



20 December 2012

WHYTES GULLY NEW LANDFILL CELL

Response to Submissions/Preferred Project Report

Submitted to:
NSW Department of Planning and Infrastructure

REPORT

Report Number. 117625003





Table of Contents

1.0 INTRODUCTION.....	1
1.1 Overview and Background.....	1
1.2 Structure of the Report	1
2.0 SUMMARY OF SUBMISSIONS.....	2
3.0 RESPONSE TO SUBMISSIONS	4
3.1 Project Description.....	4
3.2 Planning.....	9
3.3 Design	9
3.4 Noise	10
3.4.1 Noise Criteria	10
3.4.2 Offsite Impacts.....	11
3.4.3 Mitigation.....	13
3.5 Greenhouse Gas	16
3.6 Contamination	16
3.7 Groundwater.....	16
3.7.1 Groundwater Beneficial Uses.....	16
3.7.2 Groundwater Dependent Ecosystems.....	17
3.7.3 Licences.....	17
3.7.4 Use of Historical Data	18
3.7.5 Water Quality Analytical Results	18
3.7.6 Interpretation of Borehole core samples	19
3.7.7 Impact on Dapto Creek and Groundwater Quality	20
3.8 Surface Water, Drainage and Flooding.....	21
3.8.1 Flood Impact	21
3.8.2 Catchment Area	23
3.8.2.1 Drainage structure design.....	23
3.8.3 Surface Water Pond Design.....	24
3.8.4 Surface Water Management	24
3.8.5 Surface Water Pond Reconfiguration.....	27
3.9 Leachate.....	27
3.9.1 Leachate Treatment Plant Augmentation.....	27



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTES GULLY NEW LANDFILL CELL

3.9.2	Leachate Pond Capacity	27
3.9.3	Sewer Capacity	28
3.10	Flora and Fauna and Heritage	28
3.10.1	Biodiversity	29
3.10.2	Riparian Land	31
3.10.3	Flora and Fauna	32
3.10.4	Heritage	33
3.11	Dust and Odour	33
3.11.1	Dust	33
3.11.2	Odour	36
3.12	Traffic	37
3.13	Socio-economic	37
3.14	Visual Assessment	38
3.15	Bushfire Risk	38
4.0	MODIFICATIONS MADE TO THE PROJECT	39
4.1	Overview	39
4.2	Noise	39
5.0	REVISED DRAFT STATEMENT OF COMMITMENTS	40
6.0	REFERENCES	1

TABLES

Table 1: Summary of Submissions	2
Table 2: New Landfill Cell Works Staging	4
Table 3: Predicted construction noise levels (dB L _{Aeq}) – plant and equipment located within Stage 4-2A	12
Table 4: Predicted operational noise levels (dB L _{Aeq}) – plant and equipment located within Stage 4-2A	12
Table 5: Predicted cumulative noise levels (dB L _{Aeq}) – plant and equipment located within Stage 4-2A	13
Table 6: Summary of pre-development PSD values	23
Table 7: Approximate Stage 4 Volumes and Timelines	39
Table 8: Revised Draft Statement of Commitments	40

FIGURES

Figure 1: Revised Staging Plan	14
Figure 2: Revised Staging Plan Section 1	15
Figure 3: An extract from Bewsher’s extended flood model (figure 7) completed December 2011	22



Figure 4: Existing Catchments and Surface Water management..... 26

Figure 5: Recommended Buffer Distances along Riparian Corridors..... 32

Figure 6: Time series of measured and modelled 24-hour average PM₁₀ concentrations at R1 (Stage 4)..... 34

Figure 7: Predicted annual average dust deposition levels due to Stage 1 operations (g/m²/month) 35

Figure 8: Predicted 24-hour average PM₁₀ concentrations due to Stage 1 operations (µg/m³)..... 36

APPENDICES

APPENDIX A

Surface Water Routing and Flood Analysis



1.0 INTRODUCTION

1.1 Overview and Background

Wollongong City Council (WCC) own and operate the Whytes Gully Resource Recovery Park (RRP), which currently receives all of the municipal solid waste within the Wollongong local government area. With existing landfill airspace at Whytes Gully RRP projected to expire in late 2013, WCC is proposing a staged new landfill cell at this location (the Project).

An Environmental Assessment (EA) supporting the proposed new landfill cell at Whytes Gully RRP has been prepared by Golder Associates Pty Ltd (Golder) in accordance with the assessment requirements of transitional Part 3A (Schedule 6A) of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The EA addresses the Director Generals' Requirements for the Project, which were issued 11 August 2011.

The EA was exhibited from 6 August 2012 to 7 September 2012 by the NSW Department of Planning and Infrastructure (DPI). During the exhibition period, DPI received eight submissions from government agencies and one further submission from the public.

In accordance with the EP&A Act, the Director General of the DPI requires WCC to respond to the issues identified during the exhibition period, in addition to identifying and assessing proposed minor changes to the Project as a result of responding to submissions. As such, a combined Response to Submissions and Preferred Project Report (the Report) has been prepared by Golder for the Project.

1.2 Structure of the Report

The structure of the Report is as follows:

- Section 2.0 presents a summary of submissions received;
- Section 3.0 presents the response to submissions;
- Section 4.0 presents modifications to the Project; and
- Section 5.0 presents the Revised Draft Statement of Commitments for the Project.



2.0 SUMMARY OF SUBMISSIONS

A total of nine submissions were received in relation to the Project, comprising eight submissions from government bodies and one submission from the public. No submissions were received from individuals. Submissions were received from the following stakeholders:

- The NSW Department of Planning and Infrastructure (DPI)
- Sydney Water
- The NSW Office of Water (NOW)
- The Environment Protection Authority (EPA)
- The Roads and Maritime Services (RMS)
- The Office of Environment and Heritage (OEH)
- Wollongong City Council (WCC); and
- Asciano Pty Ltd.

The stakeholder, issue, and the sections of the Report in which each issue is addressed are summarised in Table 1.

Table 1: Summary of Submissions

Submission Issue/ Discipline	Stakeholder	Report Section
Project Description	DPI	Section 3.1
Planning	WCC	Section 3.2
Design	DPI	Section 3.3
Noise	EPA DPI Asciano	Section 3.4
Greenhouse Gas	Asciano	Section 3.5
Contamination	Asciano	Section 3.6
Groundwater	OEH WCC NOW Sydney Water Asciano	Section 3.7
Surface Water, Drainage and Flooding	OEH WCC DPI Asciano	Section 3.8
Leachate	DPI Asciano	Section 3.9
Flora and Fauna and Heritage	OEH NOW Asciano	Section 3.10
Dust and Odour	EPA Asciano	Section 3.11
Traffic	RMS	Section 3.12



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTES GULLY NEW LANDFILL CELL

Submission Issue/ Discipline	Stakeholder	Report Section
	DPI WCC Asciano	
Socio-economic	Asciano	Section 3.13
Visual Assessment	Asciano	Section 3.14
Bushfire Risks	Asciano	Section 3.15



3.0 RESPONSE TO SUBMISSIONS

3.1 Project Description

The submission by DPI states:

- 1) *The Department requires more detailed information about the staging of the project.*
- 2) *The Department wishes to clarify and summarise exactly what components of the project are scheduled to occur and when. This may be achieved by providing an amended. More detailed version of Table 10.5 in the EA. This table must include all components of the proposed project (eg surface water and leachate pond reconfiguration, landfill gas management system construction, ancillary infrastructure and demolition components).*

Response

Staging is assessed in Chapter 8 of the EA. Further detail on the staging of components of the Project is provided in the staging plans for the Whytes Gully New Landfill Cell, presented in the Landfill Master Plan, located within Appendix P Draft Landfill Environmental Management Plan (LEMP). Appendix A, Figures 1 to 11 of the Landfill Master Plan show the staging plans, and surface water staging is shown in Figure 5 of the Landfill Master Plan.

Table 3 of the Landfill Master Plan provides details of the New Landfill Cell Works staging for components of the Project including areas of cell construction and lining, landfilling and capping, permanent stormwater infrastructure, leachate management infrastructure, easements and services relocation, temporary and permanent access roads, excavation and other associated infrastructure including progressive construction of landfill gas management system and relocation of site amenities. This table has been reproduced in this Report as Table 2.

Table 2: New Landfill Cell Works Staging

Stage 1-1: Approximately 2012 – 2013 (Appendix A Figure 1 of the Landfill Master Plan)	
Cell Construction	Stage 1-1 (Cell 1 and lower portion PB 1)
Landfilling	Complete filling on Eastern Gully Landfill Platform.
Capping and Rehabilitation	Not required.
Access Road	Construction of new access road A - B, going across the existing Green Waste Processing Centre prior to the construction of liner in Cell 1. Construction of temporary access road C - D on Western Gully Landfill along western side of Stage 1.
Permanent Surface Water	Construction of diversion channel for surface water drainage from Central Ridge (C-D) connected with existing drainage system to discharge to surface water pond.
Excavation	Excavation of existing material on Eastern Gully Landfill to average 1.5 m depth to form subgrade surface; for use as daily cover material.



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTES GULLY NEW LANDFILL CELL

Other	<p>Relocation of existing amenities to Old SWERT building.</p> <p>Demolishing of existing infrastructure and removal of services with Cell 1 footprint.</p> <p>Construction of new leachate drainage system for the existing leachate collection systems in the existing Western and Eastern Gully Landfill (beneath the Cell 1 liner system).</p> <p>Construction of active landfill gas extraction on existing Western and Eastern Gully landfill areas in 2012.</p>
-------	--

Stage 1-1 and 1-2: Approx. 2013 – 2015 (Appendix A Figure 2 of the Landfill Master Plan)

Cell Construction	Stage 1-2 (upper portion PB 1)
Landfilling	Stage 1-1 (Cell 1 and lower portion PB 1)
Capping and Rehabilitation	Not required
Access Road	<p>Construction of permanent access road E – E1.</p> <p>Forming access road E1 - F on waste during the filling of Stage 1-1.</p>
Permanent Surface Water	Not required
Excavation	Complete excavation of material in Cell 2A prior to the construction of Stage 2A.

Staging 1-2 and 2A: Approx. 2015 – 2018 (Appendix A Figure 3 of the Landfill Master Plan)

Cell Construction	Stage 2A (Cell 2A and PB 2A)
Landfilling	<p>Stage 1-2 (Cell 1 and PB 1)</p> <p>Waste Cutback on Eastern Gully Landfill (Waste relocation to Stage 1-1)</p>
Capping and Rehabilitation	not required
Access Roads	<p>Construction of temporary access road D - D1 during filling of Stage 1-2.</p> <p>Removal of access road within Stage 2A footprint (refer Appendix A Figure 2 of the Landfill Master Plan for location).</p> <p>Construction access road E1 - F during capping Stage 1-1.</p>
Permanent Surface Water	Construction of swale drain along eastern boundary of the waste cutback and perimeter drain along southern edge of Cell 1, to discharge into the existing surface stormwater pond.
Excavation	Not required
Other	Progressive construction of active landfill gas extraction in new waste.



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTES GULLY NEW LANDFILL CELL

Stage 2A and 2B-1: Approx. 2018 – 2021 (Appendix A Figure 4 of the Landfill Master Plan)

Cell Construction	Stage 2B-1 (Cell 2 and PB2B)
Landfilling	Stage 2A (PB 2A and Cell 2A)
Capping and Rehabilitation	Progressive Stage 1
Access Road	Construction access road G - H - I for filling of Stage 2A. Construction of access road I – J on waste during the filling of Stage 2A. Removal of access roads B - C and C - C1 located within Stage 2B-1 footprint.
Permanent Surface Water Drain	Construction drainage channel to discharge clean stormwater from northern site catchment and Stage 1 cap area off site.
Excavation of On-Site Materials	Not required
Other	Relocation of services (Telstra and Power) to along old Reddalls Road. Progressive construction of active landfill gas extraction in new waste.

Stage 2B-1 and 2B-2: Approx. 2021 – 2026 (Appendix A Figure 5 of the Landfill Master Plan)

Cell Construction	Stage 2B-2 (PB2B)
Landfilling	Stage 2B-1 (Cell2 and PB2B)
Capping and Rehabilitation	Progressive Stage 1, Stage 2A
Access Road	Construction of permanent landfill access road I - J, during capping Stage 2A. Construction of temporary access road B - K adjacent to Stage 2B. Forming access road F – B on waste during the filling of Stage 2B-1. Road surface to be constructed during/after capping.
Permanent Surface Water	Construction of perimeter drain along the edge of Stage 2A, discharged to the clean water drain along eastern cell boundary. Construction of clean drainage channel along north western and western boundary of the site.
Excavation of On-Site Materials	Complete excavation of Cell 2B prior to the construction of Stage 2B-3.
Other	Progressive construction of active landfill gas extraction in new waste.



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTES GULLY NEW LANDFILL CELL

Stage 2B-2 and 2B-3: Approx. 2026 – 2031 (Appendix A Figure 6 of the Landfill Master Plan)

Cell Construction	Stage 2B-3 (Cell 2B and PB2B)
Landfilling	Stage 2B-2 (PB2B)
Capping and Rehabilitation	Progressive Stage 1, Stage 2A, Stage 2B-1
Access Road	Removal of access road K - D located within Stage 2B-3 footprint. Construction of access road F – B for Stage 2B-3 during capping Stage 2B-1.
Permanent Surface Water	Not required
Other	Progressive construction of active landfill gas extraction in new waste.

Stage 2B-3 and 3-1: Approx. 2031 – 2035 (Appendix A Figure 7 of the Landfill Master Plan)

Cell Construction	Stage 3-1 (Cell3 and PB3)
Landfilling	Stage 2B3
Capping and Rehabilitation	Progressive Stage 1, Stage 2A, Stage 2B-1, Stage 2B-2
Access Road	Removal of access road A - B - B1 located within Stage 3-1 footprint (refer Figure 6 of Landfill Master Plan for location of access road). Construction of temporary access road H – H1 during the filling of Stage 2B-3. Removal of access road B – N at end of Stage 2B-3.
Permanent Surface Water Drain	Not required
Excavation	Excavation of borrow materials within PB3-1 footprint completed prior to the construction of Stage 3–1.
Other	Progressive construction of active landfill gas extraction in new waste. Removal of private powerlines prior to construction of Stage 3-2.

Stage 3-1 and 3-2: Approx. 2035 – 2041 (Appendix A Figure 8 of the Landfill Master Plan)

Cell Construction	Stage 3-2 (PB3)
Landfilling	Stage 3-2 (Cell3 and PB3)
Capping and Rehabilitation	Progressive Stage 1, Stage 2A, Stage 2B-1, Stage 2B-2, Stage 2B-3



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTES GULLY NEW LANDFILL CELL

Access Road	Construction of access roads A - M - N on waste during the filling of Stage 3-1 and access road G - L - H for the filling of Stage 3-2. Removal of access roads G - H and G - K located within Stage 3-2 footprint.(refer Figure 7 of Landfill Master Plan for location)
Permanent Surface Water	Connecting perimeter drain along Cell 2 boundary to the clean water channel discharged off site.
Excavation of On-Site Materials	Excavation of borrow materials within Stage 4-1 footprint completed prior to Stage 4-1 cell construction.
Others	Progressive construction of active landfill gas extraction in new waste. Relocation of leachate pond(s) prior to Cell 4 construction 2045. Downsizing of surface water pond(s) prior to leachate pond relocation.

Stage 3-2 and 4-1: Approx. 2041 – 2047 (Appendix A Figure 9 of the Landfill Master Plan)

Cell Construction	Stage 4-1 (Cell 4)
Landfilling	Stage 3-2 (PB3)
Capping and Rehabilitation	Progressive Stage 1, Stage 2A, Stage 2B-1, Stage 2B-2, Stage 2B-3, Stage 3-1, Stage 3- 2
Access Road	Construction of temporary access road Z – Z1 during the filling of Stage 3-2.
Permanent Surface Water	Construction of perimeter drain along Cell 3 and Cell 2B boundary, discharged to the existing stormwater ponds.
Excavation of On-Site Materials	Excavation of Cell 4A completed prior to Stage 4-2.
Other	Progressive construction of active landfill gas extraction in new waste.

Stage 4-1 and 4-2: Approx. 2047 – 2050 (Appendix A Figure 10 of the Landfill Master Plan)

Cell Construction	Stage 4-2 (Cell 4A)
Landfilling	Stage 4-1 (Cell 4)
Capping and Rehabilitation	Progressive Stage 1, Stage 2A, Stage 2B-1, Stage 2B-2, Stage 2B-3, Stage 3-1, Stage 3- 2
Access Road	Removal of access road (M-N-G-L) located within Stage 4-2 footprint during Cell 4A construction.
Permanent Surface Water Drain	Connecting perimeter drain along Cell 3 boundary to the clean water channel discharged off site.
Excavation of On-Site Materials	Not required



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTES GULLY NEW LANDFILL CELL

Others	Progressive construction of active landfill gas extraction in new waste.
--------	--

Stage 4-2 : Approximately 2050 – 2054 (Appendix A Figure 11 of the Landfill Master Plan)

Cell Construction	None
Landfilling	Stage 4-2
Capping and Rehabilitation	Stage 4
Access Road	Forming access road M – O and P – Q on waste during the filling of Stage 4-2. Construction of access road O – P for the filling of Stage 4-2. Completing the permanent access road for final landform during capping of Stage 4-2.
Permanent Surface Water Drain	Completing the perimeter drain around the final landform.
Excavation of On-Site Materials	Not required
Others	Not required Progressive construction of active landfill gas extraction in new waste.

3.2 Planning

WCC provided the following comment in relation to Land Use Strategy:

- 1) “..it is considered that the applicant should provide comment on Part 6 of Wollongong LEP (West Dapto) 2010 within Section 2.1.3 of the EA.”

Response

The Project addresses the objectives of Part 6 of *Wollongong LEP (West Dapto) 2010* in considering and contributing to the appropriate infrastructure for development of urban release areas. Comment on Part 6 of the LEP is provided in the last paragraph of Section 18.1 of the EA.

3.3 Design

The submission by DPI states the following in relation to the landfill liner and contingency measures:

- 1) *The Department requires more detailed information on how the design of the new landfill cells (eg. liner) and leachate pond would ensure that local water sources are not further impacted upon by leachate. Contingency measures and/or remedial actions in the event that the liner/s fail should also be detailed.*

Response

As described in Section 8.4 of the EA, cell design features to protect groundwater and surface water from leachate impacts would include measures to limit the volume of leachate generated at the Whytes Gully RRP site, barriers to leachate migration, separation of surface water and monitoring and managing the impacts.

In order to limit leachate generation, the cell capping would include a barrier to limit infiltration of water into the waste. The capping would be sloped to promote runoff. The surface water design would include measures to collect and control runoff such that clean waters are diverted away from waste filling areas.



The cell design also includes measures to protect groundwater from leachate impact such as the leachate barrier and leachate collection system. To limit impact of leachate on groundwater, the cell base liner would include a low permeability liner and a leachate collection system. Detailed discussion of these design features is provided in Section 4.0 of the Preliminary Design Report (refer to Appendix O of the EA). To provide a barrier to migration of leachate into groundwater from the leachate ponds, the existing ponds are lined with a HDPE liner, and future ponds would be lined with a composite liner.

Measures to protect surface water include separation of surface water from 'dirty' water and leachate water, such as diversion of 'clean' runoff away from disturbed areas, capture of sediment laden 'dirty' water in swale drains and diversion to the surface water ponds, and managing all surface water that falls on the exposed working face of the landfill as leachate. The staged separation of waters is described in the Draft LEMP (Appendix P of the EA).

Measures to protect surface waters from leachate impact include the separation of surface water and leachate and management of the leachate ponds. Measures to prevent overtopping of leachate ponds include the provision of freeboard and the use of shutoff valves on leachate lines to shut off flow to the ponds when capacity is reached.

Contingency measures to manage potential of leachate impact on surface waters from overtopping of the ponds are presented in Section 12.5 of the EA and include discharge directly to sewer from leachate ponds, reinjection into waste, provision of temporary 'package' treatment plants, upgrade of the treatment plant, construction of a cover over leachate ponds, trucking of leachate to sewage treatment plant for disposal and use of the old leachate ponds for contingency storage until the end of Stage 1.

Monitoring of groundwater quality and trends at the Whytes Gully RRP site is detailed in the groundwater sampling and assessment program in the Draft LEMP (Appendix P of the EA). The Draft LEMP sets out the remedial actions for liner or leachate collection system failure in Section 7.3, which comprises detection of water pollution through a sampling and assessment program, development of a groundwater assessment program in the event of a possible failure of the leachate containment system, and development of a water contamination remediation plan if groundwater contamination is confirmed by the assessment program. General options for remediation of groundwater contamination in an aquifer are also provided in Section 7.4 Water Contamination Remediation Plan of the Draft LEMP (Appendix P of the EA).

3.4 Noise

Responses to submissions relating to potential noise impacts of the Project have been arranged under the following main themes.

- Noise Criteria
- Offsite Impacts
- Mitigation

3.4.1 Noise Criteria

The DPI submission states the following in relation to noise criteria:

- 1) *The Department does not agree the use of the Interim Construction Noise Guideline (ICNG) criteria for the evaluation of the cumulative noise impacts of the project but notes that there would be an on-going component of construction noise associated with the project.*
- 2) *The Department recognises the historical use of the site which has been operating since 1983 and considers the site and its surrounds represent a rural/industrial interface.*
- 3) *The Department therefore considers that it would be more appropriate to apply the Industrial Noise Policy (INP) amenity criteria (Table 2.1) for rural residences to the project (i.e. A maximum recommended Level (11 hour) noise level of 50dBA during standard day-time hours).*



The EPA submission states the following in relation to noise criteria.

- 4) *The Noise Impact Assessment (NIA) in the Environmental Assessment includes the subject premises in the background noise monitoring, which is not in accordance with the guidance in the Industrial Noise Policy (INP). The EPA will therefore assume that the minimum background level of 30dBA applies to the surrounding residential receivers.*
- 5) *The EPA does not agree with the proponent that cumulative noise levels should be assessed against the construction noise criteria. The EPA considers that the INP applies to the entire process on site, that is both the construction and operation stages.*

Response

In response to comments 1, 2, 3 and 5 and in accordance with the recommendations of the DPI, given the historical use of the site, it is considered reasonable to adopt the suggested INP amenity daytime criteria for rural residences of 50 dB L_{Aeq} (11 hour).

It is also proposed that Wollongong City Council would enter into discussions on negotiated agreements of affected locations of the Project in accordance with Chapter 8 of the INP. Golder considers this to be a suitable planning outcome given the purpose the Project, the proposed activity (i.e. construction and operational activities overlapping and running concurrently throughout the life of the Project), the number of residences potentially affected by noise generated as a result of the Project and the potential complication in maintaining two sets of noise limits where construction and operational activities consistently occur throughout the life of the Project.

In response to comment 4, it is considered that it would be unreasonable to adopt a minimum background level of 30 dBA to all surrounding residential receivers, as all the residential receivers are also affected by other extraneous noise such as road traffic and other industrial uses in the vicinity. Furthermore a background level of 30 dBA would not be consistent with the recommended licence conditions noise limits as identified by EPA and would not be consistent with the recommended INP noise limit of 50 dB L_{Aeq} (11 hour).

3.4.2 Offsite Impacts

The submission by DPI states the following in relation to noise impacts upon the surrounding area:

- 1) *The Department needs to be satisfied that the project would achieve an acceptable acoustic environment for local residents.*
- 2) *As discussed at our on-site meeting on 21/9/2012, the Department suggests that you consult with the EPA and consider reducing the footprint of landfilled waste in Stage 4 to increase the buffer distance between N1 and reduce noise levels to comply with the INP amenity criteria. In this regard, a preferred project report which addresses this issue should be submitted to the Department as part of your response to submissions report.*

The submission by EPA states the following in relation to noise impacts:

- 3) *The cumulative (ie construction and operation) predicted noise levels at receivers N1 and N2 are significantly greater than the Project Specific Noise Level (PSNL) – up to 54 dBA at N1 and 45 dBA at N2. The proponent has not provided any description of feasible and reasonable mitigation measures to reduce the predicted levels. The EPA advises that it does not normally Licence to levels significantly greater than the PSNLs.-*
- 4) *The EPA has not included receivers N1 and N2 in the noise limits table in the attached recommended licence conditions, on the assumption that Planning will advise the proponent that the negotiated agreements process in Chapter 8 of the INP is available to them, and that Planning will require the proponent to provide evidence of negotiated agreements being in place with N1 and N2 before any Project Approval can be issued.*

The submission by Asciano identified:



- 5) *Proposed activities associated with the construction & operation of the project generate noise the (sic) amenity of the surrounding area.*

Response

In response to comments 1, 2 and 3, to further reduce the potential cumulative effects of the construction and operational activities at Receiver N1, the final Stage (4-2) of the Project has been broken into two parts (Stage 4-2A and Stage 4-2B) (refer Figure 1). Stage 4-2B would be the final stage of the Project to be constructed. The division of the stages as shown in Figure 1 is such that all activity up to and including Stage 4-2A occurs behind the existing north-east ridgeline, and at a greater distance from Receiver N1 than for Stage 4-2B (refer Figures 2). It is proposed that approval of Stage 4-2B would be conditional on further noise modelling and assessment of mitigation measures to be conducted prior to construction. This has been reflected in the revised draft Statement of Commitments in Section 5.0 of the Report. Further details of the revised staging including proposed volumes and timelines are provided in Section 4.0 of the Report.

The breaking of Stage 4-2 into two parts allows a greater level of detail in modelling the level and duration of noise exposure to Receiver N1. The reduced duration of exposure is discussed in Section 4.0, and shows that for construction and operation activity nearest to Receiver N1 (in Stage 4-2B) is approximately six years, which is less than the nine years presented in the EA for the whole of Stage 4-2.

The assumptions adopted in the NIA report have been used in predicting the noise associated with the construction and operational activities for Stage 4-2A. Table 3 below sets out the predicted Stage 4-2A construction noise levels at Receiver N1, taking into account site layout, distance separation, screening from existing topography and ground and atmospheric absorption, without the implementation of any mitigation measures except that all plant and equipment are assumed to be fitted with appropriate silencers and broadband reversing alarms.

Table 3: Predicted construction noise levels (dB L_{Aeq}) – plant and equipment located within Stage 4-2A

Receivers	Stage 4-2A
N1	37

Similarly, Table 4 sets out the predicted Stages 4-2A operational noise levels at Receiver N1, taking into account site layout, distance separation, screening from existing topography and ground and atmospheric absorption, without the implementation of any mitigation measures except that all plant and equipment are assumed to be fitted with appropriate silencers and broadband reversing alarms. In accordance with the recommendations of the DPI, given the historical use of the site, the INP amenity daytime criteria for rural residences is considered to be the applicable criteria for the Project.

Table 4: Predicted operational noise levels (dB L_{Aeq}) – plant and equipment located within Stage 4-2A

Receivers	INP Amenity Criteria (L _{Aeq, 11-hour})	Stage 4-2A
N1	50	45

Noise from the operational activities is predicted to comply with the INP amenity limit at Receiver N1 during all operation phases. By breaking down the staging of the landfill and considering Stage 4-2B separately, the predicted operational noise levels at N1 have been reduced by 9 dB(A) to 45 dB L_{Aeq}.

It should also be noted that the predicted noise levels are considered to be conservative as all plant and equipment have been assumed to operate concurrently and continuously on the Project site, which is unlikely to be the case under normal operational conditions.

As discussed in section 6.1.2 of the NIA report, construction and operational activities are expected to be undertaken concurrently at the Whytes Gully RRP. To assess the cumulative effects of the construction and operational activities, all the plant and equipment are assumed to operate simultaneously and continuously. Table 5 sets out the cumulative predicted Stage 4-2A noise levels at the closest receivers to the proposed



Project assuming all plant and equipment are located at the northern part of each stage (i.e. closest to the Receiver N1).

Table 5: Predicted cumulative noise levels (dB L_{Aeq}) – plant and equipment located within Stage 4-2A

Receivers	INP Amenity Criteria (L _{Aeq, 11-hour})	Stage 4-2A
N1	50	47

By breaking down the staging of the landfill, compliance of the construction noise criteria are predicted at N1 and during stage 4-2A when all plant and equipment are located at the northern part of each stage. This assessment indicates that based on the information currently available, that “highly noise affected” levels are not expected at any residential receivers and therefore respite periods are not proposed.

Over the life of the landfill receiver noise levels will vary over the range of the predicted levels depending upon the relative locations of plant and equipment. In addition, at other times when the plant and equipment are further from the receivers, lower noise levels are predicted.

In response to comment 4, as identified within the NIA and the draft statement of commitments within the EA, it is proposed that Wollongong City Council enter into discussions on negotiated agreements of affected locations of the Project in accordance with Chapter 8 of the INP.

In response to comment 5, it is considered that the noise impacts of construction and operation of the Project upon the amenity of the surrounding area has been assessed appropriately within the Report and the EA including the Noise Impact Assessment report located in Appendix D of the EA.

3.4.3 Mitigation

The submission by DPI states the following in relation to noise impacts:

- 1) *The Department needs to be satisfied that all reasonable and feasible noise management and mitigation measures have been implemented to minimise noise impacts on surrounding receivers (eg. committing to the installation of 'smart alarms' on equipment once replaced).*

The submission by DPI states the following in relation to noise impacts:

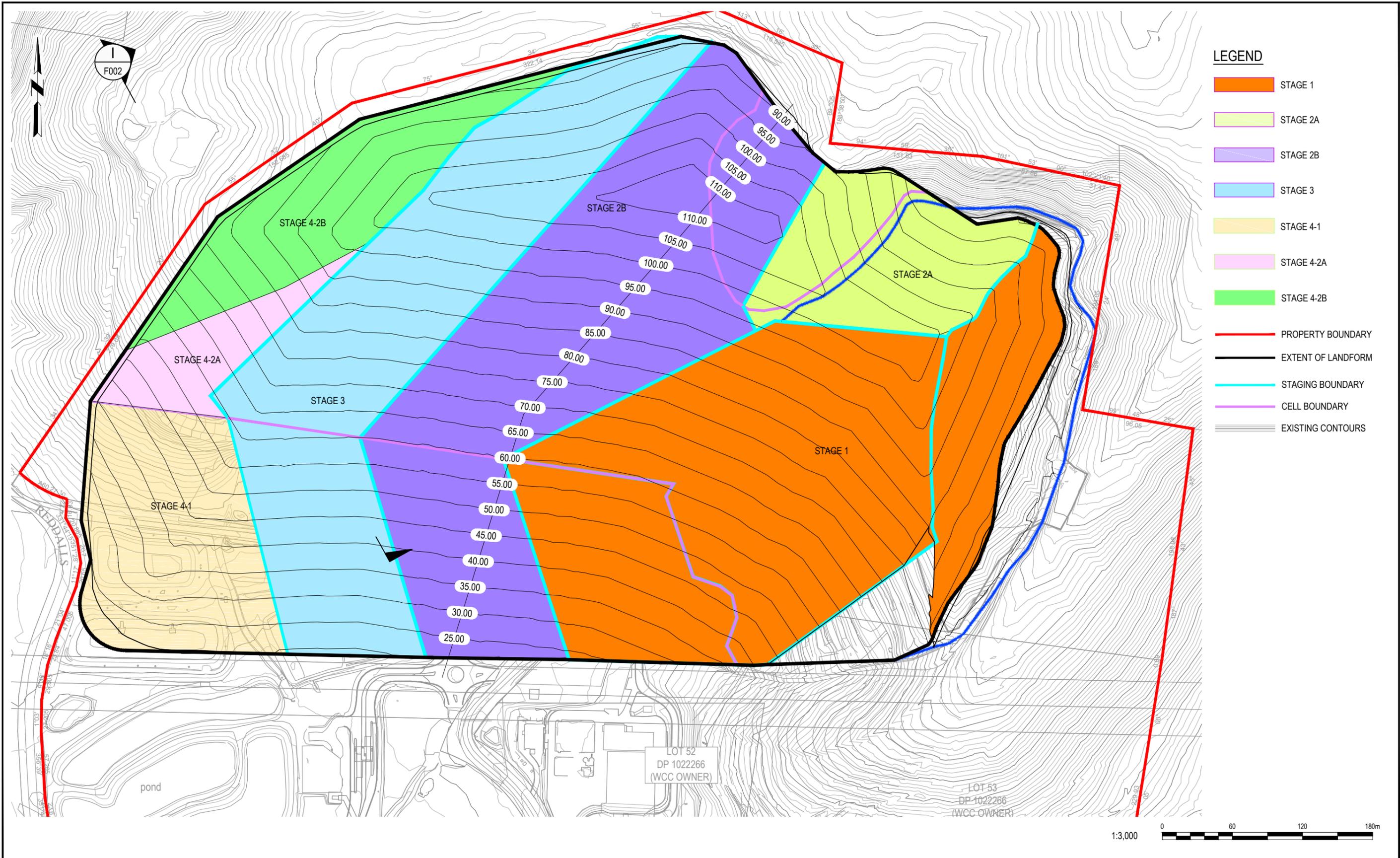
- 2) *The EPA has recommended noise limits for receivers N3 to N5 based on the predicted cumulative noise levels in Tables 15 and 16 in the NIA. Where the levels are more than 2dBA above the PSNLs, the EPA recommends that the proponent implement a noise management plan (NMP) to minimize noise from the site over the life of the landfill. The EPA does not and will not approve or endorse a NMP and does not need to review such a plan.*

Response

The proposed splitting of Stage 4-2 of the Project into Stage 4-2A and 4-2B has reduced the construction and operation noise levels at Receiver N1 to below their respective calculated noise limits (refer modelling results in Table 3 to Table 5). In addition mitigation measures have been incorporated to reduce the noise generated by the Project upon the site and surrounding area. This includes the fitting of all plant and equipment with appropriate silencers and broadband reversing alarms.

WCC are committed to reducing noise limits of the Project and propose to draft and implement a noise management plan to manage noise generated at the Whytes Gully RRP site over the life of the proposed Project.

© GOLDER ASSOCIATES PTY. LTD. INFORMATION CONTAINED ON THIS DRAWING IS THE COPYRIGHT OF GOLDER ASSOCIATES PTY. LTD. UNAUTHORISED USE OR REPRODUCTION OF THIS PLAN EITHER WHOLLY OR IN PART WITHOUT WRITTEN PERMISSION INFRINGES COPYRIGHT.



 www.golder.com GOLDER ASSOCIATES PTY. LTD.	CLIENT WOLLONGONG CITY COUNCIL		PROJECT PRELIMINARY CONCEPT - WHYTES GULLY LANDFILL				
	DRAWN BY EJ JEET	DATE 18 DEC 2012	DRAWING TITLE Revised Staging Plan				
	CHECKED BY K DOHLE	DATE 18 DEC 2012					
	SCALE 1:3,000	SHEET SIZE A3	PROJECT No 117625003	DOC No 207	DOC TYPE R	FIGURE No F001	REVISION 0



3.5 Greenhouse Gas

The submission from Asciano commented that “a high level of greenhouse gas may be generated as a result of this project”.

Response

The greenhouse gas impact is assessed in Chapter 11 of the EA.

Estimated peak Project annual net emissions of greenhouse gas (in 2053) are less than 0.03 percent of the NSW total state emissions (based on 2009 data). Energy efficiency mitigation measures for the Project include reduced emissions from increased resource recovery and recycling, and capture and combustion of landfill gas.

3.6 Contamination

The submission from Asciano identified potential issues associated with contamination.

Response

The contamination impacts in relation to soil, groundwater and surface water are assessed in Chapter 12 of the EA. As a part of the EA, groundwater and surface water sampling and analysis was conducted and sampling, field screening and laboratory analysis of pond sediments and surface soils was undertaken.

3.7 Groundwater

Reponses to submissions have been arranged under the following main themes:

- Groundwater Beneficial Uses
- Groundwater Dependent Ecosystems
- Licences
- Use of Historical Data
- Water Quality Analytical Results
- Interpretation of Borehole core samples
- Impact on Dapto Creek and Groundwater Quality

3.7.1 Groundwater Beneficial Uses

The submission by DPI states the following in relation to groundwater beneficial reuse:

- *Section 12.2.2 of the environmental assessment (EA) states there is a “moratorium on new entitlements under the Greater Metropolitan Water Sharing Plan” (pages 159, volume 1). Under the Water Sharing Plan (WSP), entitlements will be released in the future under a controlled allocation order. The mechanism for controlled allocation is yet to be communicated by the NSW government but there is a not a moratorium on new entitlements.*

Response

The correction is noted. The original advice was based on a phone conversation with Office of Water when the hydrogeological assessment was being prepared. The description should have read “no new entitlements are currently being granted under the Water Act 1912, pending commencement of the Greater Metropolitan Water Sharing Plan”.



3.7.2 Groundwater Dependent Ecosystems

The submission by DPI states the following in relation to groundwater dependent ecosystems:

- 1) *The EA provides insufficient details on Groundwater Dependent Ecosystems (GDEs) to assess the potential impact of the proposal on GDEs. Section 12.2.2 of the EA indicates a number of actions have been undertaken to assess the potential presence of high value GDE's in the vicinity of the site. The EA notes the actions include a review of high value GOEs presented in the WSP for the Greater Metropolitan Region and the review found there are no known high value GOEs within at least 10 km of the site (page 159). The section on GDE's contradicts with the Groundwater Beneficial Uses section which indicates Dapto Creek "may receive baseflow from groundwater in the alluvial deposits" (page 159).*
- 2) *The assessment of GDEs should not be limited to high value GDEs. The EA should have given consideration to all GDEs that may occur at the local scale. There is a strong likelihood that GDEs occur downstream of the site in association with surface water flow. The EA needs to demonstrate a sound understanding of surface water and groundwater interaction particularly as Dapto Creek is located down gradient of the site and may receive baseflow from groundwater. An assessment at the local scale needs to be undertaken in the surrounding area.*

The submission by NOW states the following in relation to groundwater dependent ecosystems:

- 3) *The 14th dot point under Flora and Fauna (page 256) to extend the current water quality monitoring program on Dapto Creek should reflect that there is to be a combined surface water and groundwater monitoring program to gain an understanding of surface water and groundwater interaction and to assess potential impacts on the downstream environment including Dapto Creek and GDEs.*

Response

Dapto Creek and its minor tributaries are the only natural surface water courses located close enough to the site to be reasonably considered as a potential receiving environment for discharge of shallow groundwater from the site. The depth to the water table as measured in the shallow boundary monitoring wells located close to Dapto Creek is approximately 3m below ground level, however the creek bed elevation is currently not known so a comparison of water table elevation to creek bed elevation (as a rough indicator of potential for surface water – groundwater interaction) could not be made. This would be assessed in the future for future assessment of impact on Dapto Creek.

There are considered to be a sufficient number of shallow monitoring wells installed along the south-western (downgradient) boundary of the site to identify groundwater quality issues along the downgradient site boundary, and surface water quality is monitored from Dapto Creek upstream and downstream from the landfill such that potential correlations can be made between shallow groundwater and creek water quality.

It is confirmed there is to be a combined surface water and groundwater monitoring program to gain an understanding of surface water and groundwater interaction and to assess potential impacts on the downstream environment including Dapto Creek and GDEs. Refer revised draft statement of commitments Section 5.0.

3.7.3 Licences

The submission by DPI states the following in relation to licences:

- 1) *Table 2.1 in the EA notes the project would involve the installation of bores on the site to enable monitoring of groundwater quality (page 18). The table notes licences as prescribed under Section 112 have been received. The licences may be subject to a conversion process to convert them to Water Management Act authorisation.*



Response

It is noted that if additional wells are required as a consent condition to the Project approval, that the wells may qualify as exempt bores within the meaning of CI 3 and CI 36(1)(c) of the Water Management (General) Regulation 2011, and therefore not require a water supply works approval.

3.7.4 Use of Historical Data

The submission by WCC states the following in relation to use of historical data:

- 1) *In relation to the impact of tip leachate on surface and groundwater contamination, the entire document is based on the results of three sampling events conducted during August 2011, November 2011 and January 2012. However, a reliable and solid data base reflecting nearly 20 years of data collection is available with Wollongong Council Waste Management Services. The Council database reflects fluctuation in leachate composition, surface water, and groundwater chemistry in extreme weather conditions over an extended period of time interval.*
- 2) *Since the early 1990's, the Whytes Gully waste disposal depot was operating under an EPA licence. Under the licence requirements, leachate, surface water, groundwater samples were collected regularly and analysed by NATA accredited analytical laboratories. In the opinion of Council's Environment Section, the information from this data base should have been assessed and used for the design of future cells at Whytes Gully.*

Response

During the preparation of the hydrogeological assessment, multiple requests were made with WCC for access to all available environmental monitoring data associated with Whytes Gully RRP. A number of older investigation reports were made available dating back to 1981, as described under "Summary of Previous Hydrogeological Investigations" (refer Section 12.2.2 of the EA and Section 2.5 of Appendix G3 of the EA). In addition, a spreadsheet of groundwater monitoring results dating back to 1996 was reviewed, which included:

- pH and ammonia results for two wells (1 and 3) between 1996 and 2003;
- pH and ammonia results for five wells (1, 3, 4a, 5a, 6a) from 2004 to 2009; and
- pH, ammonia, major ions, TDS and TOC for eight wells (1, 3, 4, 5, 6, 4a, 5a, 6a) from 2009 to 2011.

Using pH and ammonia concentrations as a proxy for leachate impact assessment, the average pH values during this monitoring period ranged from 6.2 to 7.0, and the average ammonia concentrations ranged from 0.05 to 0.7 mg/L (based on detect ammonia concentrations only; approximately 50% of the ammonia analyses were below the laboratory limit of reporting). Only nine of the 461 ammonia results were above the ANZECC (2000) criterion of 0.91 mg/L (not adjusted for pH), and in each case were discrete spikes in the monitoring record.

While the previous monitoring data were considered, well construction details were not available for the monitoring network and therefore the data were not extensively relied upon for interpretive purposes. It is noted that the monitoring wells installed as part of the new cell design investigation provide more extensive spatial coverage than the previous monitoring network. Some of the new well locations represent similar locations to the previous wells, and the analytical results from these wells are consistent with the historical data set. Hence the conclusions regarding the local hydrogeological setting and groundwater quality in the hydrogeological assessment are consistent with the historical monitoring data.

With isolated exceptions, groundwater monitoring between August 2011 and August 2012 has confirmed these results.

3.7.5 Water Quality Analytical Results

The submission by WCC states the following in relation to water quality analytical results:



- 1) *In various chapters and sections of the report (volume 1, page 158, table 12.3, volume 2, appendix G, page 48, table 22, volume 2, appendix G3) the ammonia concentration of the leachate is reported as 0.69 mg/L., while long term data indicates that the ammonia concentrations in the Whytes Gully leachate is well over 100 to 150 mg/L. Fluctuations in ammonia concentrations up to 280 mg/L was also recorded, depending on weather conditions.*
- 2) *In the Fauna and Flora report prepared by Biosis (volume 2, page 140, and table 12, appendix S) inaccurate data reporting was also observed. A conductivity of 0.1 us/cm in the Whytes Gully stormwater pond is reported. The conductivity of the stormwater pond is usually over 400 to 470 uS/cm. Whilst it is noted that this inaccuracy would have no great bearing on interpretation of the habitat value, it should be further reviewed to ensure that the reported values are correct and not contradictory to other values reported in the other chapters of the document.*

Response

The reported leachate ammonia concentration of 0.69 mg/L, for a leachate pond influent sample collected in December 2011, was identified as being unusual at the time; however the result was verified by the laboratory and was reported as it appeared on the laboratory report. It is still considered that this may have been an analytical or transcription error on the lab report, and should probably have been qualified as such in the report. However more extensive leachate monitoring data was not made available until after the completion of the hydrogeological assessment. The leachate monitoring data indicate ammonia concentrations closer to the expected range (over 1000 mg/L ammonia-N). Whilst it would have been preferable to include this data in the assessment, it does not affect the conclusions of the hydrogeological assessment as the impact assessment focused primarily on shallow and deep groundwater across the site as an indication of historical leachate impact, and potential groundwater exposure pathways in the event of future leachate impacts.

The Biosis report represented the only available recent water quality data for Dapto Creek at the time of preparation of the hydrogeological assessment, which was important for comparison to previous results reported in a regional surface water quality study (Beardsmore and Ganjayia, 2006). The unusually low EC value reported in the Biosis is noted, but as mentioned does not have a material impact on the assessment results as EC was only one of nine leachate indicator parameters considered during review of the surface water quality data.

The data set in the hydrogeological assessment was subject to a data validation process and multiple levels of peer review. Whilst the unusual leachate ammonia concentration was correctly challenged, it was reported as it appeared in the laboratory report. We are confident that this does not reflect a systematic data reporting error throughout the hydrogeological assessment.

3.7.6 Interpretation of Borehole core samples

The submission by WCC states the following in relation to interpretation of the boreholes:

- 1) *In the current study, 13 newly drilled bores were cored and the photographs of the core samples show signs of discoloration along the fractures and joints. This discoloration often results from vertical movement of leachate or contaminated water toward the deeper horizons. In the early 1990s, when the eastern gully waste cell was under construction, the core samples extracted from the bed of the gully were examined by a UoW Honours student and the samples from the discoloured joints were analysed using XRF. Analytical results confirmed the impact of the leachate in the joints. In the current report, discoloration along the joints and fractures is observable in BH01 (1 - 4m depth), BH03 (12m depth), BH OS (13m depth), GWM 101 (in 4-7 m interval) GWM 103 (5-7 m interval) ... etc.*

The comment is noted. Whilst discoloration in fractures can potentially be an indication of contamination, it is also commonly associated with natural mineral deposits related to the water-rock interactions. In particular, orange iron-stained fractures are very commonly encountered in water bearing fractures in areas of little or no contamination potential, simply from oxidation of iron-bearing minerals in the rock matrix.

In addition, if the staining in the fractures from the well installation cores was attributable to the presence of landfill leachate, then it should have been detected in the groundwater samples collected from those wells.



Staining in fractures was one of the criteria for deciding where to set the well screens (as an indicator of potential water-bearing fracture zones), hence the fractures in question would be represented in the monitoring data. With minor exceptions, limited evidence of leachate impact to groundwater was noted at the site.

3.7.7 Impact on Dapto Creek and Groundwater Quality

The WCC submission states the following in relation to impacts on Dapto Creek:

- 1) *Water quality monitoring conducted by Wollongong City Council in Dapto Creek just downstream of the Whytes Gully stormwater detention pond has revealed high concentrations of nitrogen species, especially ammonia. Water quality data from borehole GMW09D indicated high levels of ammonia and nitrogen species. Information from this borehole indicated that the contaminated groundwater from Whytes Gully is discharging into the Dapto Creek. Lake Illawarra's receiving waterbody is a nitrogen limited system, discharge of nitrogen rich groundwater is potentially detrimental to the water quality of the lake. Interception of polluted groundwater through a permeable reactive barrier at the down gradient of ground water flow can reduce the negative impacts on the water quality Lake Illawarra.*

The DPI submission states the following in relation to impacts on Groundwater Quality:

- 2) *It is evident to the Department from past environmental performance monitoring and information provided by Wollongong City Council that groundwater quality at the site may have been impacted upon by leachate from previous landfilling activities.*
- 3) *Given the above, the Department wishes to understand what (if any) remedial actions have occurred (or are planned) to explore and/or rectify the potential groundwater leachate contamination issue at the site?*

The Sydney Water submission states the following in relation to impacts on Groundwater Quality:

- 4) *The proponent should enquire through the Environmental Protection Authority and take appropriate precautions to manage contamination. In addition, they should protect all Sydney Water infrastructure affected by their development including taking any precautions to protect our infrastructure from all potential contamination issues, including acidic groundwater.*

Response

Isolated cases of leachate impact to groundwater were noted in certain historical reports for the site (e.g. WCC, 1991; Maunsell, 1992), which were generally "one-off" results reported for samples collected from boreholes or temporary wells later destroyed during cell development.

Recent groundwater baseline monitoring results from the current robust monitoring network, as well as the monitoring data available from WCC since 1996 indicates very limited evidence of leachate impact to groundwater at the site.

An elevated ammonia concentration has been reported for shallow boundary monitoring well MW109S during the recent groundwater monitoring program (August 2011 to August 2012). The source of the ammonia is uncertain as it does not appear in any other wells in the monitoring network, including wells located upgradient from MW109S, and is not characteristic of water quality in the stormwater pond adjacent to the well. It is noted that MW109S is located close to a sewer main in the Reddalls Rd alignment, which could be a possible alternative source of contamination.

Irrespective of the source, it is noted that recent baseline surface water quality monitoring in Dapto Creek both upstream and downstream of MW109S, carried out in conjunction with the groundwater monitoring, has not indicated an increasing (or even elevated) ammonia concentration, which suggests that the creek is not being adversely affected by the presence of elevated ammonia concentrations in shallow groundwater adjacent to the creek. The issue would be considered further in the annual evaluation of the baseline monitoring data.



Based on review of the groundwater quality monitoring results for the past 15 years, and especially the recent detailed monitoring, there is limited evidence to suggest significant leachate impact to groundwater has occurred at the site. Isolated cases of elevated leachate-indicator parameters have been noted at specific wells, and would be considered further in the annual review of the baseline monitoring results. It would be premature to consider remedial action at this stage.

3.8 Surface Water, Drainage and Flooding

The response to surface water and flooding comments has been arranged by the following main themes:

- Floodplain risk management
- Flood impact
- Catchment Area
- Drainage
- Surface water management
- Surface water pond sizing
- Surface Water pond reconfiguration

3.8.1 Flood Impact

The submission by OEH states the following in relation to flood impacts:

- 1) *With regard to floodplain risk management, the proposal should be considered in accordance with the NSW Government's Flood Prone Land Policy as set out in the Floodplain Development Manual, 2005 as areas of the project are located on a floodplain with the potential to be adversely affected by or to impact on flooding in the catchment. Consideration should be given to the impact of flooding on the proposal, the impact of the proposal on flood behaviour and the impact flooding to the safety of people over the full range of possible floods up to the probable maximum flood.*
- 2) *OEH notes the EA has limited its consideration to the impact of flooding to the 1% AEP event. While flooding has been identified in the EA as a 'Potential Hazardous Scenario' (vol.1, p.234), it is unclear whether adequate consideration has been made to issues associated with the impacts of flooding (and associated risks) over the full range of potential floods. Issues relating to the integrity of the water treatment ponds (i.e. risk of failure or overtopping), hydrologic impacts, flood damages and environmental risks of floods exceeding the design event on water quality. In addition, major flooding may restrict access to and from the site potentially affecting operational management during a flood event and the safety of people on site. These issues are potentially compounded if flooding causes a loss power and/or communications.*

The submission by WCC states the following in relation to flood impacts:

- 3) *The methodology used to determine the Permissible Site Discharge (PSD) and Site Storage Requirement (SSR) values for catchments larger than 2 ha need to be determined using pre and post development runoff routing analysis, inclusive of any existing on-site detention storage (OSD) on site.*
- 4) *The PSD/SSR calculations use a pre development impervious area percentage of 20% (based on a land use of Public Recreation Area). As the nature of the pre development catchment is known, the actual pre development impervious area should be used in this instance. This should be reflected in the pre-development runoff routing modelling used to determine the site PSD/SSR values (as above)*
- 5) *Runoff routing modelling should be undertaken for each stage of the development (including final landform) demonstrating that the total site discharge to Dapto Creek including OSD bypass flows will not exceed the PSD values. The modelling for each stage must take into account any additional*



impervious area and changes to the hydrology of the catchment, including increases in surface stormwater generation resulting from the infiltration barrier in the capping profile.

The submission by Asciano states the following in relation to flood impacts:

- 6) *Contribution and adverse impact upon local flooding of the site and surrounding area. The Whytes Gully surface water ponds drain into a creek that crosses the Autocare site. If flooding occurs:*
- *What is the impact on our site?*
 - *What measures will be in place to minimise the flood risk?*
 - *Key concerns: (i) Vehicle water damaged due to flooding. (ii) facility may need to resurface vehicle storage areas due to flooding (iii) repair facility fencing (electric) due to flooding.*

Response

Subsequent to submission of the EA an extension to the Mullet Creek, West Dapto flood model has been made available in the form of the Bewsher Consulting Pty Ltd report (Bewsher 2011). Based on this report, and in particular the revised 100 year ARI flood levels, flood water appears to have been generated on the existing Whytes Gully landfill site. The depth of water shown on the Bewsher model plans shows that the water upstream of the Reddall's road is significantly greater than the depth downstream (by more than several meters), suggesting that the model is showing flood water on site is not caused by backwater., suggesting that flood water is overtopping Reddalls Road before discharging into Dapto Creek (refer Figure 3). This is opposed to the 100 year floodplain reaching the Whytes Gully RRP and inundating the site with flood water.

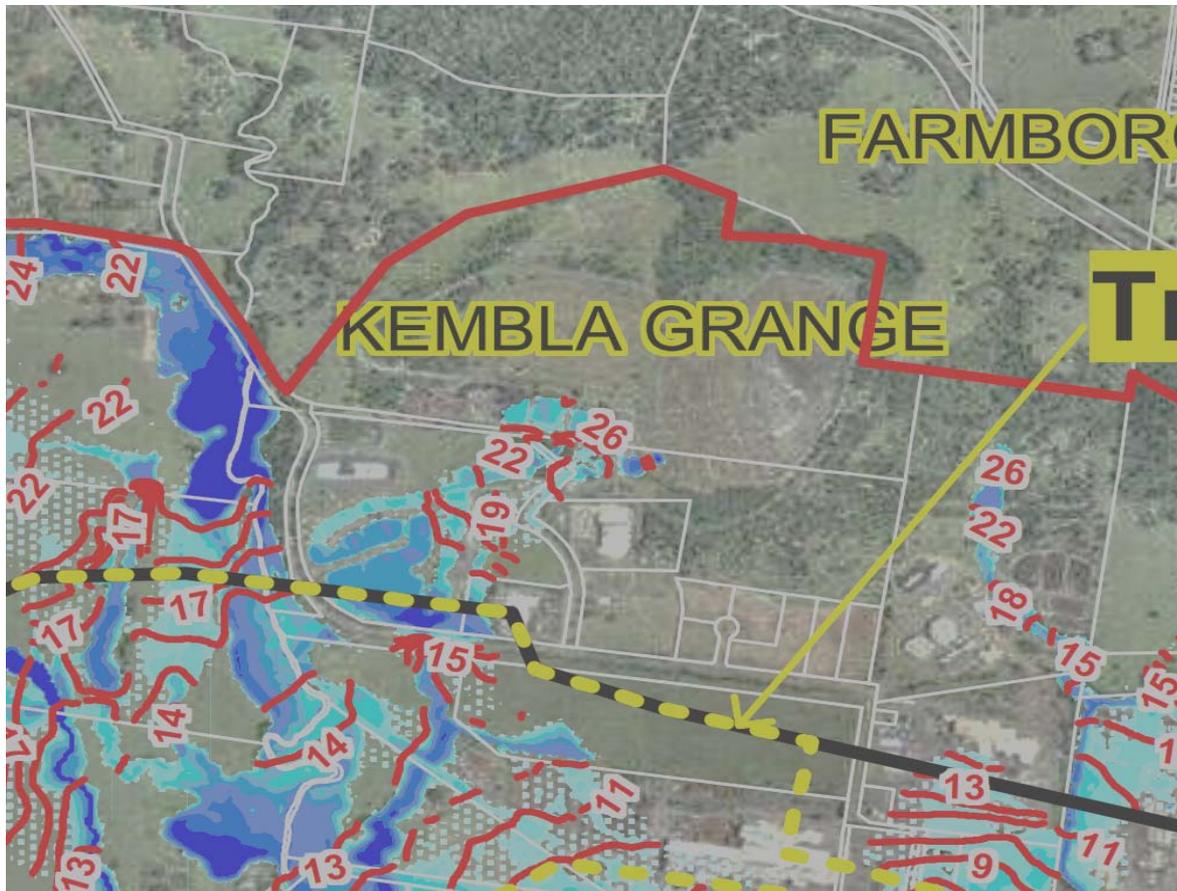


Figure 3: An extract from Bewsher's extended flood model (figure 7) completed December 2011



It is therefore our opinion that the culverts under the Reddalls Road have not been modelled within Bewsher's extended flood model as these would be classed as minor structures for the intent of the overall model. To confirm whether or not the existing landfill site is within the 100 year floodplain (as shown on the Bewsher model), a runoff routing analysis was completed to include the culverts under Reddalls Road. The results from this analysis have been presented in the Surface Water Routing and Flood Analysis Report (Golder 2012) in Appendix A of this Report.

In summary, it is believed that flood water from the 100 year event would not reach the site and therefore not impact the proposal, and therefore affect the integrity of the ponds or human safety.

A pre-development runoff routing analysis has been completed. A summary of pre-development PSD results have been listed in Table 1 below which have been modelled going through the twin 2500 mm diameter culverts under Reddalls Road before discharging into Dapto Creek.

Table 6: Summary of pre-development PSD values

ARI	PSD (m ³ /s)
5 yr. Minor (2 hour critical storm)	7.04
100 yr. Major (2 hour critical storm)	18.1

The philosophy for the post-development runoff from site is to mimic to that of the pre-development runoff, therefore it is envisaged that there would not be a change to the existing flood behaviour. The runoff from site would be managed onsite through the attenuation of flows using storage ponds and outflow controls (i.e. orifices and high level spill ways) throughout the construction of the landfill to ensure that that PSD's would not be exceeded. It is proposed that all post development runoff would be restricted to the existing runoff for the 5 year and 100 year ARI critical storm in accordance with WCC DCP chapter E14 (WCC 2004).

A runoff routing analysis would be completed as part of the detailed design for each stage of the Project and would be presented within the detailed design report for each Stage of the landfill development. The post-development peak flow rates off site would be restricted to the pre-development PSD rates. Therefore the proposed works would not affect downstream flood behaviour and human safety.

3.8.2 Catchment Area

The submission by WCC states the following in relation to catchment area:

- 1) *The information submitted with the development indicates that the catchment area of the site is approximately 50 ha. However, based on Council's ALS contour data it appears that the total site catchment area (incl. surface water ponds) is in excess of 60 ha. A catchment plan should be provided showing the total catchment area and sub-catchment breakdown for pre development conditions and each respective stage of the development (including landform).*

Response

The submission by WCC notes that the total site catchment in is in excess of the 60 ha; 10 ha greater than the area given in the EA. The additional 10 ha consists of land unaffected by the development of the new landfill cell. This additional 10 ha is located to the south of the landfill catchment, labelled as Area 10 on Figure 1 (Existing Catchment Boundaries and Surface Water Management).. This area would remain undisturbed and the water would continue to be conveyed offsite via existing controls.

3.8.2.1 Drainage structure design

The WCC submission states the following in relation to drainage structure design:

- 1) *The surface drainage for the landfill area (i.e. bench and drop structures) should have sufficient capacity to convey a 100 year ARI storm event in a controlled manner without scouring or eroding the landfill surface. It is unclear whether these drains achieve this.*



- 2) *The documentation provided with the application indicates that a 2 hour duration storm has been used to size the drainage system. However, this may not be the critical storm duration for all parts of the surface water drainage network. Where the contributing catchment area is small, shorter storm durations may produce higher localised peak flows. The critical storm duration at each location in the drainage network should be used to size the drainage system.*
- 3) *The proposed grassed surface drains are contrary to section 10.3.6 of chapter E14 of the Wollongong DCP2009. Side slopes of grassed channels should be relatively flat for safe access/maintenance purposes. The desirable batter slope must not be greater than 1 vertical to 6 horizontal. However in difficult circumstances a 1 vertical to 4 horizontal may be considered.*

Response

Drainage details provided to date have been designed for up to a 100 year storm event (refer to section 4.4.1.2 of the EA appendix G4) including the benching and drop structures.

With respect to the comment on use of a 2 hour storm duration, it has been noted that other storm durations could present themselves as a critical duration for each catchment area. Critical duration would be ascertained as part of detailed design for each Stage of the Project.

The design criteria for the grassed channels have been noted and the channel sections would be updated to suit as part of the detailed design for each Stage of the Project.

3.8.3 Surface Water Pond Design

The submission by DPI states the following in relation to stormwater pond size:

- 1) *The Department notes from the EA that the existing surface water ponds would be used to capture sediment laden water for stages 1 to 3 of the project and would have a storage volume of 29,000 m³. The Department wishes to clarify whether the existing sediment ponds would be able to contain up to a 100 year ARI peak flow event and/or satisfy Council's DCP (or Landcom's Bluebook) requirements for Permissible Site Discharge values and Site Storage Requirements*

Response

The volume of the surface water ponds is 40,000 m³, of which 29,000 m³ is provided for sediment storage in accordance with the Blue Book (Landcom) methodology. This pond volume will be sufficient to hold a 100 yr ARI storm event.

It is proposed that the existing ponds are maintained to be able to contain a 5 day duration (90th percentile) rainfall depth in accordance with the Landcom Blue book. The offsite discharge from site would be restricted to the WCC DCP requirements for PSD and SSR for a minor storm 5 yr ARI and major storm 100 yr ARI.

3.8.4 Surface Water Management

The submission by DPI states the following in relation to surface water management:

- 1) *Department requires more information on how clean, dirty and waste affected (leachate) surface water would be separated at all stages of the project to prevent cross contamination. A figure similar to drawing 'D051' (Appendix A of Appendix O) with more labels may be useful in illustrating how bunds, swales, drains and other diversion devices are currently (and would be) used to keep water sources separate.*
- 2) *The Department also requires more information on how 'dirty' surface water that has not come into contact with waste (i.e. not considered leachate) is currently (and would be) managed and treated before discharging to Dapto Creek (including frequency of discharge) at all stages of the project in accordance with the relevant guidelines (i.e. for both treatment and water quality).*
- 3) *It is unclear if the proposed 'clean drain' to be constructed at the end of Stage 2B to bypass the sediment ponds and discharge directly to Dapto Creek would be able to convey a 100 year ARI storm event in a controlled manner. Further, it is unclear if it is proposed to solely use this drain to discharge*



the entire anticipated 30 hectare 'clean' catchment by stage 4. Measures to monitor the quality of this surface water from 2 B and beyond prior to discharging into Dapto Creek should be detailed.

- 4) *Clean & Dirty (sediment laden) stormwater leaving the site may not meet discharge criteria. Flows are discharged at a rate that do not protect downstream environments.*

The submission by Asciano states the following in relation to surface water management:

- 5) *Patrick AutoCare require confirmation that the creek that flows from the landfill site across our facility will not fill with sediments over time. Given our site is downhill from the landfill, we need assurance that sediment or dirty water will be controlled in such a manner that will not impact our facility.*

Response

Management and separation of surface waters is described in Section 7.3.2 of the of the EA. Surface water is described as either "clean", "dirty" or "leachate" as follows:

- "clean" stormwater: runoff from areas of the site where soil and vegetation have not been disturbed or vegetation has been established is considered to be "clean";
- "dirty" stormwater: runoff from areas of the site where soils have been disturbed and are likely to generate sediment are considered to be "dirty", including areas of intermediate cover or areas of final capping that have not yet been vegetated; and
- "leachate": comprises runoff from areas of waste or daily cover material as well as leachate generated by the landfill.

Existing and future management of "dirty" stormwater throughout the stages of the Project is described in the Draft LEMP (refer Section 7.2.3 in Appendix P of the EA). The existing catchment boundaries and surface water management is shown in Figure 4. Stormwater runoff is captured in swale drains and directed to the surface water treatment system comprising a series of reed beds and surface water polishing ponds. Discharge of the ponds is to Dapto Creek. Details of how 'dirty' surface water is managed prior to discharge to Dapto Creek throughout Project staging are also provided in Section 7.2.3 of Appendix P of the EA.

Drawing D051 showing the surface water management concept has been revised to provide clearer annotation of the separation of clean and dirty water throughout each stage construction. For the separation of leachate at each stage refer to drawing D041 (Leachate Collection System) located in Appendix O of the EA.

The proposal is to convey the entire 30 ha clean catchment (once the 30 ha catchment has been fully capped) off site, via the 'clean' drain. This drain would be used solely for this purpose. This drain would be designed for up to a 100 year ARI.

The outfall for this drain, in combination with the outfall from the treated water from the sediment ponds, would be restricted to PSD restrictions at the Dapto Creek outfall as per the WCC's DCP requirements for a 5 year ARI minor storm and 100 year ARI major storm.

Water quality monitoring would be conducted before and/or after the clean drain is constructed in accordance with the site management plan to ensure water quality criterion have been met in accordance with the EPL licence. Surface water monitoring would be taking place throughout the construction and operation of the landfill site to ensure sediment laden surface water is kept below permissible criteria (refer draft LEMP in Appendix P of the EA).

Sediment migration would be managed on site through the use of erosion controls and sediment ponds to collect migrating silts prior to discharging off site (refer draft LEMP in Appendix P of the EA).

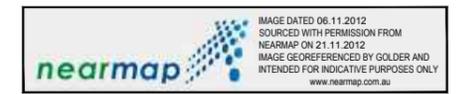
© GOLDER ASSOCIATES PTY. LTD. INFORMATION CONTAINED ON THIS DRAWING IS THE COPYRIGHT OF GOLDER ASSOCIATES PTY. LTD. UNAUTHORISED USE OR REPRODUCTION OF THIS PLAN EITHER WHOLLY OR IN PART WITHOUT WRITTEN PERMISSION INFRINGES COPYRIGHT.



LEGEND		HECTARES
CATCHMENT AREAS		
[Color]	AREA 1A	3.00 Ha
[Color]	AREA 1B	2.20 Ha
[Color]	AREA 1C	2.00 Ha
[Color]	AREA 2	2.00 Ha
[Color]	AREA 3	8.60 Ha
[Color]	AREA 4	2.00 Ha
[Color]	AREA 5	4.00 Ha
[Color]	AREA 6	10.30 Ha
[Color]	AREA 7	10.00 Ha
[Color]	AREA 8	1.90 Ha
[Color]	AREA 9	0.80 Ha
[Color]	AREA 10	9.00 Ha
[Color]	AREA 11	4.60 Ha
[Symbol]	CATCHMENT BOUNDARIES	
[Symbol]	SITE BOUNDARY	
[Symbol]	DRAINAGE AND FLOW DIRECTION	
[Symbol]	LEACHATE PONDS	
[Symbol]	SURFACE WATER PONDS	

SOURCE:

- BASE DRAWING TAKEN FROM K F WILLIAMS & ASSOCIATES WHYTES PHOTOGRAMMETRY AND GROUND SURVEY 20-07-11
- GRID COORDINATES ARE MGA 94, ZONE 56



**ISSUED FOR
PRELIMINARY
NOT FOR CONSTRUCTION**



<p>www.golder.com GOLDER ASSOCIATES PTY. LTD.</p>	CLIENT WOLLONGONG CITY COUNCIL		PROJECT STAGE I PROPOSED WORKS WHYTES GULLY LANDFILL GAS COLLECTION SYSTEM			
	DRAWN BY HC	DATE 21.11.2012	DRAWING TITLE EXISTING CATCHMENT BOUNDARIES AND SURFACE WATER MANAGEMENT		PROJECT No 117625003	DOC No 207
	CHECKED BY MN	DATE 30.11.2012			DOC TYPE R	FIGURE No F008
SCALE 1:4,000		SHEET SIZE A3	REVISION 0	FIGURE 4		



3.8.5 Surface Water Pond Reconfiguration

The submission by DPI states the following in relation to surface water ponds:

- 1) *The Department notes that it is proposed to reconfigure existing surface water ponds that are located on flood affected land. The Department wishes to clarify if the reconfigured ponds would have the same capacity and bund level height/s as the existing ponds.*
- 2) *The Department requires more information on the potential impacts of this reconfiguration on the available flood storage area and flooding behaviour.*
- 3) *The Department also requires a discussion of what the potential environmental and downstream impacts would be if the surface water ponds were inundated during the 100 year ARI flood event.*

Response

The surface water ponds are not to be reconfigured, rather the reed bed ponds will cease being used and the polishing pond used as the surface water pond as the size of the catchment decreases substantially (approximately 60 per cent) between Stage 3 and 4 of the project.

Furthermore, based on the results of the surface water routing and flood analysis (refer Appendix A), the 100 year flood would not reach the site, and as such the ponds would not impact the 100 year flood event.

3.9 Leachate

The response to leachate comments has been arranged by the following main themes:

- Leachate Treatment Plant Augmentation
- Leachate Pond Capacity
- Sewer Capacity

3.9.1 Leachate Treatment Plant Augmentation

The submission by DPI states the following in relation to the leachate treatment plant augmentation:

- 1) *The Department notes from the EA that it is proposed to 'augment the existing landfill leachate biological treatment plant required to treat leachate for disposal to the sewer system' (p. 50) as part of the project. The Department requires more detailed information on what this entails and when?*

Response

As discussed in Section 12.5.2 of the EA, WCC would log and review the leachate generation volumes and rainfall amounts during 2014 and reassess the water balance model assumptions for infiltration rates and continue to liaise with Sydney Water on timing for sewer capacity upgrade and quantify and assess the need to upgrade the leachate treatment plant.

3.9.2 Leachate Pond Capacity

The submission by DPI states the following in relation to leachate pond capacity:

- 1) *The EA states that the existing leachate ponds would cater for worst-case leachate volumes generated for stages 1 to 3 of the project (ie 18 000 m³). However, it is unclear if the existing leachate ponds would have (reserve) additional capacity for high rainfall events (eg. As a minimum, a 1 in 25 year storm event) and appropriate freeboard for wave action.*
- 2) *The department needs to be satisfied that the existing leachate ponds have sufficient capacity to cater for worst-case leachate generation during high rainfall events and/or long wet periods. Additional contingency actions for reducing leachate volumes during high rainfall event/periods should be detailed.*



Response

The freeboard provided on the leachate ponds is approximately 300 mm which is provided for wave action, and also is able to receive approximately a 1 in 25 year, 24hr ARI storm event.

Of greater significance to the pond's capacity is the worst case wet weather period modelling. Modelling of required leachate pond capacity is presented in Section 4.5 of Appendix G5 of the EA (Leachate Generation and Water Balance Modelling). To determine the required capacity of the leachate ponds in stages 1 to 3 a worst case wet weather period was modelled using two consecutive years of 90th percentile annual rainfall data as recommended in the EPA Victoria's *Best Practice Environmental Management – Siting, Design, Operation and Rehabilitation of Landfills* (2010). The modelling showed that the ponds have sufficient capacity to store leachate during two consecutive wet years, with a peak cumulative leachate storage requirement occurring during the third month of the Project (during Stage 1A), and the volume of leachate storage required generally decreasing as the Project progresses.

Contingency measures for leachate storage and/or treatment include discharge directly to sewer from leachate ponds, reinjection into waste, provision of temporary 'package' treatment plants, upgrade treatment plant, construct a cover over leachate ponds, trucking of leachate to sewage treatment plant for disposal and use of the old leachate ponds until the end of Stage 1. These contingency measures are presented in Section 12.5 of the EA and Section 5.0 of Appendix G5.

Additional measures to prevent overtopping of leachate ponds include the provision of freeboard and the use of shutoff valves on leachate lines to shut off flow to the ponds when capacity is reached.

3.9.3 Sewer Capacity

The submission from Asciano stated:

- 1) *Sydney Water have denied our Reddalls Road site access to the same sewer on the basis that the sewer line is at 100% capacity. Given that they are expanding the landfill I assume that the leachate discharge will increase. If the sewer is already at 100% capacity how can it handle this additional volume from the landfill? Has the landfill 'reserved' some additional sewer capacity or have they been given preferential treatment regarding access to the sewer system?*

Response

The calculations for future discharges to sewer are in accordance with the limits set in the existing Sydney Water Trade Waste Agreement for the site for discharge to sewer, reference is made to Section 12.5 of the EA.

This approach is considered to be conservative, as a future upgrade to the capacity of the West Dapto sewer main is planned, as detailed in a recent Sydney Water Booklet titled *West Dapto Urban Release Area and Adjacent Growth Areas, Proposed water and wastewater services* (September 2012, available <http://www.sydneywater.com.au/majorprojects/South/WestDaptoUrbanReleaseArea/index.cfm>).

3.10 Flora and Fauna and Heritage

Responses to submissions with regard to flora, fauna and heritage have been arranged under the following themes:

- Biodiversity
- Riparian Land
- Flora and Fauna
- Heritage



3.10.1 Biodiversity

The submission by OEH states the following in relation to biodiversity:

- 1) *Impacts of vegetation may occur as a result of the 'construction phase of the project' and the future operation of the expanded landfill. To offset these losses, measures including a weed control program in the remaining 0.55ha (or 0.48ha) of ISTR (and an unknown area of other native vegetation communities) and the revegetation of an unknown disturbed areas are proposed. These measures are to be undertaken in accordance with a Landscape Strategy (appendix N) which contains little detail on how existing native vegetated areas proposed to be retained will be restored and/or managed.*
- 2) *To realise the proponent's commitment 'to ensure the proposal maintains or improves the biodiversity values of the region', OEH recommends the offsetting measures be assessed against the 'Principles for the use of biodiversity offsets in NSW' (Offsetting Principles). In accordance with the first of these principles, OEH recommends DPI seek from the proponent justification on why the proposed clearing of the 0.49 ha of good condition native vegetation cannot be avoided. OEH also recommends any approval include a requirement for the proponent to prepare a biodiversity offset strategy detailing the proposed offset measures to be implemented and secured and how they will be protected managed, funded and monitored over the duration of the project. The offset strategy should also reference best management guidelines for restoring and managing the vegetation communities proposed for protection.*

Response

Reference is made to Chapter 13 of the EA and the Flora and Fauna Assessment Report in Appendix F of the EA.

Table 9 in Section 4.1 of Appendix F documents 0.49 ha of native vegetation mapped as Forest-Redgum Open Forest/Closed Woodland (0.48ha) and ISTR (0.01ha) to be cleared as a direct impact of the Project. The Forest Redgum community is described as being in poor condition due to dominance of exotic species in the midstorey and ground layer and the ISTR proposed to be removed is described as being in moderate to poor condition due to woody weeds throughout the midstorey.

Works recommended to offset native vegetation removal include regeneration of native vegetation communities to improve quality, as well as re-vegetation of cleared and disturbed areas. WCC commit to providing a Vegetation Management Plan (VMP) to address restoration works.

An assessment of proposed offsetting measures against the thirteen Offsetting Principles is outlined below:

- 1) *Impacts must be avoided first by using prevention and mitigation measures*

The new landfill cell has been significantly redesigned to retain majority of the ISTR. and other vegetation communities.

- 2) *All regulatory requirements must be met*

All offsetting provisions outlined in the Biosis report are to offset residual losses of native vegetation, following all efforts to avoid and minimise losses of native vegetation. All regulatory requirements will be met through the approvals process.

- 3) *Offsets must never reward on-going poor performance*

All efforts have been taken to avoid and minimise impact to native vegetation. The measures proposed to offset native vegetation losses include improvements to the quality of retained native vegetation.

- 4) *Offsets will complement other government programs*

The areas where offsetting measures are proposed are not currently managed for biodiversity conservation.

- 5) *Offsets must be underpinned by sound ecological principles*



The majority of works are proposed in areas of retained ISTR, an endangered ecological community, as well as restoration of areas of other native vegetation communities. These areas are not currently managed for conservation, and would assist in retention and improvement of vegetation in the local area, and at a regional scale.

6) *Offsets should aim to result in a net improvement in biodiversity over time*

Offsetting measures include restoration of ISTR and Forest Red Gum Community, as well as re-vegetation of disturbed areas. These measures would result in an increase in areas of native vegetation across the site as well as improvements in the quality of retained vegetation.

7) *Offsets must be enduring - they must offset the impact of the development for the period that the impact occurs*

Offsetting measures are proposed through the life of the Whytes Gully Landfill site. All areas proposed for restoration or re-vegetation are outside of the operational areas of the landfill site.

8) *Offsets should be agreed prior to the impact occurring*

Regeneration and re-vegetation works would be outlined in a VMP. This VMP would be prepared prior to the removal of native vegetation.

9) *Offsets must be quantifiable - the impacts and benefits must be reliably estimated*

The VMP would specify hectares of vegetation to be restored, as well as management actions, planting lists, maintenance program and a timeframe for the works, setting out the works program.

10) *Offsets must be targeted*

Offsets are proposed for the two vegetation communities proposed to be impacted, namely the Forest Red Gum Community and ISTR.

11) *Offsets must be located appropriately*

Offsetting measures are proposed for on-site. If suitable offsets were not available off-site offsets in immediate proximity to the local area are available.

12) *Offsets must be supplementary*

The areas proposed for restoration works are not currently managed for conservation or funded under any conservation scheme.

13) *Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract*

Offsetting measures, and measures to monitor the success of these offsets, would propose to be provided in a VMP.

Restoration works are to follow the guiding principles set out in DEC (2005) *Recovering Bushland on the Cumberland Plain: Best practice guidelines for the management and restoration of bushland*.

- **Retain** – Retain remnant indigenous vegetation. Conserving existing native vegetation should be the highest priority;
- **Regenerate** – Where bushland remains but is degraded, regeneration should be the primary objective;
- **Revegetate** – Where there is no regeneration potential, revegetation is then an option.

The design of the new landfill cell has been significantly redesigned to retain the majority of the ISTR. Regeneration is recommended in the ISTR patch as this area has regeneration potential and an increase in native species diversity is expected following regeneration works in this area. Revegetation is recommended



in disturbed areas. Briefly this would include the revegetation of areas that would not be disturbed by the ongoing operations of the recovery centre and would be restricted to the northern portion and the north western boundary of the site. This area would be planted with a diversity of species of local provenance to re-establish the Forest Red Gum Community over this area.

The draft Statement of Commitments within the EA outlines a number of mitigation measures in relation to Flora and Fauna and offsetting and the VMP would provide further detail of an offset strategy and would be developed in accordance with the Principles for the use of Biodiversity Offsets in NSW as outlined above.

Offsetting measures, and measures to monitor the success of these offsets, would be outlined in the VMP.

3.10.2 Riparian Land

The NOW submission states the following in relation to riparian land:

- 1) *Section 3.5.4 of the Terrestrial and Aquatic Flora and Fauna Assessment (TAFFA) in Appendix F refers to the RCMS riparian buffer widths to be considered in the planning and design of the proposal. The EA (Section 13.3) and Section 4.2 of the TAFFA recommends as a mitigation measure to maintain suitable buffer distances from nearby waterways based on the stream orders of waterways and the subsequent categories identified within the Wollongong DCP (2009). It should be noted the riparian land management section in Wollongong DCP 2009 (Chapter E23) is not based on stream order but on the DIPNR (2004) Riparian Corridor Management Study. Map 7 in DIPNR (2004) is the relevant riparian map for the Whytes Gully site. It is not clear how the recommended buffer distances shown on Figure 9 in Appendix F have been derived.*
- 2) *The 12th dot point under Flora and Fauna (page 256, Volume 1) refers to maintaining suitable buffer distances from nearby waterways and it notes these buffer distances are based on stream orders of waterways and the subsequent categories identified within the Wollongong City Council Development Control Plan 2009. The riparian land management section in Wollongong DCP 2009 (Chapter E23) is not based on stream order but on the DIPNR (2004) Riparian Corridor Management Study (RCMS).*

Response

Generic advice sought from NOW and WCC as a part of this response to submissions indicates that the new *Guidelines for riparian corridors on waterfront land* (NSW Office of Water, July 2012) have replaced the RCMS method and would be the minimum that is required from NOW and WCC when assessing riparian buffer widths.

Outcomes from discussions with NOW specifically relating to the Project's potential impact on buffer widths were completed. NOW identified they agree to the usage of buffer widths identified within Map 7 of DIPNR (2004) and a merit based assessment for the historic stream within the resource recovery park boundary as completed in the EA and Appendix F.

Figure 9 of the Biosis report has been amended to further define the buffer widths of the merit based assessment, as well as the usage of Map 7 of the DIPNR (2004) Riparian Corridor Management Study (refer Figure 5 below). All proposed buffer zones are outside of the Resource Recovery Park boundary.

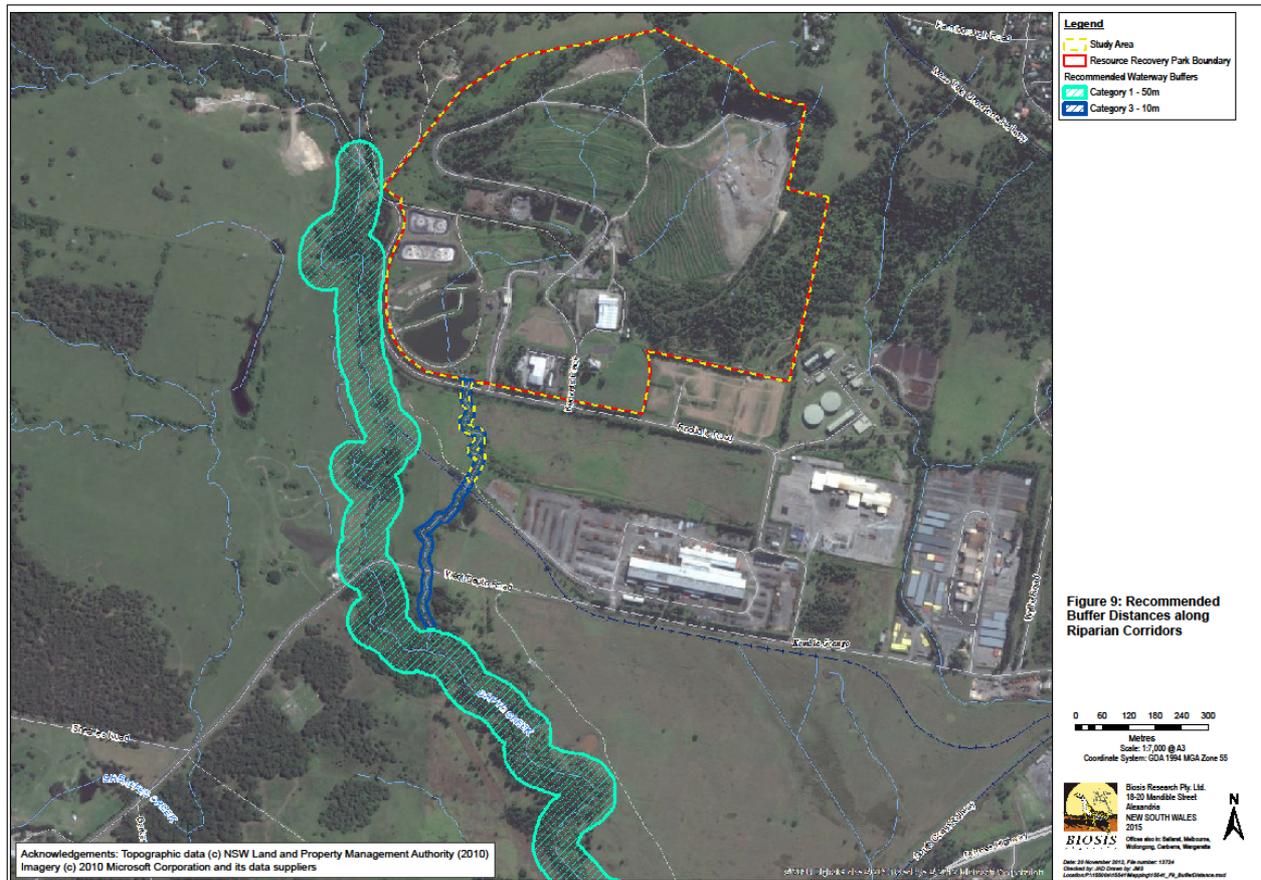


Figure 5: Recommended Buffer Distances along Riparian Corridors

3.10.3 Flora and Fauna

The WCC submission states the following in relation to flora and fauna:

1) *The report would have benefited from:*

- *Page 18 - Reference to the Illawarra Biodiversity Strategy (2011) rather than the draft Illawarra Biodiversity Strategy.*
- *Page 32 - Reference to the current requirements for Lantana under the NSW Noxious' Weeds' Act 1993 for the Wollongong LGA, i.e. The growth of the plant must be managed in a manner that reduces its numbers, spread and incidence and continuously inhibits its reproduction and the plant must not be sold propagated or knowingly distributed.*
- *Reference to the current requirements for African Lovegrass under the NSW Noxious' Weeds' Act 1993 for the Wollongong LGA, i.e. the growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction.*
- *Page 54 - Reference to the Water Management Act 2000 rather than the Rivers and Foreshores Improvement Act 1948.*
- *Page 140 - Replacement of the unrealistic result of 0.1 J-ls/cm conductivity for Whytes Gully surface water ponds with an actual realistic result.*



The Asciano submission states:

- 2) *Will the new cells attract / increase new/existing wildlife to the site? What is in place to ensure the site does not attract excessive wildlife to the area with the accompanying fall out. In some cases the acid in bird faeces can etch vehicle paintwork within 48 hours if it is not removed.*

Response

WCC comments are noted.

The Project is unlikely to substantially change the current diversity of species in the site, and the intensity of operations is not increasing. Issues associated with vermin, pests and litter are addressed in the Section 9 of the Draft LEMP (Appendix P of the EA). This includes measures such as daily covering of waste and minimising the size of the operating tipping face.

3.10.4 Heritage

The Asciano submission noted:

- 1) *Adverse impacts upon existing heritage on site and surrounding area*

Response

Aboriginal and non-Aboriginal heritage impacts of the Project were assessed in Chapter 16 of the EA finding it would have negligible impacts upon known heritage sites on the site or surrounding area.

3.11 Dust and Odour

The EPA submission states:

- 1) *The issue of PM10 24-hour average exceedances requires some clarification. The proponent should confirm the cumulative 24-hour average PM10 assessment results. If the results shown in Figure 7.12 are correct, the proponent should provide a revised assessment including additional controls to ensure no exceedances are predicted to occur due to project operations. If the assessment does not predict exceedances of impact assessment criteria for PM10, the EPA recommends conditions of approval.*

The Asciano submission states:

- 2) *Patrick Autocare will be storing vehicles within 250 m of the proposed expansion cells. We require surety that the proposed expansion does not increase the amount of dust/dirt in the air that may settle on the vehicles in storage and affect the health and safety of our staff. Key concerns: (i) vehicle paint damage caused by dust with metallic content settling on new vehicles in storage. (ii) increase the need to perform vehicle washing due to increase amount of dust/dirt (iii) employee's health and safety may be affected (breathing issues) due to increase gasses/odours/dust/dirt in the area.*

Response

3.11.1 Dust

The NSW EPA was correct that the text and Figure 7.12 were conflicting. Figure 7.12 was correct and did show one additional cumulative exceedance of the 24-hour average PM10 criterion at R1 during Stage 4. It is noted however, that this was a conservative assessment and the exceedance was less than $2 \mu\text{g}/\text{m}^3$ above the criterion, on a single occasion.

Notwithstanding this, dust control measures have been applied to dozer activity and then Stages 1 and 4 were remodelled. Emissions from dozer activity are estimated make up more than half of the total emissions from the site.

Katestone (2011) suggests that a 50% reduction in emissions can be achieved by keeping travel routes moist. This factor was applied to the Stage 1 and 4 emissions inventories and the results and assessment report updated.



Figure 6 shows the updated time series (measured and modelled incremental increase) for the nearest residence (R1) during Stage 4, assuming that dozer travel routes are kept moist. This results in no predicted additional exceedances above the 24-hour PM10 criterion.

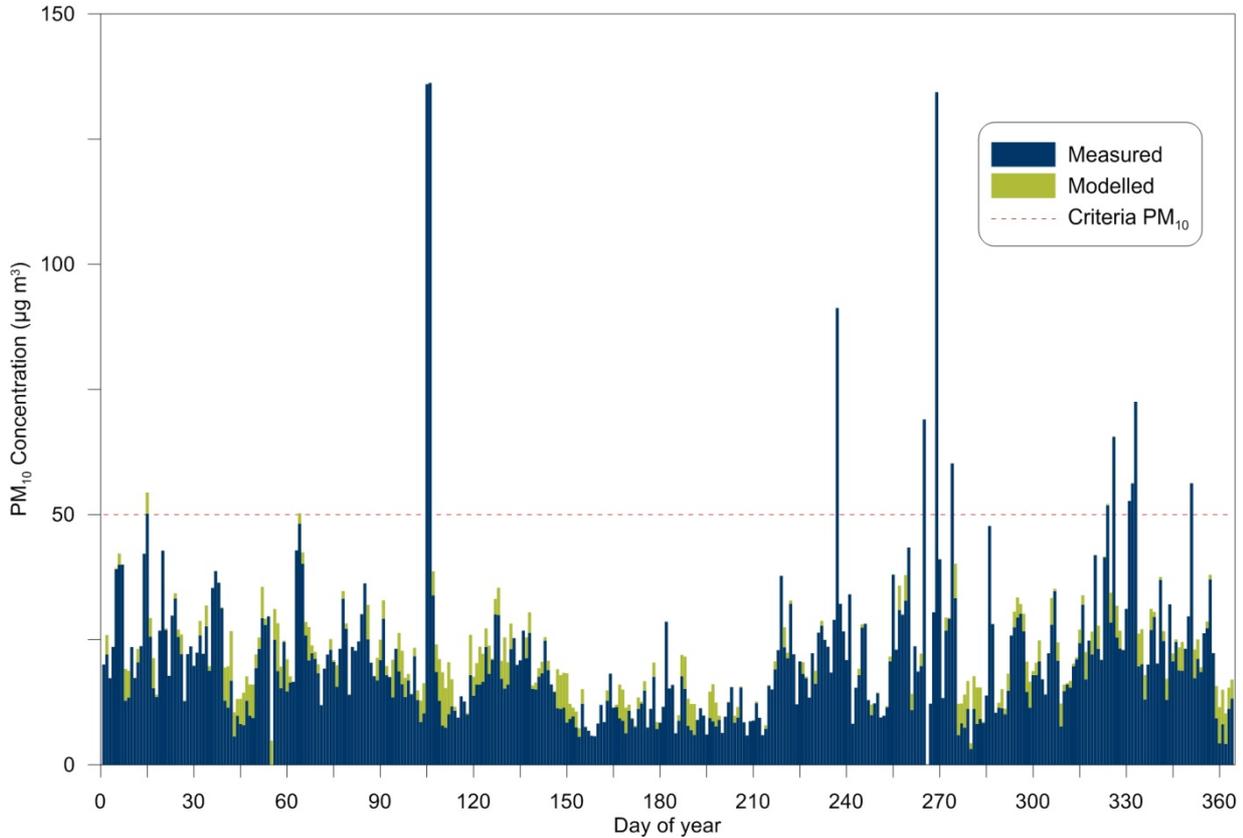


Figure 6: Time series of measured and modelled 24-hour average PM₁₀ concentrations at R1 (Stage 4).

Figure 7 shows the predicted annual average dust deposition levels in Stage 1, likely to be the worst case for Asciano (Patrick Autocare site). These are the remodelled results with dust controls on dozers.

The levels at the Patrick site are predicted to be less than 0.1 g/m²/month which is well below both the incremental and cumulative criteria for nuisance impacts. These criteria are set to protect public amenity (i.e. dust nuisance), including visible dust on cars, and predictions indicate that the contribution from Whytes Gully is likely to be less than four times below the incremental criterion of 2 g/m²/month.

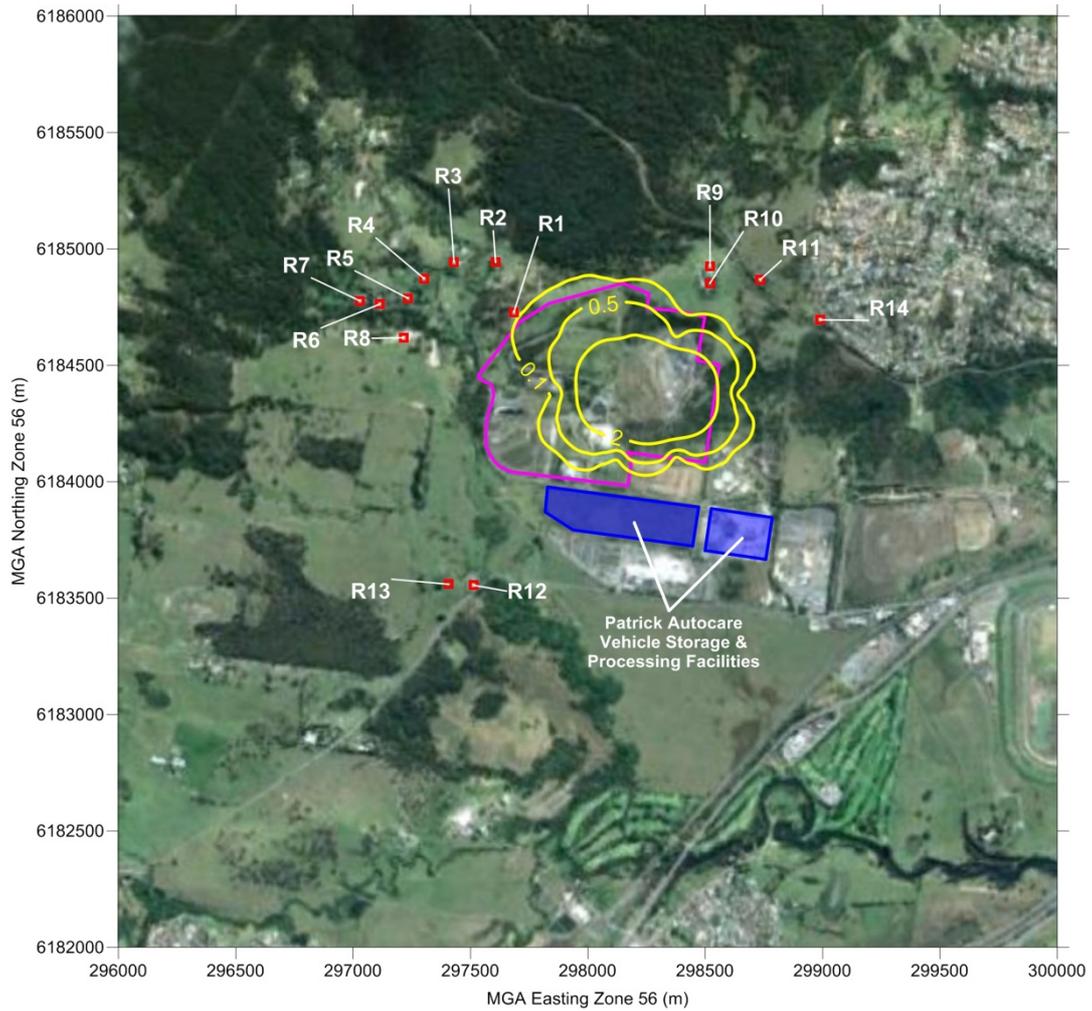


Figure 7: Predicted annual average dust deposition levels due to Stage 1 operations (g/m²/month)



Figure 8 shows the 24-hour average PM10 concentrations predicted at the Patrick site and surrounding land, due to proposed Stage 1 operations. Maximum incremental increases in 24-hour PM10 are predicted to be of the order of $2 \mu\text{g}/\text{m}^3$, significantly below the health-based criterion of $50 \mu\text{g}/\text{m}^3$.

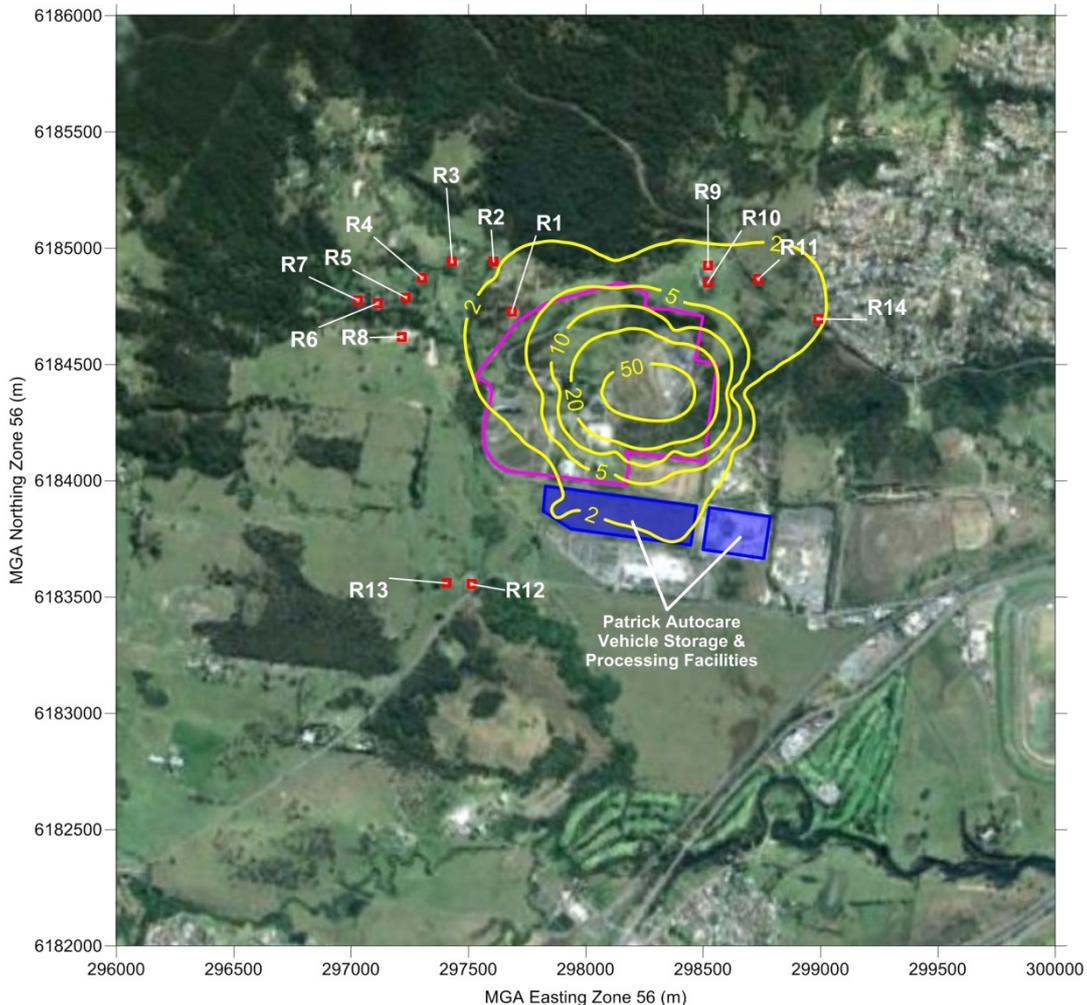


Figure 8: Predicted 24-hour average PM10 concentrations due to Stage 1 operations ($\mu\text{g}/\text{m}^3$)

In relation to the “key concerns” raised by Asciano, the following points are made:

- Predicted annual average dust deposition levels at the Patrick site do not indicate that vehicles in storage are likely to be adversely impacted with respect to additional dust loads. Levels are well below the criterion set to protect amenity, including dust on cars.
- Predicted 24-hour and annual average predictions due to operations at the Whytes Gully landfill are not predicted to be at levels that would exceed health-based air quality criteria.

3.11.2 Odour

Odour assessment criteria are designed to take into account the range in sensitivities to odours within the community, and provide additional protection for individuals with a heightened response to odours. The EPA suggests that an odour criterion of 7 odour units (ou) is likely to represent the level below which offensive odours should not occur for an individual with a standard sensitivity. The EPA therefore recommends that no individual be exposed to odour levels greater than 7 ou (99th percentile) in its Technical Framework for odour assessment and management (EPA, 2006).



Stage 1 is likely to represent the worst case period with respect to odour, as previously buried waste would be uncovered briefly during excavation operations. The odour impact assessment predicted that levels of approximately 5 ou (99th percentile) are anticipated at the Patrick site during Stage 1 operations. This does not mean that odour levels above 5 ou would never be experienced at that location, but rather they are not anticipated to occur for more than 1% of the time (88 hours per year), in line with the EPA criterion.

In relation to odour, levels are not predicted to exceed 7 ou (99th percentile) at the Patrick site, an appropriate level for this site.

3.12 Traffic

The submission by DPI states:

- 1) *The Department notes that construction and operation of the project would be undertaken concurrently.*
- 2) *The Department therefore considers that the traffic impact assessment should consider the worst-case scenario of cumulative traffic impacts (ie. Adding the predicted worst-case construction and operation traffic numbers and assessing the impact of this on the safety and capacity (ie. Level of service) of the surrounding street networks). Any inconsistency with this approach should be adequately justified.*

The submission by RMS notes that:

- 3) *The traffic modelling assumes that the intersection of the Princes Highway and West Dapto Road would be signalised by mid 2012, and that at the time of preparing their submission (dated 7 September 2012) works had not yet commenced.*

The submission by WCC states

- 4) *A Traffic Management Plan is to be implemented during the construction phases of the Project.*

The submission from Asciano notes the potential for:

- 5) *Adverse impacts upon traffic within the site and surrounding.*

Response

Traffic and Transport impacts are assessed in Chapter 15 of the EA and the Transport Assessment presented in Appendix I of the EA.

With regard to operational traffic assessment methodology utilised for assessment of the Project, Section 5 of the Traffic Assessment identifies that a sensitivity analysis has been conducted using an increase of material accepted at the facility of 20% (Sensitivity Test 1) and of 40% (Sensitivity Test 2). Both tests model the worst case operating conditions where operational and background traffic occur along with cell construction and capping at the same time. Other conservative assumptions of the modelling are detailed in the Traffic Assessment (Appendix I of the EA).

A Traffic Management Plan is proposed to be prepared prior to commencement of construction and operation. As noted in Section 15.2.1 of the EA, while the traffic modeling assumes the Princes Highway/West Dapto Road intersection (including installation of traffic signals) upgrade, the traffic Impact Assessment provided in Appendix I of the EA identifies that even if the intersection upgrade is delayed beyond construction of the Project there is adequate road capacity to cater for the anticipated additional construction traffic generated by the Project.

3.13 Socio-economic

The submission from Asciano noted:

- 1) *adverse socio-economic considerations to the site and surrounding area.*



Response

The socio-economic impacts are assessed in Chapter 18 of the EA and the assessment demonstrates a net benefit to the community.

3.14 Visual Assessment

The submission from Asciano noted:

- 1) *adverse impact on visual amenity.*

Response

The visual impacts are assessed in Chapter 17 of the EA. The overall potential visual impact of the Project is assessed as generally low to moderate, with mitigation measures proposed to reduce potential impact of the Project.

3.15 Bushfire Risk

The submission from Asciano noted:

- 1) *increase in the potential of bushfire hazard upon the site and surrounding area.*

Response

Bushfire risk is assessed in Chapter 19 of the EA. The assessment considered that with identified safeguards and mitigation measures, the project would not result in a significant risk to human health, life or property or the biophysical environment.



4.0 MODIFICATIONS MADE TO THE PROJECT

4.1 Overview

In order to address comments received from DPI principally relating to potential offsite noise impacts (refer Section 3.4 of the Report), the final Stage of the EA (4-2) is proposed to be split into two parts (Stage 4-2A and Stage 4-2B) (Refer Figure 1).

The breakdown of Stage 4-2 into two parts allows for a further level of detail on the duration of operations in this stage, in particular the duration of operations in proximity to Receiver N1. The approximate stage volumes and timelines of the parts of Stage 4 are presented in Table 7.

Table 7: Approximate Stage 4 Volumes and Timelines

Stage	Area (m2)	Airspace (cum)	Life of Cell (Years)	Operation Period	Proposed Capping Construction Period *	Proposed Liner Construction Period *
4-1	27,000	152,000	1.1	2046-2048	2048	2046
4-2A	9,000	300,000	2.1	2048-2050	2051	2047
4-2B	33,000	555,000	4.0	2050-2054	2054-2055	2049
Stage 4 Total	69,000	1,007,000	7.2	2046-2054	2048-2055	2046-2050

*not continuous during this period

The breakdown in Table 7 shows that the duration for landfilling in Stage 4 was previously nine years.

4.2 Noise

Stage 4-2 has been split into two parts (4-2A and 4-2B) divided by the existing ridgeline, such that Stage 4-2A sits behind the ridgeline. The division of Stage 4-2 into two parts would act to attenuate noise from operations in Stage 2A due to increased distance to the N1 receptor and also due to the ridge line acting as a buffer (refer to Section 3.4.2 of the Report). Additional noise modelling has been undertaken to assess the impact on sensitive receiver N1 for stages 4-2A, demonstrating that the noise generated meets applicable criteria for the Project as identified in Section 3.4.2 of the Report).

It is proposed that the Project would be subject to further detailed noise modelling prior to commencement of stage 4-2B construction. This is identified within the revised draft Statement of Commitments presented in Section 5.0 of the Report.



5.0 REVISED DRAFT STATEMENT OF COMMITMENTS

Chapter 21 of the EA presented the draft Statement of Commitments to outline all proposed environmental management and monitoring measures to reduce adverse impacts of the Project.

The draft Statement of Commitments has been revised to reflect the issues and modifications to the Project as identified within the Report. WCC commits to implementing these commitments with approval of the Project.

The final Statement of Commitments would be considered by DPI and identified with determination of the Project. Should approval be granted, the final Statement of Commitments would become part of the Project approval conditions.

Table 8: Revised Draft Statement of Commitments

Issue	Commitments
General	<ul style="list-style-type: none"> ■ Wollongong City Council would implement the Project in accordance with the EA and conditions of approval as provided by the determining authority. ■ Wollongong City Council commit to considering the Concept Site Masterplan for future planning of resource recovery activities on the Whytes Gully RRP site. This includes consideration of an appropriate footprint for future resource recovery activities and access requirements. ■ By 2014 Wollongong City Council's Waste Strategy commits Wollongong City Council to reviewing available alternative waste technologies as identified in Wollongong City Council's Waste Strategy. ■ If the Project is approved, it is proposed that Wollongong City Council would surrender existing development consents of relevance to the Project site. This does not include the existing development consent for the MRF, which is not affected by the Project.
Waste Management Strategy	<ul style="list-style-type: none"> ■ Wollongong City Council would implement the Project in accordance with the "Wollongong City Council Waste and Resource Recovery Strategy 2012 to 2022" as provided in Appendix B and future updates of this document as relevant to the Project. ■ Detailed design of the Project would consider and address constraints and opportunities identified within the EA.
Environmental management plans	<ul style="list-style-type: none"> ■ A Construction Environmental Management Plan would be prepared and implemented to guide environmental management and monitoring activities during construction. The CEMP would include specific environmental issue sub-plans to reduce potential impacts and in accordance with relevant commitments identified within the EA and within this table. A monitoring program shall be conducted throughout the construction period to monitor compliance with the CEMP. ■ The Landfill Environmental Management Plan (LEMP) would be implemented to be consistent with the draft LEMP provided in Appendix P. This includes implementation measures to guide environmental management and monitoring activities during operation as identified within the EA in addition to further specific issues identified within this Table. ■



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTES GULLY NEW LANDFILL CELL

Issue	Commitments
Noise	<p>Wollongong City Council commit to the following with regard to noise:</p> <ul style="list-style-type: none"> ■ All mobile equipment would be selected to minimise noise emissions. Equipment would be fitted with silencers and be in good working order. ■ Broadband reversing alarms would be used for all site equipment. ■ Construction activities would be limited to the recommended construction hours where feasible and reasonable. ■ Consultation with residents who are identified as potentially affected by cumulative and operational noise exceedances and communication of details of the construction and operational program on a regular basis. ■ Provide a community liaison phone number and permanent site contact so that noise complaints would be received and addressed in a timely manner. ■ Submission of a noise impact assessment and associated mitigation measures for Stage 4-2b for approval prior to commencement of construction of Stage 4-2b.
Greenhouse Gas	<p>Wollongong City Council commit to the following:</p> <ul style="list-style-type: none"> ■ An active landfill gas management system would be installed including flaring and/or combustion to reduce potential greenhouse gas emissions from the landfill. ■ Potential energy efficiency measures would be considered in the detailed design phase of the Project and be implemented and monitored through an Energy Savings Action Plan in accordance with the “Guidelines for Energy Savings Action Plans (DEUS 2005).
Erosion and Sedimentation Control	<ul style="list-style-type: none"> ■ An Erosion and Sedimentation Control Plan would be developed as part of the CEMP in general accordance with the following erosion and sedimentation control principles including: <ul style="list-style-type: none"> ▪ Construction of earth bunds and diversion drains upslope and around the perimeter of construction areas where surface disturbance occurs, to prevent clean surface water entering these areas. ▪ Erection of silt fences or straw bales at strategic locations (i.e. around stockpiles) to manage the migration of fines. ▪ Construction of temporary sediment retention ponds. ▪ Dust suppression as needed. ▪ Reducing the surface area disturbed by construction activities at any one time. ▪ Regular inspection and maintenance of sediment and erosion control structures. ▪ Protecting and retaining vegetation and surface cover where possible.



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTES GULLY NEW LANDFILL CELL

Issue	Commitments
	<ul style="list-style-type: none"> ▪ Placement of an erosion protection barrier (e.g. grassing) at the completion of works. ▪ Using designated access roads and paths where possible. ▪ Removing soil adhering to the wheels and undercarriage of trucks (e.g. by wheel wash) prior to departure from the Project site. ▪ Limit both the size of any stockpile footprints and the time between excavation and removal off-site of materials. ▪ Do not place stockpiles within 30 m of any watercourse. ▪ Stabilise all disturbed areas as soon as practicable. Temporary vegetative destabilisation techniques must be applied to any disturbed soil to prevent areas remaining bare for more than 28 days. ▪ Stabilise all temporary and permanent drainage immediately. ▪ Maintain all sediments and erosion control measures in effective condition until the works are completed and the site is stabilised. ▪ Release “Dirty” Stormwater, captured and stored by sediment and erosion control measures or site works, after treatment and testing to confirm compliance with relevant criteria. ▪ A monitoring program shall be conducted by throughout the construction period to monitor compliance with the CEMP. ■ Proposed erosion and sediment control measures that would be applied during operation of the Project are outlined in the draft LEMP (Appendix P).
Acid Sulfate Soils	<p>In the event of discovery of Acid Sulfate Soils, procedures would be implemented/adopted to mitigate potential impacts on the environment in accordance with appropriate guidance and legislation and as identified in Chapter 12 of the EA.</p>
Contamination	<p>In the event of discovery of previously unidentified area(s) of potentially contaminated material, procedures would be implemented/adopted to mitigate potential impacts on the environment, employees and the public in accordance with appropriate guidance and legislation and as identified in Chapter 12 of the EA.</p>
Surface water	<ul style="list-style-type: none"> ■ A Surface Water Management Plan would be developed as part of the CEMP in general accordance with the following control principles: <ul style="list-style-type: none"> ▪ Bund fuels, oils, paints, and other chemicals onsite to comply with the requirements of relevant legislation. ▪ Bunds must be fitted with an impervious floor and must not be fitted with a drain valve. ▪ Remove accidental spills of soil or other materials. ■ Wollongong City Council would commit to the following key principles in developing the surface water management controls for operation of the



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTE'S GULLY NEW LANDFILL CELL

Issue	Commitments
	<p>Project.</p> <ul style="list-style-type: none"> ▪ Diversion of clean drainage directly into Dapto Creek. Runoff from areas that are unaffected by the development would be allowed to discharge directly from the site to Dapto Creek. ▪ Runoff from areas that are likely to generate sediment such as the new cell construction areas and stockpile areas would be directed into the Surface Water Ponds. ▪ Reduce the volume of runoff to Surface Water Ponds by reducing the contributing catchment area at any particular time. ▪ Keep sources of different water quality types separate from each other. ▪ Construction of a perimeter bund around the entire active landfill area to prevent surface water from entering the landfill area. ▪ Construction of a diversion drain around the entire landfill area to collect all runoff from disturbed areas (but outside exposed/uncapped active waste cell area(s)) which would drain to the sedimentation basin ▪ The existing surface water ponds would be used for Stage 1 to 3 of the development. ▪ The Surface Water ponds would be downsized for Stage 4 onwards, as Stage 1 to 3 would be rehabilitated and runoff would be directed offsite to Dapto Creek. ▪ Re-use 'dirty' water for dust suppression.
Groundwater	<ul style="list-style-type: none"> ■ A Construction Quality Assurance (CQA) system would be implemented for cell construction. Detailed CQA requirements are embedded in the Technical Specification of the Design Report (Appendix O). ■ During the operational phase of the Project a number of engineering measures and management strategies would be used to mitigate impacts to groundwater. Further documented within the EA these include: <ul style="list-style-type: none"> ▪ Leachate Barrier System and Leachate Collection System ▪ Leachate Pond ▪ Leachate Treatment Plant ▪ Groundwater separation ▪ Monitoring <ul style="list-style-type: none"> – A network of groundwater bores would be used to monitoring groundwater quality and trends at the Project Site. This would include a regular programme of groundwater sampling and assessment as detailed in the LEMP. – The leachate management system would be monitored in accordance with measures described in the LEMP including direct monitoring for the purposes of system integrity, leachate quantity and quality.



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTES GULLY NEW LANDFILL CELL

Issue	Commitments
	<ul style="list-style-type: none"> - Groundwater Assessment Program to monitor background concentrations. If a significant change in concentration for any of the indicator parameters is detected over two consecutive monitoring periods, then the affected groundwater monitoring bores would be resampled and assessed and OEH notified (if required). Following this a groundwater remediation plan may be developed in accordance with the LEMP. - Combined surface water and groundwater monitoring program to gain an understanding of surface water and groundwater interaction and to assess potential impacts on the downstream environment including Dapto Creek and GDEs
Leachate Management	<p>Wollongong City Council commit to the following with respect to leachate management:</p> <ul style="list-style-type: none"> ■ Segregation of leachate from surface water and groundwater; ■ Maintain pond levels with adequate freeboard to minimise the potential for overflow; ■ Continue to monitor leachate discharge to sewer in accordance with Trade Waste Agreement.
Flora & fauna	<p>Wollongong City Council commit to the following to ensure the Project maintains or improves the biodiversity values of the region.</p> <ul style="list-style-type: none"> ■ Clearing for the purposes of bushfire protection would be restricted to non-native vegetation communities (Acacia Scrub/Exotic, Closed Exotic Grassland, Planted). In accordance with the Bushfire Assessment, clearing or trimming of the Illawarra Subtropical Rainforest on the site is proposed to be avoided. ■ Removal of native vegetation communities and fauna habitats during construction and operation of the Project be avoided and minimised where possible. ■ Undertaking two additional targeted surveys for the Green and Golden Bell Frog in the peak breeding season to confirm results of targeted surveys undertaken in November/December 2011 and early January 2012. ■ Waterbody removal and associated vegetation removal being undertaken over the spring or summer months when fauna species are most active. ■ Undertaking protection of all retained trees. Tree protection measures such as temporary fencing will be implemented for any trees potentially indirectly impacted by the Project. ■ Installation of protective fencing around all retained native vegetation. This is particularly important for areas of ISTR EEC where there is a risk of indirect impact. ■ Installation of sediment and erosion controls as required including for potential indirect impacts to the ISTR EEC. ■ Ensure machinery parking, equipment or materials storage compounds,



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTES GULLY NEW LANDFILL CELL

Issue	Commitments
	<p>temporary stockpiling of excavated material and work areas are outside sensitive natural features including retained native vegetation, wetlands and drainage lines.</p> <ul style="list-style-type: none">■ Logs removed with any vegetation removal would be relocated into areas of retained vegetation, for the purpose of providing fauna habitat.■ A weed control program would be undertaken in accordance with the LEMP.■ Undertake revegetation of cleared and disturbed areas using a range of native species of local provenance for the purpose of managing weeds, controlling soil erosion, and maintaining fauna habitat in accordance with the Landscape Strategy (Appendix N).■ Maintain suitable buffer distances from nearby waterways. These buffer distances are recommended based on the stream orders of waterways and the subsequent categories identified within the “Wollongong City Council Development Control Plan 2009”.■ Following the disturbance of existing surface water ponds, landscaping would be undertaken to enhance existing riparian zone vegetation associated at the ponds to be in accordance with appropriate riparian buffer widths. The vegetation buffer is proposed to be constructed to an average width of 5 metres where possible to improve the existing aquatic habitats.■ Extend the current water quality monitoring program to include one monitoring location on Dapto Creek, upstream of the discharge point and two locations downstream.■ Biodiversity and habitat values would be maintained and increased where possible by planting a range of indigenous species.■ Offsetting measures, and measures to monitor the success of these offsets, would be outlined in a Vegetation Management Plan.
Air quality	<p>Wollongong City Council commits to the following with regard to air quality:</p> <ul style="list-style-type: none">■ Watering of unsealed haul roads and disturbed surfaces (including construction areas).■ Restricting the size of disturbed areas as much as practicable.■ Disturbed areas would be rehabilitation progressively in accordance with the Landscape Strategy.■ Prevention of truck over-loading and covering dusty loads.■ Washing down trucks before they leave the site.■ Maintaining equipment and plant appropriately to ensure efficient operation.■ The active landfill area would be covered following the completion of waste placement at the end of each day with landfill lids or approximately 150 mm of daily cover material or other cover system.



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTES GULLY NEW LANDFILL CELL

Issue	Commitments
	<ul style="list-style-type: none"> ■ Adhering to appropriate hours of construction and operation. ■ Temporarily suspending operations under extreme wind speed conditions. ■ Giving consideration to reducing the footprint of the active cell area and daily cover and increasing the thickness of daily cover to control odour as required, particularly during the operation of Stage 1 during waste relocation works and Stage 4. ■ An air quality (including dust and odour) management strategy would be incorporated into the CEMP. ■ Monitoring in accordance with the EPL and ongoing assessment.
Traffic and transport	<p>Wollongong City Council commit to:</p> <ul style="list-style-type: none"> ■ Appropriate management and maintenance of road pavement of Reddalls Road intersection to Whytes Gully RRP and site access. ■ The CEMP for the Project would include a traffic management plan identifying truck movements to and from the site, internal access, interactions with general public, parking and access requirements for construction personnel and safety signage and training of personnel in traffic management in accordance with relevant requirements and guidelines of the RTA in terms of road safety and network efficiency. ■ Where possible, trucks to the site would be scheduled to avoid peak hour and within standard hours of operation, except in emergencies.
Heritage	<p>Wollongong City Council commit to the following with regard to heritage (indigenous and non-indigenous):</p> <ul style="list-style-type: none"> ■ Registered Aboriginal parties identified within the EA would be informed about the management of Aboriginal cultural heritage sites within Whytes Gully RRP where they may be impacted upon by the Project. ■ Identified potential archaeological deposits within the Whytes Gully RRP site would be left in their identified location and not salvaged unless the Project cannot avoid impacting upon these sites. If salvage is required Wollongong City Council would consult with the relevant statutory bodies and provide an opportunity for collection of the cultural material from the site. ■ Monitoring of construction would be completed for the Project where in proximity to listed heritage items (i.e. Glengarry Cottage) to ensure there is no disturbance to heritage significance. ■ A heritage induction including indigenous and non-indigenous heritage is proposed to be incorporated within the general induction during construction of the Project. ■ Should indigenous or non-indigenous cultural material be identified during any works, construction and/or operation will cease in the vicinity of the find and the appropriate representative at OEH will be contacted.



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTES GULLY NEW LANDFILL CELL

Issue	Commitments
Visual	<p>Wollongong City Council commit to:</p> <ul style="list-style-type: none"> ■ Staging and planning of landfill activities to reduce the extent to which they would be visible during the construction and operation of the Project. ■ Implementation of the Landscape Strategy (Appendix N of the EA) to reduce and manage potential long term visual impacts. ■ Reducing the area of un-vegetated landfill slope, both permanent and temporary, by staging the operations and progressively establishing a vegetation cover on each section of slope as they are completed. ■ Revegetating the proposed landfill slopes with mix of shrubs and small trees and grass to create a landscape character similar to adjoining rural areas. ■ Adopting design options (when suitable) to be in keeping with the surroundings of the site including native grasses and dark toned colours for existing and proposed structures to reduce their visual contrast with their landscape setting. ■ Consulting with residents (as identified within the relevant chapter of the EA) to discuss the potential for planting to be carried out close to their houses to screen views of the landfill operations. ■ Subject to bushfire protection requirements (such as trimming of mature trees), existing native vegetation would be retained where possible to provide visual screening and contribute to the landscape character of Whytes Gully RRP. ■ Screen planting with dense tall tree planting on natural ground would be used to block views to the site, particularly from adjoining residences.
Socio-Economic	<p>Wollongong City Council commit to ensuring:</p> <ul style="list-style-type: none"> ■ A Stakeholder Strategy would be implemented throughout the delivery of the Project. Provided within environmental management documentation (LEMP) the Stakeholder Strategy would provide procedures for communication with stakeholders, procedures for the dissemination of information to the community, identification of the communication channels available for the community and stakeholders to provide feedback on the Project, a protocol for the Project to respond to any enquires or feedback and for managing site visits and property inspections. ■ Implementation of measures to reduce the potential for construction and operation impacts upon amenity as identified within the relevant chapters of the EA and the draft Statement of Commitments.
Hazards and Risk	<p>Wollongong City Council commit to ensuring:</p> <ul style="list-style-type: none"> ■ No smoking around plant equipment and within designated areas only. ■ Any dangerous goods would be stored in accordance with normal dangerous goods storage procedures. ■ Spill containment to be managed in accordance with relevant Australian



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTES GULLY NEW LANDFILL CELL

Issue	Commitments
	<p data-bbox="528 365 660 392">Standards.</p> <ul style="list-style-type: none"><li data-bbox="472 423 1445 483">■ Safety hazards would be managed through occupational health and safety procedures.<li data-bbox="472 512 1406 539">■ Environmental hazards would be managed through the CEMP and LEMP.<li data-bbox="472 568 1445 663">■ Fire protection (including fire extinguishers, separation distances) would be provided in accordance with relevant Australian Standards and as identified within the EA.<li data-bbox="472 692 1445 719">■ Fire suppression and protection systems serviced and inspected periodically.<li data-bbox="472 748 1238 775">■ Water carts would continue to be made available at the site.<li data-bbox="472 804 1445 864">■ Site emergency response plan including emergency contact numbers provided within management system for the site.<li data-bbox="472 893 1238 920">■ The site landscaping would not exceed a fuel load of 2 t/ha.<li data-bbox="472 949 1445 1077">■ Planted trees that are retained on the site would have the lower branches trimmed (cut off) to a height of 2 m above the ground. The tree trimming works may be staged with priority given to the protection of assets and fuel load reduction adjacent to roads.<li data-bbox="472 1106 1445 1167">■ An asset protection zone (APZ) of 10 m would be maintained around existing site buildings.<li data-bbox="472 1196 1445 1290">■ A perimeter firebreak of 5 metres be established around the entire Whytes Gully RRP site and around buildings (roads and access tracks including offsite roads and tracks, may be utilised to form the fire break).<li data-bbox="472 1319 1262 1346">■ Wind-blown litter would be managed as outlined in the LEMP.<li data-bbox="472 1375 1445 1435">■ Coordination of vegetation planting and removal with bushfire management requirements that include access tracks and fuel management zones.<li data-bbox="472 1464 1445 1525">■ Flammable materials would be removed from site fencing as outlined in the LEMP.<li data-bbox="472 1554 1445 1615">■ The LEMP would be implemented to ensure reduction of hazards and risk associated with delivery and/or processing of waste.<li data-bbox="472 1644 1445 1738">■ A Vegetation Management Strategy (including Weed management) would be developed within the LEMP to ensure that vegetation is managed to not exceed recommended fuel loads in relevant guidelines.<li data-bbox="472 1767 1334 1794">■ The general public would not be allowed direct access to the landfill.<li data-bbox="472 1823 1445 1883">■ Security of the site would be maintained during construction and operation including security fencing, which is locked after hours of operation.<li data-bbox="472 1912 1445 1973">■ Waste entry and flows would be monitored and controlled in accordance with the LEMP.



RESPONSE TO SUBMISSIONS/PREFERRED PROJECT REPORT - WHYTES GULLY NEW LANDFILL CELL

Issue	Commitments
Rehabilitation and Final Landform	<p>Wollongong City Council commit to:</p> <ul style="list-style-type: none">■ Development of a final landform that integrates with the surrounding landscape and environment.■ Implementing of the Design Report to ensure that appropriate capping of the landfill is completed progressively throughout the Project.■ Implementing the LEMP to ensure appropriate post closure monitoring and maintenance. This includes contingency and remediation measures should environmental monitoring indicate that the closed landfill is impacting upon air, surface water, groundwater or amenity of nearby receptors. This also includes procedures for maintaining the landfill surface post closure and repairing damage to the capping system.
Stakeholder Engagement	<p>Wollongong City Council commit to ongoing regular consultation with the community on the Project through:</p> <ul style="list-style-type: none">■ Community Consultative Committee for the Whytes Gully RRP.■ Phone line to communicate issues to Whytes Gully RRP management.■ Complaints management process (as provided in the draft LEMP).■ Clear signage at construction sites during construction.■ Stakeholder satisfaction surveys and feedback forms (as part of wider Wollongong City Council activity).■ Ongoing use of interactive web-based activities including updates of the Project website.



6.0 REFERENCES

DEC (2005) "Recovering Bushland on the Cumberland Plain: Best practice guidelines for the management and restoration of bushland."

DECC (2009) "Interim Construction Noise Guideline"

DIPNR (2004) "Riparian Corridor Management Study."

EPA (2006) "Technical Framework: Assessment and management of odour from stationary sources in NSW. Published by the Department of Environment and Conservation, November 2006."

EPA (2010) "Victoria's Best Practice Environmental Management – Siting, Design, Operation and Rehabilitation of Landfills"

Katestone (2011) "NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining." (Prepared for the Office of Environment and Heritage, June 2011, by Katestone Environmental Pty Ltd).

NSW Office of Water (July 2012) "Guidelines for riparian corridors on waterfront land."

NSW EPA (1999) "Industrial Noise Policy"



Report Signature Page

GOLDER ASSOCIATES PTY LTD

Kelly Dohle
Environmental Engineer

Jacinta McMahon
Associate, Principal Environmental Engineer

KAD/JLM/kad

A.B.N. 64 006 107 857

Golder, Golder Associates and the GA globe design are trademarks of Golder Associates Corporation.

c:\users\dfaria\documents\whytes gully\117625003_207_r_rev0_response_to_submissions_preferred_project_report final.docx



APPENDIX A

Surface Water Routing and Flood Analysis



December 2012

WHYTES GULLY LANDFILL

Surface Water Routing and Flood Analysis

Submitted to:
Wollongong City Council
NSW Department of Planning and Infrastructure

REPORT

Report Number. 117625003_213_R_Rev0





Table of Contents

1.0 INTRODUCTION	1
1.1 Background	1
1.2 Objectives.....	1
2.0 FLOODING	1
3.0 RUNOFF ROUTING ANALYSIS	3
3.1 Onsite Flood water staging	4
3.2 Permissible Site Discharge.....	5
4.0 SUMMARY	6
5.0 LIMITATION	7
6.0 REFERENCE	7

FIGURES

Figure 1: An extract from Bewsher's extended flood model (figure 7) completed December 2011	2
Figure 2: XPSWMM schematic model.....	3
Figure 3: 100 year ARI pre-developed water level upstream of Reddalls Culverts	4
Figure 4: 5 year ARI pre-developed site discharge at Reddall's Road Culverts	5
Figure 5: 100 year ARI pre-developed site discharge at Reddall's Road Culverts	6

APPENDICES

APPENDIX A

Pre-development Catchment Plan

APPENDIX B

Limitations



1.0 INTRODUCTION

Golder Associates Pty Ltd (Golder) has produced this surface water routing and flood analysis to evaluate the downstream floodplain conditions and how they may affect the Whytes Gully Resource Recovery Park (RRP) site. This report also ascertains the pre-development runoff characteristics discharging from the site.

1.1 Background

An Environmental Assessment (EA) (Golder 2012) was submitted for community consultation on March 2012. Golder received comments on September 2012 regarding surface water management and onsite flooding from:

- Office of Environment & Heritage (OEH) (*Ref: DOC12/34399*);
- Wollongong City Council (WCC) (*Ref: MP-2011/94, dated 5 Sept 2012*);
- NSW Dept of planning & Infrastructure (DoPI) (*Ref: 11/19432*); and
- Asciano (*Ref: 11_0094, dated 6 Sept 2012*).

Specifically, comments were received regarding the effects of floodplain levels on the proposed site (flooding currently shown from the 100 year floodplain). Additionally, it was requested that the completion of a runoff routing analysis to ascertain what the peak pre-development flow rates are discharging off the site, which would then be used as Permissible Site Discharge (PSD) rate for the proposed development.

1.2 Objectives

To respond to comments provided through the submissions, the following objectives were derived:

- evaluate floodplain modelling that has been made available since the submission of the EA report to provided updated comments on the effects of flood plain on the proposed site;
- model the existing pre-development site to evaluate possible flood behaviour on site and link with current flood modelling; and
- model the existing pre-development site to ascertain PSD discharge rates.

2.0 PREVIOUS FLOOD MODELLING

Since the submission of the EA, an extension to the Mullet Creek, West Dapto flood model has been made available in the form of the Bewsher Consulting Pty Ltd report (Bewsher 2011).

The revised 100 year ARI flood levels on Figure 7 of the Bewsher report, flood water appears to have been generated on the existing Whytes Gully landfill site and is shown building up against the northern edge of the carriageway and overtops Reddalls Road before discharging into Dapto Creek. An extract of Figure 7 showing the Whytes Gully site has been shown in Figure 1 below.

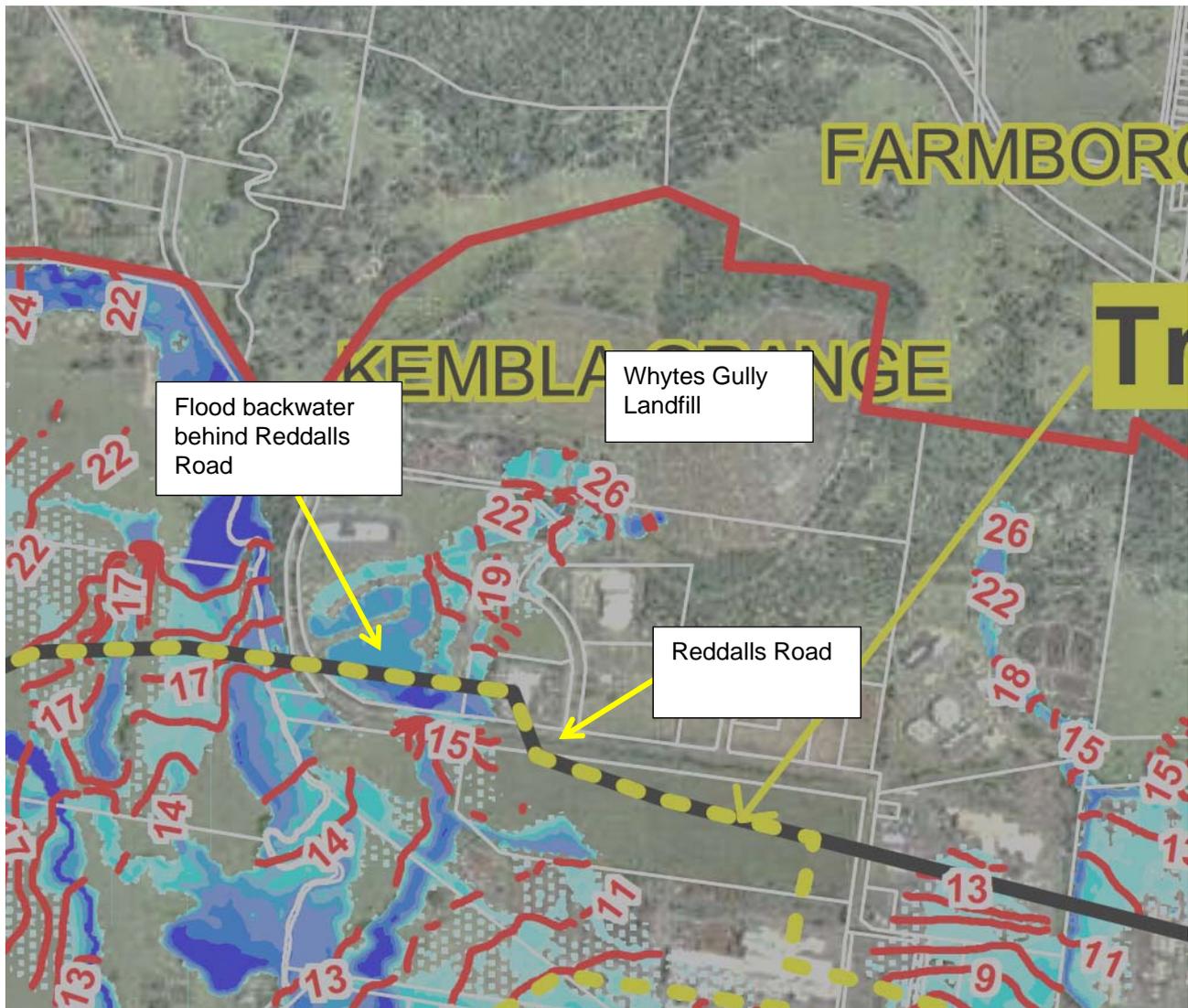


Figure 1: An extract from Bewsher's extended flood model (figure 7) completed December 2011

There is a significant drop in water level through Reddalls Road reported by the Bewsher's flood model as seen on the Figure 1. The water level downstream of Reddalls Road is approximately 13 m AHD. The water level upstream of Reddalls Road is over 16 m AHD, which is about the level of the sag in Reddalls Road (approximately 16.75 m AHD).

It is our opinion that the culverts (twin 2500 mm diameter) under Reddalls Road have not been modelled within Bewsher's extended flood model, as these may have been classified as minor structures for the intent of their overall model. If the culverts have not been taken into account the flood extents shown may be overestimated within the Whytes Gully Landfill, particularly the lower end of the site.

As part of our runoff routing analysis, the 100 year ARI event is modelled to better estimate the flood characteristics of the twin 2500 mm diameter culverts under Reddalls Road and the lower portion of the site. If onsite flood depths are not similar to that of Figure 7 of the Bewsher report it is assumed that their model has not accounted for the these culverts.



3.0 RUNOFF ROUTING ANALYSIS

An XPSWMM hydraulics model was set up to simulate the flows in and out of the existing sediment ponds to estimate runoff characteristics for the pre-development catchment throughout the ponds and at the outfall into Dapto Creek.

The Laurenson's non-linear routing method was used within XPSWMM to simulate the rainfall/runoff process. Rainfall depths were retrieved from the Bureau of Meteorology website. Conservative assumptions were made for losses and other catchment parameters, as it an ungauged catchment.

The below Figure 2 is the XPSWMM schematic model used.

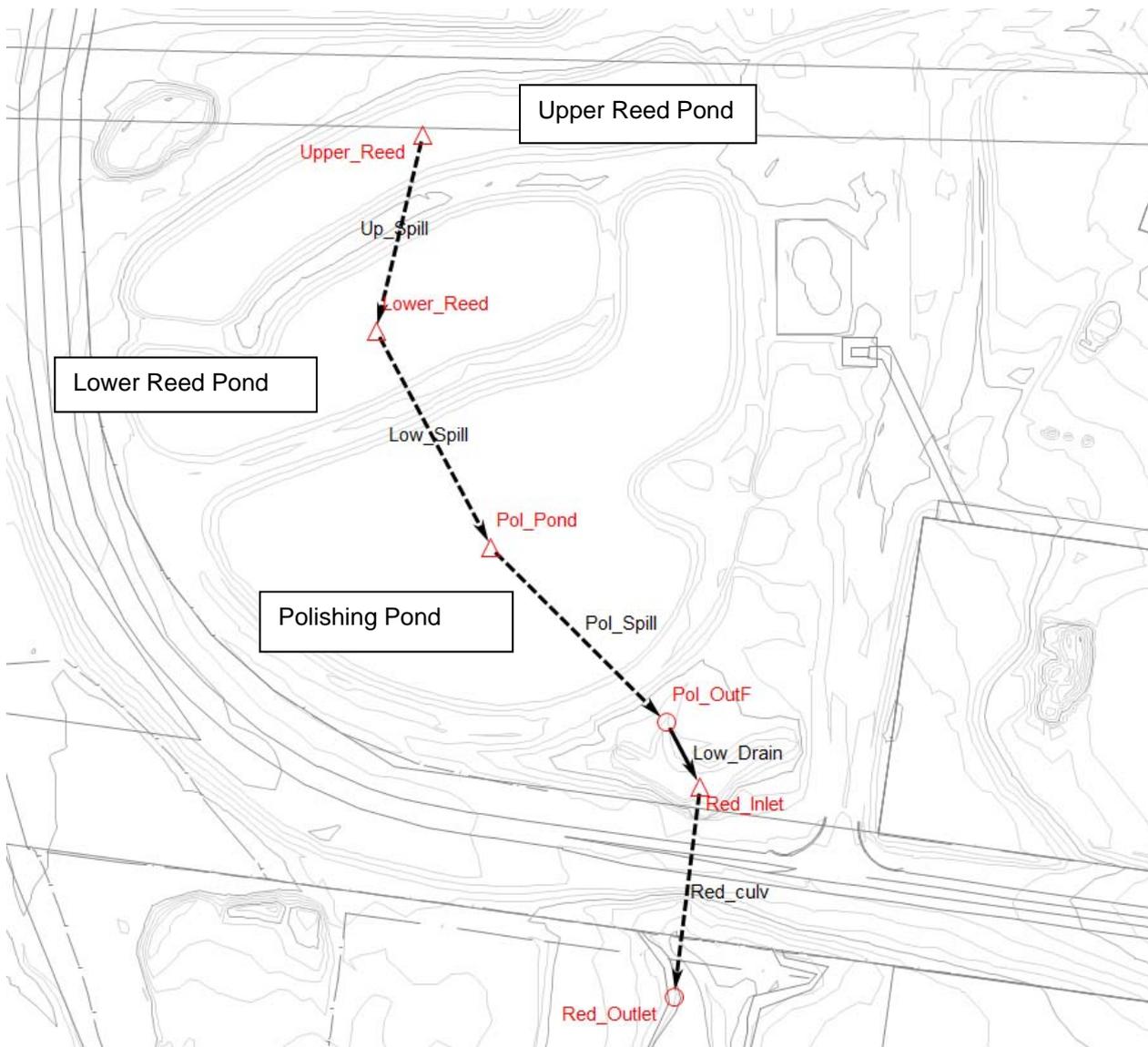


Figure 2: XPSWMM schematic model

The model is made up of:

- three ponds (upper reed pond, lower reed pond and polishing pond) and their corresponding outfalls/spillways;



- a storage node for the existing volume at the Reddalls Road culvert inlet; and
- the twin 2500 mm diameter culverts at Reddalls Road.

The inputs into the model have been based on the long-section design drawing produced by Forbes & Rigby (Forbes & Rigby 2003) and a Photogrammetry Ground Survey produced by KFW & Associates Pty Ltd (KFW 2011).

An initial depth of all three ponds have been set at the dry weather level shown on the design long sections to simulate the available dynamic storage within the ponds.

The outfall is modelled with a fixed back water level of 13 m AHD to simulate the floodplain level in Dapto Creek just downstream of the culvert as discussed in Section 2.0.

A pre-development catchment plan was evaluated and input into the model. The pre-development catchment plan can be found in Appendix A.

3.1 Onsite Flood Level

The resulting maximum water levels upstream of the Reddalls Road culverts for the peak 100 year ARI is 14.77 m AHD, which is below the soffit of the Reddalls Road culverts (approx. 15.28 m AHD) and below the sag level within Reddalls Road where an overspill would occur (approx. 16.75 m AHD). Figure 3 presents the water levels for a 100 year ARI storm event upstream of the Reddalls Road Culverts.

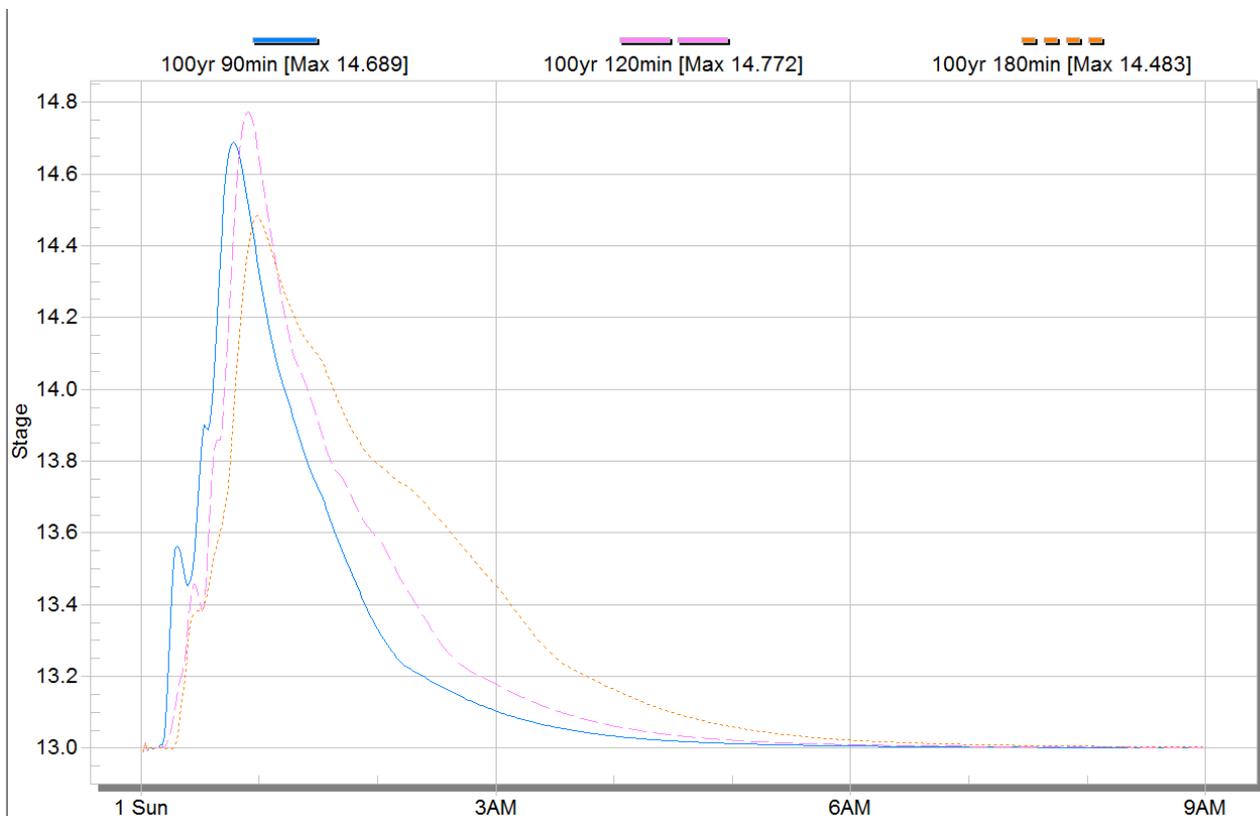


Figure 3: 100 year ARI pre-developed water level upstream of Reddalls Culverts



3.2 Permissible Site Discharge

The resulting 5 year ARI peak discharge through the site's outfall through Reddalls Road Culverts is 7.04 m³/s. It was found that critical duration for a 5 year ARI storm event is the 2 hour storm event as depicted within Figure 4.

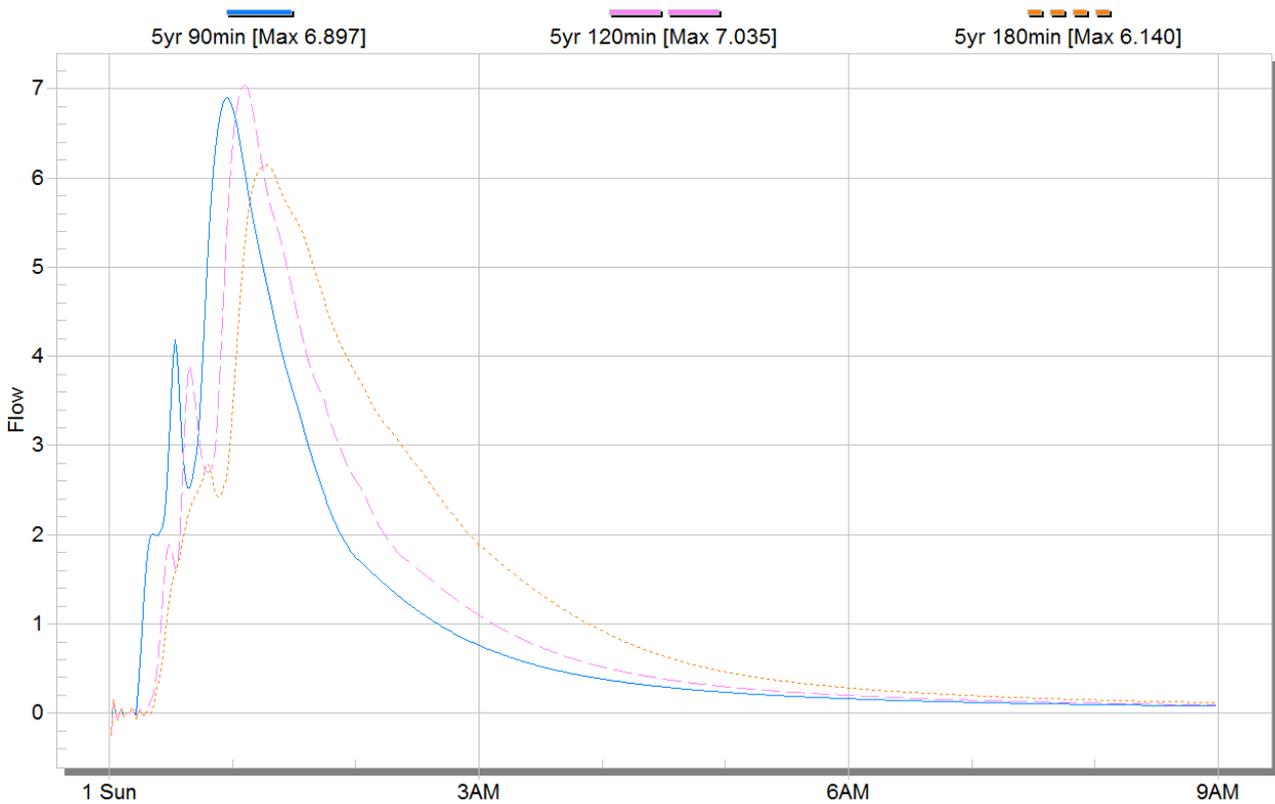


Figure 4: 5 year ARI pre-developed site discharge at Reddall's Road Culverts

The resulting 100 year ARI peak discharge through the site's outfall through Reddalls Road Culverts is 18.1 m³/s. It was found that the critical duration for a 100 year ARI storm event is the 2 hour storm event as depicted within Figure 5.



Conduit Red_Cul.1 from Reddalls to Daptocreek

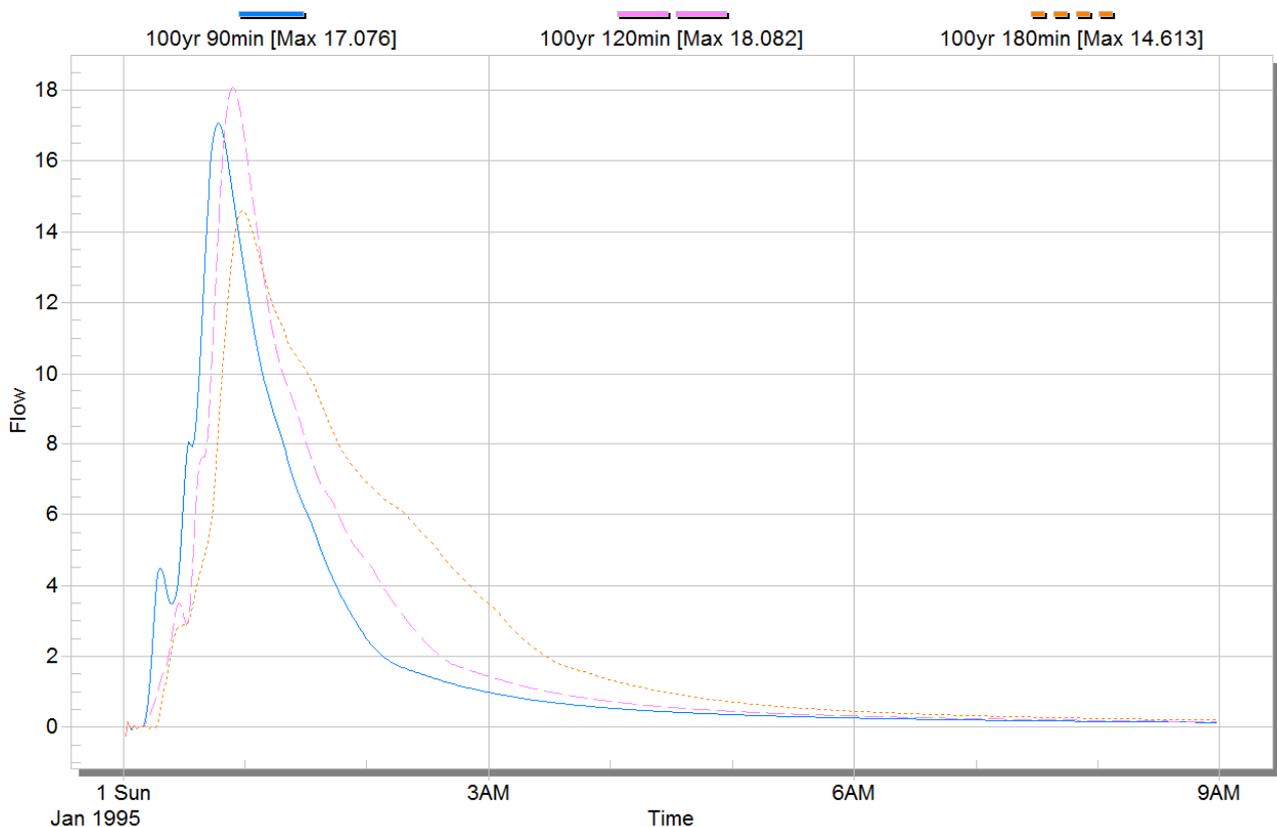


Figure 5: 100 year ARI pre-developed site discharge at Reddall's Road Culverts

4.0 SUMMARY

Our review of recently available flood modelling report (Bewsher's 2011) regarding possible site flooding includes the following:

- It is likely that the culverts (twin 2500 mm diameter) under Reddalls Road have not been modelled within Bewsher's extended flood model as these may have been classified as minor structures for the intent of their overall model.
- If the culverts have not been taken into account, the flood extents shown in the Bewsher's report may be overestimated at the site.
- As part of the runoff routing analysis, the 100 year ARI was modelled to estimate the flood characteristics of the twin 2500 mm diameter culverts at Reddalls Road.
- Our estimated 100 year ARI floodlevel upstream of the Reddalls Road Culverts is 14.77 m AHD, which is below the soffit of the Reddalls Road Culvert (approx. 15.28 m AHD) and below the sag level within Reddalls Road where an overspill would occur (approx. 16.75 m AHD).

The resulting Permissible Site Discharge (PSD) requirements are as follows:

- 5 year ARI, 2 hr peak storm event at Dapto Creek outfall = 7.04 m³/s
- 100 year ARI, 2 hr peak storm event at Dapto Creek outfall = 18.1 m³/s.



5.0 LIMITATION

Your attention is drawn to the document – “Limitations”, which is included at the end of this report. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risk associated with the service provided for this project. The document is not intended to reduce the level of responsibility accepted by Golder, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

6.0 REFERENCE

- Bewsher Consultanting Pty Ltd, 2011, Mullet Creek, West Dapto Extension of Flood Model, Hydrologic and Hydraulic Modelling Report, Prepared on behalf of Wollongong City Council
- Department of Environment & Climate Change, 2008, “Managing Urban Stormwater: Soil and Construction: Volume 2B Waste Landfills”, Published by DECC, Canberra
- Landcom, 2004, “Managing Urban Storm Water: Soil and Construction, Volume 1”, Published by DECC, NSW
- Forbes & Rigby Pty Ltd, 2003, Reference “Leachate & Stormwater Pond Design, Whytes Gully Waste Depot, Site master profiles, Drawing no. 5003, Rev P2”, Prepared for Wollongong City Council
- KFW & Associates Pty Ltd, 2011, Reference “Overall Site Plan Whytes Gully Waste Disposal Area West Dapto”, Drawing no. SV01, Rev B
- Golder Associates Pty Ltd, March 2012 “Environmental Assessment – Whytes Gully New Landfill Cell”, Ref: 117625003_159_R_Rev0



Report Signature Page

GOLDER ASSOCIATES PTY LTD

Mike Niisato
Civil Engineer

Scott Stoneman
Principal Water Resource Engineer

MN/SS/mn

A.B.N. 64 006 107 857

Golder, Golder Associates and the GA globe design are trademarks of Golder Associates Corporation.

https://aupws.golder.com/117625003wollongongcitycouncilnewcellwhytesgully/project doc/413 response to submissions/117625003_xxx_m_reva_route analysis.docx



APPENDIX A

Pre-development Catchment Plan

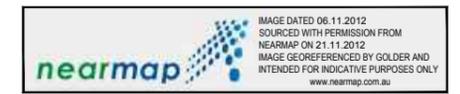
© GOLDER ASSOCIATES PTY. LTD. INFORMATION CONTAINED ON THIS DRAWING IS THE COPYRIGHT OF GOLDER ASSOCIATES PTY. LTD. UNAUTHORISED USE OR REPRODUCTION OF THIS PLAN EITHER WHOLLY OR IN PART WITHOUT WRITTEN PERMISSION INFRINGES COPYRIGHT.



LEGEND		HECTARES
CATCHMENT AREAS		
[Color]	AREA 1A	3.00 Ha
[Color]	AREA 1B	2.20 Ha
[Color]	AREA 1C	2.00 Ha
[Color]	AREA 2	2.00 Ha
[Color]	AREA 3	8.60 Ha
[Color]	AREA 4	2.00 Ha
[Color]	AREA 5	4.00 Ha
[Color]	AREA 6	10.30 Ha
[Color]	AREA 7	10.00 Ha
[Color]	AREA 8	1.90 Ha
[Color]	AREA 9	0.80 Ha
[Color]	AREA 10	9.00 Ha
[Color]	AREA 11	4.60 Ha
[Symbol]	CATCHMENT BOUNDARIES	
[Symbol]	SITE BOUNDARY	
[Symbol]	DRAINAGE AND FLOW DIRECTION	
[Symbol]	LEACHATE PONDS	
[Symbol]	SURFACEWATER PONDS	

SOURCE:

- BASE DRAWING TAKEN FROM K F WILLIAMS & ASSOCIATES WHYTES PHOTOGRAMMETRY AND GROUND SURVEY 20-07-11
- GRID COORDINATES ARE MGA 94, ZONE 56



**ISSUED FOR
PRELIMINARY
NOT FOR CONSTRUCTION**



 www.golder.com GOLDER ASSOCIATES PTY. LTD.	CLIENT WOLLONGONG CITY COUNCIL		PROJECT STAGE I PROPOSED WORKS WHYTES GULLY LANDFILL GAS COLLECTION SYSTEM						
	DRAWN BY HC	DATE 21.11.2012	DRAWING TITLE EXISTING CATCHMENT BOUNDARIES AND SURFACE WATER MANAGEMENT						
	CHECKED BY MN	DATE 30.11.2012							
SCALE 1:4,000	SHEET SIZE A3	PROJECT No 117625003	DOC No 213	DOC TYPE R	FIGURE No F001	REVISION 0	FIGURE 1		



APPENDIX B

Limitations



LIMITATIONS

This Document has been provided by Golder Associates Pty Ltd ("Golder") subject to the following limitations:

This Document has been prepared for the particular purpose outlined in Golder's proposal and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.

The scope and the period of Golder's Services are as described in Golder's proposal, and are subject to restrictions and limitations. Golder did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Golder in regards to it.

Conditions may exist which were undetectable given the limited nature of the enquiry Golder was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.

In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. Golder's opinions are based upon information that existed at the time of the production of the Document. It is understood that the Services provided allowed Golder to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.

Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.

Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Golder for incomplete or inaccurate data supplied by others.

Golder may have retained subconsultants affiliated with Golder to provide Services for the benefit of Golder. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any direct legal recourse to, and waives any claim, demand, or cause of action against, Golder's affiliated companies, and their employees, officers and directors.

This Document is provided for sole use by the Client and is confidential to it and its professional advisers. No responsibility whatsoever for the contents of this Document will be accepted to any person other than the Client. Any use which a third party makes of this Document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this Document.

At Golder Associates we strive to be the most respected global company providing consulting, design, and construction services in earth, environment, and related areas of energy. Employee owned since our formation in 1960, our focus, unique culture and operating environment offer opportunities and the freedom to excel, which attracts the leading specialists in our fields. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees who operate from offices located throughout Africa, Asia, Australasia, Europe, North America, and South America.

Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

solutions@golder.com
www.golder.com

Golder Associates Pty Ltd
124 Pacific Highway
St. Leonards, New South Wales 2065
Australia
T: +61 2 9478 3900

