Report

Water Quality Report

Response to Submissions

4 MARCH 2011

Prepared for

Veolia Environmental Services

43177749

URS

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Introduction

This report has been prepared in response to submissions raised by The NSW Office of Water (NOW) and Sydney Catchment Authority (SCA) in relation to groundwater, surface water and leachate management associated with the proposed Woodlawn Expansion. The issues relate to the potential for the proposed expansion to adversely impact on water quality, as detailed below.

Discussions were held with Neil Cowley and Malcolm Hughes from SCA and Tim Baker from NOW to clarify the issues raised and to go through the proposed responses to ensure that they will meet their requirements.

Sydney Catchment Authority

The SCA has raised the following issues:

1. *The SCA remains concerned that leachate generated when the landfill reaches a height at and above the more permeable surface rock near the current rim of the void may contaminate groundwater, surface water or soils outside the void. The leachate modelling is only done to a maximum waste level of 802.5mAHD, whereas the rehabilitation plan has the height of the centre of the bioreactor as 846.8mAHD.*
2. *The EA poorly represents the relationship of the finished bioreactor profile to the existing mine void wall profile. The rehabilitation diagram 3.18 in Volume 2 Appendix K shows the RL on the finished surface being between 844.6 and 846.8m. Section 15.4 states that the height of the capped landfill will vary from 806 AHD to 810 AHD with the capping depths shown in Figure 14-1, (which is actually 15-1 in the assessment). Figure 8.6 shows the existing heights of the void ranging from 840 in the south to 805 m in the north. To achieve the rehabilitation profile shown in Figure 3.18, would require the expansion of the northern, western and eastern face of the landfill mass approximately 40 metres above the existing level of the rim of the void. The SCA considers the proponent should be required to provide accurate diagrams and that these should be superimposed with geological permeability data and local water table levels*.
3. *The EA assumed doubling of transported waste volumes will not impact on water quality issues above that identified in the original application. Increased transport volumes may affect the degree of contaminated material on the hardstand at the Intermodal and the required sizing of first flush retention areas and sediment basins. Additionally, increased transport from both the Intermodal and road transport from local councils will have some incremental effect on water quality of roads used to access the bioreactor.*

This report provides a response to each of these issues in Sections 2.1, 2.2 and 2.3, respectively.

NSW Office of Water

NOW has raised the following issues:

1. *Amendment to the Leachate Management Plan to clearly identify existing points and methods of groundwater extraction. This is to include existing and proposed bores for groundwater removal.*
2. *Confirmation of annual groundwater interception/extraction volumes which must be licensed under the Water Act 1912. These license requirements are addressed separately to a Part 3A approval and it is the Applicants responsibility to ensure the appropriate licenses are obtained.*

1 Introduction

Detailed comments provided by NOW regarding the groundwater management issues raised in point 1 are as follows:

The Leachate Management Plan (LMP) refers to groundwater dewatering via two bores (OSW1 and a back up bore OSW2) however the location and depth of these bores was not clearly mapped. As this is a key component of the LMP it is requested the two bores be accurately identified on a map and a cross-section of the pit be provided to indicate the bores' location, depth and extraction points in relation to the pit infrastructure (e.g. pit walls, basal liner, drainage system beneath the liner and waste material).

Confirmation is also requested as to the impact of the dewatering bores in relation to the groundwater level over time. It is recommended the water balance of the LMP include a graph of groundwater levels from a number of monitoring bores and this be related to the pit infrastructure and dewatering rates, and be updated as part of the Groundwater Monitoring Program.

These groundwater management issues are addressed in Sections 2.4 and 2.5.

Groundwater licensing issues raised in point 2 are being addressed separately by Veolia through a groundwater licence application process, however the following specific issue dealing with rates of inflow and outflow have been raised:

To assist in this licensing process it is critical that the proponent nominate an annual volume to be intercepted/extracted for each activity. The EPA provided volumes for inflows and outflows in a range of sections with varying figures depending on whether they were modelled, estimated or measured values. For example Section 4.5.2 of the LMP refers to dewatering from beneath the liner at OSW1 of 0.58 L/sec (18.25 ML/yr) and then also refers to groundwater dewatering at 31% of outflows which is approximately 28 ML/year. Section 4.5.1 of the LMP states groundwater seepage contributes to pit inflows of approximately 26.4 ML/year (based on 21% of total inflow) and then Section 6.2 refers to an observed groundwater flow rate into the pit to be <1 L/sec (<31.5 ML/year).

This issue is addressed in Section 2.6.

Issues and Responses

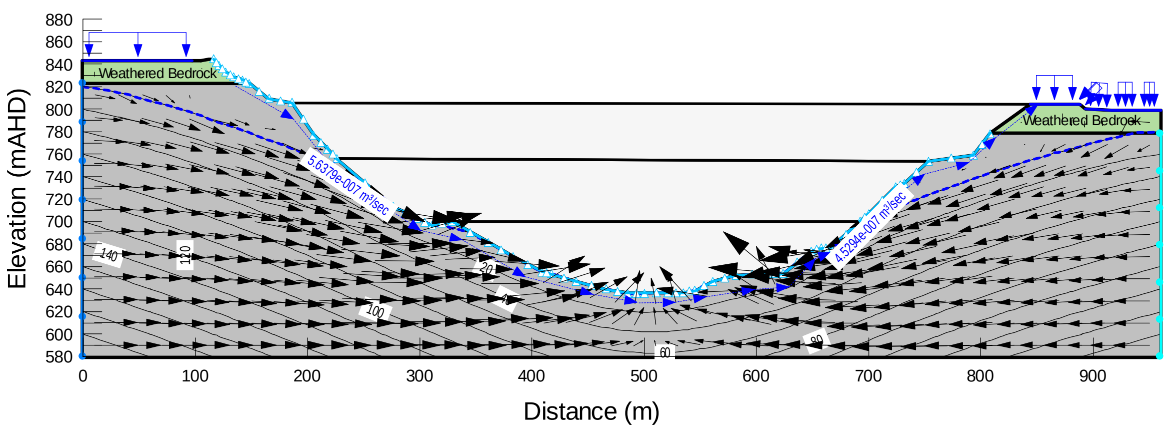
2.1 Environmental Integrity after Leachate Recovers

The Sydney Catchment Authority has raised issues regarding groundwater, surface water and leachate conditions when the bioreactor reaches the top of the void.

The water balance leachate modelling could only be carried out for the filling of the void to the lowest rim level at 802.5mAHD and therefore had to stop when the level of waste reached the level of the rim. The reason for this is that the equation for available storage in the waste mass is based on the geometry of the void. With filling above the rim, the use of the SEEP model is more appropriate and this is what is presented below.

The leachate modelling was carried out using the cross-sectional model SEEP which simulates horizontal and vertical fluid movement in the saturated and unsaturated zone. The model is shown in Figure 2-1 below.

Figure 2-1 Woodlawn Seepage Model - Open Void



A former hydrogeological study of the site indicated, through packer testing, that the hydraulic conductivity of the fractured rock mass is between 1 x 10^{-8} m/sec and 3 x 10^{-9} m/sec. Using an average value of 8 x 10^{-9} m/sec, the model indicates that the groundwater flow into the pit is approximately 60 m^3/day, or 0.7 L/sec. This is similar to the value observed at the sump of the mine pit prior to filling (c. 1 L/sec).

As the void is progressively filled, groundwater inflow decreases as the hydraulic gradient reduces. The filling sequence is simulated in the following figures. Steady state modelling was used to simulate groundwater conditions at various stages of filling. Figure 2-2 shows the current condition with the waste level at 700 mAHD. Subsequent stages are shown in Figures 2-3 to 2-5.

2 Issues and Responses

Figure 2-2 Woodlawn Steady-state Seepage Model - Waste Level at 700mAHD.

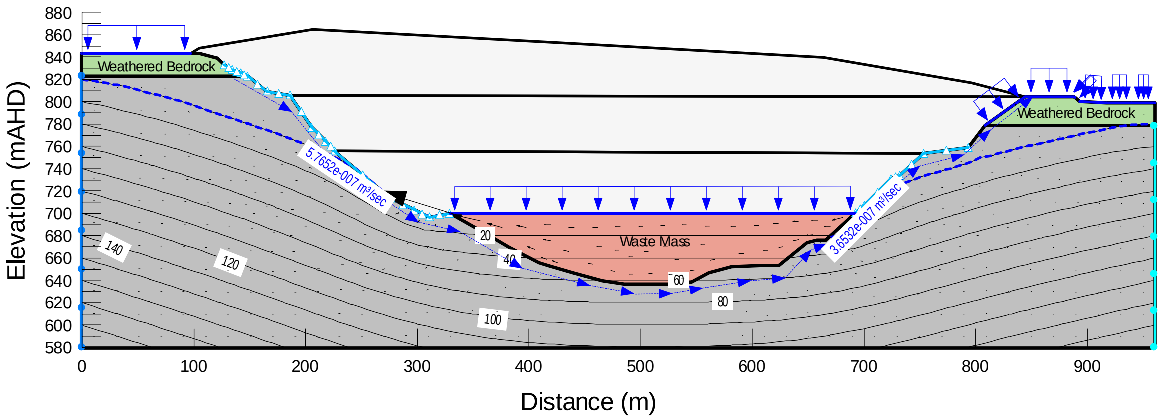
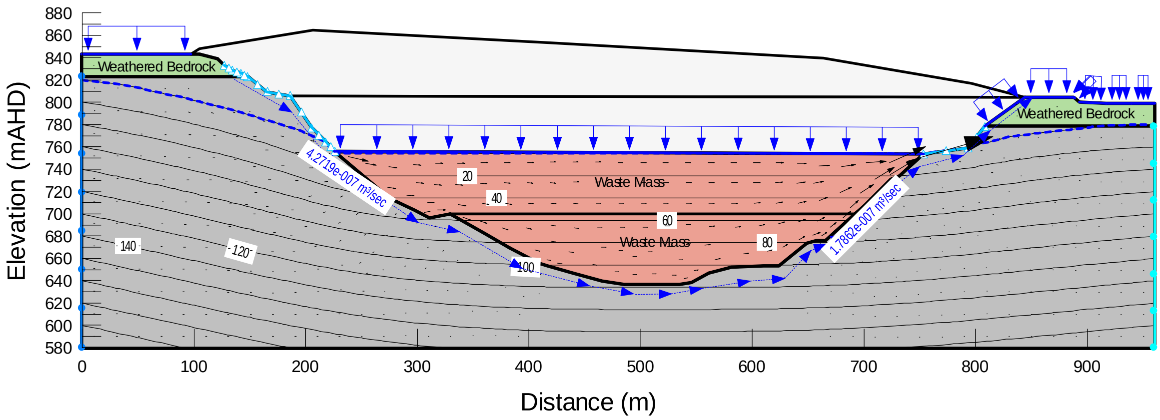


Figure 2-3 Woodlawn Steady-state Seepage Model - Waste Level at 755mAHD



As the waste level rises, the bedrock becomes more weathered, and the SCA has pointed out that the weathered bedrock is more likely to have a higher permeability. To mitigate the potential for leachate migration from this more weathered zone, Veolia will selectively line the rock faces to ensure that the hydraulic conductivity is less that 1 x 10^{-9} m/sec. Such measures are already being undertaken in selected areas of the wall where higher permeability fracture zones are encountered. The impact of this liner is simulated in the SEEP model on the right hand rock face along the weathered bedrock zone.

2 Issues and Responses

Figure 2-4 Woodlawn Steady-state Seepage Model - Waste Level at 805mAHD

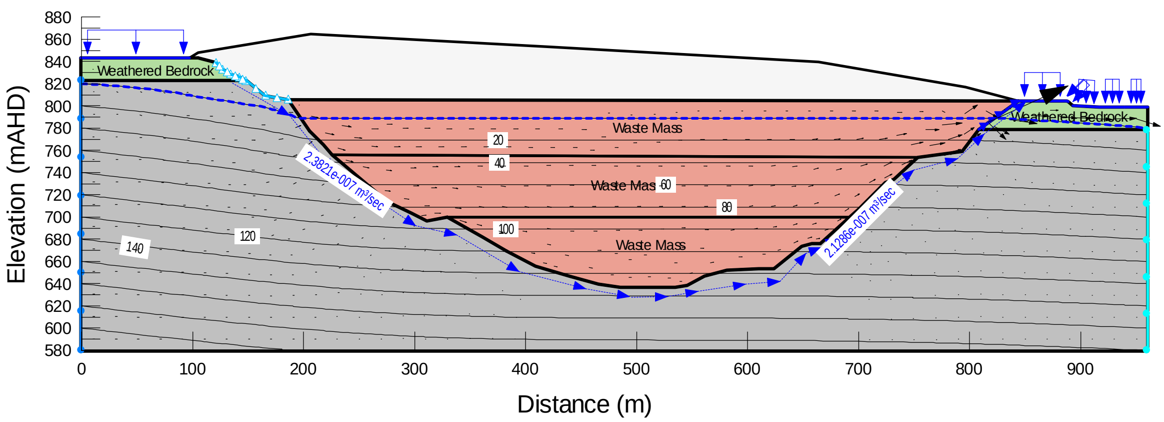
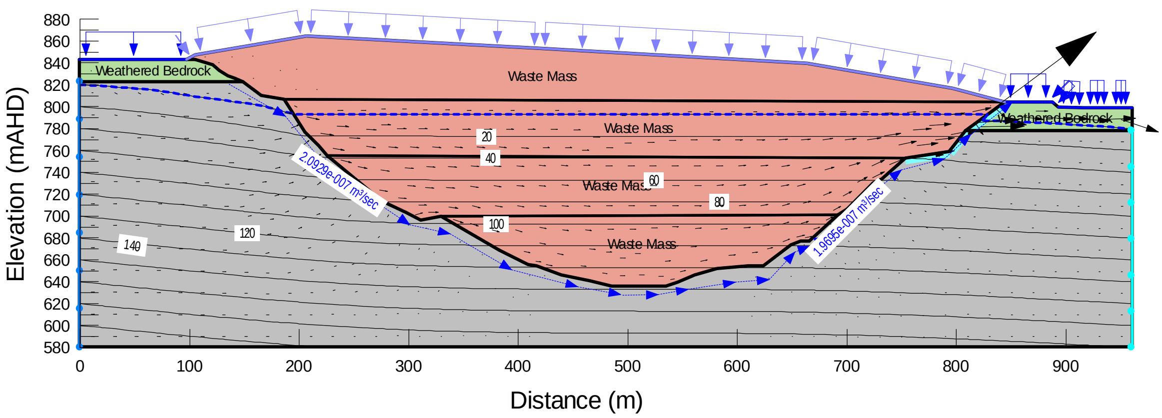


Figure 2-5 Woodlawn Steady-state Seepage Model - Final Cap with Barrier System



Once the bioreactor is capped, a transient flow SEEP model was used to evaluate the time for the leachate level in the waste mass to rebound to the levels in the bedrock surrounding the void. The model was run to simulate 1,000 years after the bioreactor is capped.

Results from the SEEP modelling suggest that complete rebound of the leachate level would take between 600 and 700 years after the bioreactor is capped.

2 Issues and Responses

Figure 2-6 Predicted Liquid level 100 years after capping - Final Cap with Barrier System

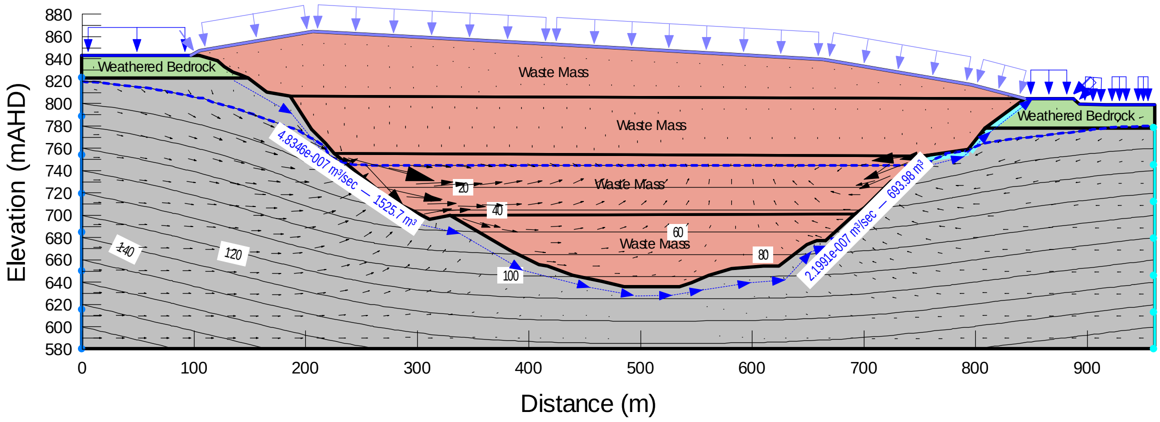


Figure 2-7 Predicted Liquid level 400 years after capping - Final Cap with Barrier System

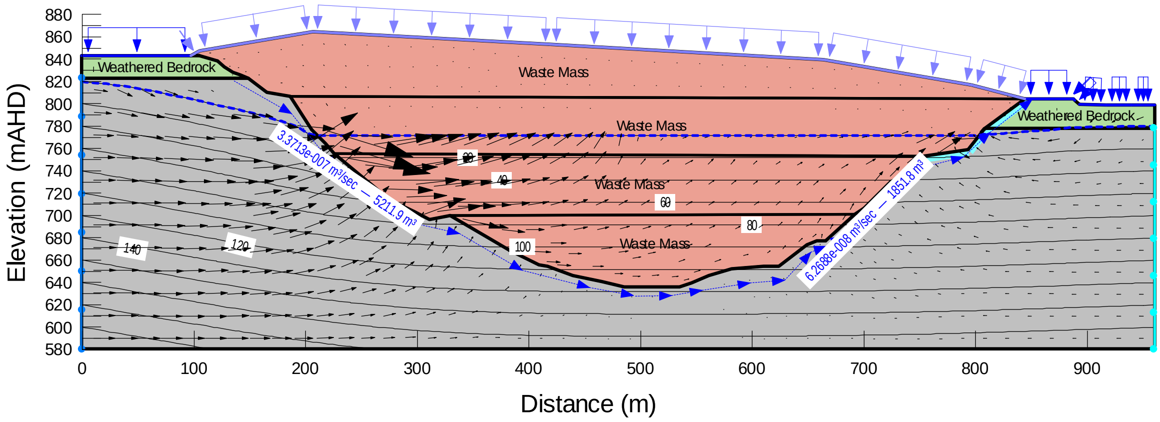


Figure 2-8 Predicted Liquid level 700 years after capping - Final Cap with Barrier System

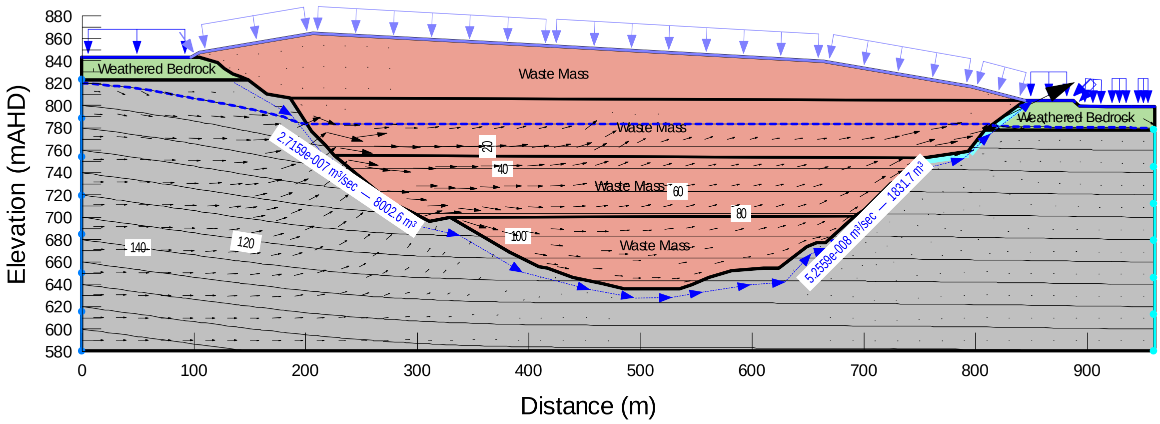
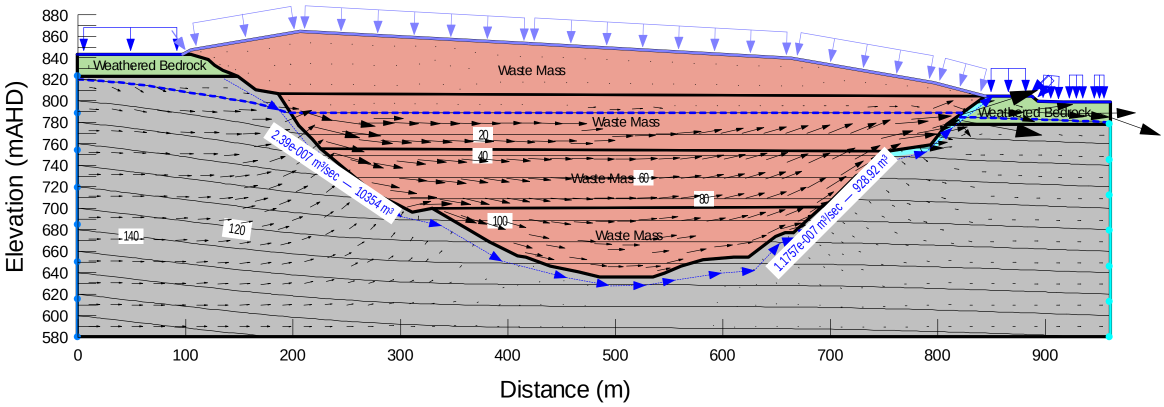


Figure 2-9 Predicted Liquid level 1,000 years after capping - Final Cap with Barrier System



After 1,000 years a leachate mound of approximately 8 m is predicted by the SEEP model. The maximum seepage velocity of liquid occurs along the uppermost right edge of the void (where the longest black arrows are shown on Figure 2-9).

To assess the impact of the elevated leachate level on the surrounding, recovered water table, seepage velocities from the model, as depicted by the flow arrows in the diagrams, have been reviewed. Inspection reveals that a thousand years after the bioreactor is capped, the seepage velocities will be less than 1 m/year. Therefore, the travel time for conservative contaminants to migrate to the nearest offsite receptor (Crisps Creek) would be centuries after the leachate level has rebounded. This does not take into account the influence of dilution from rainfall recharge, which will attenuate the impact further, and the fact that the leachate quality will be more benign as a result of biochemical degradation processes having been exhausted.

The bioreactor process is designed to accelerate biological stabilisation in the waste mass. International studies (e.g. Christensen, T. H, 1999, Landfilling of Waste: Biogas) suggest that accelerated degradation will stabilise the chemical activity in the waste mass and reduce the timeframe for monitoring post-closure significantly. Monitoring of leachate quality and gas emission will indicate the status of degradation and provide a benchmark for control of the stabilisation process.

Other reactive contaminants, such as heavy metals and ammonia, will be attenuated through adsorption and cation exchange, over the extended time frames.

Groundwater monitoring and sampling at the site will detect any changes in groundwater quality close to the void prior to any offsite impacts occurring, enabling appropriate remediation measures to be implemented in a timely manner, if required.

Consistent with the post closure requirements in the Environmental Guidelines: Solid Waste Landfills, EPA NSW, 1996, monitoring and maintenance will be provided until the site does not pose a threat to the environment.

2.2 Capping Profile

SCA has requested clarification of the final capped surface level with appropriate design drawings. It is important that the final surface level of the cap has sufficient grade to facilitate runoff and to prevent ponding of surface water which would increase infiltration post-closure.

The maximum final post-settlement surface level of the cap is approximately 865 mAHD and the design provides for post-settlement slopes less than 20% and greater than 5% across the whole surface, in accordance with the Environmental Guidelines: Solid Waste Landfills, EPA NSW, 1996.

The final cap contours are shown in Figure and show that the final levels will join back in to the existing levels around the rim of the void.

2.3 Stormwater Management during Transport

SCA has raised issues in relation to stormwater management at the Intermodal Facility (IMF) and along the road to the Bioreactor.

The stormwater collection system at the Intermodal Facility (IMF) has been designed to collect all stormwater runoff from the hardstand areas via an open channel system on the perimeter of the area. As indicated in the EA, stormwater runoff generated within this area is diverted underneath the access road and rail sidings through culverts, and to the stormwater treatment system located at the north-eastern end of the Intermodal facility. Collection of the all the stormwater from the sealed surfaces is achieved via an open channel system that runs around the perimeter of the hardstand area.

The stormwater system captures the first flush water through a pipe with a flap valve to ensure no back flows. The first 15mm of runoff for each square metre of the hardstand area is contained on site, in accordance with the EPL requirements.

Once the first flush volume has been isolated, any excess stormwater is diverted over a weir into a sedimentation pond. This stormwater passes through gross pollutant trap prior to discharge along a grass lined channel into Mulwaree River. The grass lined channel is approximately 150 metres long, and attempts to emulate a nature drainage path that may flow into the river.

Regular inspection of the stormwater system is undertaken to determine the need to clean out any sediment built-up.

The surface water monitoring program for the Bioreactor and IMF sites is contained within the SWMS. The program outlines the actions that will be implemented for monitoring surface water during the operation and rehabilitation phases.

Monitoring is being carried out in the Wollondilly and Lake George catchments and include monitoring points located on Crisps Creek and Allianoyonyiga Creek. Monitoring of these locations for surface water quality has been conducted over a number of years and this monitoring will continue in the future.

It is important to note that all waste is transported to the Intermodal in sealed containers which limit the potential for waste to contaminate the hardstand areas. The waste is also transported from the IMF to the Bioreactor in the same sealed containers, also limiting the opportunity for any contamination of road drains.

Waste transported from local councils will pose no further impacts on local roads beyond that which may occur currently, as any additional road movements anticipated are well within the current design capacity of the roads to deal with potential impacts. Furthermore, local waste trucks will also be covered to minimise the potential for waste contamination.

NOTE:
ARROWS INDICATE DIRECTION OF FALL WHILST ARROW COLOUR INDICATES GRADE AS SET OUT IN TABLE BELOW.

SURFACE SLOPE ARROW DATA			
NUMBER	MINIMUM SLOPE	MAXIMUM SLOPE	COLOR
1	0.000%	5.000%	
2	5.000%	7.500%	
3	7.500%	10.000%	
4	12.500%	15.000%	
5	15.000%	17.500%	
6	17.500%	20.000%	

X:\JOBS\201146\ACAD\201146_CAPPING.DWG

VEOLIA ENVIRONMENTAL SERVICES

WOODLAWN BIOREACTOR

A1 SHEET

0 50 100 150 200 250 METRES
SCALE: 1:2500

ISSUE	AMENDMENT	DRAWN	DATE
A	INITIAL ISSUE	J.C.	27/01/11

LandTeam Australia Pty Ltd
ABN 35 300 283 592
Bowral Office
357 Bong Bong Street,
BOWRAL NSW 2576
p: 4861-2467
f: 4861-4975
e: bowral@landteam.com.au
www.landteam.com.au

Campbell & Anderson
LandTeam
Founding member servicing the Southern Highlands

VEOLIA ENVIRONMENTAL SERVICES

WOODLAWN BIOREACTOR
VOID WORKS
CATCHMENTS PLAN

WOODLAWN BIOREACTOR COMPLETED REHABILITATION SURFACE PLAN

SCALE:	1:2000	DATUM:	A.H.D.	DATE:	27/01/2011

DESIGNED: J.C.
DRAWN: J.C.
CHECKED: R.A.
ISSUE: A
DRAWING No. 201146-CRS1

2.4 Groundwater Management

NOW has raised issues regarding groundwater management, and in particular groundwater dewatering details.

The location of the two groundwater dewatering bores (OSW1 and OSW2) is shown in Figure 2-11. The two bores (one operational and one back-up) are used to dewater groundwater from beneath the bioreactor liner, as shown in Figure 2-12.

OSW1 is equipped with a submersible pump with a 5.5KW motor that is able to pump 1.5 to 2.0 L/sec against a head of 100m. The inclined borehole is extended up the side of the void as the waste level increases. The groundwater bores are used for dewatering of the mine void and the extraction will be licensed under the Water Act, in accordance with the advice of NOW.

2.5 Impact of Dewatering on Groundwater Levels

Open cut mining at Woodlawn commenced in 1978 and in 1997 Woodward-Clyde (now URS) plotted groundwater levels in the bedrock around the mine void. These contours, which are reproduced in Figure 2-13 show the cone of depression created by the open cut mine. The groundwater levels range from as high as 840mAHD beneath the waste rock dump on the southern side of the pit to 760mAHD to the east and west of the mine. These groundwater levels are within the bedrock and are a completely separate system from the shallow water table conditions that exist along the Crisps Creek alluvium where spring flows are observed.

The 1997 contours (Figure 2-13) show the impact on groundwater levels in the bedrock after 20 years of depressurisation during open cut mining, when the pumping sump was located about 180m below the regional water table level.

Groundwater levels have been monitored by Veolia in bores drilled around the Woodlawn mine void since 2002. In response to the NOW submissions, hydrographs of most of the bores have been prepared. These are presented in Figure 2-14 to Figure 16 below.

Although pit dewatering has had an impact on groundwater levels, as shown in Figure 2-13, the consistent declining trend that is illustrated in some of the hydrographs between 2002 and 2009 (e.g. MB10, MB12, MB7, MB2 and MB5), is more likely a result of low rainfall conditions and lower than normal recharge rates. This is confirmed by the fact that, in 2010, this trend reversed as wetter conditions began. These hydrographs indicate that the fractured rock aquifer is responsive to vertical fluxes associated with rainfall. Horizontal permeabilities are much lower, however, as noted by the low flow rates into the mine void, and these flows are less susceptible to local climatic variability.

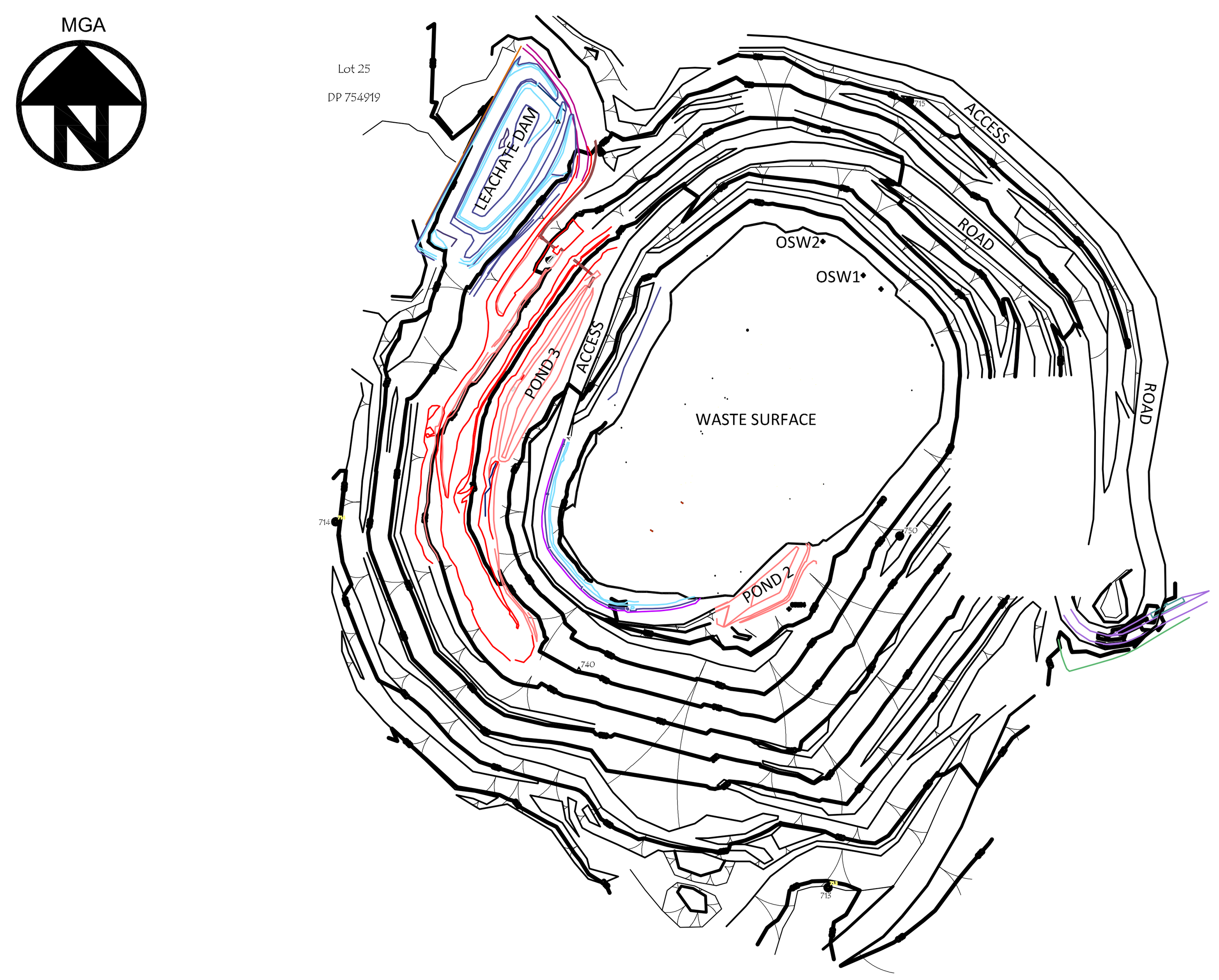
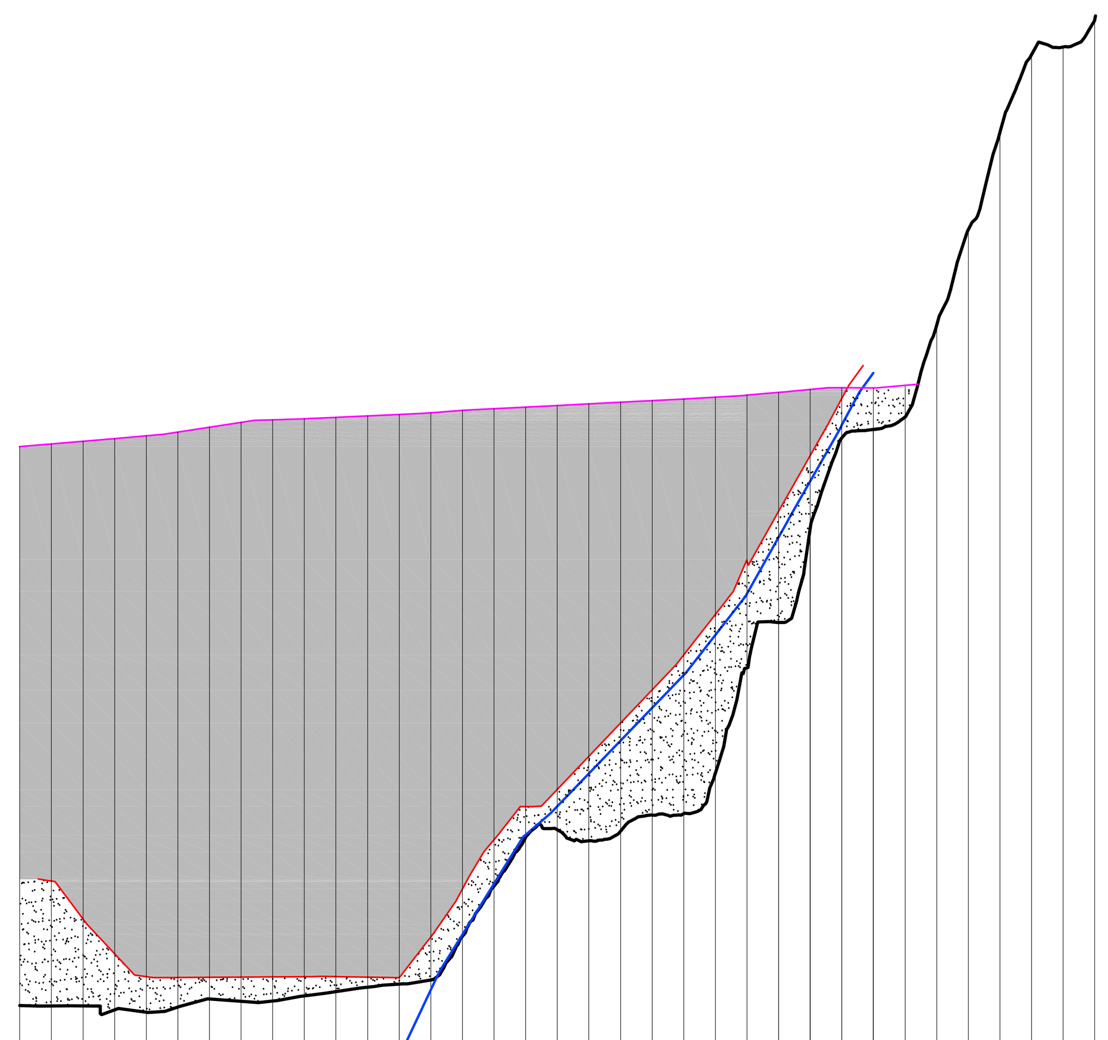


DIAGRAM OF LOCATIONS OF OSW1 & OSW2

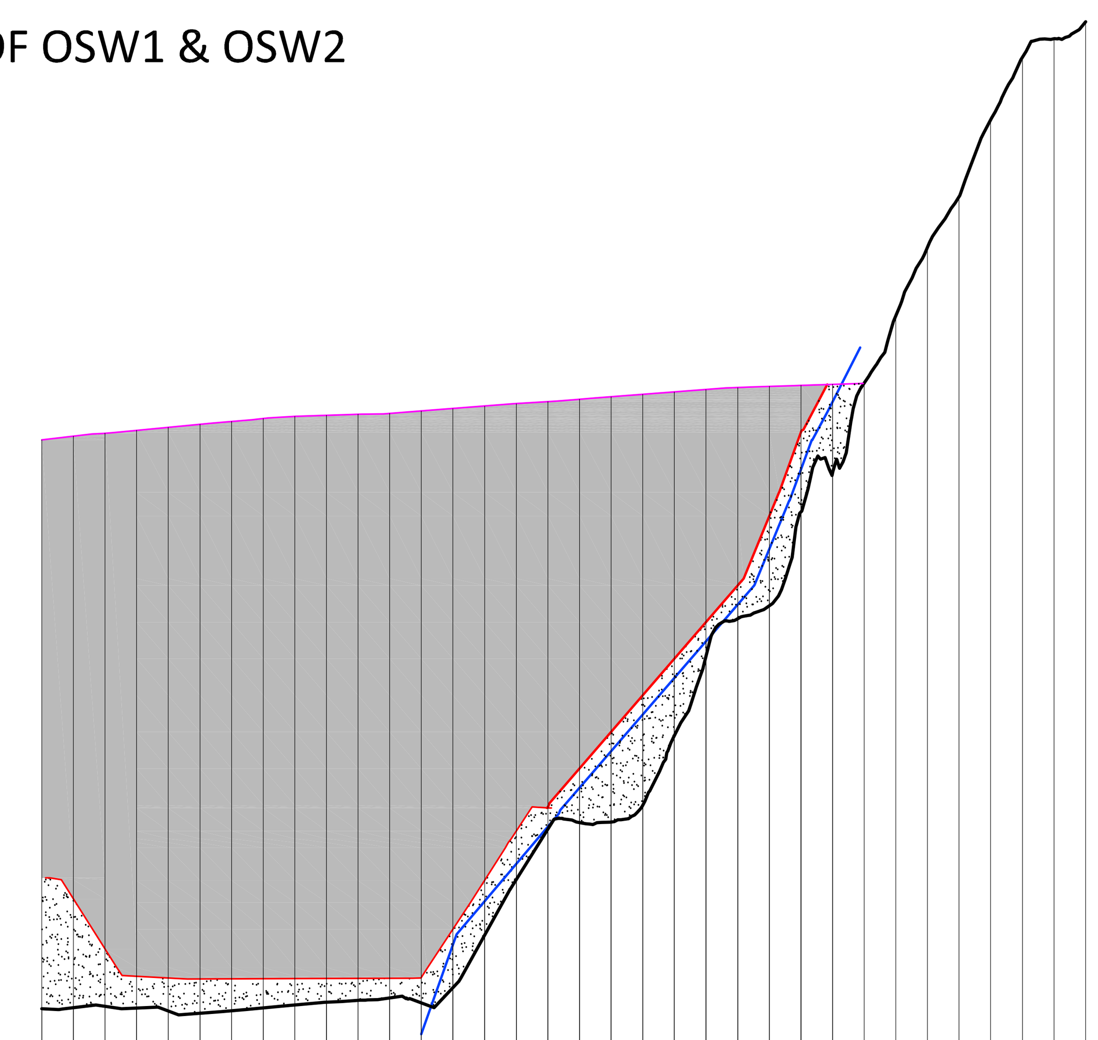
SCALE: 1:5000



DATUM 650.000

Chainage	CLAY LINER	OSW01 PROFILE	WASTE LEVEL	VOID SURFACE
0.00		-----	698.25	654.06
5.00	663.91	-----	698.47	654.03
10.00	660.90	-----	698.68	654.04
15.00	658.16	-----	698.90	653.72
20.00	656.35	-----	699.12	653.54
25.00	656.28	-----	699.42	653.94
30.00	656.30	-----	699.80	654.58
35.00	656.32	-----	700.18	654.41
40.00	656.34	-----	700.38	654.42
45.00	656.36	-----	700.47	654.82
50.00	656.35	-----	700.57	655.16
55.00	656.31	-----	700.69	655.50
60.00	656.28	650.10	700.80	655.76
65.00	659.49	655.30	700.93	656.08
70.00	663.30	659.67	701.13	659.54
75.00	667.18	663.70	701.26	663.53
80.00	669.80	667.57	701.38	667.37
85.00	-----	669.83	701.50	667.96
90.00	-----	672.42	701.64	667.10
95.00	-----	675.02	701.78	667.86
100.00	-----	677.61	701.90	669.13
105.00	-----	680.21	702.02	669.24
110.00	-----	683.38	702.17	672.43
115.00	-----	686.65	702.33	680.77
120.00	-----	691.10	702.54	684.35
125.00	-----	695.54	702.79	691.80
130.00	-----	699.96	702.92	698.95
135.00	-----	704.08	702.90	699.62
140.00	-----	704.65	702.92	700.60
145.00	-----	-----	-----	707.85
150.00	-----	-----	-----	715.39
155.00	-----	-----	-----	723.11
160.00	-----	-----	-----	729.25
165.00	-----	-----	-----	729.85
170.00	-----	-----	-----	732.03

CROSS SECTION OF OSW01



DATUM 650.000

Chainage	CLAY LINER	OSW02 PROFILE	WASTE LEVEL	VOID SURFACE
0.00		-----	698.79	653.81
5.00	662.50	-----	699.09	653.90
10.00	658.55	-----	699.32	654.00
15.00	656.38	-----	699.55	653.86
20.00	656.25	-----	699.79	653.64
25.00	656.17	-----	700.03	653.45
30.00	656.18	-----	700.25	653.65
35.00	656.19	-----	700.48	653.88
40.00	656.20	-----	700.65	654.11
45.00	656.21	-----	700.73	654.32
50.00	656.22	-----	700.82	654.47
55.00	656.23	-----	700.88	654.66
60.00	656.30	651.80	701.08	654.28
65.00	660.10	658.89	701.27	655.48
70.00	663.96	662.32	701.47	659.63
75.00	667.87	665.27	701.66	664.09
80.00	669.69	668.23	701.81	668.34
85.00	-----	671.27	702.00	668.52
90.00	-----	674.17	702.20	668.58
95.00	-----	677.06	702.39	669.91
100.00	-----	679.96	702.58	675.40
105.00	-----	682.86	702.77	681.70
110.00	-----	685.75	702.93	684.64
115.00	-----	690.15	703.02	685.68
120.00	-----	696.44	703.10	693.08
125.00	-----	701.79	703.19	696.17
130.00	-----	-----	-----	703.29
135.00	-----	-----	-----	708.63
140.00	-----	-----	-----	714.02
145.00	-----	-----	-----	718.04
150.00	-----	-----	-----	724.10
155.00	-----	-----	-----	729.03
160.00	-----	-----	-----	730.52
165.00	-----	-----	-----	731.85

CROSS SECTION OF OSW02

LEGEND

- CLAY SUPPORT STRUCTURE
- WASTE

C:\Documents and Settings\shaneh\Local Settings\Temporary Internet Files\OLK1CE\16700-15 OSW Profile.dwg

Issue	Description	By	Date
A	Initial Issue	MK	21/01/2011
B	Modification to Clay Lining	MK	28/01/2011
C	VOID DIAGRAM ADDED	JC	09/02/2011

VEOLIA ENVIRONMENTAL SERVICES

LandTeam — Powering your Development
GOULBURN
36 Montague Street
Postal: PO Box 1040 p: (02) 4821 1033
GOULBURN NSW 2580 f: (02) 4821 7238
e: goulburn@landteam.com.au

CLIENT: VEOLIA ENVIRONMENTAL SERVICES

HORIZONTAL SCALE 1:1000 — 0 20 40 60 80 100

VERTICAL SCALE 1:500 — 0 10 20 30 40 50

DRAWN BY: M KADZIELA

DATUM: AHD

ORIGIN OF LEVELS: PILLAR 713

CONTOUR INTERVAL: N/A

LOCAL GOVERNMENT

LGA: GOULBURN MULWAREE

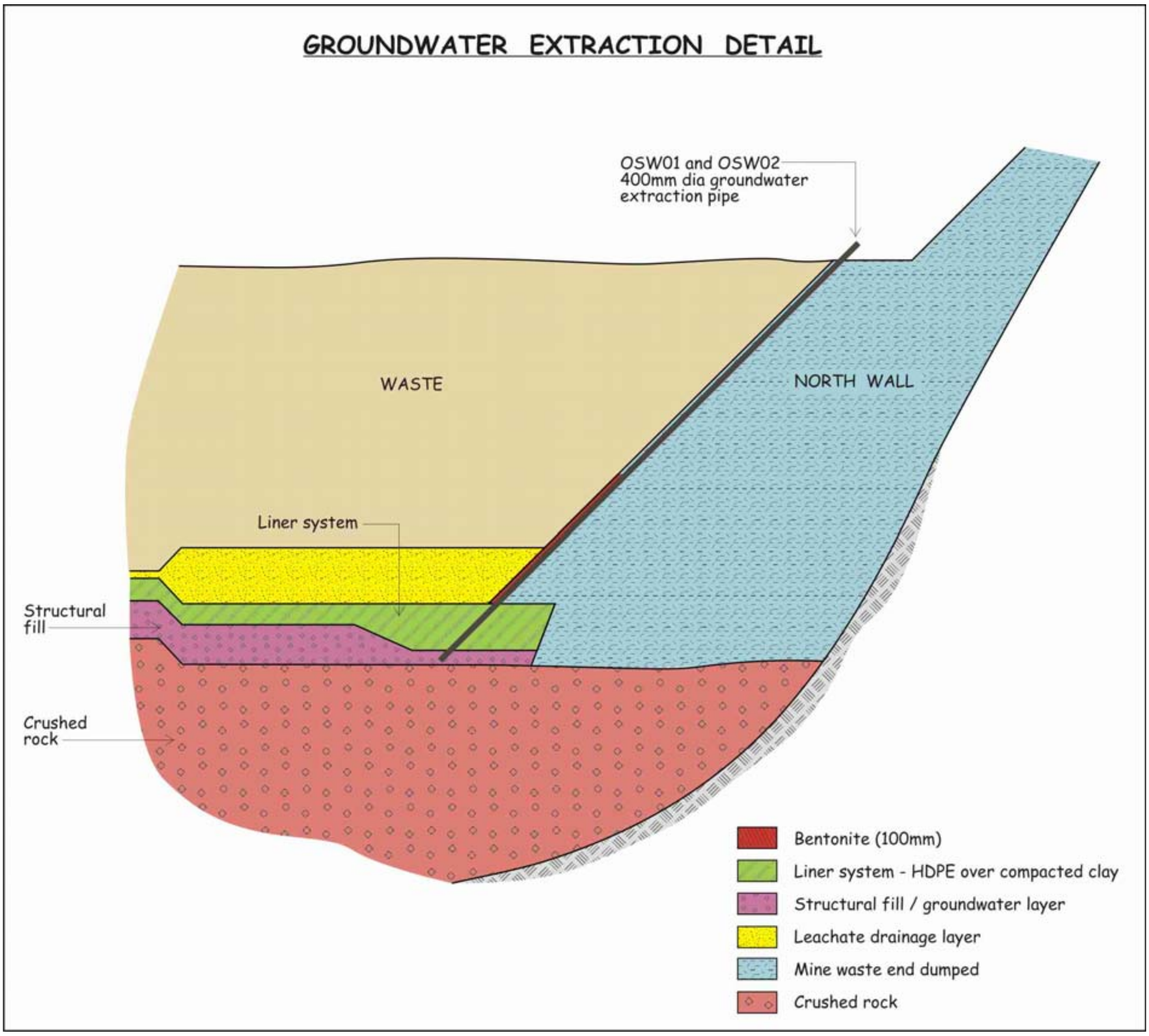
COUNCIL REFERENCE:

PLAN

SHOWING
CROSS SECTIONS OF OSW01 AND OSW02
WOODLAWN BIOREACTOR
COLLECTOR RAOD, TARAGO
PARISH OF WERRIWA
COUNTY OF ARGYLE

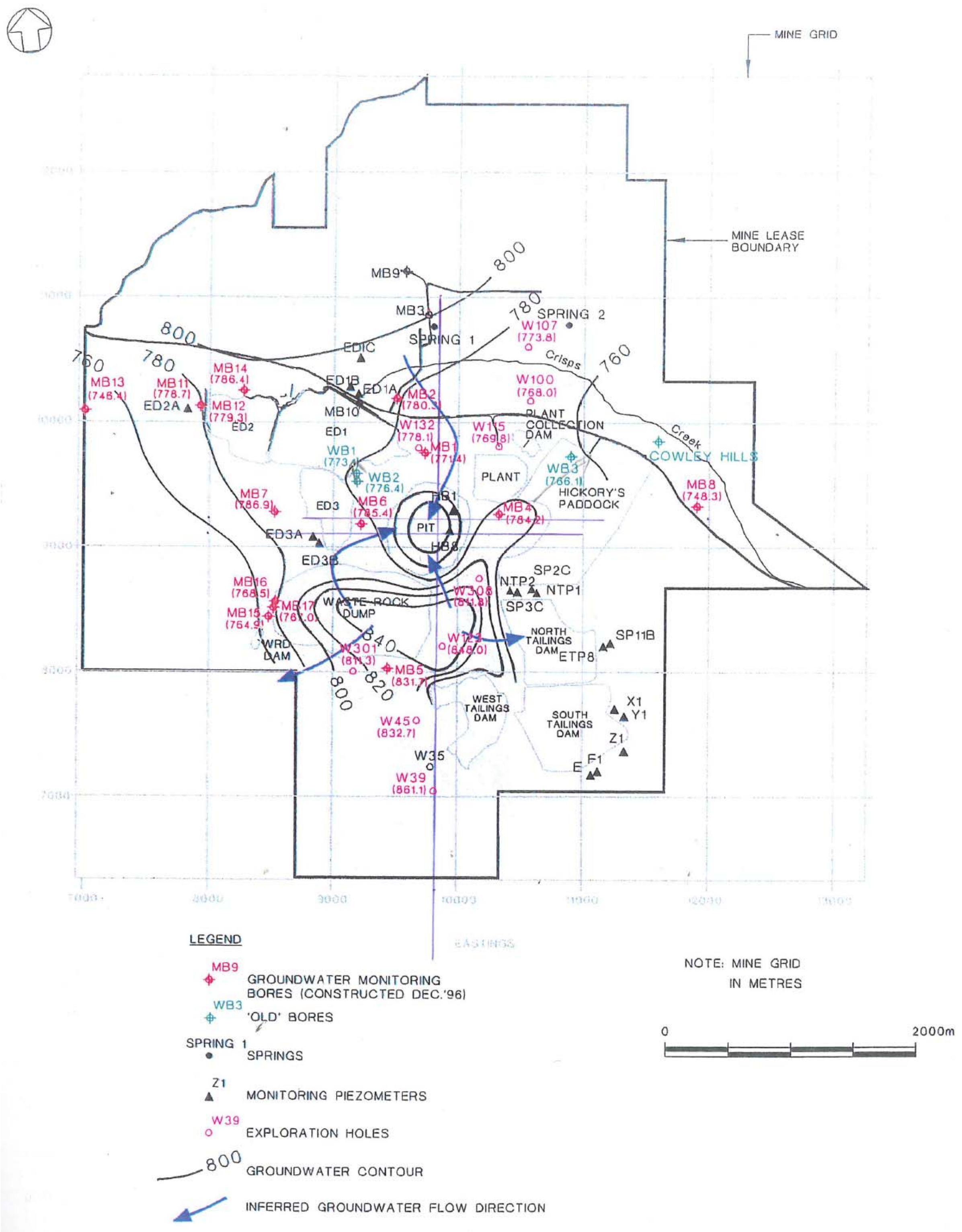
Sheet No. 1
No. of Sheets: 1
Date: 28/01/2011
Ref. No: 16700
Drawing No. 15 — Issue C

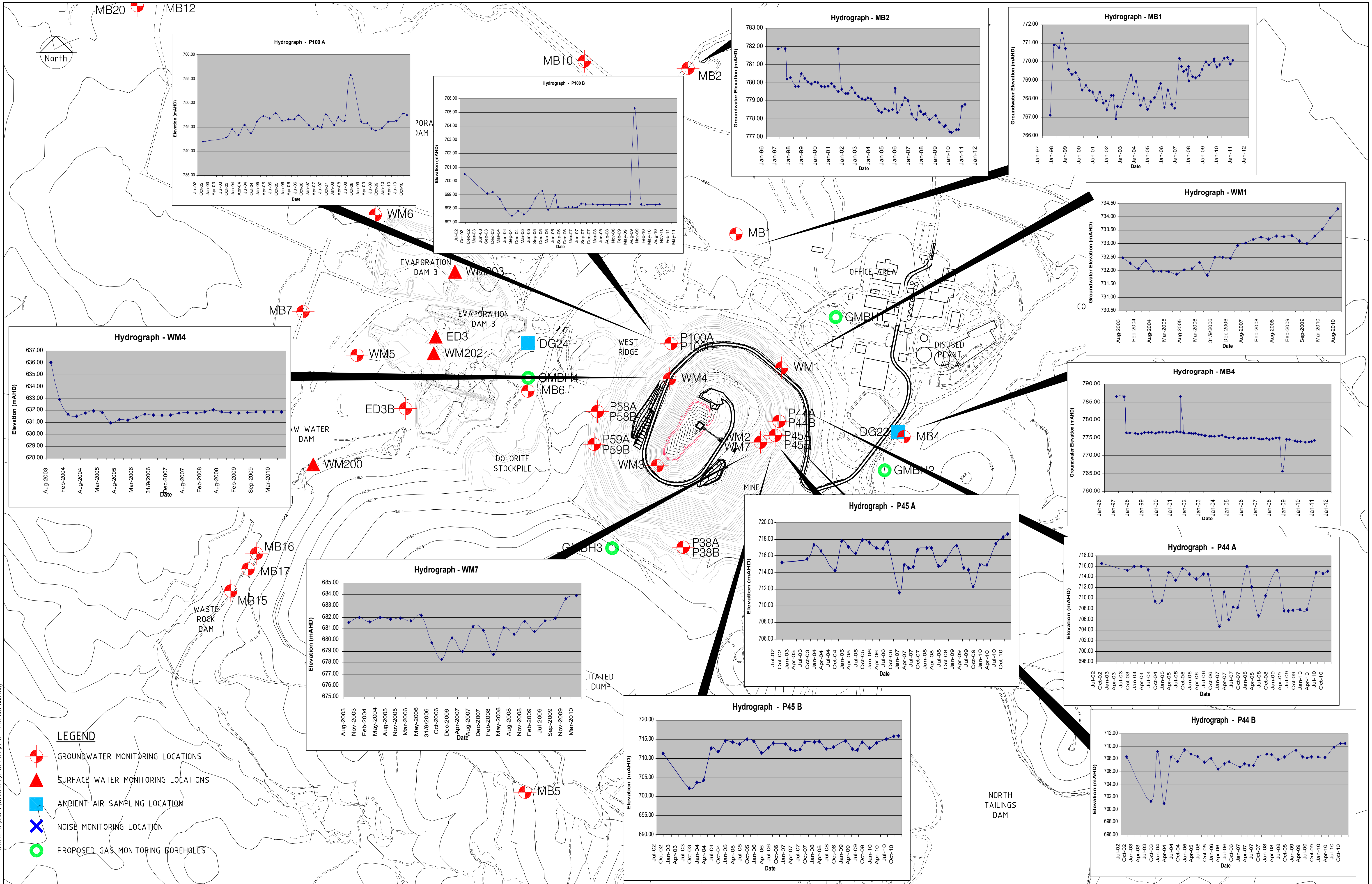
Figure 2-12 Detail of Dewatering Bore Construction



2 Issues and Responses

Figure 2-13 Woodlawn Groundwater Contours - 1997





Cad ref: J:\MPL\10407001\Cad\LEMP\LEMP-10407001-553.dwg

Last modified: 29 Jun 04 - 15:08

No.	BY	DATE	DESCRIPTION	APPD
A	SGG	29.6.04		

REVISIONS

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

50 0 100 200m

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE MAUNSELL AUSTRALIA QUALITY ASSURANCE SYSTEM CERTIFIED TO AS/NZS ISO 9001-1994

	PREPARED	CHECKED
DESIGN		
DRAFTING	SGG	

PASSED

DATE

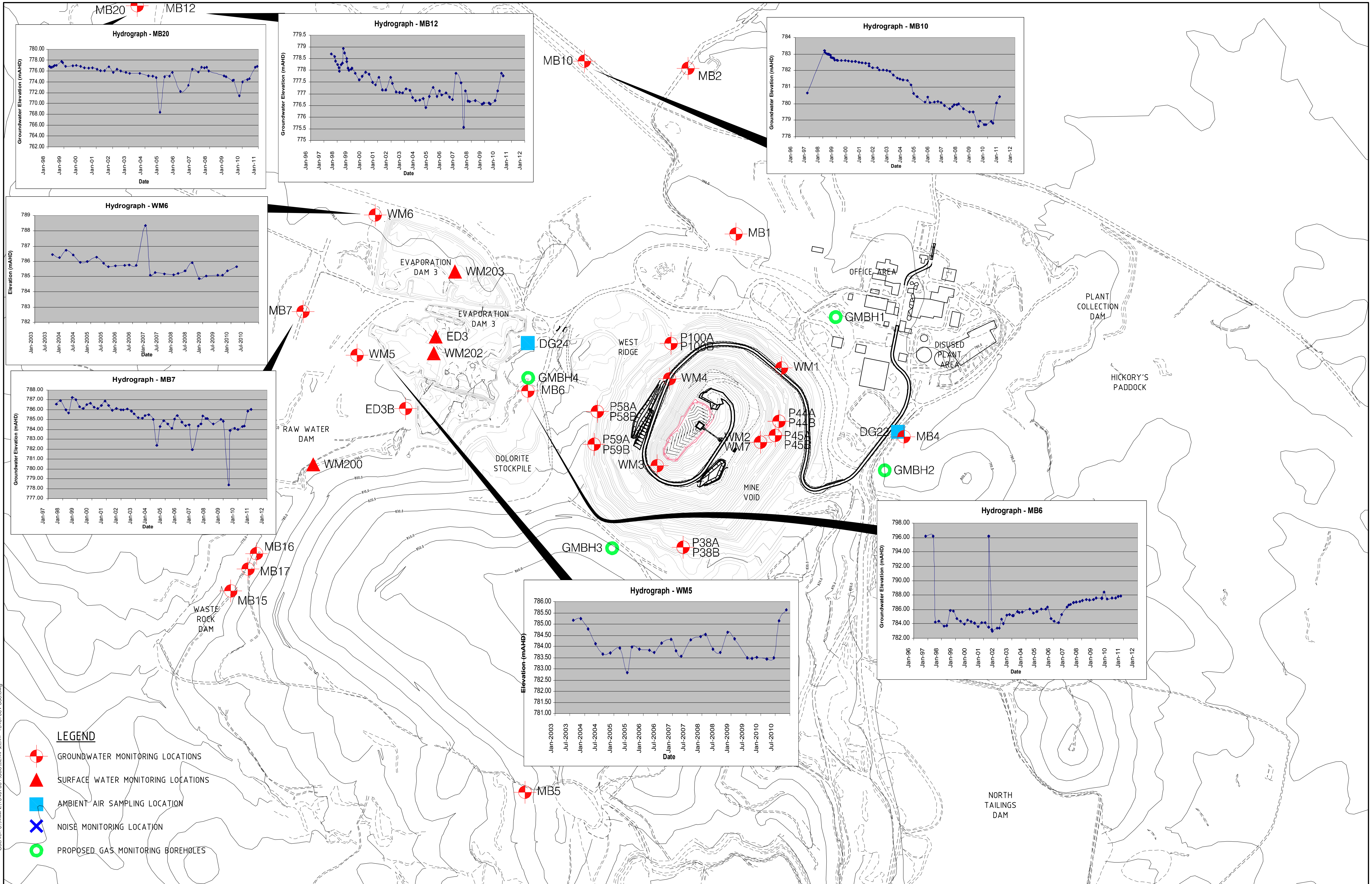
maunsell

Maunsell Australia Pty Ltd A.B.N. 20 093 846 925
An AECOM company

WOODLAWN BIOREACTOR

MINE SITE
EPA MONITORING LOCATIONS
MINE AREA

10407001-553 A



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Last modified: 29 Jun 04 - 15:08

REVISIONS				
A	SGG	29.6.04		
No.	BY	DATE	DESCRIPTION	APPD

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

50 0 100 200m

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE MAUNSELL AUSTRALIA QUALITY ASSURANCE SYSTEM CERTIFIED TO AS/NZS ISO 9001-1994

	PREPARED	CHECKED	PASSED
DESIGN			
DRAFTING	SGG		DATE

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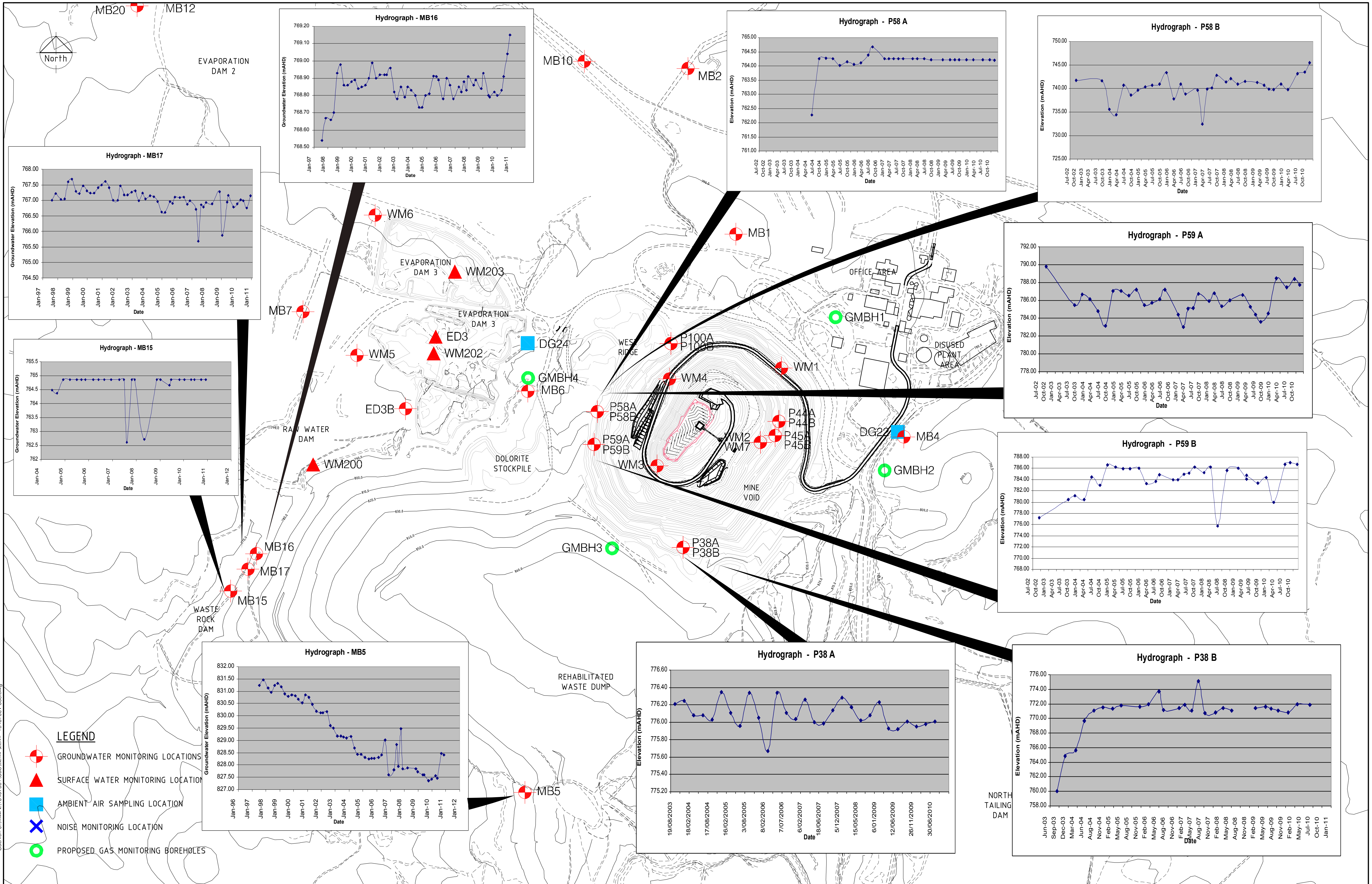

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2.6 Inflows and Outflows

NOW raised an issue concerning apparent inconsistencies between groundwater dewatering rates in various supporting documents. The clarification of the origin of these numbers and their meaning is provided in the table below.

NOW Issue	Clarification
LMP refers to dewatering below liner at OSW1 at a rate of 0.58 L/sec (18.25 ML/year)	This number is derived from the water balance and is the simulated minimum extraction rate for the predictive simulations of the water balance. If the extraction rate is less than this number there is more pressure on leachate levels in the waste mass. This, therefore, represents the minimum required extraction for the proposed groundwater extraction licence entitlement.
Groundwater dewatering is stated to be 31% of outflows, corresponding to approximately 28 ML/year.	This number has been calculated from the water balance on the basis of the sum of all inputs and outputs since the bioreactor began operations. It corresponds to the annual volume of 28.5 ML/year (refer below).
Groundwater seepage into the pit is stated to be approximately 26.4 ML/year (based on 21% of total inflow)	This is the inflow rate to the void, calculated on the basis of a base rate of 1 L/sec which decreases as the water level in the bioreactor rises. For this reason, the resultant inflow is less than 1 L/sec.
Observed groundwater inflow is noted to be less than 1 L/sec (<31.5 ML/year)	This was the observation in the base of the mine pit before filling began and is considered the maximum level. As the water level in the void rises, this number is expected to decrease and the water balance has been adjusted to reflect this.

Pumping rates have been monitored for OSW01 and OSW02 since 2007 and the table below provides the total volumes pumped since then. Note that there was no need for pumping in 2010.

	Annual Volume (m^3)	Number of Records	Annual Rate	
			m^3/day	L/sec
2007	22,395	42	61.3	0.7
2008	35,268	48	96.6	1.1
2009	28,577	364	78.2	0.9
2010	No pumping carried out			

It is anticipated that the groundwater inflow rate will decrease as the level of saturation in the waste increases, because of the reduction in differential head.

2 Issues and Responses

The average extraction rate over the 3 years of monitoring between 2007 and 2009 is 0.9 L/sec, which corresponds to 28.7 ML/year.

The results of the monitoring and water balance analysis indicate that a groundwater licence entitlement for 30 ML/year would be most appropriate for the site.

Conclusions

This report has been prepared to address the specific issues raised in relation to water quality and leachate management at the Woodlawn Bioreactor arising from the proposed Woodlawn Expansion.

The results of the assessment show:

1. The proposed tonnage increase would not adversely impact human health or the environment, particularly via a water pathway, which can be managed effectively.
2. The rate of rise of leachate within the waste mass will decline once the bioreactor is capped and the potential for movement of offsite will not exist until the leachate head is above the recovered water table level.
3. Selective lining of the upper more permeable profile will ensure that offsite migration potential is minimised.
4. Groundwater dewatering at an average rate of less than 30 ML/year is required to maintain operating conditions within the bioreactor.

Limitations

URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of Veolia Environmental Services (Australia) Pty Ltd and only those third parties who have been authorised in writing by URS to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared between July 2010 and February 2011 and is based on the conditions encountered and information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

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