989	OCT 2015	97.7	8.6	59	0



Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

Basic Climatological Station Metadata

Current status

Station:	GOULBURN AIRPORT AWS			**Location:**	GOULBURN AIRPORT AWS			**State:**	NSW
Bureau No.:	070330	**WMO No.:**	95716	**Aviation ID:**	YGLB	**Opened:**	07 Nov 1988	**Current Status:**	Still open
Latitude:	-34.8085	**Longitude:**	149.7312	**Elevation:**	640 m	**Barometer Elev:**	640.8 m	**Metadata compiled:**	26 NOV 2015

THERE ARE NO RAINFALL INTENSITY DATA HOLDINGS

ONE-MINUTE DATA HOLDINGS

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	FREQUENCY average daily	SINGLE DAYS MISSED	FULL MONTHS MISSED
ALL ELEMENTS	SEP 2010	NOV 2015	99.1	1427.4	N/A	0

HALF-HOURLY DATA HOLDINGS

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	FREQUENCY average daily	SINGLE DAYS MISSED	FULL MONTHS MISSED
ALL ELEMENTS	JAN 1989	NOV 2015	72.1	34.6	N/A	2

THERE ARE NO UPPER-AIR EDT DATA HOLDINGS

Holdings calculated up to 01 Nov 2015

The % complete figure is the completeness of observations averaged over all months of record, for the given station and observation type, taking gaps into account. For hourly holdings, the completeness is relative to the maximum number of daily observations for the site each month, and is therefore an estimate. For daily holdings, the completeness figure shown is exact.

The single days missed figure is the total number of days for which no observation was received, not including full missed months. The full months missed figure is the total of full month gaps over the period of record. Where an element is not included assumptions can generally be made about availability, and the list to use has been suggested below.

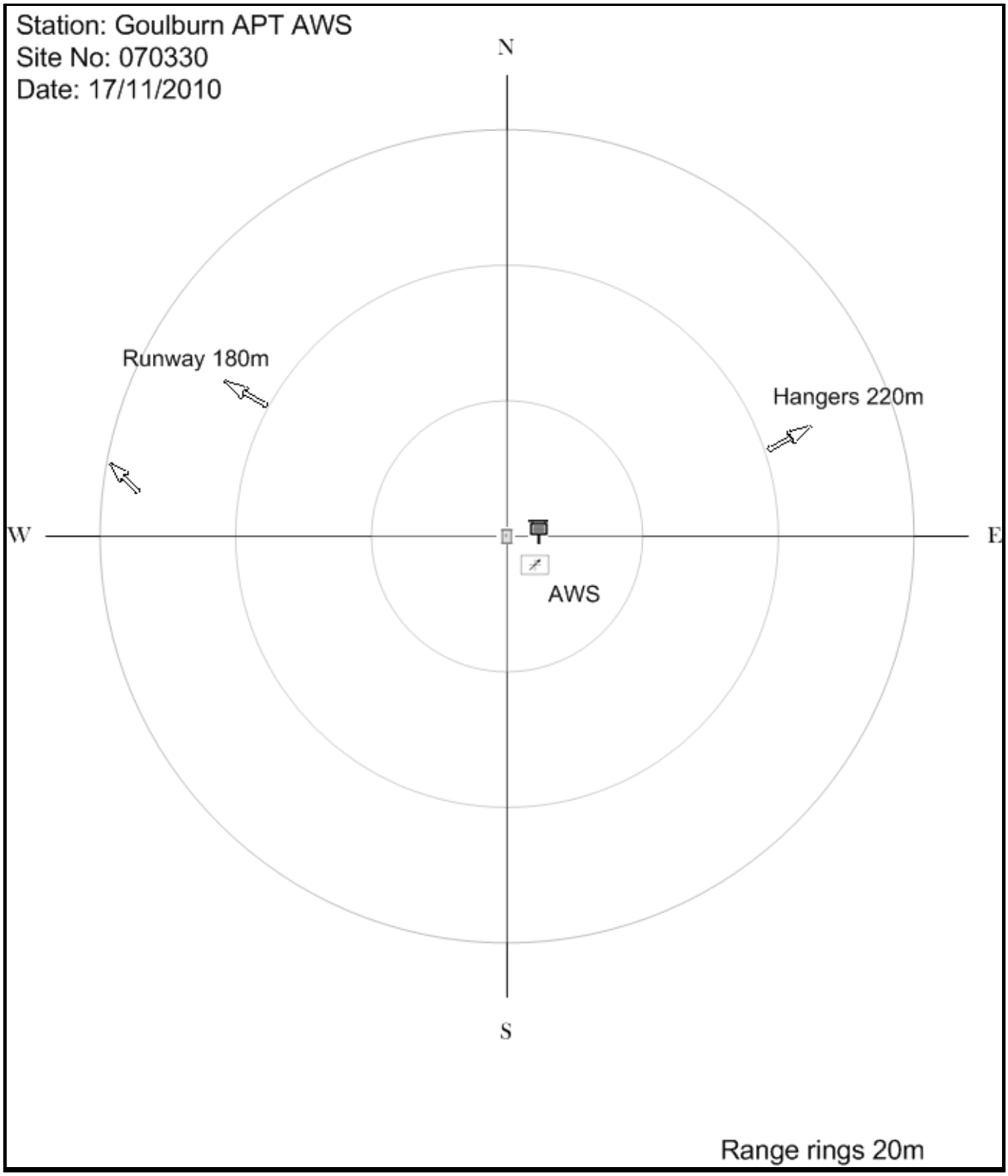
Unlisted element	Listed element to use
Minimum air temperature	Maximum air temperature
Wet bulb temperature	Dew point
Soil temperature at 20, 50 & 100cm	10cm soil temperature
Relative humidity	Dew point
Minimum temp. of water in evaporimeter	Evaporimeter - max water temp
Visual observations eg. weather, visibility	Total cloud amount
Sea related observations	Sea state

Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

Extended Climatological Station Metadata
All History

Station:	GOULBURN AIRPORT AWS			**Location:**	GOULBURN AIRPORT AWS			**State:**	NSW
Bureau No.:	070330	**WMO No.:**	95716	**Aviation ID:**	YGLB	**Opened:**	07 Nov 1988	**Current Status:**	Still open
Latitude:	-34.8085	**Longitude:**	149.7312	**Elevation:**	640 m	**Barometer Elev:**	640.8 m	**Metadata compiled:**	26 NOV 2015

Instrument Location and Surrounding Features
17/11/2010(most recent)



Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

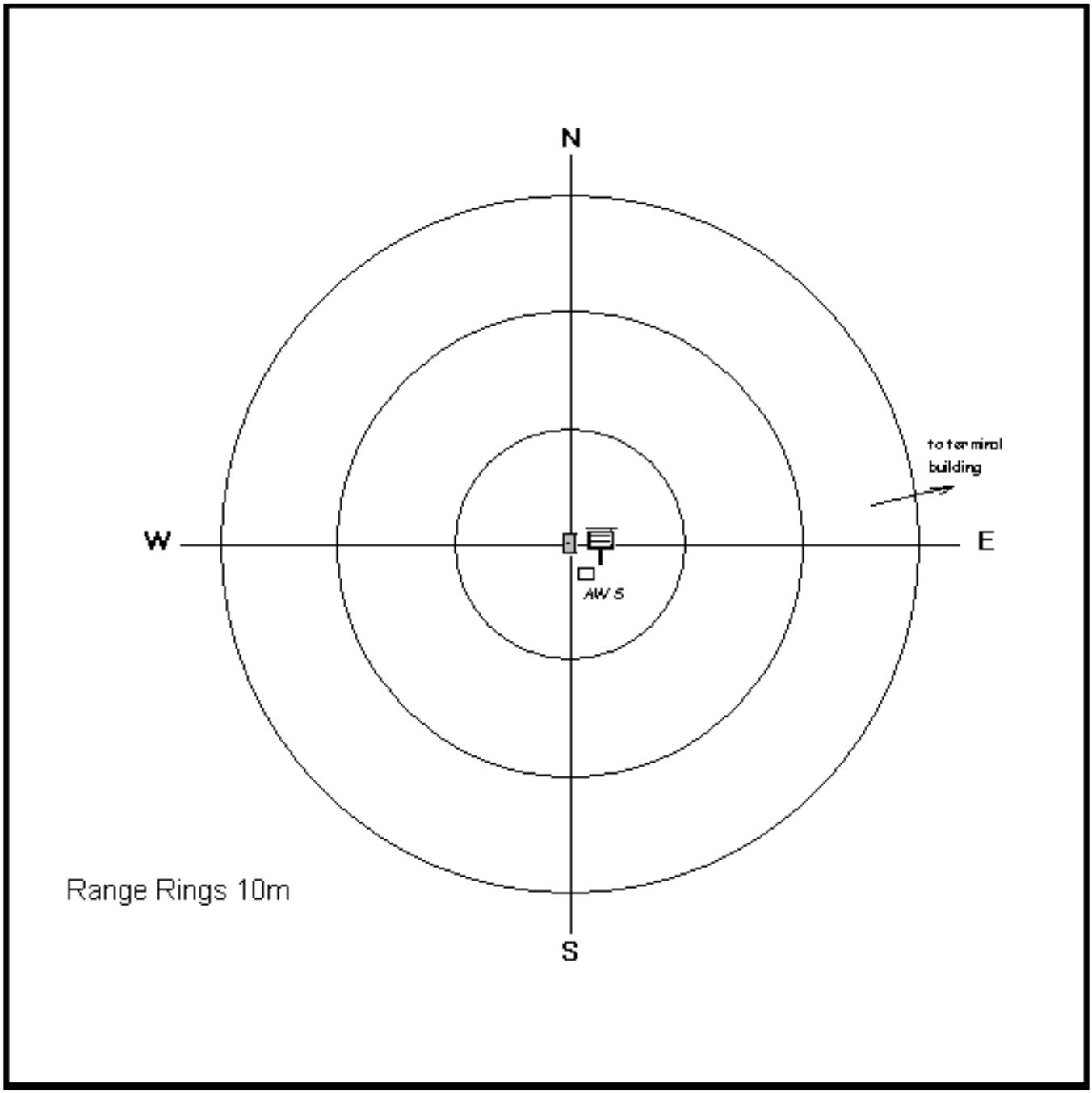
Extended Climatological Station Metadata

All History

Station:	GOULBURN AIRPORT AWS			**Location:**	GOULBURN AIRPORT AWS			**State:**	NSW
Bureau No.:	070330	**WMO No.:**	95716	**Aviation ID:**	YGLB	**Opened:**	07 Nov 1988	**Current Status:**	Still open
Latitude:	-34.8085	**Longitude:**	149.7312	**Elevation:**	640 m	**Barometer Elev:**	640.8 m	**Metadata compiled:**	26 NOV 2015

Instrument Location and Surrounding Features

26/03/2007



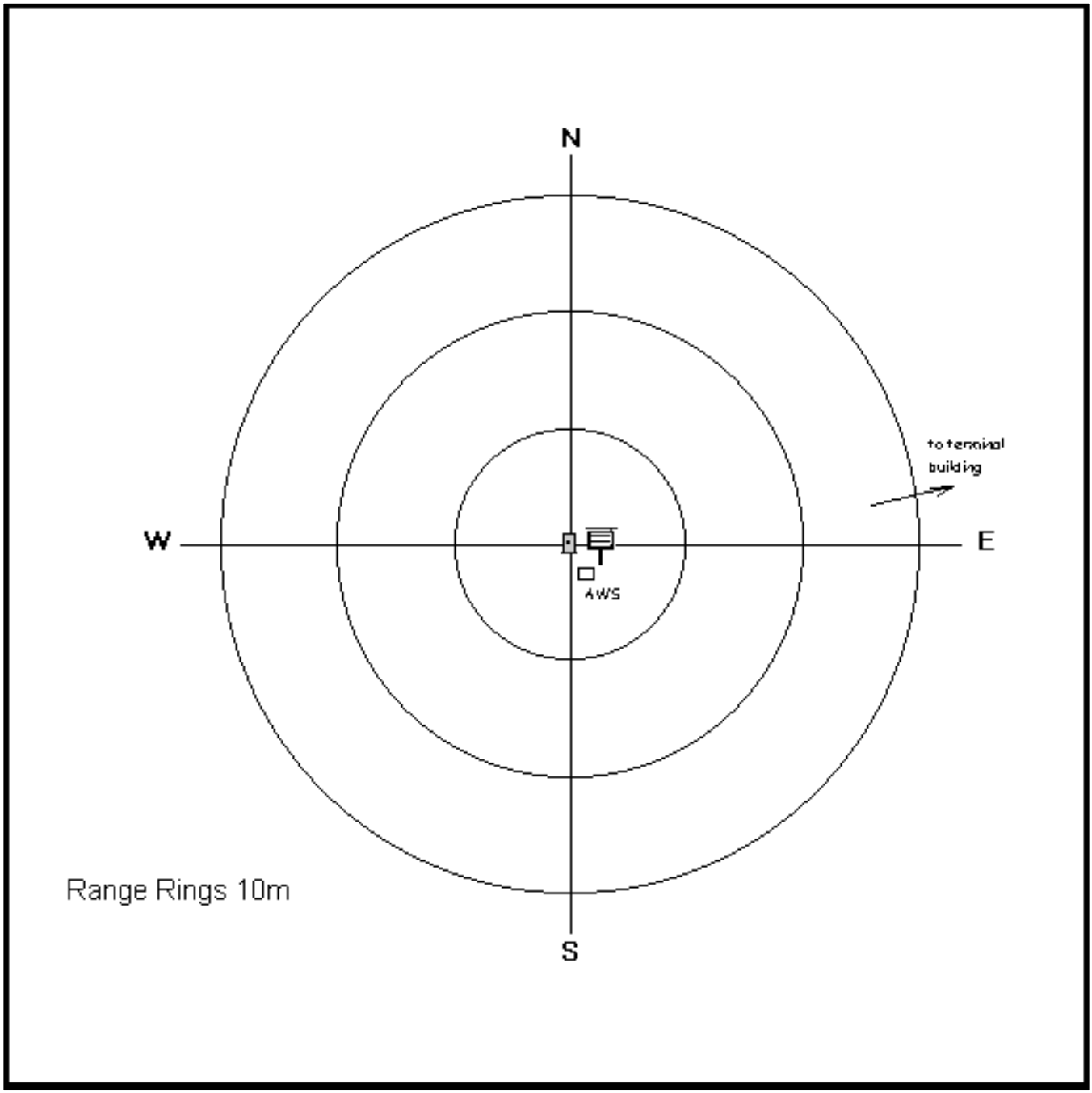
Extended Climatological Station Metadata

All History

Station:	GOULBURN AIRPORT AWS			**Location:**	GOULBURN AIRPORT AWS			**State:**	NSW
Bureau No.:	070330	**WMO No.:**	95716	**Aviation ID:**	YGLB	**Opened:**	07 Nov 1988	**Current Status:**	Still open
Latitude:	-34.8085	**Longitude:**	149.7312	**Elevation:**	640 m	**Barometer Elev:**	640.8 m	**Metadata compiled:**	26 NOV 2015

Instrument Location and Surrounding Features

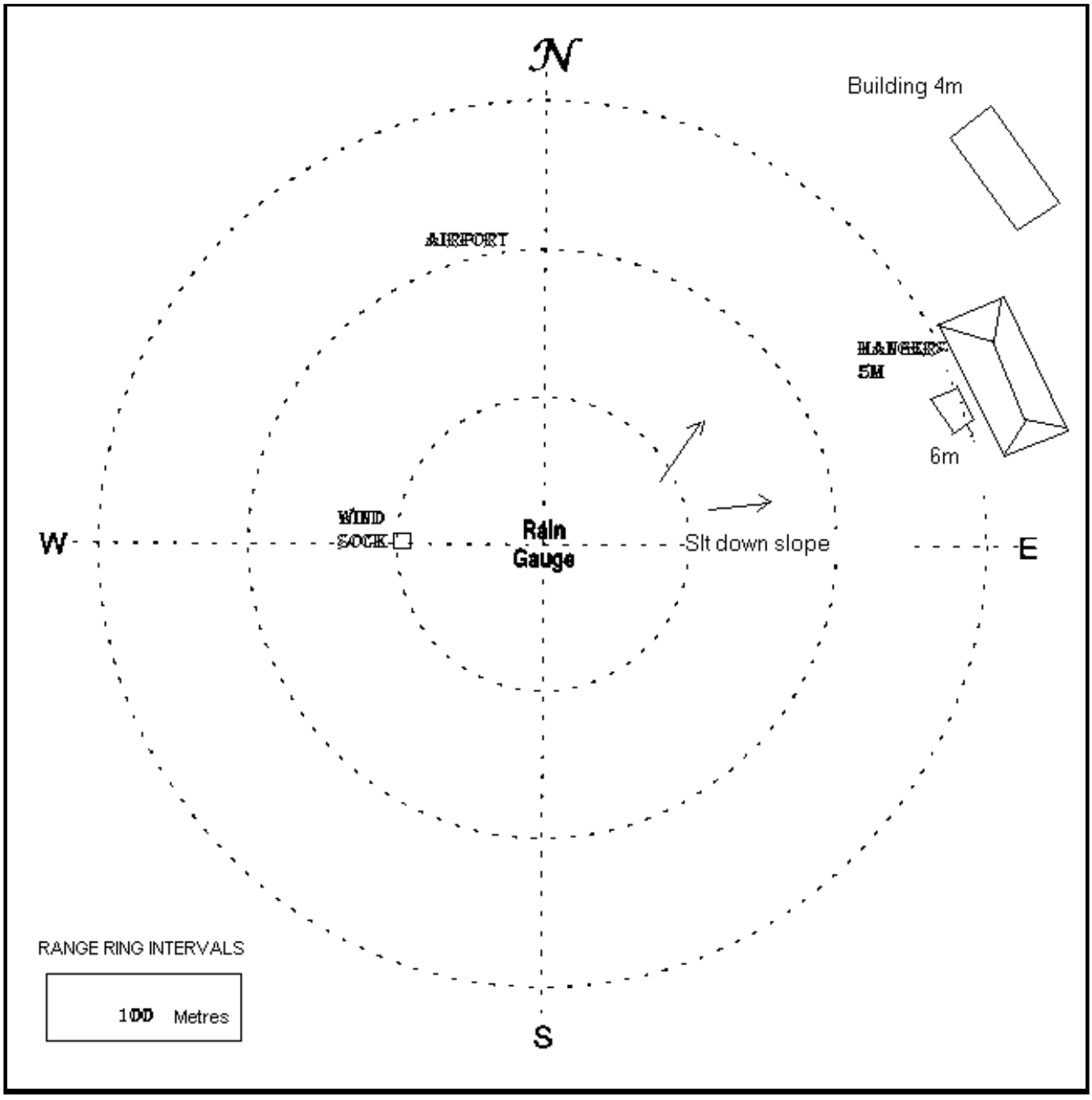
13/11/2002



Extended Climatological Station Metadata
All History

Station:	GOULBURN AIRPORT AWS			**Location:**	GOULBURN AIRPORT AWS			**State:**	NSW
Bureau No.:	070330	**WMO No.:**	95716	**Aviation ID:**	YGLB	**Opened:**	07 Nov 1988	**Current Status:**	Still open
Latitude:	-34.8085	**Longitude:**	149.7312	**Elevation:**	640 m	**Barometer Elev:**	640.8 m	**Metadata compiled:**	26 NOV 2015

Instrument Location and Surrounding Features
27/03/2001



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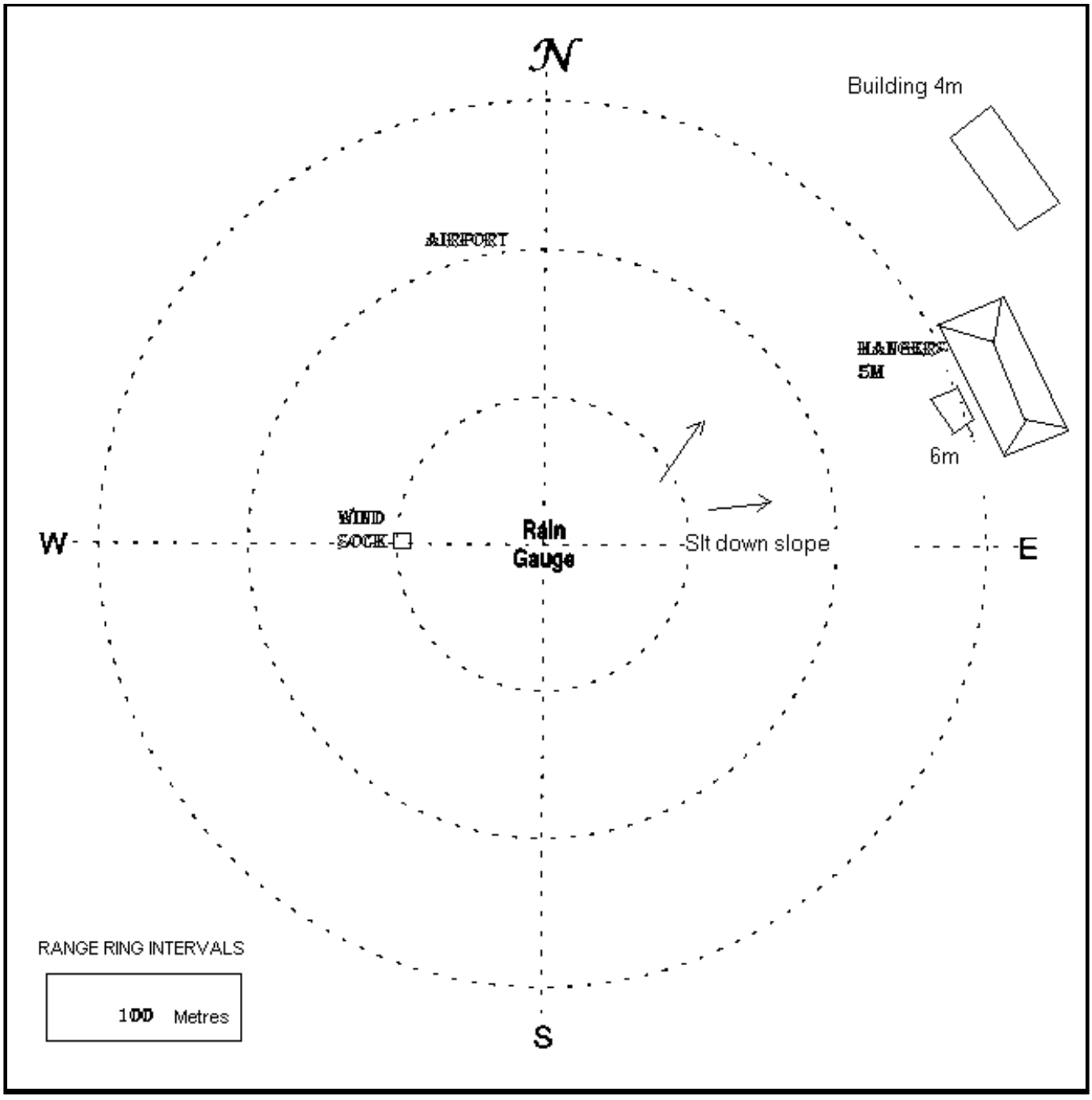
Extended Climatological Station Metadata
All History

Station:	GOULBURN AIRPORT AWS			**Location:**	GOULBURN AIRPORT AWS			**State:**	NSW
Bureau No.:	070330	**WMO No.:**	95716	**Aviation ID:**	YGLB	**Opened:**	07 Nov 1988	**Current Status:**	Still open
Latitude:	-34.8085	**Longitude:**	149.7312	**Elevation:**	640 m	**Barometer Elev:**	640.8 m	**Metadata compiled:**	26 NOV 2015

Instrument Location and Surrounding Features
09/03/1998

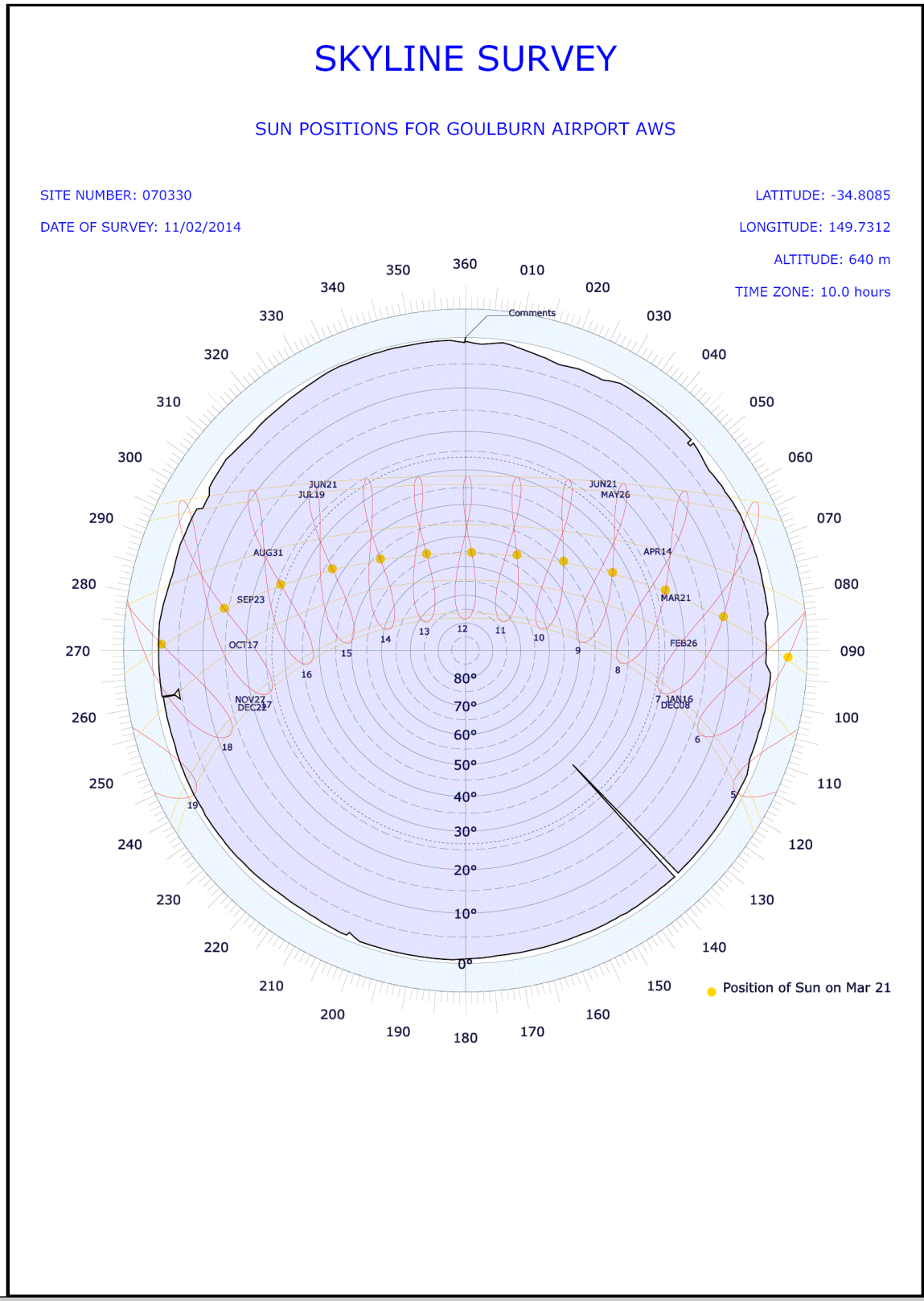


Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

Extended Climatological Station Metadata
All History

Station:	GOULBURN AIRPORT AWS			**Location:**	GOULBURN AIRPORT AWS			**State:**	NSW
Bureau No.:	070330	**WMO No.:**	95716	**Aviation ID:**	YGLB	**Opened:**	07 Nov 1988	**Current Status:**	Still open
Latitude:	-34.8085	**Longitude:**	149.7312	**Elevation:**	640 m	**Barometer Elev:**	640.8 m	**Metadata compiled:**	26 NOV 2015

Skyline Diagram
11/02/2014(most recent)

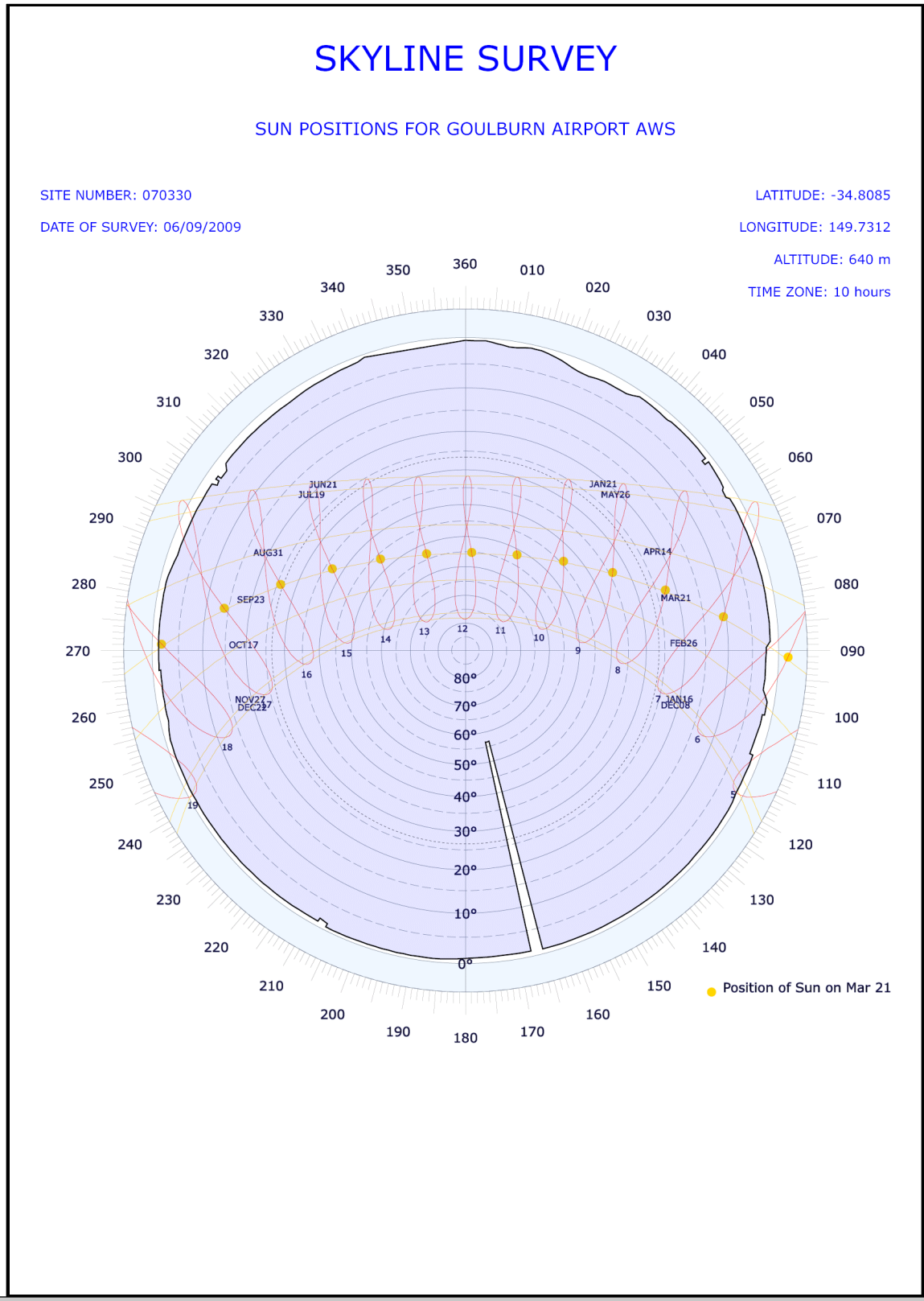


Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

Extended Climatological Station Metadata
All History

Station:	GOULBURN AIRPORT AWS			**Location:**	GOULBURN AIRPORT AWS			**State:**	NSW
Bureau No.:	070330	**WMO No.:**	95716	**Aviation ID:**	YGLB	**Opened:**	07 Nov 1988	**Current Status:**	Still open
Latitude:	-34.8085	**Longitude:**	149.7312	**Elevation:**	640 m	**Barometer Elev:**	640.8 m	**Metadata compiled:**	26 NOV 2015

Skyline Diagram
06/09/2009

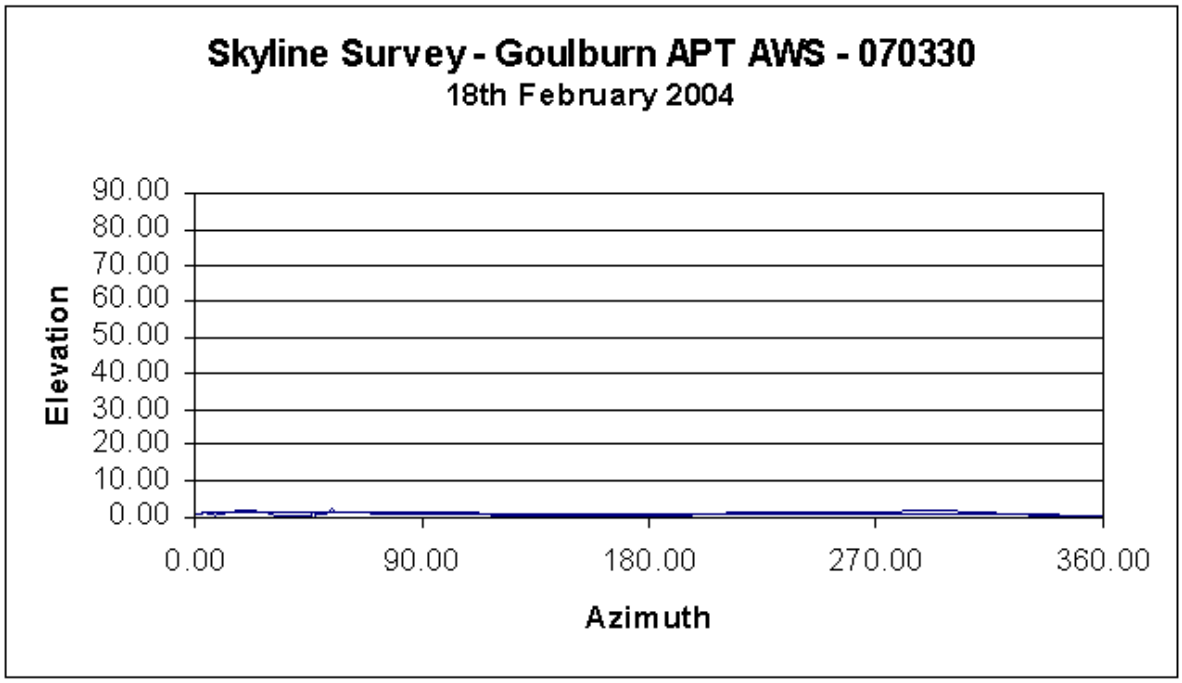


Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

Extended Climatological Station Metadata
All History

Station:	GOULBURN AIRPORT AWS			**Location:**	GOULBURN AIRPORT AWS			**State:**	NSW
Bureau No.:	070330	**WMO No.:**	95716	**Aviation ID:**	YGLB	**Opened:**	07 Nov 1988	**Current Status:**	Still open
Latitude:	-34.8085	**Longitude:**	149.7312	**Elevation:**	640 m	**Barometer Elev:**	640.8 m	**Metadata compiled:**	26 NOV 2015

Skyline Diagram
24/02/2004



Extended Climatological Station Metadata
All History

Station:	GOULBURN AIRPORT AWS			**Location:**	GOULBURN AIRPORT AWS			**State:**	NSW
Bureau No.:	070330	**WMO No.:**	95716	**Aviation ID:**	YGLB	**Opened:**	07 Nov 1988	**Current Status:**	Still open
Latitude:	-34.8085	**Longitude:**	149.7312	**Elevation:**	640 m	**Barometer Elev:**	640.8 m	**Metadata compiled:**	26 NOV 2015

Station Observation Program Summary (Surface Observations) from 01/11/1988 to 13/09/2010

Current Observation	Continuous	Half Hourly	Hourly
Surface Observations	-	Y	Y

Current Observation	Program Type	12 AM	3 AM	6 AM	9 AM	12 PM	3 PM	6 AM	9 AM
Surface Observation	PERFORMED	Y	Y	Y	Y	Y	Y	Y	Y
Surface Observation	REPORTED	Y	Y	Y	Y	Y	Y	Y	Y
Surface Observation	SEASONAL	-	-	-	-	-	-	-	-

Station Observation Program Summary (Surface Observations) 26 NOV 2015 (most recent)

Current Observation	Continuous	Half Hourly	Hourly
Surface Observations	Y	Y	Y

Current Observation	Program Type	12 AM	3 AM	6 AM	9 AM	12 PM	3 PM	6 AM	9 AM
Surface Observation	PERFORMED	Y	Y	Y	Y	Y	Y	Y	Y
Surface Observation	REPORTED	Y	Y	Y	Y	Y	Y	Y	Y
Surface Observation	SEASONAL	-	-	-	-	-	-	-	-

Extended Climatological Station Metadata
All History

Station:	GOULBURN AIRPORT AWS			**Location:**	GOULBURN AIRPORT AWS			**State:**	NSW
Bureau No.:	070330	**WMO No.:**	95716	**Aviation ID:**	YGLB	**Opened:**	07 Nov 1988	**Current Status:**	Still open
Latitude:	-34.8085	**Longitude:**	149.7312	**Elevation:**	640 m	**Barometer Elev:**	640.8 m	**Metadata compiled:**	26 NOV 2015

Station Equipment History

Equipment Install/Remove

Cloud Height
31/OCT/2013 INSTALL Ceilometer (Type Vaisala CL31 S/N - J3510003) Surface Observations
River Height (No Electronic History)
Wind Run (No Electronic History)
Spectral Radiation (No Electronic History)
Sea Surface Temperature (No Electronic History)
Sea Water Temperature (No Electronic History)
Evaporation (No Electronic History)
Minimum Temperature (No Electronic History)
Soil Temperature 50cm (No Electronic History)
Sub Surface Temperature (No Electronic History)
Electrical Conductivity (No Electronic History)
Maximum Temperature (No Electronic History)
Soil Temperature 20cm (No Electronic History)
Solar Radiation (No Electronic History)
Soil Temperature 5cm (No Electronic History)
Oxygen Content (No Electronic History)
Sea Water Level (No Electronic History)
Surface Inclination (No Electronic History)
Terrestial Minimum Temperature (No Electronic History)
Visibility (No Electronic History)
Solar Radiation (Direct) (No Electronic History)
Magnetic Bearing (No Electronic History)
Wind Direction
10/SEP/2004 INSTALL Anemometer (Type Synchrotac Cups - Type 732 S/N - 80261) Surface Observations
01/NOV/1988 INSTALL Anemometer (Type Synchrotac Vane - Type 706 S/N - WS - 74105 WD - 74066) Surface Observations
01/NOV/1988 INSTALL Mast Anemometer (Type Pivot, Standard 8m S/N - NONE) Infrastructure
15/FEB/2005 REPLACE Anemometer (Now Synchrotac Cups - Type 732 S/N - D100) Surface Observations
10/SEP/2004 REPLACE Anemometer (Now Synchrotac Vane - Type 706 S/N - 80309) Surface Observations
15/FEB/2005 REPLACE Anemometer (Now Synchrotac Vane - Type 706 S/N - D100) Surface Observations
Air Temperature
01/NOV/1988 INSTALL Humidity Probe (Type Rotronics S/N - 713201/9) Surface Observations
23/FEB/2012 REPLACE Humidity Probe (Now Rotronics MP101A-T4-W4W S/N - 11666-005) Surface Observations
19/FEB/2010 REPLACE Humidity Probe (Now Rotronics MP101A-T4-W4W S/N - 39220-007) Surface Observations
03/APR/2012 REPLACE Humidity Probe (Now Rotronics MP101A-T4-W4W S/N - 49513-003) Surface Observations
25/NOV/2002 REPLACE Humidity Probe (Now Vaisala HMP45D S/N - X4150011) Surface Observations
01/NOV/1988 INSTALL Temperature Probe - Dry Bulb (Type Rosemount S/N - NONE) Surface Observations
23/FEB/2012 REPLACE Temperature Probe - Dry Bulb (Now WIKA TR40 S/N - 107822-1) Surface Observations
01/NOV/1988 INSTALL Thermometer, Mercury, Dry Bulb (Type Dobbie S/N - M1803) Surface Observations
Wet Bulb Temperature (No Electronic History)
Lightning (No Electronic History)
Turbidity (No Electronic History)
Total Column Ozone Amount (No Electronic History)

Extended Climatological Station Metadata
All History

Station:	GOULBURN AIRPORT AWS			**Location:**	GOULBURN AIRPORT AWS			**State:**	NSW
Bureau No.:	070330	**WMO No.:**	95716	**Aviation ID:**	YGLB	**Opened:**	07 Nov 1988	**Current Status:**	Still open
Latitude:	-34.8085	**Longitude:**	149.7312	**Elevation:**	640 m	**Barometer Elev:**	640.8 m	**Metadata compiled:**	26 NOV 2015

Station Equipment History (continued)

Equipment Install/Remove(Continued)

Pressure

01/MAY/1995 INSTALL Barometer (Type Vaisala PA11A S/N - 601091) Surface Observations
23/SEP/2002 REPLACE Barometer (Now Vaisala PA11A S/N - 458199) Surface Observations
31/MAR/2011 REPLACE Barometer (Now Vaisala PTB220B S/N - D3540108) Surface Observations

Humidity

01/NOV/1988 INSTALL Humidity Probe (Type Rotronics S/N - 713201/9) Surface Observations
23/FEB/2012 REPLACE Humidity Probe (Now Rotronics MP101A-T4-W4W S/N - 11666-005) Surface Observations
19/FEB/2010 REPLACE Humidity Probe (Now Rotronics MP101A-T4-W4W S/N - 39220-007) Surface Observations
03/APR/2012 REPLACE Humidity Probe (Now Rotronics MP101A-T4-W4W S/N - 49513-003) Surface Observations
25/NOV/2002 REPLACE Humidity Probe (Now Vaisala HMP45D S/N - X4150011) Surface Observations

Sunshine Hours (No Electronic History)

Pressure Trend (No Electronic History)

Snow Height (No Electronic History)

Wind Speed

10/SEP/2004 INSTALL Anemometer (Type Synchrotac Cups - Type 732 S/N - 80261) Surface Observations
01/NOV/1988 INSTALL Anemometer (Type Synchrotac Vane - Type 706 S/N - WS - 74105 WD - 74066) Surface Observations
01/NOV/1988 INSTALL Mast Anemometer (Type Pivot, Standard 8m S/N - NONE) Infrastructure
15/FEB/2005 REPLACE Anemometer (Now Synchrotac Cups - Type 732 S/N - D100) Surface Observations
10/SEP/2004 REPLACE Anemometer (Now Synchrotac Vane - Type 706 S/N - 80309) Surface Observations
15/FEB/2005 REPLACE Anemometer (Now Synchrotac Vane - Type 706 S/N - D100) Surface Observations

Rainfall

01/NOV/1988 INSTALL Raingauge (Type Rimco 7499 TBRG S/N - 66837) Surface Observations
31/JUL/2006 REPLACE Raingauge (Now Rimco 7499 TBRG S/N - 84619) Surface Observations
01/AUG/2006 REPLACE Raingauge (Now Rimco 7499 TBRG S/N - 84625) Surface Observations

Soil Temperature 100cm (No Electronic History)

Soil Temperature 10cm (No Electronic History)

Solar Radiation (Long Wave) (No Electronic History)

RF Reflectivity (No Electronic History)

The following table summarises information on field performance checks available electronically over the period indicated. The number of instances an instrument was found to fail field performance checks should only be used as a guide. A system of data quality flags is implemented by the Bureau of Meteorology to indicate the data quality of an observation as determined by a mutli-stage quality control process.

Available Date Range	Element	Fail Field Performance Check
14/NOV/2013 - 10/MAR/2015	Cloud Height	0
09/MAR/1998 - 18/NOV/2015	Wind Direction	6
09/MAR/1998 - 18/NOV/2015	Air Temperature	3
09/MAR/1998 - 10/MAR/2015	Pressure	0
09/MAR/1998 - 18/NOV/2015	Humidity	2
09/MAR/1998 - 18/NOV/2015	Wind Speed	6
09/MAR/1998 - 18/NOV/2015	Rainfall	4

Station Detail Changes

09/MAY/2006 CLASSIFICATION Category D (TAF D)

Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

Extended Climatological Station Metadata
All History

Station:	GOULBURN AIRPORT AWS			**Location:**	GOULBURN AIRPORT AWS			**State:**	NSW
Bureau No.:	070330	**WMO No.:**	95716	**Aviation ID:**	YGLB	**Opened:**	07 Nov 1988	**Current Status:**	Still open
Latitude:	-34.8085	**Longitude:**	149.7312	**Elevation:**	640 m	**Barometer Elev:**	640.8 m	**Metadata compiled:**	26 NOV 2015

Station Equipment History (continued)

Station Detail Changes(Continued)

01/NOV/1988 CLASSIFICATION Mesonet (FME)
05/OCT/2001 CLASSIFICATION National Benchmark Network for Agrometeorology (NBNA)
10/JAN/2011 CLASSIFICATION Standard (ASOSSTD)
10/JUN/2014 CLASSIFICATION Standard Aviation or Defence (AVSTD)
28/JUN/2011 OBJECT Document/AWS SITE AUDIT
14/NOV/2013 OBJECT Document/CEILOMETER STATUS
24/FEB/2004 OBJECT Document/Goulburn APT AWS Skyline points
06/SEP/2009 OBJECT Document/SKYLINE DATA
11/FEB/2014 OBJECT Document/SKYLINE DATA
07/NOV/1988 STATION - (nondb seeding) Opened
07/NOV/1988 STATION - (nondb seeding) aero_ht Changed to 652.6
07/NOV/1988 STATION - (nondb seeding) bar_ht Changed to 640.8
07/NOV/1988 STATION - (nondb seeding) bar_ht_deriv Changed to MAP 1:25 000
07/NOV/1988 STATION - (nondb seeding) stn_ht Changed to 640
07/NOV/1988 STATION - (nondb seeding) stn_ht_deriv Changed to MAP 1:25 000
07/NOV/1988 STATION - (nondb seeding) wmo_num Changed to 95716
07/NOV/1988 STATION aviation_id Changed to YGLB
07/NOV/1988 STATION latitude Changed to -34.80854
07/NOV/1988 STATION latlon_deriv Changed to GPS
07/NOV/1988 STATION latlon_error Changed to 4
07/NOV/1988 STATION longitude Changed to 149.73118
09/MAR/1998 STATION lu_0_100m Changed to Airport
09/MAR/1998 STATION lu_100m_1km Changed to Airport
09/MAR/1998 STATION lu_1km_10km Changed to Open farmland, grassland or tundra
07/NOV/1988 STATION name Changed to GOULBURN AIRPORT AWS
09/MAR/1998 STATION soil_type Changed to red soil
09/MAR/1998 STATION surface_type Changed to fully covered by grass

System Changes

01/NOV/1988 SYSTEM Infrastructure Commenced
01/NOV/1988 SYSTEM Surface Observations Commenced

Notes on these metadata

The following notes have been compiled to assist with interpreting the metadata provided in this document. These notes are subject to change as the network evolves. Changes in station-specific metadata occur more frequently, both as recent changes are recorded and historical information is transferred from paper file to electronic database.

Reliability of the metadata

The Commonwealth Bureau of Meteorology maintains information on more than 20,000 stations which have operated since observations began in the mid 1800s. The amount of information available for each of these sites and its associated uncertainty are influenced by a number of factors including the type and purpose of the station and the time over which it operated.

Early information about stations was held only on paper file. In 1998 a corporate electronic database was established to help maintain information about the network and its components. The number of parameters recorded about a station is now much greater than before this database was established. The national database has also helped improve consistency in the metadata through the implementation of predefined fields. As a result, and through the refinement of operating procedures, station metadata recorded since 1998 are of a higher overall standard than previously, although occasional omissions and errors are still possible.

The Bureau is part way through a task of entering historical information held on paper file into the corporate database. **Until this process is completed there will remain large gaps in the information contained in these metadata documents and considerable caution should be used when deriving conclusions from the metadata.** As an example, two consecutive entries about a rain gauge dated 50 years apart may appear in the equipment metadata. This may either mean that nothing happened to that instrument over the 50 years, or that information for the intervening period has yet to be entered into the database. Similarly, if no information was available about instruments at a site when it was first established, fields which were required to have a value present may have used the earliest information available as a best-guess estimate. Sometimes this was the metadata current when the database was established in 1998. In some instances there may be gaps in metadata relevant to the post 1998 period.

For the above reasons it is recommended that all metadata prior to 1998 be considered as indicative only, and used with caution, unless it has been quality controlled. The Bureau of Meteorology should be contacted if further information or confirmation of the data is required. Depending on the nature of the inquiry there may be a fee associated with this request. Contact details are provided in the telephone book for each capital city or the Bureau's web site at:
http://www.bom.gov.au

The following pages contain explanatory notes for selected terms found in this document.

Station Number

The Bureau of Meteorology station number uniquely specifies a station and is not intended to change over time time, although on very rare occasions a station number may change or be deleted from the record (usually to correct an error). Generally a new station number is established if an existing station changes in a way that would affect the climate data record for that site (measured in terms of air temperature and precipitation). Significant station moves are an example of this.

Some stations also possess a World Meteorological Organization (WMO) station number. The WMO number is different to the Bureau of Meteorology number. It also uniquely specifies a station at any given time but can be reassigned to another station if the new station takes priority in the global reporting network. Only selected stations will have a WMO number. Significant stations may maintain their WMO number for many decades.

Notes on these metadata

Network Classification

SUPPORTING the BASIC CLIMATE SERVICE
Global Climate Observing System (GCOS)
GCOS Upper Air Network (GUAN)
GCOS Surface Network (GSN)
National Climate Network {not yet assigned}
Reference Climate Stations (RCS)
Regional Basic Climatological Network (RBCN)
CLIMAT Stations (CLC)
CLIMAT TEMP Stations (CLT)
SUPPORTING the NATIONAL WEATHER WATCH SYSTEM
WMO Global Observing System (GOS)
GOS Upper Air Network
GOS Satellite Network
Global Atmospheric Watch
Background Atmospheric Pollution Monitoring Network (BAPMON)
Basic Ozone Network
Basic Solar and Terrestrial Radiation Network
Regional Basic Synoptic Network (RBSN)
WMO Global Oceanic Observing System (GOOS)
SUPPORTING the BASIC WEATHER SERVICE (BWS)
BWS Land Network
Significant Land Locations
Capital City Mesonets
National Benchmark Network for Agrometeorology (NBNA)
BWS Marine Network
Significant Coastal Loactions
Open Ocean Network
BWS Upper Air Network
Major Significant Locations
BWS Remote Sensing Network
Weather Watch Radar Network
Fire Weather Wind Mesonets
High Resolution Satellite
SUPPORTING the BASIC HYDROLOGICAL SERVICE
Regional Flood Warning Network
Water Resources Assessment Network
Global Hydrological Network
Global Terrestrial Observing System (GTOS)
World Hydrological Cycle Observing System (WHYCOS)
National Hydrological Network

Networks of stations are defined for a variety of purposes (as defined in above table).

Notes on these metadata

Network Classification Continued....

Stations may be included in several different networks, which may change over time. The table on the previous page lists current network classifications related to the scientific purpose of the network. Some of these networks - the GCOS network for instance - are components of a global network. Entries in the database for some networks may not be complete, thus not properly representing the status of the network. The composition of the network will usually change over time. While several of the networks have international significance, other network classifications have been developed to aid operational management.

Station Purpose

The station purpose can be classified according to the observation program listed below. Parameters in brackets list some of the various different configurations which occur.

- Synoptic [Seasonal, River Height, Climatological, Telegraphic Rain, Aeronautical, Upper Air]
- Climatological [Seasonal, Telegraphic Rain]
- Aeronautical
- Rainfall [River Height]
- River Height
- Telegraphic Rain [Non-Telegraphic River Height, Telegraphic River Height]
- Non-Telegraphic Rain [Telegraphic River Height]
- Evaporation [Rainfall, River Height, Telegraphic River Height, Non-Telegraphic River Height, Telegraphic Rain, Non-Telegraphic Rain]
- Pluviograph [Rainfall, Telegraphic Rain, Non-Telegraphic Rain, River Height, Telegraphic River Height, Non-Telegraphic River Height]
- Radiation
- Lightning Flash Counter
- Public Information
- Local Conditions
- Radar Site
- Unclassified
- No Routine Observations

Note: Telegraphic observations are those which are sent by some electronic means be it a phone or telegram to the responsible Bureau office. It is a term which is historically linked to analogue non automatic data transmission.

Station Observation Program Summary

Surface Observations

The following terms are used to describe the frequency of surface observations at a site. Historical observation programs will typically be missing for many sites until the database is backfilled with information.

Set a)

- Continuous Program
  - More than half hourly observations sent (eg an automatic weather station {AWS} which continuously transmits 10 minute observations). This will automatically include half hourly and hourly observations programs.
- Half hourly observations
  - Half hourly observations sent. This will automatically include hourly observations.
- Hourly observations
  - Hourly observations sent only. Stations report on non-synoptic hours (ie. 0100, 0200, 0400, 0500, etc)

Notes on these metadata

Surface observations continued....

Set b)

- Performed
  - Observations performed, instruments read and observations recorded
- Reported
  - Observations performed, instruments read and reported real time
- Seasonal
  - The program may only be performed during a defined season (such as Fire Weather observations) or the routine program may increase in reporting frequency and/or parameters. The program dates are currently modified at the start and end of each season for stations performing seasonal observations. Historically this was not always the case.

Current Station Equipment Summary

Equipment listed in this metadata product is catalogued under one of systems listed below, appropriate to its application. The "Infrastructure" category has been included since it contains information about the mast height of an anemometer (if present).

- Flood Warning
- Infrastructure
- Radiation
- Rainfall Intensity
- Surface Observations
- Upper Air
- Weather Watch {RADAR}

Station Equipment History

Equipment Install/Remove

One of four types of actions can be performed on an instrument in this listing:

Install - A new instrument is installed at the site. This can be either a completely new addition (eg the first barometer at the site), or the replacement of an existing instrument with a different type (eg replacing mercury barometer with electronic barometer)

Remove - An instrument can be removed either when it is no longer necessary to measure a particular element, or when the element is to be measured by an instrument of a different type (see under "Install" above)

Replace - This occurs when one instrument is replaced with another of the same type (eg Kew pattern mercury barometer replacing another Kew pattern mercury barometer)

Share - The same instrument is used for observations under two (or more) systems (eg a rain gauge may be used within both Surface Observations and Rainfall Intensity systems)

Unshare - The instrument is no longer shared between systems

Notes on these metadata

Calibration

During a site inspection an instrument will be calibrated as either being within or not within the specified tolerance in accuracy.

Where a quantative calibration result can be achieved by comparison to a transfer standard (eg barometer comparisons and tipping bucket rain gauge calibrations), the instrument will be recorded as being within or outside the required tolerance. Instruments (such as 203mm rain gauges, screens and evaporation pans) where quantitative calibrations cannot be derived should be regarded as meeting specifications when the instrument is in 'good working order'.

This product provides a summary table of the number of times an instrument was found to be out of calibration

Station Detail Changes

This set of metadata indicates when some aspect of the general information about a station has changed.

- STATION

Metadata which are categorised as pertaining to STATION are items of (textual) information describing a specific attribute of the station. A reference to (nondB seeding) indicates initial information of this field has been sourced from a previous database.

Station position

- Latitude and longitude

Derivation of station latitude and longitude, defined by the location of the rain gauge when it is present, has changed over time. Current practice is to locate or verify open and operational station latitude and longitude based on Global Positioning System equipment. Methods used to locate a station as described in this product (latlon_deriv) are as follows: GPS, MAP 1:10000, MAP 1:12500, MAP 1:25000, MAP 1:50000, MAP 1:100000, MAP 1:250000, SURVEY, and Unknown (which is more commonly represented by a null value). The field latlon_error should be used with caution as the method of determining this value has been interpreted in different ways over time.

- Height

Determination of heights for observing sites is by survey where possible. Otherwise height may be determined using a Digital Aneroid Barometer and a known surveyed point, or derived from map contours. The source of height is provided in the corresponding parameter with a suffix of "_deriv".

Heights which may appear in these metadata are:

- aero_ht
  - The official elevation of the aerodrome which normally corresponds to the altitude of the highest threshold of the runways at that airport;
- bar_ht
  - this represents the height of the mercury barometer cistern or the digital aneroid barometer above mean sea level (MSL);
- stn_ht
  - this normally represents the height of the rain gauge above MSL

Notes on these metadata

- Land Use

To assist the long term understanding of climate change it is important to be able to determine the differences over time which are attributed to variations in the climate. Since land use has an effect on the micro climate around the site, and changes in land use will therefore affect the climate record, it is important that the characteristics of the site are monitored. Soil types are recorded as they affect the land use and also add to the knowledge of the site details.

Defined Land use Types.

- Non-vegetated (barren, desert)
- Coastal or Island
- Forest
- Open farmland, grassland or tundra
- Small town, less than 1000 population
- Town 1000 to 10,000 population
- City area with buildings less than 10 metres (3 stories)
- City area with buildings greater than 10 metres (3 stories)
- Airport

The land use code is entered on the station inspection form in the ranges 0 to 100 m, 100 to 1 km and 1km to 10 km; ie:

- lu_0_100m: Land Use 0 to 100 metres from the enclosure
- lu_100m_1km: Land Use 100 metres to 1 kilometre
- lu_1km_10km: Land Use 1 kilometre to 10 kilometres

Defined Soil Type (At Enclosure).

- unable to determine
- sand
- black soil
- clay
- rock
- red soil
- other

Surface Type (At Enclosure).

- unable to determine
- fully covered by grass
- mostly covered by grass
- partly covered by grass
- bare ground
- sand
- concrete
- asphalt
- rock
- other

Veolia Australia & New Zealand

APPENDIX C:

CALPUFF SOURCE AND EMISSION MODELLING CONFIGURATIONS

Long-term Treated Leachate Solution

July 2016

AREA SOURCE

Source	Lower	Lower	Upper	Upper	Upper	Upper	Lower	Lower	Effect.	Base	Init.	ODOR
(12 chars.)	(km)	(km)	(km)	(km)	(km)	(km)	(km)	(km)	(m)	(m)	(m)	(g/m**2/s)
LDAM	734.1	6117.183	734.166	6117.287	734.184	6117.268	734.129	6117.163	0	797.19	0.1	3.6
GW	733.455	6117.624	733.399	6117.421	733.552	6117.39	733.652	6117.541	0	791.39	0.1	0.3
TL1	733.559	6117.387	733.658	6117.54	733.707	6117.508	733.725	6117.46	0	791.56	0.1	3.6
UTL	733.661	6117.366	733.788	6117.346	733.73	6117.455	733.662	6117.37	0	791.55	0.1	5
SW	733.55	6117.367	733.84	6117.319	733.661	6117.1	733.424	6117.219	0	792.37	0.1	0.1
COVW	734.128	6116.962	734.37	6117.189	734.463	6117.157	734.735	6117.023	0	731.67	0.1	0.3
AGEDW	734.156	6116.944	734.649	6116.721	734.498	6116.646	734.099	6116.859	0	687.56	0.1	3.6
FW	734.099	6116.858	734.098	6116.793	734.359	6116.638	734.493	6116.644	0	753.02	0.1	0.7
WR3	733.132	6117.509	733.185	6117.628	732.905	6117.753	732.852	6117.634	0	793.74	2	0.253
WR2	733.163	6117.495	733.216	6117.614	733.185	6117.628	733.132	6117.509	0	792.15	2	13
WR4	733.193	6117.482	733.246	6117.6	733.216	6117.614	733.163	6117.495	0	791.81	2	11.3
WR4_2	732.816	6117.65	732.869	6117.769	732.857	6117.775	732.803	6117.656	0	796.36	2	11.3
WR5	732.803	6117.656	732.857	6117.775	732.843	6117.781	732.79	6117.662	0	796.38	2	5.45
WR5_2	732.79	6117.662	732.843	6117.781	732.778	6117.81	732.725	6117.691	0	796.74	2	0.253
ED3S-S	733.529	6116.967	733.523	6117.122	733.739	6117.044	733.641	6116.904	0	794	0.1	0.159
ED1	733.233	6117.742	733.577	6118.346	734.273	6117.793	733.898	6117.446		785	0.1	0.0488

VOLUME SOURCE

Source	X	Y	Effect.	Base	Init.	Init.	ODOR
(12 chars.)	(km)	(km)	(m)	(m)	(m)	(m)	(g/s)
SRC_1	732.95	6117.695	0	0	20	2	5.65
SRC_2	733.066	6117.623	0	0	10	2	2.37


TREATED LEACHATE TO ED1 Effluent Dam
PROCESS/BORE WATER CONNECTION POINT
WATER SUPPLY
HIGH VOLTAGE CABLE SUPPLY TRENCH
EXISTING 11KV POLE
TRUE NORTH
24000
8500
CONCRETE JERSEY BARRIER T.B.C.
NEW ROAD RL799.0 NOM
30000
EXISTING ROAD
CONCRETE
BOLLARDS
TRANSFORMER
MIN. 150 HIGH KERB
DRAIN PIT TO BUNDED AREA
UNLOADING AREA CONCRETE BASE
150mm FALL
RL798.8 NOM
LEACHATE UNLOADING POINT
METHANOL UNLOADING POINT
CAUSTIC SODA UNLOADING POINT
BOLLARDS
KERB
6400
4200
1600
4600
SAFETY SHOWER AND EYEWASH
10000
SPRAYSEAL PAVEMENT
3200
BUND GATE
22000
8000
PROCESS/BORE WATER SUPPLY TRENCH
METHANOL
SAFETY SHOWER AND EYEWASH
FIRE EXTINGUISHER
STEPS AND PLATFORM ACCESS OVER BUND WALL.
ALL KERBS AND DRAINS CIVIL ENGINEER'S SPECIFICATION
CAUSTIC TRENCH
LTP SHED
FFL799.0 NOM
1.4M HIGH REINFORCED CONCRETE BLOCKWORK WALL TO ENGINEER'S SPECIFICATION.
LTP BUNDED AREA
SPRAYSEAL PAVEMENT
LOCATION OF POSSIBLE FUTURE TANK
AERATION TANK #2
JET PUMPS
SERVICES / PIPE ZONE - LOW LEVEL
14160
49000
FORKLIFT CROSSOVER ZONE TO CIVIL ENGINEERS DETAILS
NITRATE RECIRC. PUMP
3000 MIN. CLEARANCE
ANOXIC TANK #1
SERVICES / PIPE ZONE - HIGH LEVEL
LEACHATE FEED TRENCH
CONTAINS:
• FEED IN FROM VOID
• FEED IN FROM EO3
• FEED IN FROM EXISTING DAM
• OVERFLOW FROM TANKS & BUNDS
• COMMS FIBRE OPTIC CABLE
BALANCE TANK
UF FEED PUMP
15500
SERVICES / PIPE ZONE - LOW LEVEL
4 X C.C. CAMERAS
LTP FEED-IN PIPEWORK T.B.C.
ANOXIC TANK #2
AERATION TANK #1
JET PUMPS
16740
ANOXIC FEED PUMP
HEAT EXCHANGER
STAIRS AND PLATFORMS BY OTHERS
13740
16340
14050
COOLING TOWER
FORKLIFT CROSSOVER ZONE TO CIVIL ENGINEERS DETAILS
7930
58000
0 5 10 15 20 25 M

GENERAL NOTES

1 ROAD ALIGNMENT TO CIVIL ENGINEER'S DETAILS

2 ALL KERBS AND DRAINS CIVIL ENGINEER'S DETAILS AND SPECIFICATION

4 ALL DRAINAGE LINES AND PITS TO CIVIL ENGINEERS SPECIFICATION

☒ DRAINAGE PIT

5 CONTRACTOR TO ALLOW FOR IDENTIFICATION SIGNAGE AND WARNING GRAPHICS TO ALL CHEMICAL UNLOADING POINTS.

REV	REVISION	DRAWN	CHECKED	APPROVED	REVISION DATE
B_01	ISSUED FOR TENDER	JM	MS	MS	31/05/2017
B_00	ISSUED FOR CONCEPT DESIGN	JM		_	24/04/2017

DO NOT SCALE THIS DRAWING
IF IN DOUBT ASK
THIRD ANGLE PROJECTION

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DRAWN: — DATE: 24/04/2017
CHECKED: MS DATE: 24/04/2017
APPROVED: - DATE: -

PROJECT: WOODLAWN LEACHATE TREATMENT PLANT

TITLE: LTP PLANT LAYOUT PLAN

SCALE: 1:200 | SHEET 01 OF 01 | SIZE A1

DRAWING No. 00004-Z-00-D02-00-01 | REVISION B_01

Bollard

BUNDED AREA

1800 | 2560 | 1650

3750 | 2210 | 3750

IBC ZONE

2HR FIRE RATED DOOR WITH SMOKE SEALS TO ALL SIDES

ANTI-FOAM IBC

ANTI-FOAM IBC

ANTI-SCALENT AND BIOCIDE IBC

PHOSPHORIC IBC

LIQUID POLYMER IBC

Bollard

Bollard

4M WIDE ROLLER SHUTTER

TREATED LEACHATE TO ED1 Effluent Dam

NOTE: LOCATE DOOR POSITION AFTER FINALISING ROOM LAYOUT

SAFETY SHOWER AND EYE WASH

ANTI SCALENT AND BIOCIDE DOSING

PHOSPHORIC DOSING

FUTURE DOSING STATION

POLYMER DOSING

C.C. CAMERA

300 LITRE CENTRATE TANK UNDER CENTRIFUGE PLATFORM

RAISED ACCESS PLATFORM 1.3M ABOVE FLOOR AND 600MM CLEARANCE AROUND CENTRIFUGE

ANTI-FOAM DOSING

FALL FLOOR TO OUTLETS

FALL FLOOR TO OUTLETS

FALL TO BUNDED AREA

CONCRETE KERB TO BUNDED AREA

BORE WATER PIPE TRENCH

2HR FIRE RATED STEEL STUD FRAMED WALLS AND CEILING SYSTEM (FROM SWITCHROOM SIDE ONLY)

7000

6550

1000 | 7500 | 6340 | 2478 | 760

2HR FIRE RATED CEILING OVER - UNDERSIDE SET AT 3M

ULTRA FILTRATION UNIT

2550

SAWCUT SLAB ON GRID TO CIVIL ENGINEER'S DETAIL

DOWEL JOINT IN SLAB ON GRID TO CIVIL ENGINEER'S DETAIL

SAWCUT SLAB ON GRID TO CIVIL ENGINEER'S DETAIL

SWITCHROOM

- AIR CONDITIONED TO MECHANICAL ENGINEER'S SPECIFICATION
- FIRE DETECTION TO ELECTRICAL ENGINEER'S DETAILS.

U-F SWITCHBOARD

FALL FLOOR TO OUTLETS

FALL FLOOR TO OUTLETS

3200 1307

1699 8693

SOFTENING UNIT ZONE

DE-IRONING UNIT ZONE

20,000 LITRE BORE WATER TANK

~3750

600

BORE / PROCESS WATER TANK 1 50,000 litre

CIP

CIP PIPEWORK

POTABLE WATER BOOSTER PUMP STATIONS

BORE WATER BOOSTER STATION

C.C. CAMERA

4M WIDE ROLLER SHUTTER

Bollard

Bollard

Bollard

100 | 3800 | 100

3230 | 5500 | 5500 | 5500 | 5500

20M³ BIN ZONE

DRAIN TO ENGINEER'S SPECIFICATION

BORE / PROCESS WATER TANK 2 50,000 litre

REV	REVISION	DRAWN	CHECKED	APPROVED	REVISION DATE
B_01	ISSUED FOR TENDER	JM	MS	MS	31/05/2017
B_00	ISSUED FOR CONCEPT DESIGN	JM		_	24/04/2017

0 2 4 6 8 M

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		DATE
DRAWN		24/04/2017
CHECKED	MS	24/04/2017
APPROVED	-	-

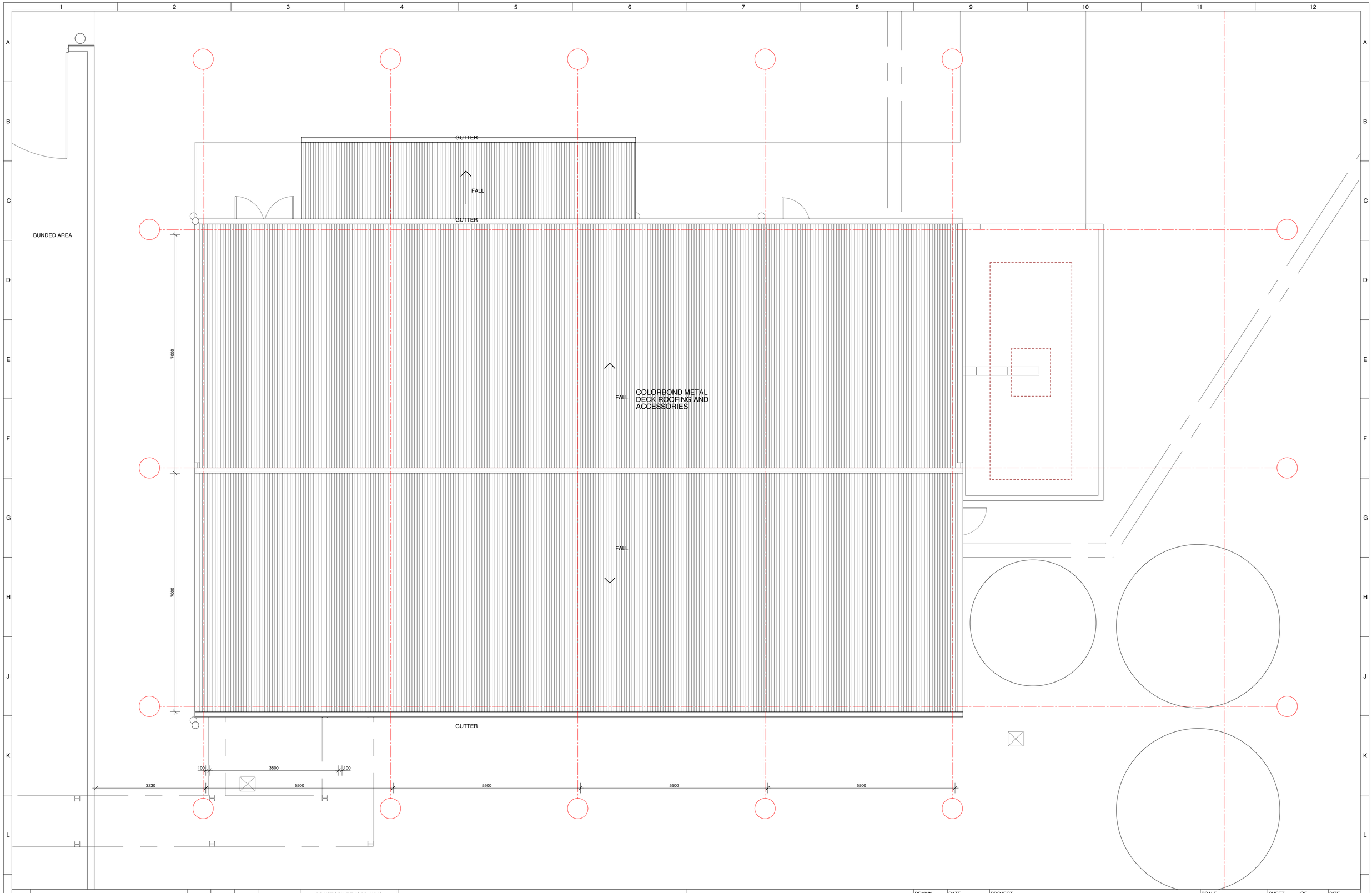
PROJECT: WOODLAWN LEACHATE TREATMENT PLANT

TITLE: LTP SHED LAYOUT PLAN

SCALE: 1:100 | SHEET: 01 OF 01 | SIZE: A1

DRAWING No.: 00004-Z-00-D03-00-01

REVISION: B_01



REV	REVISION	DRAWN	CHECKED	APPROVED	REVISION DATE
B_01	ISSUED FOR TENDER	JM	MS	MS	31/05/2017
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DRAWN	DATE 24/04/2017	PROJECT	WOODLAWN LEACHATE TREATMENT PLANT
CHECKED MS	DATE 24/04/2017	TITLE	LTP SHED ROOF PLAN
APPROVED -	DATE -		

SCALE	SHEET	OF	SIZE
1:50	01	01	A1

DRAWING No.	REVISION
00004-Z-00-D04-00-01	B_01