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AECOM

Armidale Regional Landfill
Armidale Dumaresq Council
12th April 2011

Armidale Regional Landfill

Submissions Report

Submissions Report

Prepared for

Armidale Dumaresq Council

Prepared by

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Reviewed by Catherine Brady

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
0	28-Oct-2010	DRAFT for Council Review	Catherine Brady Associate Director - Environment	
1	26-Nov-2010	FINAL DRAFT	Catherine Brady Associate Director - Environment	
2	17-Dec-2010	ISSUED for DoP Review	Catherine Brady Associate Director - Environment	
3	12-Apr-2011	For Issue	Catherine Brady Associate Director - Environment	

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1.0 Introduction

1.1 Overview of the proposal

Armidale Dumaresq Council (Council) proposes to develop the Armidale Regional Solid Waste (Putrescible) Landfill Facility off Waterfall Way in Armidale, NSW. The existing landfill facility at the Armidale Waste Management Centre is fast approaching its final capacity. No further options are available to extend or otherwise prolong the life of the landfill, mainly due to the lack of further available land area at that site. As such, the need now exists to provide a long-term waste disposal solution for the region. It is therefore proposed to seek approval to construct and operate a new regional landfill facility.

The proposed landfill facility would be designed to accept up to 15,000 tonnes per annum (tpa) of general solid waste, up to a total capacity of 750,000 tonnes over the proposed landfill's life span of 50 years. The proposed landfill facility is intended to service the future waste disposal needs of the Armidale Dumaresq, Guyra Shire, Uralla Shire and Walcha Local Government Areas (LGAs).

The Project Site is located on Waterfall Way (also known as Grafton Road) about 12 kilometres east of Armidale.

The proposed development would include:

- Progressive development of five individual, operational cells, each with an operational life of approximately 10 years.
- Leachate Barrier System.
- Leachate Collection and Conveyance System.
- Leachate Pond.
- Sedimentation Basin.
- Dry Basin.
- Internal Access Road.
- Biodiversity Offset Area.
- Diesel Storage Tank and Bunded Area.
- Site amenities building, including staff toilets, staff lunch room, office, first aid / Occupational Health and Safety (OH&S) facilities (eye wash facilities and fire extinguishers, etc) and car parking spaces for both staff and visitors.

A leachate barrier and leachate collection and conveyance system would drain to an appropriately sized leachate pond, which would be installed to contain leachate on site. Intermediate cover would be applied to all landfilled areas that would otherwise be exposed for more than 90 days. Final clay capping of each cell would occur progressively and final capping would commence within 30 days of the final landfill height being reached at each location. Finally capped areas would be progressively revegetated with shallow rooted native grasses and shrubs to return the landfill footprint to its pre-existing land use condition, suitable for agricultural purposes.

The proposal includes a single lane access road between the proposed landfill facility and Waterfall Way. The access road would be bitumen sealed from the intersection with Waterfall Way to a wheel wash located near the landfill footprint.

1.2 Impact assessment process

1.2.1 Planning Framework

The proposed Armidale Regional Landfill is defined as a 'waste facility' under Schedule 1 of the *State Environmental Planning Policy (Major Development) 2005* (SEPP 2005) as it would have the capacity to receive greater than 650,000 tonnes of putrescible waste over the life of the landfill. The project is therefore a Major Project and requires the approval of the Minster for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

An Environmental Assessment (EA) was prepared to determine the potential impacts of the proposal on the environment. The EA was prepared in accordance with the provisions of Part 3A of the EP&A Act, together with the Director General's Requirements (DGRs) issued by the Director General of the Department of Planning (DoP) on the 20th November 2008.

On the 29th April 2010, the Director General advised that the EA adequately addressed the environmental assessment requirements (i.e. the DGRs) for the project and that the EA would be made publically available for comment.

1.2.2 Public Exhibition

Under Section 75H (3) of EP&A Act, the Director General of the DoP is required to exhibit the EA for a period of '*at least 30 days*'. Given the size of the EA and previous comments from the public suggesting the exhibition period be extended to allow sufficient time for the public to comprehend the information contained within it, the EA was placed on exhibition for a period of 60 days. During the exhibition period, the DoP website experienced technical difficulties with the electronic collection of submissions. In light of this issue, DoP accepted submissions for a further 30 days after the exhibition period closed.

The EA was made available on the DoP web site (www.planning.nsw.gov.au) and was exhibited at the following locations:

- DoP
  - Information Centre, 22-33 Bridge Street, Sydney
  - Tamworth Office, Level 3, Noel Park House, 155-157 Marius Street, Tamworth
- Armidale Dumaresq Council
  - Council Administration Building, 135 Rusden Street, Armidale
  - Armidale War Memorial Library, Corner Rusden and Faulkner Streets, Armidale
- Nature Conservation Council
  - Level 2, 5 Wilson Street, Newtown

During the exhibition period the public was able to submit written comments on the proposal. The comments raised have been considered by Armidale Dumaresq Council and its Consultant and responses provided in this Submissions Report.

Consultation with key stakeholders continued through and in some cases beyond the exhibition period. This included ongoing discussions with Department of Environment, Climate Change and Water (DECCW), Roads and Traffic Authority (RTA) and meeting with specific residents and community groups.

1.3 Purpose of this Report

In total, the DoP received 104 submissions and provided copies to Armidale Dumaresq Council. Of these:

- 4 were from interest groups (Gara Valley Environment Protection Association, Wilderness Society, Humane Society International, National Parks Association of NSW);
- 4 were from Local and State Government authorities (DECCW, RTA, NSW Office of Water [NOW], and Kempsey Shire Council); and
- 96 were from individuals.

In accordance with Section 75H(6) of the EP&A Act, the Director-General required Armidale Dumaresq Council to address the issues raised in the submissions.

This Submissions Report has been structured in a manner that clearly sets out the issues raised in the submissions on the EA and addresses each issue.

Chapter 1 provides an overview of the proposal, the impact assessment process and report purpose and structure.

Chapter 2 provides a summary of the key issues raised in the submissions.

Chapter 3 describes the additional work that has been undertaken during the preparation of responses, to supplement the information provided in the EA.

Chapter 4 outlines the recent changes to the *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) and documents how the proposal satisfies the provisions set out in *State Environmental Planning Policy (Infrastructure) Amendment (Landfills) 2010*.

Chapter 5 provides additional information requested by the DoP regarding waste strategy, economic analysis of waste management options, recycling, organic waste collection and processing and securing biodiversity off-sets.

Chapter 6 presents the Statement of Commitments and justification for project approval.

Chapter 7 provides all submissions and a table of responses to each submission and issue raised. Each submission has been given a number i.e. S001 for submission 1, S002 for submission 2, and so on. Each response within the submission has been numbered, i.e.S001_1, S001_2, S001_3 and so on. For each of the issues raise, a topic number has been listed in the table, i.e. W1, SE4, P3 and so on.

2.0 Issues Raised in Submissions

A summary of the key issues raised in the submissions, set out by topic, is presented in Table 2 . Responses to issues raised in submissions are presented in **Chapter 3**.

Table 1 Key issues raised in submissions

Topic	Subtopic	Reference
EA Process	**Exhibition Period** Concerns were raised regarding a perceived lack of information regarding exhibition of the EA and opportunity to provide comment. Some comments were received regarding the technical difficulties received during the exhibition period.	E1
	Community access to information Submissions raised issues with the timing and availability of project information during the site selection, *Environmental Protection and Biodiversity Conservation Act 1997* (EPBC Act) Referral and EA preparation stages.	E2
	Procedure/Council/Consultants Numerous submissions raised concerns regarding the integrity of the site selection process, Council procedures during site selection, and potential conflicts of interest for the Consultants engaged by Council.	E3
Project	**Need and Justification** The need for the proposed new landfill was questioned and requests made for further justification of the new landfill.	P1
	Site Selection A significant number of submissions raised issues relating specifically to the site that was selected for the landfill. Concerns were raised as to the criteria and weightings used in the site selection process, appropriateness of the site with regard to its location in the catchment and the alternative sites considered.	P2
	Alternatives Considered Many submissions questioned whether or not alternatives to the new regional landfill were considered, including Alternative Waste Technologies (AWT), composting, zero-waste policies and transport of waste to other landfills.	P3
	Landfill Design The issues raised for this topic included sizing of the landfill, design of the landfill liner, leachate management, potential geological fault and size and design of the leachate pond.	P4
	Landfill Operation Issue raised regarding estimated operational life of the landfill.	P5
	Monitoring, Mitigation and Management (Site/General) Concern was raised regarding the commitment of Council to preparing and implementing management plans. Post closure monitoring and management were also raised in many submissions.	P6
Consultation	**Community** Submissions raised issues regarding perceived lack of correspondence with local landowners, frequency of newsletters, publicising results of community meetings, lack of communication regarding costs and no unsolicited communication from the proponent.	C1

Topic	Subtopic	Reference
	Agency Submissions raised the issue of the Commonwealth consultation process during the EPBC referral and assessment process by the then Department of Environment, Water, Heritage and the Arts (DEWHA), now the Department of Sustainability, Environment, Water, Populations and Communities (DSEWPC).	C2
	Aboriginal Questions were raised as to whether traditional owners had been properly consulted.	C3
Heritage	**World Heritage Area** Submissions highlighted the value and importance of the Gondwana Rainforests of Australia World Heritage Area (GRAWHA). Submissions raised concerns with the siting of the landfill within the catchment of the GRAWHA. Concerns related to the potential for the landfill to impact on the GRAWHA through: • Direct impacts on water quality resulting from leachate runoff or via leachate contamination of the groundwater to the Gara River; and • Indirect impacts on tourism, flora and fauna and recreation in the World Heritage Area.	H1
	Local or State Historical Site Submissions raised the issue of potential destruction of historical sites resulting from earthmoving, leachate and traffic movement to and from site.	H2
Water	**Surface Water** Issues raised in submissions relating to surface water included the potential for chemical or fuel spill resulting from transport movements. There were also perceived issues associated with the potential for uncontrolled surface water flows from the site into the Gara River. Concern was raised as to the rainfall data that was used in the modelling and pond sizing. The potential for impacts on potable surface water supplies was also raised.	W1
	Groundwater Concern was raised that the volume of groundwater in the vicinity of the site has been underestimated. Issues relating to groundwater dependent ecosystems were raised. Also concern was raised regarding the location of a licensed borehole on the adjacent property, in close proximity to the site.	W2
	Stormwater Drainage and Flooding Submissions queried the design of containment structures and the ability for them to contain sufficient volumes of runoff during flood events. Concern was also raised regarding capacity of the ponds with respect to potential increases in the frequency and volume of floods with future climate change.	W3
	Containment/Management of Leachate/Pollution The potential for leachate pollution was raised in a large number of submissions, including concern regarding potential pollution of groundwater as well as the potential for leachate to be present in surface runoff flowing from the site downstream into the Gara River. The integrity of the landfill liner, including long-term deterioration and leakage, was raised in a large number of submissions.	W4

Topic	Subtopic	Reference
	Mitigation/Monitoring/Management Concern was raised that mitigation measures were dated and inadequate. Concerns were also raised as to the availability and cost of management/remediation measures should contamination occur.	W5
Flora and Fauna	**General** Potential for impacts on flora and fauna was raised in submissions including: • Direct impacts – vegetation clearance and associated potential for loss of habitat, disturbance of wildlife corridors and impacts to threatened species. • Indirect impacts – potential for water quality impacts to occur with a resulting impact on downstream aquatic ecology The level of survey effort undertaken for flora and fauna was also raised in submissions.	FF1
	Threatened Species/Offsets Concerns were raised regarding impacts of the proposed landfill on threatened species both on site and offsite. In particular, concern regarding potential impacts on Box Gum Woodland, presence of koala habitat, availability of hollows and obstacles to low flying species such as the Swift parrot.	FF2
	Oxley Wild Rivers National Park (OWRNP) Submissions highlighted the value and importance of the OWRNP. Submissions raised concerns with the siting of the landfill within the catchment of the OWRNP. Concerns related to the potential for: • Direct impacts on water quality of the Gara River resulting from potential presence of leachate in surface runoff or groundwater ; and • Indirect impacts on tourism, flora and fauna and recreation in the OWRNP.	FF3
	Weeds The potential for the introduction of weeds to the site was raised in submissions. Potential future spread of weeds from the site to adjacent properties was also raised.	FF4
	Vegetation Removal Clearing of remnant and regrowth vegetation on site was raised as an issue.	FF5
Air Quality	**Odour** Concerns raised regarding the potential for odour from the site impacting on neighbouring landowners as well as the passing public.	AQ1
	Dust Submissions raised general concern with regard to dust emissions from the proposed landfill.	AQ2
	Mitigation/Monitoring/Management No specific issues were raised in submissions.	AQ3
	Greenhouse Gases (GHG) Emissions of GHG (methane and carbon dioxide) resulting from landfill gas emissions was raised as an issue.	AQ4

Topic	Subtopic	Reference
Noise	**General** Concerns raised regarding increased background noise resulting from the proposed landfill.	N1
	Construction No specific issues were raised in submissions.	N2
	Operation Submissions were concerned with potential noise resulting from plant used on site, such as compactors and bulldozers. Impacts of noise from reversing alarms was also raised in a number of submissions. Concerns were also raised regarding impacts of increased operational noise on tourist activities in the surrounding area.	N3
Social and Economic	**General** Concerns were raised regarding general impacts on the regional economy resulting from impacts on businesses located close to the proposed landfill site. Issues were raised with regard to the impact of the proposal on the reputation of food and wine businesses.	SE1
	Lifestyle/Recreation Concerns that the proposal would reduce recreational amenity of the popular swimming and picnic areas near the site. Concerns that the proposed landfill would have indirect impacts on the Blue Hole recreation area downstream of the site.	SE2
	Tourism Submissions raised the potential for impacts on regional and local tourism, in particular on the tourism value of the scenic Waterfall Way tourist drive. Concerns were also raised regarding potential impacts on tourism due to visibility of the landfill, odour and increased traffic and heavy vehicles.	SE3
	Project Cost A key issue raised by the submissions related to the project cost, including capital expenditure, operating cost and management and closure costs. Concerns were also raised that the proposed landfill project would increase rates paid by Armidale residents.	SE4
	Property/Land Values Concerns raised about possible decrease in the value of land in the vicinity of the proposed landfill site.	SE5
Land Use	**General** Submissions raised the issue of conflicting landuses of food tourism and the landfill. Opinions expressed that the landuse is inappropriate in a rural context and may affect future land use of the site. Concern that impacts from the proposed landfill on water quality may impact on agricultural land use.	LU1
Traffic and Transport	**General** General concerns expressed regarding potential traffic increase on Waterfall Way.	T1
	Road Network and Traffic Volume Submissions raised concern regarding potential increases in heavy vehicle movements along Waterfall Way, including perceived increase in heavy vehicle traffic from other parts of the region.	T2

Topic	Subtopic	Reference
	Safety Some concerns were raised regarding potential risks to safety for drivers and tourists along Waterfall Way resulting from increased heavy vehicle traffic.	T3
	Design Concern regarding signage at the new intersection for the access road to the landfill site.	T4
Hazard and Risk	**Fire** Submissions raised the issue regarding potential risk of combustion of materials on site and the impact of bushfire on vegetated areas in the vicinity of the site.	HR1
	Toxic Substance Perceived concerns regarding the potential for emissions of toxic chemicals (such as carcinogens) as a result of flaring of landfill gas.	HR2
Visual	**Visibility** The visibility of the landfill was raised as a key issue, for both nearby landowners and tourists travelling along the Waterfall Way.	V1
	Aesthetic and amenity Concerns were raised regarding the visual impacts of the landfill on the natural beauty, scenic value and landscape character of the surrounding area.	V2
	Litter Submissions raised concerns regarding the control and management of windblown litter from the site, as well as illegal dumping of waste near the landfill.	V3
Geology and Soils	**Erosion** The potential risk of soil erosion at the site was raised.	GS1
	Hydrogeology Submissions raised concern about the fractured nature of the subsurface environment and groundwater transmissions rates.	GS2
Other Issues	**Health** Concerns were raised in relation to potential impacts on public health, including potential contamination of drinking water by leachate, the release of toxic gases from incineration and potential for disease introduced by vermin.	O1
	Vermin Submissions raised issues regarding potential introduction of vermin such as rats and mice as well as insects such as flies.	O2

3.0 Further Work Undertaken

3.1 Leachate Modelling

During the development of the conceptual design for the landfill, a water balance was prepared for the site to model the surface water and leachate inputs and outputs. The modelling was used to determine the leachate pond, sedimentation basin and dry basin volumes.

In its submission, DECCW requested the water balance analysis be extended past final capping of all cells, to assess long term performance and implications for leachate management once the landfill is closed.

As agreed with DECCW during the submissions response period, the water balance modelling was extended for a further 20 years post-closure to determine the long term performance of the leachate pond once final capping has occurred. The results of the modelling indicated that a disposal rate of between 7 to 10m^3/day (similar to the leachate re-injection rate during operation) is likely to be required to maintain a constant and stable leachate pond volume below the spill capacity (12ML). This post-closure leachate disposal is of a manageable volume and could be achieved by one (or a combination) of the following options:

- Continued leachate re-injection into the landfill mass (but subject to the available long-term water storage capacity within the placed landfill waste);
- Irrigation of the stored leachate over natural vegetated land within controlled surface runoff drainage area/s (located outside the landfill but within the site) with appropriate pre-treatment; or
- Provision of additional leachate storage for contingency containment (such as the dirty water and sediment dams which will be redundant following landfill closure and rehabilitation of the final landfill capping surface).

Water infiltration rates into the landfill mass would gradually reduce over time as the surface capping layer, vegetation and re-growth becomes more stable and mature and leachate generation rates would reduce as a result.

A Closure Management Plan would be prepared which would incorporate monitoring of leachate and infiltration rates (compared to site rainfall) towards the end of the life and post closure. The plan would be used to determine and assess the most appropriate post-closure leachate disposal option/s based on the monitoring results. The Closure Management Plan would be developed well ahead of closure and would therefore provide sufficient time to develop the post-closure disposal method best suited to the predicted quantity and quality of leachate that would be generated and to ensure any risk of environmental impact is minimised. Over that time it is likely that technologies and best practice closure management will improve and consultation would be undertaken with the DECCW at the time of preparing the Closure Management Plan, to agree the most appropriate option for post-closure leachate management.

3.2 Confirmation of Flooding Calculations

A significant number of submissions raised concerns with regard to the potential for flooding to impact on the site. In light of the concerns raised, the flooding calculations undertaken for the conceptual design were reviewed and further information as to the methodology and calculations is provided below as well as individual responses to submissions (**Chapter 6**).

The proposed landfill site is located within the upper reaches of the catchment (approx 275 hectares in area) and is sited between the Gara River to the east and Commissioners Waters River to the west. Surface runoff from the site flows to the north towards an ephemeral creek, which flows east and ultimately discharges into the Gara River, approximately 1km downstream of the site.

The flood assessment undertaken for the project was in accordance with the procedures outlined in Australian Rainfall and Runoff (ARR) which is used as the guideline for the analysis and prediction of flood events in Australia for design purposes. ARR was used to predict the 1 in 100 year Average Recurrence Interval (ARI) storm event from the existing creek catchment at a point opposite the site. The 1 in 100 year ARI peak flow of approximately 40m^3/s was predicted for the creek adjacent to the north-eastern boundary of the site. Note that this flow is to be passed through the north-eastern extent of the site (adjacent to the line of the creek) as per

existing (natural) conditions and is not designed to be contained or controlled as part of the landfill operational requirements.

Flooding during high rainfall events will occur along the existing ephemeral creek and will ultimately discharge into the Gara River, approximately 1km downstream of the site. Manning's equation was used to predict the flood level of the 1 in 100 year ARI peak flow in accordance with the procedures outlined in ARR. The results indicated that flood levels would be approximately 1 to 1.5m above the creek banks resulting in a flow width of approximately 50m through the valley and would encroach on the north-eastern boundary (adjacent to the creekline) of the site. Given that the Dry Basin, which is the closest stormwater storage basin to the north-eastern boundary, is approximately 8m above the existing creek banks and is located approximately 200m upslope of the creek, it was concluded that the Dry Basin, the landfill itself and the water and leachate containment system are well outside the extent of the predicted 1 in 100 year floodplain.

It is noted that the site access road would need to cross the creek floodplain and may therefore be affected by flooding during high rainfall events. Road creek crossings will incorporate suitably designed pipe culverts to allow flows up to the 1 in 100 year ARI to pass through and/or overtop the roadway in a safe manner. During flood events, waste transport to the site could be postponed until such time that the flooding recedes and safe access to the site is possible. During this time, waste would be stored at the Waste Transfer Station where there is adequate capacity and safeguards to temporarily store the waste. Procedures during times of flooding will be outlined in the LEMP.

The water management system has also been designed to contain the 24 hour duration, 1 in 100 year ARI surface runoff volume from the entire disturbed catchment area of the site in accordance with ARR guidelines. This is considered to provide adequate protection against heavy rainfall and ensure containment of onsite dirty and leachate water. The proposed stormwater pond (Dry Basin) incorporates adequate freeboard storage to contain the 24 hour duration, 1 in 100 year ARI surface runoff volume (which equates to 153 mm of rainfall or approximately 19 ML storage) from the entire disturbed catchment area of the site, without further containment or storage actions needing to be implemented. In the event of an emergency, the sedimentation pond and/or dry basin have been designed with sufficient capacity to contain an emergency release from the leachate pond, with no release of leachate to the receiving environment.

The Water and Leachate Management Plan (WLMP) details all aspects of the design and operation of the proposed water management system for the site including the Leachate Pond, Sedimentation Basin and Dry Basin which would contain all dirty water runoff and leachate water generated from the landfill.

4.0 State Environmental Planning Policy (Infrastructure) Amendment (Landfills) 2010

4.1 Clause 123 Amendments

Amendments to clause 123 of ISEPP 2007 were introduced in July 2010. The changes aim to deliver improved resource recovery and a reduction in environmental impacts of landfill applications. The amendments strengthen the requirements for proponents to:

- Consider waste minimisation and demonstrate justifiable demand for a landfill;
- Adopt best practice landfill design and operation;
- Locate the landfill or extension on degraded land and to avoid land use conflicts; and
- Optimise transport links to reduce social and environmental impacts associated with transporting waste to the landfill.

The new requirements of clause 123, set out in ISEPP 2010, have been considered with regard to the proposed concept design and environmental assessment that was undertaken for the proposed Armidale regional landfill. A description of compliance for each provision is provided in the following section.

4.2 Compliance with amendments

Clause 123

(a) *whether there is a suitable level of recovery of waste, such as by using alternative waste treatment or the composting of food and garden waste, so that the amount of waste is minimised before it is placed in the landfill*

The 2009/10 Council waste recovery rates with respect to the NSW Waste Avoidance and Resource Recovery Strategy 2007 Targets are presented in Table 2. [Note that Council is not able to accurately differentiate streams 1 and 2 due to the logistics of the collection and disposal processes so the streams have been combined as they are in practice.]

Table 2 Waste recovery rates for Armidale Dumaresq Council

Waste Stream	ADC Performance 2009/10	NSW Strategy 2007 Target
1. Municipal Waste Stream	1 and 2 combined = 60.6%	66%
2. Commercial and Industrial Stream	1 and 2 combined = 60.6%	63%
3. Construction and Demolition stream	90%	76%
4. Waste Stream combined	79.4%	Not applicable

Council has considered the implementation of various AWT technologies, including Mechanical Biological Technologies (MBT), thermal treatment or a combination of both MBT and thermal treatment. Council has demonstrated its commitment via its active pursuit of AWT processes over a number of years.

These investigations have led Council to its current position whereby it has recognised the need and is committed to the augmentation of its current processing facilities to deal with putrescible waste. This could be achieved by way of composting of organic waste and stabilisation of residual waste containing putrescible material before landfilling - commonly referred to as AWT.

Council has completed trials to evaluate the City to Soil and Groundswell process at the Long Swamp Road Waste Transfer Facility for the composting of clean organic waste and for the stabilisation of mixed residual waste containing putrescible material before it is disposed of to landfill. In addition to the processing of the organic waste, it is planned to change Council's garden waste collection service to an organics (garden waste and food waste) collection service. Both the organics collection service and the putrescible waste composting and stabilisation processes are planned for implementation in 2011.

Existing resource recovery facilities, including the MRF and Resource Recovery Centre at the existing Armidale Waste Management Centre will be maintained and improved over the long term and throughout the period of operation of the proposed new landfill. The Armidale Waste Management Centre would continue to separate all clean, recyclable material such as glass, plastic bottles and e-waste, from other non-recyclable wastes to be directed to landfill. Further facilities and processes to recover more materials for re-use will be added in future as markets and recovery costs dictate.

(b) *whether the development:*

(i) adopts best practice landfill design and operation; and

(ii) reduces the long term impacts of the disposal of waste, such as greenhouse gas emissions or the offsite impact of odours, by maximising landfill gas capture and energy recovery, and

The leachate barrier system, which includes the landfill liner and ponds, has been designed in accordance with the recommended DECCW Landfill Guidelines Benchmark Techniques. The leachate barrier will incorporate 900 mm thick clay with an in-situ coefficient of permeability of less than 10^{-9} m/s overlain by a flexible membrane liner (HDPE) with a minimum thickness of 1.5mm and permeability of 10^{-14} m/s. Council has committed to this 'double liner' design as it will provide a lower leakage rate and improved performance than the standard Benchmark Technique 1 (BT1) for solid waste landfills, to mitigate potential impacts on downstream environmental values.

During operation, stringent mitigation and management measures will be put in place to ensure that impacts on the environment are minimised. These measures will be set out in a series of management plans to be developed for the proposed landfill, including a Landfill Environmental Management Plan (LEMP) which will detail procedures and safeguards to be implemented during operation. The site would also be managed in accordance with the Environment Protection Licence (EPL) issued and monitored by the DECCW. Council is committed to ensuring the proposed landfill facility is operated in accordance with environmental guidelines stipulated within relevant local, State and Federal Government policies and legislation and the EPL for the site.

Greenhouse Gas Emissions (GHG) sources for the proposed landfill include emissions resulting from fuel use on site, vegetation clearance, landfill gas emissions and use of electricity. A GHG assessment was undertaken as part of the EA and in accordance with EPA Landfill Guidelines Benchmark Technique Number 11 – Extraction and Disposal of Landfill Gas. The assessment considered construction and operational GHG emissions.

Landfill gas would be produced within the landfill cells and trapped unless vented or managed by other means. Landfill methane emissions were considered as part of the GHG assessment and suitable options to manage landfill gas were presented, including:

- Methane oxidation cap;
- Passive venting and using a filter (e.g. activated carbon or the like) to reduce emissions; and
- Landfill gas collection system and flaring of methane (combustion conversion to CO_2).

The option selected to manage landfill gas will be determined once the proposed landfill facility is fully operational and accurate quantities of landfill gas produced have been ascertained. Putrescible material will be composted or stabilised in a biocell at Council's Long Swamp Road facility before the residual waste is transported to the landfill. Therefore, it is expected that methane production at the new landfill will likely be relatively low. Council is, however, committed to undertaking regular review of the viability of retro fitting the landfill with alternative landfill gas management techniques during the life of the landfill, if required.

(c) *if the development relates to a new or expanded landfill:*

(i) whether the land on which the development is located is degraded land such as a disused mine site; and

(ii) whether the development is located so as to avoid land use conflicts, including whether it is consistent with any regional planning strategies or locational principles included in the publication EIS Guideline: Landfilling (Department of Planning, 1996), as in force from time to time; and

Over 50 alternative sites were considered for the proposed landfill facility as part of the site selection process, including consideration of the Metz Site (Site 1), a basalt quarry 25km east of Armidale. Sites were identified through several preliminary investigations involving consultation with the Department of Mineral Resources

regarding the availability of current and former extractive industry sites, consideration of sites within appropriate geological areas and in consultation with Real Estate agents regarding availability of appropriate sites for sale.

The principles outlined in the document *Landfilling – EIS Guidelines* (DUAP [now DoP], 1996) were then used to develop appropriate criteria and weightings for the assessment of the potential landfill sites identified from the preliminary investigations.

Site evaluation included consideration of environmental impacts, proximity to sensitive receivers and the likely magnitude of impacts at each site. Criteria (and weightings) analysed during the site selection process included:

- Strategic planning guidelines (weighting 1);
- Statutory planning issues (weighting 10);
- Ground and surface water environment (weighting 10);
- Local amenity and environmental considerations (weighting 6);
- Level of Service (weighting 10);
- Adequacy of existing services (weighting 4);
- Set-up costs (weighting 4);
- Operational costs (weighting 6);
- Site features required weighting 4); and
- Social issues (weighting 4).

The *Regional Landfill Siting Study Final Report* (Maunsell, 2004) concluded that the proposed site (Site 7) was the most suitable of the sites considered with respect to the assessment criteria determined as part of the site selection process.

The proposed site is agricultural land currently used as pasture land for cattle grazing. The vegetation on site is predominantly cleared grassland with scattered patches of stringybark regrowth woodland. Portions of two properties would be acquired by Council via subdivision, to facilitate the proposed landfill. Council's proposed acquisition of parts of these properties and its subsequent use of the land for the landfill, would not require significant alteration of existing land uses currently being carried out within the residual portions of each property.

With regard to surrounding land use, the proposed landfill facility would not sterilise the surrounding area for other land uses nor would it restrict the development of other agricultural industries or businesses in the vicinity. Potential impacts on surrounding land use will be minimised by the mitigation measures proposed in the EA and SoC.

Section 6 of the EA presented the legislation, policy and planning instruments relevant to the proposal. The EA demonstrated the permissibility of the proposed landfill as well as the strategic justification for the proposal, having regard to the relevant legislative, planning and policy requirements. The New England Draft Development Strategy outlines key land use policies and principles for Armidale Dumaresq, Guyra Shire, Uralla Shire and Walcha Councils. The proposed regional landfill is consistent with this land use strategy for the region. The draft strategy has been adopted by Armidale Dumaresq Council and formerly endorsed by DoP.

(d) *whether transport links to the landfill are optimised to reduce the environmental and social impacts associated with transporting waste to the landfill.*

During consideration of alternatives to the proposed regional landfill, Council investigated the viability of disposal of Armidale's waste to Tamworth or Coffs Harbour, which are the closest potentially available landfills to accept the waste. It was concluded that waste disposal to other regions is not a viable option for waste management in the long term as:

- Haulage and disposal costs to transport waste to Coffs Harbour or Tamworth landfills would be significant;
- There would be considerable socio-economic impacts associated with waste generated in one region being transported to another region for disposal;
- Disposal of waste from Armidale and surrounding councils would impact on the landfill life of these regional landfills;

- There would be an unresolved need to provide a long-term waste disposal solution for the region; and
- Unforeseeable cost escalations for transport and disposal due to both market forces and changes in policy legislation cannot be predicted.

Further commentary on the economic analysis undertaken to determine the costs of transporting waste to other landfills is provided in Chapter 5.3.

Under the current proposal for a regional landfill, waste would be transported from the existing Armidale Waste Management Centre by truck to the proposed landfill via Waterfall Way, an existing haulage route.

Based on the RTA traffic count data, Waterfall Way has an estimated average annual peak hour flow (two way) of approximately 97 vehicles per hour which indicates that it is currently operating at a LoS A (based on the RTA's *Guide to Traffic Generating Developments*). LoS A indicates that the operation of the road is good, with minor vehicle delays and considerable spare capacity capable of accommodating future growth in traffic.

The proposal would result in an increase in traffic movements from the proposed landfill facility of a maximum of 6 movements per day (one way), of which only 4 would be heavy vehicles. Given that the waste volume to be directed to landfill is expected to decrease over time due to increasing recycling rates and proposed future development of an AWT, traffic movements to the proposed landfill facility will remain stable or may decrease over time and thus potential impacts on traffic generation are considered acceptable. Road safety, public amenity and tourist value of the Waterfall Way are not expected to be impacted by the proposal.

5.0 Additional Information Requested by DoP

5.1 Introduction

In order to be able to assess the project against the State Government's waste policies and targets, including the amended SEPP (Infrastructure 2007) landfill assessment criteria, the DoP requested further information from Council regarding:

- Waste Strategy, waste data, and Council Resolutions around Waste Policy;
- Economic analysis that led to the proposal being identified as the preferred option;
- Recycling Collection;
- Organic Waste Collection and Processing; and
- Securing biodiversity offset.

The letter from the DoP requesting the additional information, dated 24 December 2010, is included as Appendix A and the additional information is presented in the remaining chapter of this report. Information is presented by item, as raised in the DoP letter.

For reference:

- ADLCCC refers to Armidale Dumaresq Landfill Community Consultative Committee. The community consultative committee that Council established to assist with the site selection process.
- WMC refers to the Waste Management Committee. The advisory committee including community representatives that Council established to assist with the setting of waste strategy.
- AWT refers to Alternative Waste Technology.

5.2 Waste Strategy

a) *Copies of relevant Council Resolutions regarding waste policy*

The following Reports, WMC Recommendations to Council, Council Resolutions and other documents (refer to Appendix B) are provided as evidence of Council's waste policy and commitment to improvements in waste management.

i) March 2004. ADLCCC and WMC Recommendations and Council Resolution in relation to the new landfill project: "***incorporation of additional processing and separation facilities to separate putrescible material and additional mixed waste in order to minimise material going to new landfill and with the ultimate aim of achieving a Class 2 Landfill".*** Refer to Appendix B(i).

ii) Feb 2008. WMC Recommendation and Council Resolution: ***Actions list to form "Basis for Future Strategy for the introduction of AWT" and other waste initiatives*** to set strategy to meet the objectives of item i) above. Refer to Appendix B(ii).

iii) Aug 2009. Briefing Report for new members of the WMC which is comprised of both community representatives and Councillors. The report presented information on the major waste initiatives being investigated by Council and the committee and summarises Council's activities and position at that time. Refer to Appendix B(iii).

iv) Sept/Oct 2009. WMC Recommendation and Council Resolution regarding: "***Major Operational Costs and Proposals for Enhanced Waste Management Services for Armidale and the Impact of these on Fees and Charges***". Details the additional processes and services and the likely costs to the community of these additional processes and services and obtained Council's endorsement to proceed with their implementation. Refer to Appendix B(iv).

v) April 2010. Public Information Forums regarding Council's activities. Included a segment on waste – the Powerpoint presentation used is attached to confirm the issues addressed. Refer to Appendix B(v).

vi) June 2010. Following commencement of the public exhibition of the EA for the new landfill, concern was expressed by the WMC that the EA does provide sufficient detail on Council's intent to operate the new landfill as a non-putrescible landfill even although it will be licenced as a putrescible landfill. *The committee requested* ***"that Council prepare a two page summary sheet describing Council's Waste Management Strategy for public information".*** The resultant two page Strategy is attached (Refer to Appendix B(vi)). Also attached is a copy of the "Good Question" article on the

same issue published on Council's page in the local newspaper. The "Good Question" feature is a periodic series of articles prepared by the Utilities section of Council. They are prepared to inform or educate the community on issues of note. Questions are usually based on real enquiries received by Council. Also attached in Appendix B(vi) are other examples of "Good Question" articles addressing issues in the waste area:

- Feb 2010 - why Council uses recycling crates;
- May 2010 - the proposal to include foodwaste collection with garden waste collection to provide an organics waste collection service; and
- Nov 2010 - information about the chemical waste collection service operated by Council at the Armidale Waste Transfer Station (WTS).

vii) Nov 2010. WMC Recommendation and Council Resolution. This is the latest resolution that re-affirms Council's commitment to additional waste processing facilities. Trials have been held on site to test the suitability of the Groundswell composting process for the stabilization of residual Municipal Solid Waste (MSW). Trials have been held as it has been difficult to find information on the suitability of the process for stabilizing mixed waste containing putrescible material as opposed to 100% organic waste. Council staff are currently preparing technical specifications and tender documents for the front end equipment needed for the AWT facility which is essentially the same no matter which process Council finally adopts for the stabilisation/composting of organic waste. Refer to Appendix B(vii).

viii) Dec 2010. Notice of Motion to Council regarding "*commissioning the Alternative Waste Treatment (AWT) facility before the new landfill becomes operational and also setting targets for increased recycling and waste minimisation*". A discussion paper was prepared for the information of Councillors prior to this meeting. In essence, this discussion and resolution by Council re-affirms Council's long standing commitment to the installation of an AWT facility to treat putrescible waste so that the new landfill can be operated as much as is practicable as a non-putrescible landfill. As per the Council Resolution, the issue will continue to be discussed at meetings of the WMC in 2011 to progress the implementation of the AWT. The briefing paper addressed the issue of targets for recycling targets and waste minimisation. Refer to Appendix B(viii).

ix) 16 Feb 2011. WMC Recommendation.

- *"That the Waste management Committee endorses the City to Soil process to be used for the kerbside collection of clean organics (garden waste and food waste) and the Groundswell process to be used for the composting of clean organics at the Long Swamp Road waste management facility.*
- *That following receipt of a suitable proposal from Simone Dilkara, the above City to Soil and the Groundswell process be implemented."*

The recommendation of the WMC was adopted by Council at its meeting on 28th March 2011.

b) *The likely timing / staging of Council's waste initiatives*

Council's principal current waste initiative is the AWT project. It essentially consists of two separate parts. The first part relates to the separation at source and the collection of garden waste and food waste followed by the composting of this organic waste. Implementation of this first part is underway and will commence in April 2011. The second part relates to the stabilisation of the remaining putrescible waste in residual mixed MSW before it is disposed of to landfill. Investigations continue for this part with a decision regarding which option is to be implemented expected about mid 2011. Implementation will follow immediately after that decision is made.

More specific details and the likely timing and staging for each of these processes are as follows.

- Organics waste collection service. Simone Dilkara, the current project manager for the Groundswell project at Goulburn, has been commissioned by Council to undertake the City to Soil education program for Armidale residents. Simone expects to commence this work in April 2011. It is Council's objective to commence the organic waste collection as soon as possible following that initial introductory education phase and as determined by the project programme that will be developed by Simone and Council. An introductory press release was prepared and appeared in the local newspaper on Monday 11th April 2011.
- Composting of the clean organics from the above organics collection service will be undertaken using the Groundswell composting process. Simone Dilkara will assist Council with its implementation in co-ordination with the organics waste collection service.

- Stabilisation of putrescible waste in MSW. Council's intent until late in 2010 was to use the Groundswell composting process to stabilise putrescibles waste and trials have been conducted on site. However, late in 2010 Council became aware of another option that could possibly better achieve this objective and Council is now investigating the use of biocells as the way to address this need. In that regard, Council has just recently commissioned Thiess Services P/L to conduct an investigation and to provide a report on "The Investigation of the Suitability of a Biocell for waste stabilisation".
- Use of existing landfill. Significant re-working of the layout of the existing landfill to create cells and the raising of the final level by potentially two lifts, has created the necessary capacity for continued use for a number of years. DECCW concurrence has been obtained to do this so the existing site can be used until such time as the proposed new landfill is commissioned.

c) *How exactly Council proposes to achieve diversion targets*

Diversion results in Armidale are already at a high level and Council continues to seek and take opportunities to improve on these results. The cost of achieving higher diversion rates has over time resulted in increases to annual charges and gate fees. Notwithstanding the fact that Armidale is relatively remote from the majority of re-use markets and recycling is not profitable in the LGA, Council is committed to the principle of diversion of waste from landfill as demonstrated by the AWT project and its other current recycling and waste diversion from landfill activities, including:

i) **Regional Synergies**

Council continues to explore markets for resource recovered materials both from a local and regional perspective. Council is a member of the Northern Inland Regional Waste (NIRW) Group and, as all the member Councils are located approximately mid-way between Sydney and Brisbane, they work together to locate suitable markets. In addition, the NIRW Group uses the economies of scale of 11 member Councils to attract the best price possible for waste processing activities including garden waste mulching, concrete crushing, scrap metal and chemical collection, oil collection and Drum Muster. It is recognised that the only way regional councils can compete with their city counterparts when it comes to diversion targets is by working together.

ii) **Reduced Charges for Sorted Recyclable Material and Penalty Charges for Unsorted Waste containing Recyclable Material**

As an incentive for disposers to make the effort to sort their material prior to disposal, Council has for many years used reduced charges to encourage disposal of sorted recyclable material and used penalty charges for the disposal of unsorted material through its waste transfer stations. At the transfer stations, clean sorted domestic recyclables and scrap metal are accepted free of charge and other recyclables like garden waste, builders rubble and timber are typically half the standard charge. Most of the unsorted waste comes from the commercial and industrial sectors. The penalty factor has been of the order of 2 to 2.5 times the standard disposal to landfill rate. An added benefit to penalty charges is the ability to use the additional income to fund sorting processes as described in the following section.

iii) **Clean Materials Recycling Facility for Commercial and Industrial waste and Construction and Demolition waste**

In 2008 Council considered that its diversion rates were fairly reasonable for domestic waste but had concerns with the level of recyclable material being disposed of to landfill from the commercial and industrial (C&I) and construction and demolition (C&D) waste streams. At the beginning of 2009, Council entered into a commercial arrangement with a local mini-skip waste collection business that operates a commercial Materials Recycling Facility (MRF) on leased land at Council's waste management site, to use its MRF to sort the clean C&I and C&D received by Council through the WTS.

Council is able to finance this sorting activity from the revenue collected from the penalty charge applied to the disposal of unsorted waste. It is anticipated that for 2010/11 financial year, 2000 tonnes of recyclable waste will be recovered from the C&I and C&D waste streams. Council is investigating the feasibility of requiring waste haulers of C&I waste to have both wet and dry (contaminated with putrescible waste and not contaminated with putrescible waste) runs so that more waste can be sent to the C&I and C&D MRF for sorting and waste recovery.

iv) **Domestic recyclables**

For the collection of paper, cardboard and containers from domestic premises Council uses 50L crates as opposed to a Mobile Recycling Bin (MRB) used by many Councils. Council has retained this system for two main reasons.

Firstly, the low contamination rate (consistently at or below 3%) that can be achieved through the monitoring of crate content that takes place as the collection staff load the material onto the collection truck and secondly as it allows it to easily offer no limit to the number of recycling crates residents can place out for collection.

Secondly, the relatively small size of the crates used helps to satisfactorily address any occupational health and safety issues for the collection staff manually handling the crates and operational procedures are in place to ensure that lifting limits are not exceeded. Many residents who have difficulty lifting crates use small trolleys and Council is also working with a local manufacturer to develop a simple light weight trolley specifically for moving two to three crates at a time. Many residents have indicated the convenience of being able to place crates inside a garage or hallway and load recyclable directly into the crate without having to double handle recyclables. This flexibility has been identified as an important factor contributing to community participation during Armidale's cold and extended winters when residents do not have to go outside.

However, if evidence can be shown that using a MRB will increase recycling participation without loss of quality, Council will consider this option and the Recycling MRF would be altered to accommodate access by the larger vehicles required.

v) **E-waste**

For the past 3 years Council has supported a local non-profit organization called Computer Bank New England (CBNE) which has now expanded into other nearby Councils. CBNE refurbish computers and recycle most of the e-waste delivered to the Armidale WTS by the community. The success of this organization is heavily dependent on markets and, as it is for all resource recovery activities by regional councils, it is the cost of transport that restricts what can be economically recycled and ultimately affects landfill diversion rates. It is anticipated that with the introduction of a national e-waste strategy (extended producer responsibility), CBNE will be in a good position to continue to refurbish (reuse) computers rather than just scrapping them for their most valuable components. This has an important social implication as CBNE donate the refurbished computers to those-in-need both locally and overseas.

vi) **Resource Recovery Centre (the second-hand shop)**

The Armidale community has clearly indicated that it supports the continuation and expansion of the Resource Recovery Centre (RRC) and this can be qualified simply by the number of vehicles that frequent the centre. In February 2011, Council purchased land adjacent to the Armidale WMF to provide space for the additional waste processing activities associated with its AWT project. This purchase also provides space for expansion of the RRC building and storage and display areas and the provision of an improved car park. The current operator of the RRC has informed Council that there is also a need for additional space to break non-saleable items into their respective components for recycling. A new contract will be let in mid 2011 for the operation of the RRC with an emphasis on increasing the diversion of waste from landfill.

vii) **Waste Transfer Station Sorting Bins and Drop-off Points**

For the past eight years Council has not permitted public access to its landfill. All incoming light vehicles are directed to large bins at the WTS for the public to separate waste into recoverable materials or to specific drop-off points for specific recyclable material, such as garden waste. The same price incentive (unsorted penalty charge) that encourages C&I and C&D waste generators to sort their waste also applies to light vehicle customers at the sorting bins. For example, if a customer has not made the effort to prepare the waste such that it can be sorted at the bins, or refuses to sort the waste at the bins, then they are charged the penalty rate.

Council has recently employed two additional staff members, one to monitor and assist at the bins and another to monitor the larger drop-off points to control disposal and to prevent contamination of stockpiles intended for processing and re-use. Furthermore, the staff stationed at the bins retrieve material from the unsorted general waste bin and place the recovered material in the appropriate

bin, wherever possible. Since staff are available when waste is being unloaded they are in a good position to place aside any second-hand goods that are of use for either the RRC or CBNE.

viii) **Chemical Waste, Paints and Oils**

Council has developed drop-off facilities and a secure chemical compound at its WTS to encourage the wider community to dispose of waste chemicals, paint and oils at the WTS rather than dispose to landfill. In 2009/10, the whole NIRW group region collected approximately 14,000kg of this waste, of which Armidale Dumaresq Council alone contributed approximately 7,000kg, highlighting the high take up rate of this initiative by the community.

ix) **Compact Fluorescent Lighting (CFL's)**

In 2009 Council embarked on a Compact Fluorescent Lighting (CFL) collection program to reduce these lighting products entering the landfill. In conjunction with a muster point at the WTS, muster points were provided in the city centre of Armidale. As a result, agreements were made with two local lighting shops to provide a space for a muster point for the community to drop off their used CFLs. This initiative has been well received, with shop owners benefitting from potential new business and the community having a convenient disposal option.

d) *How the community is involved in solving the waste generation issues*

The Armidale community is becoming more aware of the importance of conserving natural resources by embracing resource recovery. Council has made a concerted effort to supply products like mulch, blended soil loam and crushed concrete to the public to raise awareness of the importance of separating waste for processing and future reuse. Community groups receive a waiver of fees for products like mulch which are used to maintain gardens in public spaces, for weed suppression and to reduce water consumption.

Anecdotal evidence from attendants at the Armidale WTS suggests that the community is becoming more supportive of sorting waste at the sorting bins. Customers rarely indicate an unwillingness to sort waste, attributed in part to the price signal given by the penalty charge but also the genuine desire of the community to support waste initiatives.

For many years, Council has appreciated the importance of community involvement in setting waste strategy and as a result the WMC was established in the early 1990s. The committee comprises members of the public, business representatives, a University of New England representative, Councillors and Engineering staff. The committee brings waste management issues to the table and provides a sounding board for new initiatives and decisions made by Council staff. The committee also develops educational strategies to encourage the community to reduce waste generated, reuse products where possible and recycle what remains.

e) *A copy of the Long Swamp Rd Master Plan*

The existing Long Swamp Road landfill is operated as an additional layer on top of the old landfill site, which enables Council to continue to operate the landfill prior to the proposed new landfill being commissioned. The existing Long Swamp Road Master Plan is provided in Appendix C. Most of the current waste processing activities take place on the layer above the old landfill. In February 2011, Council purchased land adjacent to the existing landfill facility. The additional land will accommodate the additional processing and stockpiling activities associated with the AWT project. The land purchase is reflected in the Long Swamp Road Future Master Plan (refer to Appendix C).

f) *Any commitments made to community education around waste.*

The education program associated with the City to Soil Groundswell organics waste collection and composting project will be rolled out in the near future.

As additional waste processes (such as the AWT) approach implementation, further community information and education programs will be developed to inform and engage them in future waste management initiatives.

5.3 Economic Analysis

a) Cost of baling vs. Traditional landfilling

A compactor is used to compact waste at the Long Swamp Road landfill. Baling is an alternative option considered in detail by Council as it would increase the density of the waste, thereby reducing the volume of waste to landfill. Baling has a number of benefits including ease of transport, ease of placement in landfill, higher density/better use of landfill cell space and minimisation of windblown litter.

Analysis undertaken for the proposed new landfill indicated that assuming baling compacts waste at a density of 0.8 tonnes per cubic metre and based on 15,000 tonnes of waste produced per year, the baling facility would only extend the life of each cell by around one year. Council considered that coupled with the fact that baling technologies are more costly and more complex, require additional up-front capital investment and more highly skilled operators, which increase operating costs, the additional cost of this option is difficult to justify when weighed up against the minimal extension to landfill life that may be achieved through baling.

An analysis of the relative economic costs of baling versus traditional compaction landfilling and the transport of waste to another landfill outside the Armidale region, was undertaken. The waste management options that were compared in the whole of life economic analysis include:

- Option 1: Construct a new regional landfill at Armidale (the proposal).
  - Option 1a: Waste compaction (traditional landfilling)
  - Option 1b: Waste baling
- Option 2: Transport waste to a landfill outside the Armidale region (refer to Chapter 5.3(d))
  - Option 2a: Transport to Coffs Harbour
  - Option 2b: Transport to Tamworth

Table 3 provides a summary of the net present costs for capital investment and operation for the compaction and baling options.

Table 3 Comparative costs (2011 prices) for compaction and baling options

Option	Net Present Cost ($million) [a]	
	Option 1a Compaction	**Option 1b Baling**
Capital Costs		
Construction of landfill and associated infrastructure (excl. waste treatment items)	$17.8 million	$17.4 million
Compactor	$0[b]	-
Baling facility	-	$2.5 million
Operational Costs		
Landfill (staff, gas & water monitoring, engineering & maintenance)	$369,000 pa	$369,000 pa
Compactor (staff, consumables)	$294,000 pa	-
Baling (staff, consumables)	-	$368,000 pa
TOTAL cost over 50 years ($)	**$26.9 million**	**$30.0 million**
TOTAL cost per tonne ($)	**$36**	**$40**

Source: AECOM

[a] Capital costs include 15% contingency.

[b] Assumes the compactor currently operated at Long Swamp Road would be used at the proposed new landfill.

As the preliminary costings indicate, the baling process would be considerably more expensive both from a capital cost and an operational cost perspective. Transport costs would be similar for baling or traditional compaction, as would placement in the landfill (although probably slightly less for baled waste), but baling establishment and baling operation would be essentially additional to current waste management costs. It is estimated that the cost of a wrap baling establishment and infrastructure would be close to $2,500,000 and annual operational costs would be approximately $370,000 (including staff and consumables).

This additional cost on top of other major waste projects in Armidale (the proposed new landfill and the AWT) is considered to be a financial burden that could not be justified to the local community.

b) **Cost of collecting/processing food and garden waste**

It is not proposed to change the type of service or the frequency of service for the collection of organic waste (garden waste and food waste). Council will continue with the 240L wheelie bin fortnightly collection, which currently collects garden waste only and for those that need more capacity, an additional bin or service will be offered at a nominal charge of $40/annum to encourage participation. The additional costs involved will be monitored and covered either by income from compost sales or by a small increase in annual charges or both.

c) ***Cost of 240l MGB recycling service***

As discussed previously Council does not use MGBs for recycling collection; crates are used and residents can put out as many crates as they need at no extra charge. Council does this to encourage participation. The current contract for domestic recyclable collection costs about $200,000 per annum and processing of domestic recyclables costs about $445,000 per annum. The contractor also retains product sales monies.

Domestic recycling costs residents about $645,000 per annum or approximately $75 per annum per property serviced. It is interesting to note that if domestic recyclables were just to be placed in landfill it would cost approximately $239,000 per annum or $27.65 per annum per property serviced. This demonstrates that Council and the community are willing to take on the extra cost burden for domestic recycling.

d) Gate price estimates at the new landfill vs transport elsewhere

As part of the economic analysis undertaken for the waste management options (refer to 5.3a), the costs for transporting waste to Tamworth or Coffs Harbour were compared to the cost for the proposed new landfill, over 50 years (Option 2). This option would involve the bulk haulage of waste by road . The possible options for receiving the waste from the Armidale region would be either at Tamworth (Option 2a) or Coffs Harbour (Option 2b) as the closest existing landfills (Uralla Shire Council and Walcha Shire Council landfills are not viable options due to limited capacity).

Issues and consequences associated with transporting waste to other landfills outside the region include:

- The economic cost of long-term and long-distance haulage of waste;
- Negotiating agreement with an alternate landfill and/or Council to accept the waste could be a difficult and protracted process;
- Transporting waste to Tamworth or Coffs Harbour would be in direct opposition to the proximity principle. The principle advocates that waste should be managed close to the point at which it is generated, thus aiming to achieve responsible self-sufficiency at a regional/or sub regional level and minimising the burden of transferring wastes to areas beyond their generation.
- Hazards and risks associated with long term and long distance haulage of wastes;
- Preparation of a contingency plan for the acceptance of waste would be required:
  - in case of an emergency; and
  - in case the waste cannot be transported due to logistics/bad weather, etc;
- The generation of increased GHG emissions as a result of long distance waste transport in the long term is environmentally unsustainable.
- Waste management requires strategic planning and solutions for the long-term. Transporting of waste outside the region would only be a short term solution to waste management due to the lack of capacity at alternate landfills.

The analysis assumed that items such as waste trucks will be leased rather than purchased as capital items, therefore no capital costs were considered as part of the economic analysis. Operating costs, however are represented by the total transport and haulage cost. Operating costs to transport waste to landfills outside of Armidale are presented in Table 4. The cost to dispose of waste is significantly higher at Coffs Harbour landfill than at Tamworth ($141 per tonne Coffs Harbour and $86 per tonne at Tamworth).

Table 4 Net present cost (2011 prices) for transporting waste to Coffs Harbour and Tamworth

Option	Net Present Cost			
	Transport cost	Tipping cost	Total	Cost per tonne[a]
Option 2a Transport to Coffs Harbour	$8.2 million	$29.1 million	$37.3 million	$50
Option 2b Transport to Tamworth	$4.7 million	$17.8 million	$22.5 million	$30

Source: AECOM

[a] Assumes 15,000 tonnes of waste produced per year over 50 years

The Net Present Cost of transporting waste to Coffs Harbour (Option 2a) would be significantly greater than transport to Tamworth and greater than for the proposed new Armidale Regional Landfill (Option 1a and 1b) over the life of the landfill (refer to Table 3). The Net Present Cost of transport to Tamworth is lower than the Armidale landfill (options 1a and 1b) over an equivalent period. However, the cost borne by Council for each of the waste transport options (2a and 2b) does not reflect total economic impact of the options, only the financial cost. The most significant issue that is excluded from this analysis would be that transporting the waste will bring forward the need for additional landfill capacity in Coffs Harbour or Tamworth. Therefore, although landfill charges are relatively low at Coffs Harbour and Tamworth at present, and so could appear somewhat attractive, these charges are likely to increase to similar levels that Armidale Dumaresq Council will be charging when these neighbouring Councils have to construct a new landfill. Armidale Dumaresq Council would then be in the position of having to pay similar disposal charges plus transport costs. This is not considered to be a sustainable long-term option, particularly when the environmental and social impacts of transporting waste are factored in.

The transport of waste from the Armidale region would result in other environmental and social issues which are difficult to quantify in purely financial terms. Some of these additional issues and consequences, the costs of which have not been included in the costings for the waste transport options, include:

- Environmental and social impacts of transporting waste to another region, including long term impacts of GHG emissions through fuel use, failure against the proximity principle, social inequity due to one community having to manage another community's waste, and so on;
- Decreased landfill life of surrounding regional landfills;
- A foreseeable need to still provide a long-term waste disposal solution due to a lack of landfills in the region; and
- Potential significant cost escalations for transport and disposal (for example, increases in tipping fees and fuel prices) due to both market forces and changes in policy legislation, resulting in a even greater cost burden on the community.

The sensitivity of the waste transport cost results to future fuel prices was tested by adopting the following scenario: diesel prices would reach $8.00 per litre by 2018 (compared to $1.80 currently) and then double every ten years (CSIRO, *Fuel for Thought*, report for Future Fuels Forum, July 2008).

The effect of this test on the Net Present Cost of Options 2a and 2b is presented in Table 5. The test results in Net Present Costs are 57-60% higher than the original analysis and 27-116% higher than cost of the proposed new regional landfill.

Table 5 Sensitivity test results (Option 2a and 2b)

Option	Net Present Cost ($million)	Cost per tonne
Option 2a: Transport waste to Coffs Harbour	$59.7	$80
Option 2b: Transport waste to Tamworth	$35.4	$47

Source: AECOM

e) Details on the current and projected landfill levy, domestic waste charge and differential gate prices as a result of the project.

The new landfill project will be financed directly by means of a "New Landfill Charge" under Section 501 of the Local Government Act and not by increases in domestic waste management annual charges or gate fees.

The New Landfill Charge

The New Landfill Charge commenced in 2007/08 at $42.40 per assessment per annum, followed by $55.00 per assessment per annum in 2008/2009, $61.00 per assessment per annum 2009/10, $62.60 per assessment per annum 2010/11 and is proposed to be $93.00 per assessment per annum for 2011/12 with significant design and construction costs for the proposed new landfill looming on the horizon.

The proposed new landfill will consist of five cells, each with an expected life of ten years. The estimated construction costs for the first cell and part of the second cell, including associated infrastructure and site establishment costs, is estimated at $14 million. Each subsequent cell and part construction of the next cell is expected to cost approximately $2.75m at present day costs. Council has proposed to take out 30 year loans for the first three cells, a 20 year loan for cell four and a 10 year loan for cell five. This strategy will ensure that the loans are paid off by the end of the landfill's life. Proposed landfill charges will need to be adjusted accordingly to service these loans. Table 6 presents the proposed future adjustments to the landfill charge, (assuming a 3% per annum increase in the Consumer Price Index [CPI] for future construction years).

Table 6 Proposed future adjustments to the landfill charge

Period	Year 0 to 10	Year 10 to 20	Year 20 to 30	Year 30 to 40	Year 40 to 50
Landfill Charge at 3% CPI inflation	$122	$154	$198	$142	$240
Landfill Charge at Present Day Value	$122	$146	$170	$76	$91

The Domestic Waste Management Charge

The domestic waste management charge for 2010/11 is $251 per assessment per annum. The domestic waste management collection service extends for a short distance into the rural area surrounding Armidale. The annual waste management charge is the same for urban and rural residents and is projected to increase to $289.50 per assessment per annum in 2014/15 as shown in Table 7.

Rural residents not serviced by the domestic waste collection service are serviced via rural transfer stations or the Armidale transfer station. These residents are charged an annual Rural Waste Management Service Charge, which for 2010/11 is $96.50. This charge is projected to increase to $111.50 per assessment per annum in 2014/15 as shown in Table 7.

Table 7 Projected changes to waste management charges from 2010/11 to 2014/15

Year	2010/11	2011/12	2012/13	2013/14	2014/15
Annual Domestic Waste Management Charge	$251	$265	$273	$281	$289.50
Annual Rural Waste Management Service Charge	$96.50	$102	$105	$108.20	$111.50

Gate Prices

The establishment of the AWT project and the additional operational costs of the AWT are to be financed by the increased annual charges and gate fees, which commenced in 2009/10. On top of the normal annual indexing increase, the domestic waste management annual charge was increased by a further 8% and the transfer station gate fees were increased by a further 11% to fund the AWT project.

5.4 Recycling Collection

a) Details of the current diversion figure details for the crate based collection recycling service.

Council is not able to provide accurate weighed figures for the crate based collection system as this incoming waste stream is not weighed at present. Council is considering weighing the incoming stream commencing 1 July 2011. Data available is for the sorted waste leaving the processing premises. Council has estimated figures for the crate based collection by deduction as follows (note that some domestic recyclables are delivered to transfer stations so they are included in the estimate).

Last financial year Council's domestic recycling contractor collected a total of 3,391 tonnes of domestic recyclables from all sources. Of that total, 655 tonnes were collected direct from C&I premises. Also, about 10% of the overall total is delivered direct to the transfer stations, which is split 7/10 from domestic premises and 3/10 from C&I premises. By simple deduction, this computes to 2,462 tonnes of domestic recyclables collected using the crate based system.

The total recyclables from domestic sources would be 2,653 tonnes, based on the combined total of recyclables from the crate collection those delivered to transfer station.

b) Can this information be expressed as a diversion kg/household?

Expressed as a diversion figure, crate only collection equates to 285kg per household. Crate collection plus transfer station collection equates to 307kg per household. These diversion figures are based on some 8635 households.

c) Have there been any audits done on waste composition?

An in-house "***Waste Characterisation Study: All Landfill Waste, Excluding Kerbside Collected Residential Waste***" was carried out in 2008 to assist Council in the consideration of how to deal with mixed waste from the commercial and industrial sectors. This study has led Council to the position where it now sorts clean mixed waste from these sectors using the commercial contractor's clean MRF. A copy of the study is attached as Appendix D.

d) How exactly is Council reaching the diversion targets?

In addition to the initiatives described in Chapter 5.3(c) and the implementation of an organics collection to include food waste, Council will continue to seek new opportunities and markets for recovered materials. Council proposes to introduce in 2011/12 a charge of $190/T for clean/dry mixed C&I for business to enable Council to sort the waste on their behalf via the clean MRF facility run by a local mini skip business. A higher charge for dirty/contaminated mixed C&I is also proposed for introduction in 2011/12 at$237.5/T. Approximately 10-15T/week of C&I waste is currently being sent to the clean MRF with a landfill diversion rate of about 50%. It is anticipated that these figures will improve significantly in the years ahead as Council informs the community of waste initiatives and the opportunity for financial savings is taken up.

5.5 Organic Waste Collection and Processing

a) How is Council considering food/garden waste will be collected, recovered and composted in the future?

Council currently collects garden waste fortnightly in a 240L MGB. For collection of food waste residents will be given a kitchen tidy bin and a year's supply of compostable liners. Residents will be encouraged to place their food waste into the garden waste (green bin) which will be re-labelled as the organics bin. Council will use the City to Soil community engagement process to educate and motivate residents to only place organic material in the green bin so as to reduce contamination to levels achieved by other councils who have used City to Soil. It is anticipated that with a comprehensive City to Soil program, contamination of the green bin will be less than 0.5%.

Upon delivery to the WTS, the aggregated organics will undergo the Groundswell composting process utilising Council staff and plant. All compost will be tested to meet all relevant regulations and sold to both the local community gardeners and to farmers. In addition, Council may choose to apply compost to land at its existing effluent and biosolids reuse farm at the sewage treatment plant to improve soil structure, promote biological activity and enhance soil water holding capacity.

b) What is the expected timing for any changes?

For organics diversion and processing, Council will be in a position to roll out City to Soil in September 2011. This will involve both the organics waste collection and the composting of the collected organics using the Groundswell process.

For the stabilisation of putrescible waste in mixed waste, Council will continue with the investigation of biocells as a likely option as opposed to the previous option being considered which used the Groundswell composting process on the finer fraction of mixed residual waste following a simple one screen/two product separation process. The finer fraction will contain the majority of the putrescible material and the separation process is intended to reduce the bulk to be handled and also increase the concentration of putrescible material and thus improve the effectiveness of the composting process. It is anticipated that the investigation into biocells will allow Council to make a decision by mid 2011, with implementation of the preferred process to occur in the latter part of 2011.

c) Is there any potential to co-compost with biosolids (are these available)?

All biosolids are currently used for the production of hay, silage and cattle at the Armidale Effluent & Biosolids Reuse Farm at the sewage treatment plant. This is the preferred use, however if it is economically viable to improve or increase compost production using biosolids then this opportunity will be investigated further.

d) What is the potential market for any output / products?

Council has received interest from local residents, farmers and retailers of loam products to purchase compost derived from the composting of food and garden organics. Council is not considering composting the garden waste or tree waste delivered to the WTS, as currently the demand for mulch is such that Council will continue to produce mulch from this material.

5.6 Securing Biodiversity Offset

The following section provides a summary of the mechanisms which are available to the project for securing the in-perpetuity protection of the biodiversity offset area.

5.6.1 Conservation Agreement under the *National Parks and Wildlife Act 1974*

A Conservation Agreement under the National Parks and Wildlife (NPW) Act is a joint agreement between landholders and the NSW Minister for the Environment. The agreement is voluntary and provides permanent protection for the area. The agreement is registered on the title of the land, ensuring that, if the land is sold, the agreement and management requirements remain in place.

Section 69 (A-K) of the National Parks and Wildlife Act (NPW Act) 1974 sets out the provisions relating to Conservation Agreements. Section 69C sets out the purposes for which a Conservation Agreement may be entered into, including:

a) areas containing scenery, natural environments or natural phenomena worthy of preservation,

b) areas of special scientific interest,

c) areas that are the sites of buildings, objects, monuments or events of national significance,

d) areas in which Aboriginal objects, or Aboriginal places, of special significance are situated,

e) for the purpose of the study, preservation, protection, care or propagation of fauna or native plants or other flora,

e1) for the purpose of the study, preservation, protection or care of karst environments,

e2) for the purpose of the conservation of critical habitat or the conservation of threatened species, populations or ecological communities, or their habitats.

Section 69C also sets out some of the binding terms which may be contained in the Conservation Agreement including restricting the use of the area; not permitting certain activities in the area; permitting access to the area by specified persons; and requiring the implementation of a plan of management.

5.6.2 Conservation Agreement under the *Nature Conservation Trust Act 2001*

Conservation Agreements under the Nature Conservation Trust (NCT) Act are made between the landowner and the NCT to protect the natural heritage values, cultural heritage values, environmental integrity and biodiversity of a property. The Conservation Agreement is registered on the property title.

Section 30-38 of the NCT Act sets out the provisions relating to Conservation Agreements, also known as Trust Agreements.

The NCT is interested in the following types of natural heritage:

- properties with an unusually high species richness, vegetation diversity or that support examples of regional vegetation communities in good condition;
- vegetation communities and ecosystems that are poorly represented at a sub-regional level in existing public reserves, or that have a high national, state or regional conservation priority, and that are in good condition and likely to benefit from covenanting and management;
- habitats or populations of State and Commonwealth listed threatened species that are viable and likely to benefit from covenanting and management ; and
- vegetation communities and habitats that contribute to maintenance of essential ecosystem processes such as the provision of corridors and links, communal roosting and nesting sites, migratory bird habitat, or that play a significant role in reducing soil erosion and air and water pollution.

5.6.3 Covenant on Land Title under the *Conveyancing Act 1919*

Under this option, a restrictive covenant for biodiversity would be applied to the land title. Under Section 88D of the Conveyancing Act, a prescribed authority may create a restriction on the use of land vested in that authority. That is, Council could by way of an Order create a covenant on land owned by Council as long as no person or corporation has acquired an interest in the land. The Order must state:

- the land burdened by the restriction;
- the particulars of the restriction; and
- the name of the prescribed authority in which the land is vested.

The covenant would include a restriction on the use of the land and a right of access for an Authority, for example the DoP or its nominated representative, to inspect the site and ensure it is being maintained in accordance with a Plan of Management. The covenant would also include requirements for restoration and rehabilitation of existing biodiversity as well as maintenance requirements including for pest and weed management.

5.6.4 Preferred option for Securing Biodiversity Offset

Discussions with DECCW and DoP are ongoing as to the most suitable mechanism for securing the biodiversity offsets into perpetuity. At this stage it is Council's intention to pursue either a Conservation Agreement under the NPW Act 1974 or a Covenant on the land title, in consultation with DECCW and DoP.

6.0 Statement of Commitments

6.1 Statement of Commitments

The SoC prepared as part of the EA is presented in Table 8. The SoC prepared for the construction and operation of the proposed landfill was compiled on an issues basis and was informed by the environmental risk analysis and impact assessment undertaken as part of the EA. No amendments have been made to the commitments made in the SoC as a result of issues arising from the submissions received during public exhibition.

Table 8 Statement of Commitments

Commitments
General Commitments 1. The Proponent will undertake the activities, the subject of the Project Approval in accordance with the general descriptions and details provided in the EA, including the mitigation and management measures identified in the EA. 2. The Proponent will gain all necessary approvals and permits supporting both construction and operation. 3. The Proponent will prepare and implement the following management plans for the project: - A LEMP and associated sub-plans; and - A Biodiversity Offset Management Plan 4. The Proponent will ensure that the final design landfill footprint of the proposed landfill facility is determined in consideration of relevant environmental constraints with a view to minimising the potential impacts of the proposal.
Landform and Soils 5. The Proponent will implement an Erosion and Sediment Control Plan as part of the LEMP.
Geology 6. The Proponent will undertake investigations of the potential geological fault during construction and will then undertake further detailed assessment if evidence of a geological fault is encountered.
Surface Water 7. The Proponent will implement a WLMP as part of the LEMP. 8. The Proponent will adopt the Water Sensitive Urban Drainage (WSUD) principles in the design criteria for the control and treatment of drainage runoff. 9. The Proponent will ensure all leachate produced is monitored in accordance with the proposed landfill facility's licensing arrangements under the *POEO Act*. 10. The Proponent will ensure that monitoring is undertaken as detailed in the Water Quality Monitoring Program and Management Plan.
Groundwater 11. The Proponent will implement a Leachate Management System as part of the LEMP and designed in accordance with the relevant *Landfill Guidelines Benchmark Techniques*. 12. The Proponent will implement a WLMP. 13. The Proponent will ensure that monitoring is undertaken as detailed in the Water Quality Monitoring Program and Management Plan and in accordance with an EPL.
Air Quality 14. The Proponent will ensure that air quality management practices identified in the EA will be included in the LEMP.
Greenhouse Gas 15. The Proponent will undertake a regular review of the viability of retro fitting the landfill with alternative landfill gas management techniques.
Noise 16. As part of the LEMP, the Proponent will prepare a Construction Noise Management Plan in accordance with the relevant DECCW *Guidelines*.

Commitments
Biodiversity Issues
17. The Proponent will ensure that the LEMP contains appropriate measures to avoid or reduce secondary/downstream impacts on biodiversity. The LEMP will include the following management sub plans: - Native Fauna Management Plan - Fire Management Plan - Pest Management Plan - Disease Monitoring Protocol
18. The Proponent will adhere to the mitigation measures identified in the Biodiversity Offset Management Plan.
Socio-Economic
19. The Proponent will undertake community consultation as identified in the EA.
Indigenous Heritage
20. The Proponent will prepare and implement an Indigenous Heritage Management Plan.
21. The Proponent will fence off and avoid significant Aboriginal heritage sites.
National Environmental Heritage
22. The Proponent will implement a WLMP to appropriately manage both surface water and leachate during the operational life of the landfill.
Land Use
23. The Proponent will build a cattle grid into the access road.
24. The Proponent will ensure grazing stock do not enter the landfill area.
Traffic and Transport
25. The Proponent will upgrade the T-junction intersection on Waterfall Way.
Hazards
26. The Proponent will ensure relevant Materials Safety Data Sheets, spill containment and safety equipment is installed at the proposed landfill facility.
27. The Proponent will ensure the proposed landfill facility is fenced to prevent vandalism.
28. The Proponent will monitor landfill gas accumulation.
29. The Proponent will prepare and implement an Emergency Response Plan for fire protection, flood hazards, and OH&S practices.
Visual
30. The Proponent will provide vegetation screening of the landfill facility using plantings of species endemic to the local area.
31. The Proponent will maintain all vegetation outside the landfill footprint but within the boundaries of the Project Site for the life of the landfill.
Climate Change
32. The Proponent will allow a freeboard in the design of the landfill dry basin (that captures overflows from the leachate pond and sedimentation basin) to capture the 100 year storm event.
33. The Proponent will implement and adhere to the mitigation measures identified in the Biodiversity Offset Management Plan.

All issues raised during the public exhibition period have been addressed in this Submissions Report. It is concluded that identified potential impacts from the proposed landfill can be appropriately managed through the implementation of specific mitigation measures and commitments outlined in the EA and the SoC and described in more detail in the responses to submissions (Chapter 6). The findings of the environmental assessment presented in the EA and accompanying technical studies confirm that the proposed landfill facility has a strong justification for proceeding and is considered to be suitable for approval under Part 3A of the EP&A Act.

Based on the detail provided in this submissions report, Armidale Dumaresq Council seeks approval of the proposed regional landfill under Part 3A of the Environmental Planning and Assessment Act 1979.

7.0 Responses to Submissions

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Government Submissions

File No: 9.5351/N01436 10/1122
Your reference: 10/10388
Gregory Sciffer

PCU007071

RTA

Chris Ritchie
Department of Planning
GPO Box 39
SYDNEY NSW 2001

Department of Planning
Received
2 8 JUN 2010
Scanning Room

Main Road 76-Waterfall Way. Armidale Dumaresq Council. 06_0220.
Proposed landfill Project. Environmental Assessment Exhibition.

Dear Sir

Reference is made to your letter dated 27 May 2010 to the Roads and Traffic Authority (RTA) concerning the proposed project.

The following comments with regards to the impacts on road safety, traffic management and efficiency are provided for your consideration.

i. There appears to be some anomalies in the information provided concerning the recommended road works on the Waterfall Way.
ii. The Waterfall Way should be widened at the its junction with Argyle-Mining Vale Road to provide an RTA Modified BAR treatment designed to 100km/h standard so through traffic can safely negotiate right-turning vehicles safely. RTA_1
iii. The junction should be constructed to an AUSTROADS Fig 8.2 Basic Rural Left-Turn Treatment. RTA_2
iv. Argyle-Mining Vale Road should be sealed for at least 50m back from the Waterfall Way to reduce fouling of the pavement. RTA_3
v. Any signposting and delineation should be in accordance with current RTA practices. RTA_4
vi. Any gate or barrier should be set back sufficiently to allow the largest vehicle to stand clear of the Waterfall Way. RTA_5
vii. The standard of improvements to the junction for outbound turning traffic will need to be upgraded if there is a significant increase in traffic to the site in order to maintain the safety of the travelling public. RTA_6

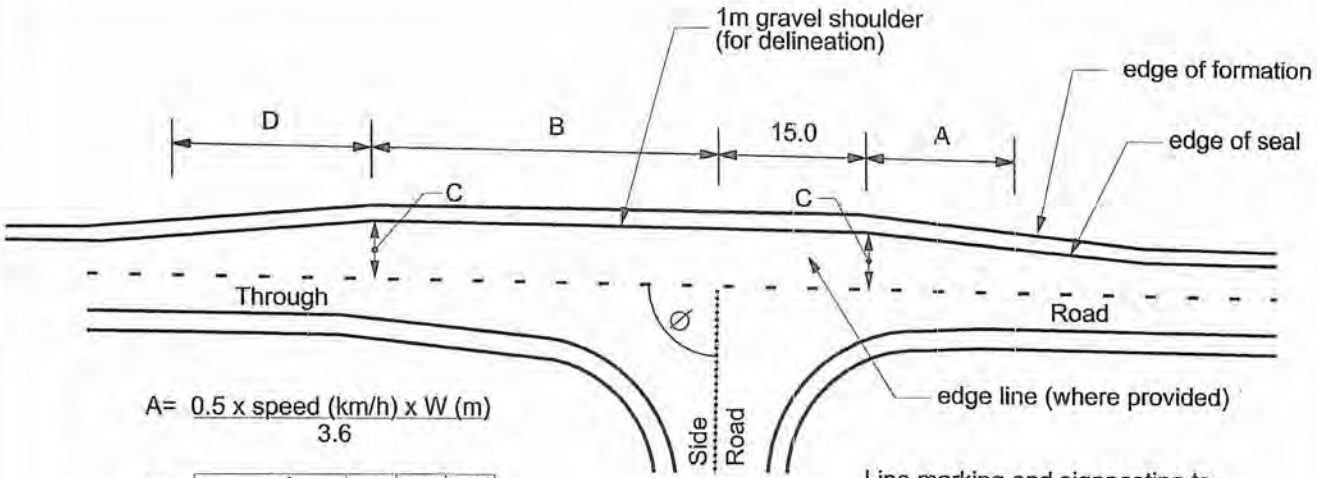
Any road works on the Waterfall Way will require a Works Authorisation Deed with the RTA in order to meet current legislative, engineering and environmental requirements. They must be undertaken by an RTA accredited road construction organisation. RTA_7

For any further enquiries please contact Greg Sciffer (Ph: 02 66401344) for advice.

Yours faithfully

23 JUN 2010

Chris Harrison
Acting Regional Manager, Northern Region



A= $\frac{0.5 \times \text{speed (km/h)} \times W \text{ (m)}}{3.6}$

B=

∅	70°	90°	110°
Length (m)	40	35	30

Line marking and signposting to be in accordance with "New Guidelines" Manual

C= on straight - 6.0m min.
on curve - 2 x (3.0 + corresponding widening for curve radius)m min.
refer Section 2 - Table 2.2.2

D= $\frac{1.0 \times \text{speed (km/h)} \times W \text{ (m)}}{3.6}$

Modified 'BAR' Right-Turn Treatment

SCALES	ROADS AND TRAFFIC AUTHORITY OF NSW	FILE No.	DRAWING	PRINTED DATE	SHEET No.
NOT TO SCALE	MODEL DRAWINGS MODIFIED 'BAR' RIGHT-TURN TREATMENT	REGISTRATION NUMBER	Standard Drawings.dgn	$DATE$	MD

Roads and Traffic Authority (RTA)

Issue Number	Topic	Response
RTA_1	T4	Argyle-Mining Vale Road is located approximately 500m west of the proposed landfill access road junction and on the opposite side of Waterfall Way. Reference to Argyle Mining Vale Road is substituted by 'the proposed landfill access road', as agreed in discussions with the RTA. Waterfall Way at the junction to the proposed landfill access road will be widened to provide an RTA modified Basic Right (BAR) Turn and designed to 100km/hour standard. The junction would be constructed in accordance with AUSTROADS *Guide to Road Design (2009) – Part 4A Unsignalised and Signalised Intersections.*
RTA_2	T4	RTA has confirmed the need for a Basic Left (BAL) Turn treatment for left turning traffic into and out of the access road, as well as a BAR treatment to cater for through and right turning traffic at the junction of the proposed landfill access road and Waterfall Way. The junction would be constructed in accordance with AUSTROADS *Guide to Road Design (2009) – Part 4A Unsignalised and Signalised Intersections.*
RTA_3	T4	Reference to Argyle Mining Vale Road is substituted by 'the proposed landfill access road', as agreed in discussions with RTA. The proposed access road will be bitumen sealed from the intersection with Waterfall Way to a wheel wash located near the landfill footprint.
RTA_4	T4	Signposting and delineation will be in accordance with RTA practices.
RTA_5	T4	Noted. Appropriate set-back will be provided.
RTA_6	T4	Noted. Significant increases in traffic to the site are not anticipated.
RTA_7	T4	Noted. Works Authorisation Deed will be obtained prior to construction.

Kempsey
Shire Council
www.kempsey.nsw.gov.au
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ABN 70 705 618 863
The Macleay Valley Coast
...Lifestyle - second to none

PCU013049

File 333
RBP:rfk

27 July 2010

Chris Ritchie
GPO Box 39
SYDNEY NSW 2001

Attention: Chris Ritchie – Manager Industry, Mining & Industry Projects

Dear Chris

Armidale Dumaresq Landfill Project (06_0220) – Exhibition of Environmental Assessment

Kempsey Shire Council wishes to advise NSW Planning, that Council has reviewed the Environmental Assessment associated with the Part 3A Application submitted by Armidale Dumaresq Council for the construction of the Armidale Dumaresq Landfill Project (06_0220).

Kempsey Shire Council further advises that Council raises no objection to the Part 3A Application provided all mitigation and management measures are employed. KSC_1

Should you wish to discuss this matter further, please contact Ron Kemsley – Senior Natural Resources Officer on (02) 6566 3200 or email ron.kemsley@kempsey.nsw.gov.au

Yours sincerely

Philip Carroll
Manager Planning & Natural Resources
SUSTAINABLE ENVIRONMENT

Department of Planning
Received
2 9 JUL 2010
Scanning Room

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Sustainable Development Services
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Library
Phone 02 6566 3210
Fax 02 6566 3215

Kempsey Shire Council

Issue Number	Topic	Response
KSC_1	P6	Submission raising no objection is noted. Appropriate and required mitigation, management measures and monitoring will be implemented in accordance with the management plans prepared for the site.

NSW GOVERNMENT **Office of Water**

PCU013202

Major Development Assessments
Department of Planning
GPO Box 39
SYDNEY NSW 2001

Contact: Christie Jackson
Phone: 02 6701 9652
Fax: 02 6701 9682
Email: christie.jackson@water.nsw.gov.au

30 July 2010

Our ref: ER20333
Your ref: 10/10388

Attention: Chris Ritchie

Dear Chris,

Subject: Environmental Assessment Review
Armidale Dumaresq Landfill Project – MP06_0220

I refer to your letter dated the 27 May 2010 seeking the NSW Office of Water's (NOW) comments and recommended conditions on the Environmental Assessment (EA) for the proposed Armidale Dumaresq Landfill Project.

NOW has reviewed the Environmental Assessment and identified a number of environmental matters that require consideration by the Department of Planning in its assessment of the project application. These issues are outlined in Attachment A.

NOW has also provided for consideration recommended conditions of approval in Attachment B, should the Minister for Planning determine the application by granting project approval.

If you require further information please contact Christie Jackson on 02 6701 9652 at the Tamworth office.

Yours sincerely

Mark Mignanelli
Manager Major Projects and Assessment

MP06_0220 ARMIDALE DUMARESQ LANDFILL PROJECT
NSW OFFICE OF WATER COMMENTS ON ENVIRONMENTAL ASSESSMENT

Groundwater

A groundwater monitoring program has been proposed in the Water Quality Monitoring and Management Plan included in the draft Armidale Regional Landfill Environment Management Plan (LEMP). The monitoring program is yet to be developed into the associated benchmark techniques for the landfilling operations.

NOW considers there is an insufficient number of bore locations proposed for the groundwater monitoring program. It is proposed to monitor the expected down gradient (North) locations being BH 4 and BH 5, however it is also noted in Section 3.3.2 of the Environmental Assessment – Volume 1 Main Report that the 'groundwater flow direction could not be accurately interpolated'. It is recommended that bore locations to the east and west of the landfill footprint be included in the monitoring program, as well as a southern deep bore for baseline purposes. Particular attention should be paid to the early warning of any potential contaminant migration to bore no. 305317. NOW_1

NOW assume these alterations to the monitoring program could be made during the adaption of the Draft LEMP to appropriate benchmarks rather than through a revised EA. NOW would like to be consulted during this process.

All monitoring bores associated with the project must be licenced under the *Water Act 1912/* or *Water Management Act 2000* by NOW.

Surface Water

The site is located within the sensitive catchment of the Gara River, Oxley Wild Rivers National Park and downstream to the Macleay River. The Gara River is located to the east of the site with Commissioners Waters to the south of the site. There is a Water Sharing Plan for the Commissioners Waters Water Source 2003 under the *Water Management Act 2000* which may be applicable for the project site. NOW_2

The EA outlines two intermittent unnamed creeks flow to the site from the neighbouring property to the west. These creeks are seasonal and only flow during wet weather. These creeks flow onto the project site for approximately 200 metres prior to forming a single gully. This gully meets the Gara River 1300 metres across the property at the north-western corner of the site.

The EA outlines a number of surface water management measures to be implemented on site including diversion drains, a leachate pond, a stormwater detention pond and a dry dam to contain all water on the site. The leachate barrier system includes a 900mm thick layer of re-compacted clay plus a HDPE liner would overlay the clay layer. It is important any surface water protection measures are implemented on the site with an accompanying monitoring plan, to ensure there are no off site impacts. NOW_3

The EA also mentions there are 7 small farm dams on Sherraloy and 2 dams on Edington. Any dams constructed as part of the project must be in accordance with the NSW Farm Dams Policy and the Harvestable Right Order published under section 54 of the *Water Management Act 2000*. NOW_4

Riparian Management

The EA outlines two ephemeral creeks flow to the site from the west. It is important any drainage lines within the site are managed appropriately. It is unclear in the EA whether the drainage lines will be crossed and whether any structures such as culverts are required. NOW_5

Whilst approvals under Part 3A of the *Environmental Planning and Assessment Act 1979* do not require a separate Controlled Activity Approval under the *Water Management Act 2000*, any works within 40 metres of a watercourse should be consistent with State Policy and Guidelines. The NOW 'Guidelines for Controlled Activities (2008)' outline the management requirements for works within 40 metres of a watercourse. It is expected all works within the riparian areas are undertaken with minimal disturbance, erosion and sediment control measures, provide adequate drainage, maintain hydrological flow regimes and all disturbed areas are revegetated and rehabilitated appropriately. NOW_6

Stormwater Management:

The EA outlines a stormwater management system for the site with the clean stormwater being diverted around the landfill footprint into an unnamed creek to the north of the site. The dirty stormwater will be diverted to the proposed sedimentation basin to the north east of the landfill footprint. The stormwater system is designed to capture and contain all dirty stormwater on site, which NOW supports, minimising potential offsite impacts. NOW_7

Attachment A Ends
30 July 2010

Attachment B

MP06_0220 – ARMIDALE DUMARESQ LANDFILL PROJECT
NSW OFFICE OF WATER RECOMMENDED CONDITIONS OF APPROVAL

1. The proponent must ensure that it has sufficient water supply for the project and obtain all appropriate water licences/ approvals as required under the *Water Act 1912* and/ or *Water Management Act 2000* prior to the commencement of works.
2. All dams associated with the project must be in accordance with any Harvestable Right Order published under section 54 of the *Water Management Act 2000*.
3. The proponent must ensure all monitoring bores and works that intersect the watertable are licensed with the NSW Office of Water. All Form A's associated with the bores must be submitted to the NSW Office of Water at the time drilling is undertaken.
4. A monitoring program must be implemented to monitor impacts of the development on surface water resources, groundwater resources, in consultation with NOW.
5. NOW is consulted in the development and finalisation of the Landfill Environment Management Plan, in particular the Water and Leachate Management Plan and Water Quality Monitoring and Management Plan.
6. Appropriate stormwater management techniques should be used on site to ensure stormwater is captured and contained on site. All stormwater must be treated to an appropriate standard prior to discharging from the site.
7. Any works within riparian areas must be undertaken in accordance with industry best practice in order to maintain and conserve the geomorphic integrity of the watercourse and natural hydrological flow regimes.
8. All disturbed areas must be revegetated and rehabilitated immediately after works are completed.
9. Works within riparian areas, including drainage lines, need to give consideration to NOW's Guidelines for Controlled Activities 2008.

Attachment B Ends
30 July 2010

NSW Office of Water

Issue Number	Topic	Response
NOW_1	W5	Additional groundwater monitoring locations to the east, west and south of the landfill will be included in the final Water Quality Monitoring Program and Management Plan. These additional locations will utilise groundwater wells installed by RCA in 2007 in the following locations: • BH10: southern end of eastern boundary of landfill cells – screened in Argillitte (total depth 47.0m, groundwater detected at 41.0m • BH11: northern end of western boundary of landfill cells – screened in Sandstone (total depth 36.0m, groundwater detected at 31.0m) • BH12: northern end of eastern boundary of landfill cells –screened in Argillitte (Sandstone to 30m, total depth 40.0m, groundwater detected at 35.0m)
NOW_2	W1	The Project Site is not located within the Commissioners Waters Water Source as defined in clause 4 of the *Water Sharing Plan for the Commissioners Waters Water Source 2003*. The plan does not apply to the creeks within the Project Site (clause 5).
NOW_3	W1	All surface water management measures and monitoring to be implemented on site will be outlined in the LEMP and its sub-plans for the proposed landfill.
NOW_4	W1	As outlined in **Section 6.2.11** of the EA, the water contained in the sedimentation basin and dry basin would be used for environmental management purposes, namely runoff capture, dust suppression and stormwater and leachate quality control. It is not intended to use surface water run-off, farm dams or groundwater sources to meet the proposed landfill facility water requirements. As such, NSW *Farm Dams Policy* does not apply to this project and a Harvestable Right Order is not required.
NOW_5	W1	An intermittent creek flows easterly from the neighbouring property Strathaven, passes to the north of the Project Site and then joins the Gara River approximately 1km downstream of the Project Site. The predicted flood level of the 1 in 100 year ARI peak flow was calculated in accordance with the procedures outlined in Australian Rainfall and Runoff. The results indicated that flood levels would be approximately 1 to 1.5m above the banks of the intermittent creek, resulting in a flow width of approx 50m through the valley. Although the flooding will encroach on the site's northern boundary, the landfill itself and the water leachate pond, sediment basin and dry basin are located well outside the extent of the predicted 1 in 100 year floodplain. It is noted that site access road would need to cross the creek floodplain. Road creek crossings at these locations will incorporate suitably designed pipe culverts to allow flows up to the 1 in 100 year ARI to pass through and/or overtop the roadway in a safe manner. During flood events, waste transport to the site could be postponed until such time that the flooding recedes and safe access to the site is possible.
NOW_6	W1	Where required, all works within 40m of the intermittent watercourse would be undertaken in accordance with the NOW *Guidelines for Controlled Activities* (2008) and undertaken with minimal disturbance, suitable erosion and sediment control measures and appropriate revegetation and rehabilitation of disturbed areas. Proposed erosion and sediment control measures are outlined in **Section 8.1.3** of the EA and would be implemented during construction and operation. Erosion control measures, stormwater management system design and rehabilitation/revegetation measures will be outlined in the LEMP and sub-plans

Armidale Regional Landfill
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		including the Construction Environmental Management Plan (CEMP) and Erosion and Sediment Control Plan (ESCP).
NOW_7	W3	Support for the proposed design of the stormwater management system for the site, which will minimise potential offsite surface water impacts, is noted.
NOW_8	W5	Noted. The proponent will liaise with NOW with regard to licensing of monitoring bores and works that intercept the water table.
NOW_9	W5	The Water Quality Monitoring Program and Management Plan and Water and Leachate Management Plan, which form Appendix A and B of the LEMP respectively) set out the groundwater and surface water and leachate monitoring proposed for the site during construction and operation. The plans would be finalised prior to construction and in consultation with NOW, DECCW and other government departments as required.
NOW_10	W3	"Clean" stormwater would be conveyed via the site's clean water diversion drains to the unnamed creek to the north of the Project Site. Clean stormwater would not be in contact with any areas where waste, organic material or compost has been handled or stored. Clean stormwater would not require treatment, however appropriate erosion controls would be provided along diversion routes and at the discharge (e.g. energy dissipator). "Dirty" stormwater is water which falls on any disturbed and operational areas of the landfill, but which has not come into contact with any waste materials. Dirty stormwater may contain suspended sediments and as such would be diverted to the proposed sedimentation basin to the north east of the landfill footprint, in which sediments would settle out. Appropriately treated, clarified surface water from the sedimentation basin is intended to be reused on-site for dust suppression purposes and for irrigation of on site vegetation, where and when required. "Leachate" is water that has been in contact with waste including all water flowing from the proposed leachate collection system; all rainfall that would infiltrate through the landfill, both within the "active" filling areas and any finally capped areas; any contaminated waters disposed by injection into the landfill; and moisture contained within either the waste or any cover materials. The leachate pond would contain, store and treat all collected leachate.

NSW GOVERNMENT | Environment, Climate Change & Water

Your reference:
Our reference: LIC08/1681; DOC10/35670
Contact: Stephen O'Donoghue, 6773 7000

9 August 2010

Mr Chris Ritchie
Manager, Industry
Mining and Industry Projects
GPO Box 39
SYDNEY NSW 2001

Attention: Megan Webb

Dear Mr Ritchie,

PROPOSED ARMIDALE LANDFILL PROJECT (06-0220) – REVIEW OF PUBLICLY EXHIBITED ENVIRONMENTAL ASSESSMENT REPORT

I refer to the Project Application, Environmental Assessment, and accompanying information provided for the proposed Armidale Landfill Project received by the Department of Environment, Climate Change and Water (the Department) on 1 June 2010. The Department has reviewed the information provided (Armidale Regional Landfill, Environmental Assessment, April 2010 Volumes 1 to 3).

Attachment A provides detailed comments on the proposal and recommendations for consideration in the Statement of Commitments and/or Conditions of Approval, if the proposal is approved by Department of Planning (DoP). The Department has also in **Attachment B** recommended conditions for an Environment Protection Licence for the proposed landfill. It is expected that the Department will be given an opportunity to review the proponent's submissions report and draft conditions of approval for this proposal for further input.

It is noted that the project will require an environment protection licence under the Protection of the Environment and Operations (POEO) Act 1997 to operate the waste facility. The proponent will need to make a separate application to the Department for this licence if development project approval is granted.

Where relevant, the Department would also appreciate receiving a copy of the submissions received by the Department of Planning (or a report summarising these submissions) received in response to the exhibition of the Environmental Assessment.

In summary, from the information presented in the EA, the Department is of the opinion that the most significant environmental issues are:

- Appropriate construction and management of leachate barrier and collection system in accordance with Benchmark Techniques defined in "*Environmental Guidelines: Solid Waste Landfills*"
- Ensuring construction and operations meet proposed noise criterion in accordance with the interim Noise Construction Guidelines and Industrial Noise Policy;
- Need to minimise impacts on biodiversity and development of an adequate biodiversity offset; and

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- Undertaking rigorous environmental monitoring to demonstrate that proposed objectives and targets for the proposal are met.

If you have any questions, or wish to discuss this matter further please contact Stephen O'Donoghue in the Armidale office on 6773 7000.

Yours sincerely

SIMON SMITH
Manager Armidale Region
Environment Protection and Regulation

Enclosed:

***Attachment A** – DECCW Submission on Proposed Armidale Regional Landfill – Key issues and Recommendations for Statement of Commitments or Conditions of Approval.*

***Attachment B** – Recommended Conditions for Environmental Protection Licences for proposed Armidale Landfill*

ATTACHMENT A - DECCW Submission for Proposed Armidale Regional Landfill
Key issues and recommendations for Statement of Commitments/ Conditions of Approval

A. LEACHATE MANAGEMENT

The Environmental Assessment report has a number of inconsistencies that require clarification by the proponent.

Issue 1: Leachate management/ water balance sizing of leachate pond
The proponent has undertaken a water balance and determined that a 12ML leachate pond would provide adequate storage capacity for management of leachate from infiltration into the landfill cells. The design also incorporates retaining a freeboard of 300mm based on 1 in 25 year 24 hr direct rainfall onto the pond and incorporates allowance for wave action.

As a general requirement, the Department requires new landfills to meet a minimum requirement of full containment and no discharge of leachate up to a 10%ile AEP (Annual Exceedance Probability) or 90%ile wet year. It is noted that the proponent has designed the leachate system effectively as a nil discharge system – that is to a higher containment standard than generally required for landfill performance as an acknowledgement of the values of the Oxley Wild Rivers National Park downstream of the landfill.

Accordingly, the Department will not include a formal discharge point from the leachate collection system in the Environment Protection Licence (EPL). It is recommended, however, that an annual review of the performance of the leachate collection system against water balance predictions be undertaken to evaluate that the capacity of the leachate collection system remains adequate to contain all leachate generated from the landfill. DECCW_1

The proponent should also clarify the following issues prior to final determination.

- Page 57 of the main report states that the leachate pond would be surrounded by a compacted clay bund with a capacity of 110% of the leachate pond. This seems at odds with other sections with no identification or discussion of this bund in the documentation. The landfill design including figures provided incorporates the proposed dry basin of capacity of 19ML as additional storage in case of overflow from leachate or sediment pond system and sized to capture runoff generated from a 1 in 100 year 24 hr storm event from a catchment area of 13.5ha assumed as maximum (based on area of 3 landfill cells). DECCW_2

- There are discrepancies in the report as to management of runoff from areas where leachate may be irrigated onto intermediate capped areas. Figure 8 of the report indicates that surface runoff from daily and intermediate cover would be diverted to the sedimentation pond. In the case where leachate is being irrigated onto the intermediate capping there is potential for leachate/ contaminants other than sediment to enter the dirty water/ sediment system. P74 of the report states that all runoff from areas where irrigation of leachate occurs would be treated as leachate, however there is no indication it would be diverted to the leachate collection system. DECCW_3

- The water balance outlined in Appendix A – Water and Leachate Management Plan, and depicted in figures 3 and 4 (Leachate Volume in Leachate Pond vs. Time) shows that up to about Year 35 (3-4 cells) the leachate volume in the pond does not exceed 3ML – well below the capacity of the leachate dam (12ML). After around year 35 there is a significant increase in the leachate volume in the pond and in figure 4 close to the end of the landfill life, there is a significant jump. It is not clear in the discussion why this is predicted to occur, particularly given that final capping of the cells would be occurring with reduced infiltration rates. It would be useful also to extend this analysis past final capping of all cells to assess long term performance and implications for leachate management in closure. DECCW_4

- The option for export of leachate from the site to a suitable/ lawful disposal facility may not be a practical or viable option given the volumes in question and distance to potential liquid disposal facilities. The leachate is in all likelihood going to be required to be managed on-site via irrigation within controlled leachate drainage area, evaporation from pond system and re-injection into the waste cells. DECCW_5

Recommendations:

1. The Environment Protection Licence will not include a formal discharge point for the leachate collection system but will be managed under s120 of the Protection of the Environment Operations Act – that is there will be no defence in the licence for pollution of waters as a result of leachate discharge to surface waters.

2. Provide additional clarification/ advice on the issues raised above prior to determination.

3. That annual monitoring and reporting of leachate volumes held in the pond, leachate volumes injected or irrigated be undertaken. DECCW_6

4. The leachate pond incorporate a gauge board to accurately determine leachate volumes held in the pond. DECCW_7

5. That a detailed review of the water balance and additional modelling be undertaken when the capacity in the leachate pond exceeds 5 ML (5,000 m^3) to assess performance against modelled predictions. The review should recommend additional mitigation measures as required if leachate management design is below that predicted in the proponent's environmental assessment report. DECCW_8

Issue 2: Leachate barrier system design
There is contradictory information in the EAR with respect to landfill leachate barrier design in the landfill cells and leachate pond. Volume 1, section 5.2.2 proposes a design of 900mm thick re-compacted clay with permeability less than $1x10^{-9}$m/s as a minimum requirement and final installed barrier 'may' exceed minimum permeability criteria in order to create surety of the ongoing integrity of the barrier. In addition, if there is insufficient clay material it is proposed that a composite liner would be considered incorporating clay bedding of 300mm thick at $1x10^{-9}$m/s overlain by 1.5mm thick HDPE with permeability of $1x10^{-11}$m/s. This design is also restated in draft LEMP in Volume 2. DECCW_9

Statement of Commitments (SOC) No. 11, states proponent will implement a Leachate Management System as part of the LEMP and designed in accordance with the relevant Landfill Guidelines Benchmark Techniques.

Volume 4 - Appendix I. A Hydrogeological (Leachate) Assessment completed in February 2010 to assess possible impacts of migration of leachate on the downstream National Park, assumed a leachate barrier design incorporating 90 cm thick clay with in-situ coefficient of permeability of less than 10^{-9} m/s overlain by a flexible membrane liner (HDPE) with a minimum thickness of 2 mm.

Based on this recent modelling undertaken by the proponent and in acknowledgement of concerns over potential impacts on downstream environmental values, there appears to be a commitment by the proponent to install a leachate barrier system that provides lower leakage rate and improved performance than the standard Benchmark Technique 1 (BT1) for solid waste landfills. The proponent indicates that the leachate barrier will be based on design incorporating 90 cm thick clay with in-situ coefficient of permeability of less than 10^{-9} m/s overlain by a flexible membrane liner (HDPE) with a minimum thickness of 1.5mm and permeability of 10^{-14} m/s.

It is also not clear the proposed barrier design for the leachate pond. Benchmark Technique 2 indicates that the leachate pond should be collected and stored in a dam that is lined to a similar standard to the landfill liner. Any use of HDPE liner as an overlay in design of the leachate pond should also consider deterioration as a result of UV radiation and design appropriate cover as necessary. DECCW_10

Recommendations:

6. The Department requires design to Environmental Guidelines: Solid Waste Landfills Benchmark Technique BT1 performance or better or alternative as approved by the Department in the final design prior to placement of waste in landfill cells. Please refer to

Attachment B for details of recommended licence conditions for design and installation of the leachate barrier and collection system.

7. The proponent should clarify the intended design for the leachate barrier system and leachate pond and provide firm commitments in the final statement of commitments for the proposed design. DECCW_10

B. NOISE IMPACT ASSESSMENT

Issue 3: Operating hours

The proponent must clearly identify proposed operating hours as there are inconsistencies in the report. P76 of the main volume makes the statement that normal operating hours of the landfill will not be outside DECCW recommended hours of 0600 to 1730 Mon-Fri and 0800-1830 hrs Sat. Then it is stated that landfill will generally operate between 0700-1730 hrs Mon-Fri, 0800 to 1830 hrs Sat. Appendix Q (Noise Impact Assessment), p2 states that operational hrs will be 0700-1730 Mon-Fri; 0800-1830 Sat, Sun and public holidays.

Recommendations: DECCW_11

8. Proponent must clarify proposed operating hours in the Statement of Commitments

9. The Department does not support landfill operations in the night time period and any operations including entry into the landfill for waste activity operations must be restricted to the day time period only as defined in the Industrial Noise Policy.

Issue 4: Predicted noise impacts and potential receptors

The noise modelling predicts that the noise criterion will be exceeded at Sherraloy residence by 3dBA under neutral conditions when covering activities occur on cell 1 assumed to be at final landform height.

It is also noted that property owner of Sherraloy residence is permitting Armidale Dumaresq Council to sub-divide their land for the purpose of construction of the landfill. There may be opportunity here to enter a negotiated agreement with this residence as a project related residence to accept higher noise limits. As the property is being sub-divided, with negotiation with the property owner, the increased noise limit could be formally placed on the title of the property in case of subsequent sale of the property to a third party. Alternatively, the conditions of approval should incorporate a noise limit of $L_{Aeq(15\ minute)}$ 38 dB(A) at the Sherraloy residence. Note increased noise limits have been included for property Sherraloy in Attachment B. DECCW_12

The potential for further sub-division of adjoining properties (Strathaven, Edington and Sherraloy) and additional residential receptors has not been discussed in the report. Any further residential development in this area will need to ensure that location is outside predicted noise impact of $L_{Aeq(15\ minute)}$ 35dB(A) as a result of operations at the landfill.

Recommendations:

10. Residence 2 (Sherraloy) and property be considered project related as the property owners are sub-dividing the land to allow the landfill construction and operation. To prevent subsequent land use conflict as a result of resale, covenants on the title of the sub-divided blocks should identify that increased noise levels are predicted to occur as a result of landfill operations.

11. Alternatively, a noise limit of $L_{Aeq(15\ minute)}$ 38dB(A) at the residence Sherraloy should be prescribed in the conditions of approval and environment protection licence.

C. THREATENED SPECIES / BIODIVERSITY OFFSETS

Issue 5: Clarification of issues required

The following comments are provided in relation to biodiversity/ offsets. The issues raised will not substantially affect the conclusions of the assessment, rather need to be considered in preparation of final management plans, pending approval of the proposed development.

All three avian species listed as under Preliminary Determination in the EAR (Little Eagle, Scarlet Robin and Varied Sittella) were gazetted under Final Determinations on 12 February 2010.

Repeated claims in the EAR that offsets "will potentially provide habitat for existing pairs (of birds) that will be impacted by the development to disperse without encroaching on the territories of other pairs or individuals", (pages 102-107) are very misleading. The revegetation of offset areas into woodland habitat capable of supporting the threatened passerine birds may take decades depending on the avian species and so be of no value to individuals that are displaced by construction. Response of existing woodland in the offset areas to gradual management that *may* improve carrying capacity will also be achieved only after many years. DECCW_13

It is proposed that Log piles will be removed (p 221 Volume 1) but no emphasis is made that coarse woody debris, such as these logs, will be retained on the offsets. Vol 3 Biodiversity Management Offset Plan does mention it (p 12). Likewise, the relocation of dead wood is noted in the title a subsection, but only trees and stags are alluded to in the text (p 222 V1). In Vol 3, only hollow-bearing trees are being relocated whereas all large trees should be used. In the summary it is correctly identified for trees with >20cm diameter.

In the adequacy assessment, the Department provided comments in relation to potential increased risk to Koalas from the landfill access road. The comments have been ignored and any threats associated with access to the landfill not discussed. This should be further addressed in the development of final flora/ fauna and biodiversity management plans.

Likewise, there has been no attempt to recognise the difficulty in restoring woodland habitat as raised by the Department in the adequacy check stage. A growing body of literature, none of which is cited in the EA (*e.g.* Wilkins *et al.* 2003 *Restoration Ecology*), demonstrates that restoration of woodland habitat is typically very difficult or unsuccessful, at least during the initial decades of effort.

Recommendations: DECCW_13

12. For information only, consideration and acknowledgement in final determination report, and incorporated into the development of final management plans for the construction and operation of the landfill.

Issue 6: In perpetuity security of proposed biodiversity offsets

There does not appear to be any mechanism identified to identify the long term security of the proposed biodiversity offset areas, for example through covenants on land title, voluntary conservation agreements, covenants through the Nature Conservation Trust.

Recommendations: DECCW_14

13. Conditions of approval require proponent to identify and implement mechanism for in-perpetuity security of proposed biodiversity offset area.

D. WATER MANAGEMENT AND MONITORING

Issue 7: Operation and integration of sediment basin and dry detention basin

The proponent has designed the proposed sediment basin to a 5 day 90%ile storm depth (37.4mm) event and proposes to capture stormwater runoff from dirty water catchments only (no leachate cross contamination). The design is based on a catchment area of 10.87 ha (3 landfill cells 3, 4 and 5). A design volume of 2.85 ML has been determined.

Stormwater captured in the sediment dam is proposed to be treated (if needed). Overflows from the sediment dam are proposed to be directed to the dry detention basin (proposed 19 ML capacity) which may then be discharged subject to demonstration that there is no cross contamination with leachate and that total suspended solids, pH and oil and grease limits are met.

Based on the information provided there appears to be 3 proposed types of discharges to the environment:

- contingent release from the sediment pond if limit conditions are met (and demonstrated no cross contamination with leachate);
- contingent release from the dry detention basin if limit conditions are met (and demonstrated no cross contamination with leachate); and
- uncontrolled release from the dry detention basin if the design capacity (1 in 100 year 24 hour duration event) DECCW_15

The proposed design suggests that even though the sediment basin is designed to a 5 day 90%ile depth storm event, the actual uncontrolled discharge of stormwater from the premises would only occur when the capacity of the dry detention basin is exceeded (>1 in 100 year 24 hour duration event).

Recommendations:

14. Confirmation that above stormwater management design summarised above is how surface water runoff will be managed from the premises.

Issue 7: Groundwater and surface water monitoring

The proponent has recommended that 2 down-gradient bores (BH4/4a and BH5/5a) and one up-gradient bore (BHX) be monitored. This is insufficient coverage for monitoring potential impacts on groundwater. Additional bores would need to be included along the up-gradient western boundary and down-gradient eastern/ north eastern boundary from the landfill cell. DECCW_16

The proponent has provided a proposed surface water quality monitoring program for monitoring upstream/ downstream surface waters. The monitoring program appears extensive and components of this are likely to be included in the Environment Protection Licence.

Recommendations:

15. The proponent is required to prepare a final groundwater and surface water monitoring program in consultation with the Department. It is noted that preparation of Environmental Management Plans including monitoring programs is generally a standard requirement of Department of Planning. DECCW_17

16. The proponent be required to prepare and submit an Annual Environmental Monitoring Report to the appropriate Government Agencies that provides a summary of environmental performance against commitments in the EAR, conditions of approval and environment protection licence.

ATTACHMENT B – RECOMMENDED CONDITIONS FOR ENVIRONMENT PROTECTION LICENCE FOR ARMIDALE REGIONAL LANDFILL

Administrative conditions

A1. Information Supplied to the EPA

A1.1 Except as expressly provided by these general terms of approval, works and activities must be carried out in accordance with the proposal contained in:

a) Armidale Regional Landfill, Environmental Assessment, April 2010;

b) the Attachments and Appendices provided with the EIS; and

c) Final conditions of approval for the proposed development

Note: Reference also to be made to final documents prepared by proponent in response to submissions.

A2. Administrative Licensing Conditions

A2.1 The applicant must apply for and receive an environment protection licence from the EPA prior to commencing any activity associated with the proposal, including construction activities.

A2.2 Waste must not be received and/or disposed of at the premises until the EPA has provided the applicant with an environment protection licence which explicitly approves the receipt and disposal of waste at the premises.

A2.3 The licence application referred to in condition A2.1 must also be accompanied by a report which provides:

a) drawings "for construction," specifications, design details and installation and commissioning schedule for the proposed :
   i) liner system for the landfill cells; and
   ii) leachate collection, conveyance, storage and disposal system; and
   iii) progressive capping and rehabilitation of the premises; and

b) a proposed Construction Quality Assurance Plan (CQAP) which ensures that the measures referred to in a) of this condition will be installed in a manner to achieve their design specifications, including an undertaking to provide:
   i) as constructed" drawings prepared from field surveys of the installed liner system and the leachate collection, conveyance and storage system; and
   ii) a report prepared by a suitably qualified person that validates that the measures referred to in a) i) and ii) of this condition were installed generally in accordance with their design specifications; and

c) a groundwater and surface water monitoring program report which:
   i) details a proposed groundwater and surface water monitoring network and a proposed groundwater and surface water monitoring program for the facility;
   ii) demonstrates that the proposed measures referred to in i) would be suitable to enable detection of leachate pollution of surface water and groundwater, if any; and
   iii) provides a proposed installation and implementation schedule for the measures referred to in i); and

d) soil and water management plan in accordance with Managing Urban Stormwater: Soils and Construction (Landcom, 2004) with all sediment control dams sized to contain up the 90 th percentile 5 day duration rainfall event with all pumped discharges

containing less than 50 mg/L of TSS, 0.9 mg/L of total ammonia, pH within range 6.5-8.5 and no visible oil and grease.

(Note condition L1.1 below that s120 of the Protection of the Environment Operations Act applies for all other pollutants, that is there is no defence in the licence for discharge of other pollutants that cause pollution of waters).

A2.4 The landfill cell liner system referred to in a) i) of condition A2.3 must comprise either:

a) re-compacted clay or similar material at least 90 centimetres thick with an in-situ co-efficient of permeability less than 10^{-9} metres per second covering the entire floor and walls of each waste disposal cell; and

b) a flexible membrane liner (FML) with a minimum co-efficient of permeability of less than 10^{-14} metres per second covering the entire floor and walls of each waste disposal cell; or

c) an alternative liner system approved in writing by the EPA.

A2.5 The design of the leachate collection, conveyance, storage and disposal system referred to a) ii) of condition A2.3 must:

a) be on the basis that disposal options for leachate are limited to irrigation over the active landfill cell/s or disposal at a facility licensed to accept such waste;

b) include a leachate drainage layer comprising either:

i) a minimum 300 mm thick layer of 20mm minimum sized rounded gravel:
- with a permeability of not less than 1×10^{-3} metres per second; and
- which is chemically resistant to the leachate; and
- is capable of withstanding the weight of the overlying waste; or

ii) an alternative system approved in writing by the EPA; and

c) incorporate leachate dam/s that:

i) have a minimum capacity of six thousand (12,000) cubic metres; and

ii) are lined with either:
- a composite liner system comprising either re compacted clay or similar material at least 90 centimetres thick with an in situ co-efficient of permeability of less than 10^{-9} metres per second; and
- a flexible membrane liner (FML) with a minimum co-efficient of permeability of less than 10^{-14} metres per second; or
- an alternative system approved in writing by the EPA; and

iii) allow for the level of leachate in the storage dam/s to be maintained such that there is no overflow ie the design should include high level alarm/s and/or interlock system/s configured such that the alarm/s are activated and any pump or gravity flow of leachate to any dam/s is automatically shut down prior to dam overflow.

Note a: *The EPA will review the reports required by condition A2.3 with a view to attaching conditions to the applicant's environment protection licence requiring installation of the respective measures and implementation of the respective programs.*

Note b: *For validation of thickness of the compacted component of any liner and the leachate drainage layer the EPA will accept the as constructed surveys referred to in b) i) of condition A3.4*

Note c: *For validation of the permeability:*
- *of the compacted component of any liner the EPA will accept compaction and moisture content testing every 1000 m2 in accordance with AS 1289.5.7.1 and permeability testing every 5000 m2 in accordance with AS1289.6.7.3 (for undisturbed samples); and*
- *of the leachate drainage media the EPA will accept particle size distribution testing in accordance with AS 1289.6.7.1 and permeability testing in accordance with AS1289.6.7.1 at least one per source and every 2500 tonnes of material used.*

Note d: *The EPA will also review the information required by b) ii) of condition A2.3 with a view to attaching conditions to the environment protection licence to enable the licensee to commence landfill disposal of wastes at the facility.*

Discharges to air and water and applications to land

P1.Location of monitoring/discharge points and areas

P1.1 The following points referred to in the table below are identified in these general terms of approval for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

Air

EPA identification no.	Type of monitoring point	Type of discharge point	Description of location
1	Air emissions monitoring		Surface gas monitoring in progressively capped areas of landfill
2	Air emissions monitoring		Building gas accumulation monitoring in buildings on landfill premises

P1.2 The following points referred to in the table below are identified in these general terms of approval for the purposes of monitoring and/or the setting of limits for the emission of pollutants to water from the point.

Water and land

EPA identification no.	Type of monitoring point	Type of discharge point	Description of location
3	Leachate quality monitoring		Final location to be determined following detailed designed and submitted with licence application.
Numbers to be determined	Surface water discharge quality monitoring	Surface water discharge quality	Final location of sediment pond(s) and dry basin to be determined following detailed designed and submitted with licence application.
Numbers to be determined	Groundwater quality monitoring		Final location of groundwater monitoring points to be determined in consultation with EPA in preparation of monitoring report prepared as per requirements of A2.3
Numbers to be determined	Surface Water/ Ambient water quality monitoring		Final location of surface water monitoring points to be determined in consultation with EPA in preparation of monitoring report prepared as per requirements of A2.3

Limit conditions

L1. Pollution of waters

L.1.1 Except as may be expressly provided by a licence under the Protection of the Environment Operations Act 1997 in relation of the development, section 120 of the Protection of the Environment Operations Act 1997 must be complied with in connection with the carrying out of the development.

L1.2 The applicant must ensure that that the level of leachate above the basal liner is maintained less than 300mm, or another depth approved by the EPA unless the leachate dam has adequate freeboard capacity.

L2 Load Limits

L2.1 Not applicable

L3 Concentration limits

L3.1 For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L3.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L3.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

Water and Land

POINTS (discharges from dirty water / sediment system only – not leachate system)

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Total suspended solids	mg/L				50
pH	pH				6.5-8.5
Oil and grease	Visible				Nil

L3.4 The licensee is not taken to have exceeded a concentration limit specified in this licence for the discharge of Total Suspended Solids, pH or oil and grease from points (to be determined) if:

a) the dam/s overflow is caused by a rainfall event exceeding the 5 day 90%ile rainfall; and

b) the licensee has taken all practical measures to avoid or minimise water pollution.

L4 Volume and mass limits

L4.1 Not applicable

L5 Waste

L5.1 The applicant must not cause, permit or allow any waste generated outside the premises to be received at the premises for storage, treatment, processing, reprocessing or disposal or any waste generated at the premises to be disposed of at the premises, except as expressly permitted by a licence under the Protection of the Environment Operations Act 1997.

L5.2 The applicant must ensure that only the following types of waste are disposed of at the premises:

Code	Waste	Description	Activity	Other Limits
	General Solid Waste (putrescible)	As defined in Schedule 1 of the POEO Act, as in force from time to time	Waste Disposal (application to land)	The total quantity of waste disposed of at the premises must not exceed 15,000 tonnes per year
	General Solid Waste (non-putrescible)	As defined in Schedule 1 of the POEO Act, as in force from time to time	Waste Disposal (application to land)	
	Asbestos Waste	As defined in Schedule 1 of the POEO Act, as in force from time to time		

L6 Noise limits

L6.1 Noise from the premises must not exceed:

(a) an $L_{Aeq\ (15\ minute)}$ noise emission criterion of 40dB(A) during the construction stage of the premises; and

(b) an $L_{Aeq\ (15\ minute)}$ noise emission criterion of 38 dB(A) at the residence Sherraloy during the operational stages of the premises

(c) an $L_{Aeq\ (15\ minute)}$ noise emission criterion of 35 dB(A) at all other residences during the operational stages of the premises

L6.2 Noise from the premises is to be measured at any residence not on the premises to determine compliance with this condition.

Definitions

$L_{Aeq\ (15\ minute)}$ is the equivalent continuous noise level- the level of noise equivalent to the energy- average of noise levels occurring over a measures period (i.e. 15 minutes).

For the purpose of these conditions:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays,
- Evening is defined as the period from 6pm to 10pm

For the purpose of noise measures required for this condition, the L_{Aeq} noise level must be measured or computed at any point within 30 metres of any residence not on the premises over a period of 15 minutes using "FAST" response on the sound level meter.

L6.3 The noise emission limits apply under all meteorological conditions except:

(a) during rain and wind speeds (at 10m height) greater than 3m/s; and
(b) under "non-significant weather conditions".

Note: Field meteorological indicators for non-significant weather conditions are described in the NSW Industrial Noise Policy, Chapter 5 and Appendix E in relation to wind and temperature inversions.

L6.4 Noise impacts where wind speed exceeds 3 metres per second at 10 metres above the ground must be addressed by:

a) documenting noise complaints received to identify any higher level of impacts or wind patterns;

Where levels of noise complaints indicate a higher level of impact then actions to quantify and ameliorate any enhanced impacts where wind speed exceeds 3 metres per second at 10 metres above the ground should be developed and implemented.

L6.5 The noise limits do not apply where a current legally binding agreement exists between the proponent and the occupant of a residential property that:

a) agrees to an alternative noise limit for that property; or

b) provides an alternative means of compensation to address noise impacts from the premises.

A copy of any agreement must be provided to the EPA before the proponent can take advantage of the agreement.

L7 Hours of operation

L7.1 Licensed activities covered by this licence must be carried out between the following hours:

a) 0700 hrs to 1730 hrs Monday to Friday;
b) 0800 hrs to 1830 hrs on Saturday; and
c) Closed Sunday and public holidays.

Note this condition will be reviewed following clarification by the proponent of proposed operating hours as requested in Attachment 1 of the Department's submission.

L7.2 Unless otherwise specified by any other condition of this licence, all construction activities are
(a) restricted to between the hours of 7:00 am and 6:00 pm Monday to Friday;
(b) restricted to between the hours of 8:00 am and 1:00 pm Saturday; and
(c) not undertaken on Sundays and Public Holidays.

L7.3 This condition does not apply to the delivery of material outside the hours of operation permitted by conditions L7.1 and L7.2, if that delivery is required by police or other authorities for safety reasons; and/or the operation of personnel or equipment are endangered. In such circumstances, prior notification must be provided to the EPA and affected residences as soon as possible or within a reasonable period in the case of emergency.

L7.4 The hours of operation specified in conditions L7.1 and L7.3 may be varied with written consent if the EPA is satisfied that the amenity of the residents in the locality will not be adversely affected.

L8 Potentially offensive odour

L8.1 No condition in this licence identifies a potentially offensive odour for the purposes of section 129 of the Protection of the Environment Operations Act 1997.

Note: Section 129 of the Protection of the Environment Operations Act 1997 provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

Operating conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.

This includes:

(a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and

(b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:

a) must be maintained in a proper and efficient condition; and

b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 All operations and activities occurring at the premises must be carried out in a manner that will minimise emissions of dust from the premises.

O3.2 Trucks entering and leaving the premises that are carrying loads must be covered at all times, except during loading and unloading.

O4 Leachate management

O4.1 Water which contacts waste, other than virgin excavated natural material, must be managed as leachate.

O4.2 Leachate must only be disposed of by:

a) evaporation,

b) irrigation or re-injection within the leachate dam or within the active cell of the landfill, or

c) disposal at a facility licensed to accept such waste.

O4.3 Irrigation of leachate must only be undertaken:

a) during dry weather;

b) such that ponding or run off within the active cell does not occur and if the active tipping face is enclosed by a 300mm high earthen bund; and

c) Have a 0.5 meter freeboard at all times.

O5 Management of surface waters

O5.1 Surface drainage must be diverted away from any area where waste is being or has been landfilled.

O5.2 The drainage from all areas at the premises which will liberate suspended solids when stormwater runs over these areas must be diverted into sedimentation basins.

O5.3 All practicable measures must be undertaken to manage all sediment dams such they have sufficient capacity to store run-off from the 90th percentile 5 day rainfall event.

O6 Fire risk reduction works

O6.1 The applicant must have in place and implement procedures to minimise the risk of fire at the premises.

O7 Burning of green waste

O7.1 There must be no incineration or burning of any waste at the premises

O8 Screening of waste

O8.1 The applicant must have in place and implement procedures to identify and prevent the disposal of any waste not permitted by this general terms of approval to be disposed of at the premises.

O9 Completion of landfill cells

O9.1 The applicant must ensure that the landfill cells are capped progressively.

O10 Unauthorised entry

O10.1 The applicant must take all practicable steps to control entry to the premises.

O10.2 The applicant must install and maintain a stockproof perimeter fence around the premises.

O10.3 The applicant must install and maintain lockable security gates at all access and departure locations.

O10.4 The applicant must ensure that all gates are locked whenever the landfill is unattended.

O11 Degradation of local amenity

O11.1 The applicant must have in place and implement a litter management program.

O12 Tracking of mud and waste

O12.1 The applicant must minimise the tracking of waste and mud by vehicles.

O13 Covering of waste

O13.1 Cover material must be "virgin excavated natural material" as defined in Schedule 1 of the Protection of the Environment Operations Act 1997 and must be applied in accordance with the following requirements:

Daily cover

(a) Cover material must be applied to a minimum depth of 15 centimetres over all exposed landfilled waste prior to ceasing operations at the end of each day.

Intermediate cover

(b) Cover material must be applied to a depth of 30 centimetres over surfaces of the landfilled waste at the premises which are to be exposed for more than 90 days.

Cover material stockpile

(c) At least two weeks cover material must be available at the premises under all weather conditions. This material may be won on site, or alternatively a cover stockpile must be maintained adjacent to the tip face.

O14 Control of pests and vermin

O14.1 The applicant must control pests and at the premises.

O15 Fire extinguishment

O15.1 The applicant must extinguish any fires at the premises as soon as possible.

O16 Fire fighting capability

O16.1 The applicant must have in place and implement fire prevention measures at the premises.

O17 Staff training

O17.1 The applicant must ensure that adequately trained staff are available at the premises in order to administer the requirements of these general terms of approval.

O18 Closure Plan

O18.1 The licensee must submit to the EPA within twelve months prior to the last load of waste being landfilled a closure plan in accordance with Section 76 of the Protection of the Environment Operations Act 1997.

Monitoring and recording conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by the EPA's general terms of approval, or a licence under the Protection of the Environment Operations Act 1997, in relation to the development or in order to comply with the load calculation protocol must be recorded and retained as set out in conditions M1.2 and M1.3.

M1.2 All records required to be kept by the general terms of approval must be:

- in a legible form, or in a form that can readily be reduced to a legible form;
- kept for at least 4 years after the monitoring or event to which they relate took place; and
- produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected: the date(s) on which the sample was taken;

- the time(s) at which the sample was collected;
- the point at which the sample was taken; and
- the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/ discharge point or utilisation area specified below (by a point number), the applicant must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The applicant must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

Air

Methane gas monitoring - POINTS to be determined

Pollutant	Units of measure	Frequency	Sampling Method
Methane	%by volume	Quarterly	Special Method 1

For the purposes of the table above Special Method 1 means sampling is to be undertaken in accordance with Benchmark technique No. 17 (Surface Gas Emission Monitoring) and Benchmark technique No. 18 (Gas Accumulation monitoring) defined in the document "Environmental Guidelines: Solid Waste Landfills, NSW EPA 1996."

Water and Land

Leachate at leachate collection dam - POINT to be determined

Pollutant	Units of Measure	Frequency	Sampling Method
Alkalinity (as HCO_3 and CO_3^{2-})	mg/L	Every six months	Grab sample
Aluminium	mg/L	Annually	Grab sample
Arsenic	mg/L	Annually	Grab sample
Barium	mg/L	Annually	Grab sample
Benzene	mg/L	Annually	Grab sample
Cadmium	mg/L	Annually	Grab sample
Calcium	mg/L	Every six months	Grab sample
Chloride	mg/L	Every six months	Grab sample
Chromium (total)	mg/L	Annually	Grab sample
Cobalt	mg/L	Annually	Grab sample
Conductivity	uS/cm	Every six months	Grab sample
Copper	mg/L	Annually	Grab sample
Ethylbenzene	mg/L	Annually	Grab sample
Fluoride	mg/L	Annually	Grab sample

Pollutant	Units of Measure	Frequency	Sampling Method
Lead	mg/L	Annually	Grab sample
Magnesium	mg/L	Every six months	Grab sample
Manganese	mg/L	Annually	Grab sample
Mercury	mg/L	Annually	Grab sample
Nitrate + Nitrite (oxidised nitrogen)	mg/L	Every six months	Grab sample
Nitrogen - ammonia	mg/L	Every six months	Grab sample
Organochlorine pesticides	mg/L	Annually	Grab sample
Organophosphate pesticides	mg/L	Annually	Grab sample
pH	pH	Every six months	Grab sample
Polycyclic aromatic hydrocarbons	mg/L	Annually	Grab sample
Potassium	mg/L	Every six months	Grab sample
Sodium	mg/L	Every six months	Grab sample
Sulfate	mg/L	Every six months	Grab sample
Toluene	mg/L	Annually	Grab sample
Total dissolved solids	mg/L	Every six months	Grab sample
Total organic carbon	mg/L	Every six months	Grab sample
Total Petroleum Hydrocarbons	mg/L	Annually	Grab sample
Total phenolics	mg/L	Annually	Grab sample
Xylene	mg/L	Annually	Grab sample
Zinc	mg/L	Annually	Grab sample

Discharges from Sediment Basin(s)/ Dry detention basin - POINTS to be determined

Pollutant	Units of Measure	Frequency	Sampling Method
Conductivity	uS/cm	Special Frequency 1	Grab sample
Nitrogen – ammonia	mg/L	Special Frequency 1	Grab sample
pH	pH	Special Frequency 1	Grab sample
Total Suspended Solids	mg/L	Special Frequency 1	Grab sample
Oil and grease	Visible	Special Frequency 1	In-situ

For the purposes of the table above Special Frequency 1 means the collection of samples on the first day of discharge and daily during continual discharge.

Groundwater monitoring - POINTS to be determined

Pollutant	Units of measure	Frequency	Sampling Method
Alkalinity (as HCO_3 and CO_3^{2-})	mg/L	Quarterly	Groundwater sample – grab
Aluminium	mg/L	Annually	Groundwater sample – grab
Arsenic	mg/L	Annually	Groundwater sample – grab
Barium	mg/L	Annually	Groundwater sample – grab
Benzene	mg/L	Annually	Groundwater sample – grab
Cadmium	mg/L	Annually	Groundwater sample – grab
Calcium	mg/L	Quarterly	Groundwater sample – grab
Chloride	mg/L	Quarterly	Groundwater sample – grab
Chromium (total)	mg/L	Annually	Groundwater sample – grab
Cobalt	mg/L	Annually	Groundwater sample – grab
Conductivity	uS/cm	Quarterly	In situ
Copper	mg/L	Annually	Groundwater sample – grab
Ethylbenzene	mg/L	Annually	Groundwater sample – grab
Fluoride	mg/L	Annually	Groundwater sample – grab
Lead	mg/L	Annually	Groundwater sample – grab
Magnesium	mg/L	Quarterly	Groundwater sample – grab
Manganese	mg/L	Annually	Groundwater sample – grab
Mercury	mg/L	Annually	Groundwater sample – grab
Nitrate + Nitrite (oxidised nitrogen)	mg/L	Quarterly	Groundwater sample – grab
Nitrogen - ammonia	mg/L	Quarterly	Groundwater sample - grab
Organochlorine pesticides	mg/L	Annually	Groundwater sample – grab
Organophosphate pesticides	mg/L	Annually	Groundwater sample – grab
pH	pH	Quarterly	In situ
Polycyclic aromatic hydrocarbons	mg/L	Annually	Groundwater sample - grab
Potassium	mg/L	Quarterly	Groundwater sample – grab
Sodium	mg/L	Quarterly	Groundwater sample – grab
Standing water level	m AHD	Quarterly	In situ
Sulfate	mg/L	Quarterly	Groundwater sample – grab
Toluene	mg/L	Annually	Groundwater sample – grab
Total dissolved solids	mg/L	Quarterly	Groundwater sample - grab

Pollutant	Units of measure	Frequency	Sampling Method
Total organic carbon	mg/L	Quarterly	Groundwater sample - grab
Total Petroleum Hydrocarbons	mg/L	Annually	Groundwater sample – grab
Total phenolics	mg/L	Annually	Groundwater sample – grab
Xylene	mg/L	Annually	Groundwater sample – grab
Zinc	mg/L	Annually	Groundwater sample – grab

Note: The monitoring requirements may be varied by the EPA subject to ongoing review and assessment of monitoring results. The suite and frequency of monitoring pollutants will also be reviewed and finalised as part of final approval process by Department of Planning through preparation of approved Environmental Monitoring Programs. The above suite is a standard suite used by the EPA for landfills.

Surface Water Monitoring Points (Ambient in-stream plus sediment basin)- POINTS to be determined

Pollutant	Units of Measure	Frequency	Sampling Method
Suite and frequency of pollutants to be finalised following review and finalisation of final approved surface water monitoring program. However monitoring points to be consistent with that proposed in Table 4-7 in "Armidale Water Quality Monitoring Program and Management Plan, 18 February 2010." In addition to these ambient water quality monitoring points, the EPA will also require routine sampling of the sediment pond/ dry detention basin to assess whether cross-contamination of the dirty water system with leachate is occurring.			

M3 Testing methods - concentration limits

M3.1 Monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area required to be conducted by the EPA's general terms of approval, or a licence under the Protection of the Environment Operations Act 1997 must be done in accordance with the Approved Methods Publication unless another method has been approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

M4 Recording of pollution complaints

M4.1 The applicant must keep a legible record of all complaints made to the applicant or any employee or agent of the applicant in relation to pollution arising from any activity to which this general terms of approval applies.

M4.2 The record must include details of the following:

a) the date and time of the complaint;

b) the method by which the complaint was made;

c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;

d) the nature of the complaint;

e) the action taken by the applicant in relation to the complaint, including any follow-up contact with the complainant; and

f) if no action was taken by the applicant, the reasons why no action was taken.

M4.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M4.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M5 Telephone complaints line

M5.1 The applicant must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities

conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M5.2 The applicant must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M6 Requirement to monitor rainfall

M6.1 Rainfall at the premises must be measured and recorded in millimetres per 24 hour period at the same time each day from the time that the site office associated with activities permitted by this licence is established.

Note: The rainfall monitoring data collected in compliance with condition M6.1 can be used to determine compliance with condition L3.4.

Reporting conditions

R1 Annual Return documents

What documents must an Annual Return contain?

R1.1 The applicant must complete and supply to the EPA an Annual Return in the approved form comprising:

a) Statement of Compliance; and

b) A Monitoring and Complaints Summary.

A copy of the form in which the Annual Return must be supplied to the EPA accompanies the licence. Before the end of each reporting period, the EPA will provide to the applicant a copy of the form that must be completed and returned to the EPA.

Period covered by Annual Return

R1.2 An Annual Return must be prepared in respect of each reporting, except as provided below

R1.3 Where the licence is transferred from the applicant to a new licensee,

a) the transferring licensee must prepare an annual return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and

b) the new licensee must prepare an annual return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.4 Where the licence is surrendered by the applicant or revoked by the EPA or Minister, the applicant must prepare an annual return in respect of the period commencing on the first day of the reporting period and ending on

a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or

b) in relation to the revocation of the licence – the date from which notice revoking the licence operates.

Deadline for Annual Return

R1.5 The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

Licensee must retain copy of Annual Return

R1.6 The applicant must retain a copy of the annual return supplied to the EPA for a period of at least 4 years after the annual return was due to be supplied to the EPA.

Certifying of Statement of Compliance and Signing of Monitoring and Complaints Summary

R1.7 Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:

a) the licence holder; or

b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R1.8 A person who has been given written approval to certify a Statement of Compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review this licence.

R2. Notification of environmental harm

Note: The applicant or its employees must notify the EPA of incidents causing or threatening material harm to the environment as soon as practicable after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act

R2.1 Notifications must be made by telephoning the EPA's Pollution Line service on 131 555.

R2.2 The applicant must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:

a) where the licence applies to premises, an event has occurred at the premises; or

b) were the licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this general terms of approval, and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The applicant must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:

a) cause, time and duration of the event;

b) type, volume and concentration of every pollutant discharged as a result of the event;

c) the name, address and business hours telephone number of employees or agents of the applicant, or a specified class of them, who witnessed the event;

d) the name, address and business hours telephone number of every other person (of whom the applicant is aware) who witnessed the event, unless the applicant has been unable to obtain that information after making reasonable effort;

e) action taken by the applicant in relation to the event, including any follow-up contact with any complainants;

f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and

g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the applicant. The applicant must provide such further details to the EPA within the time specified in the request.

R4 Reporting of Fires

R4.1 In the event of a fire at the facility the applicant must record:

a) the time and date when the fire was deliberately started or reported;
b) whether the fire was authorised by the applicant, and, if not, the circumstances which ignited the fire;
c) the time and date that the fire ceased and whether it burnt out or was extinguished;
d) the location of fire (eg. clean timber stockpile, putrescible garbage cell, etc);
e) the prevailing weather conditions;
f) any observations made in regard to smoke direction and dispersion;
g) the amount of waste that was combusted by the fire; and
h) the action taken to extinguish the fire.

R4.2 The applicant or its employees or agents must notify the EPA in accordance with conditions R2.1 and R2.2 of all fires at the premises as soon as practical after becoming aware of the incident.

R5 Leachate discharge reporting

R5.2 Whenever leachate is discharged to surface waters from the premises the licensee must notify the event to the EPA in accordance with condition R2.1.

R5.3 The licensee must provide written details of any leachate discharge(s) which exit the premises to the EPA within 7 days of the date on which the incident occurred.

R5.4 The written details referred to in the above condition must be provided as a report. The report must include the following information:

a) the volume of the leachate discharged and over what time period the discharge occurred;
b) the date and time of the commencement of the overflow;
c) the weather conditions at the time of the discharge, specifying the amount of rainfall on a daily basis that had fallen:
   - on the day(s) of the discharge; and
   - for the one week period prior to the discharge;
d) the most recent monitoring results of the chemical composition of the leachate;
e) an explanation as to why the discharge occurred;
f) the location(s) of the discharge; and
g) a plan of action to prevent a similar discharge in the future.

General Conditions

G1 Copy of licence kept at the premises

G1.1 A copy of the licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

G2 Contact number of incidents and responsible employees

G2.1 A 24-hour telephone contact line(s) for the purpose of enabling the EPA to directly contact one or more representatives of the applicant who can:

a) Respond at all times to incidents relating to the premises, and;
b) Contact the applicant's senior employees or agents authorised at all times to:
   i) speak on behalf of the applicant, and
   ii) provide any information or document required under the licence.

Department of Environment, Climate Change and Water (DECCW)

Issue Number	Topic	Response
DECCW_1	W5	Recommendation noted. The requirement for annual review of performance of the leachate collection system against water balance predictions would be included in the LEMP.
DECCW_2	W4	The "clay bund" referred to in **Section 5.2.4** of the EA has been incorporated into the design of the leachate pond. Final design details for the pond, including the bund, will be confirmed during the detailed design stage. The dry basin has been sized to capture runoff generated in a 1 in 100 year 24 hour duration storm event, and would act as additional storage in case of overflow from the leachate pond or sediment pond system.
DECCW_3	W4	The water balance model for the leachate pond is designed such that leachate is either irrigated onto the intermediate cover areas only and/or re-injected into the landfill mass. If irrigation was undertaken, then it would be undertaken within controlled leachate drainage areas comprising perimeter drains/bunds and temporary storage sump areas where any runoff containing leachate can be effectively contained and drained or pumped back to the leachate system. The risk of surface runoff containing leachate entering the dirty water/sediment system during irrigation operations is therefore considered low. Irrigation would be strictly managed and controlled to prevent saturation of the surface cover layers, therefore minimising the amount of surface runoff occurring. Irrigation would cease during and after major rainfall events. Surface runoff containing leachate from these areas would be relatively minor and for this reason has not been included in the leachate catchment and collection system.
DECCW_4	W4	The leachate water balance model undertaken as part of the assessment assumes that Cells 1 to 3 are final capped at 35 years and Cell 4 is intermediately capped at 50% capacity. After this period, the constant leachate re-injection (disposal) rate was (on average) less than the increasing leachate generated from infiltration through the final and intermediate cover areas during Stage 4. During Stage 5 when the greatest landfill area is exposed to rainfall infiltration through the final and intermediate cover, the generation rates were still increasing with area while the re-injection rates remained constant. This was also exacerbated by using higher than average rainfall (sourced from the rainfall stations) used during the last 10 years of the model. This is evident in Figure 4 (refer Appendix A of the LEMP) and even to a greater extent in Figure 3 which accounts for climate change impacts which increases rainfall after Year 21 of operation. The significant increase in the leachate pond volume following landfill closure after 50 years (shown in Figure 3 and 4) is due to cessation of leachate re-injection (and disposal of any leachate) at this time. This would indicate that leachate disposal after landfill closure is likely require further management. As agreed with DECCW during the submissions response period, the water balance modelling was extended for a further 20 years post-closure to determine likely leachate disposal rates and the long term performance of the leachate pond once final capping has occurred. The results of the modelling indicated that a disposal rate of between 7 to 10m^3/day (similar to the leachate re-injection rate during operation) is likely to be required to maintain a constant and stable leachate pond volume below the spill capacity (12ML). This post-closure leachate

		disposal could be achieved by one (or a combination) of the following options: • Continued leachate re-injection into the landfill mass (but subject to the available long-term water storage capacity within the placed landfill waste); • Irrigation of the stored leachate over natural vegetated land within controlled surface runoff drainage area/s (located outside the landfill but within the site) with appropriate pre-treatment; or • Provision of additional leachate storage for contingency containment (such as the dirty water and sediment dams which will be redundant following landfill closure and rehabilitation of the final landfill capping surface). It would be expected that water infiltration rates into the landfill mass (and hence leachate generation rates) would gradually reduce over time as the surface capping layer, vegetation and re-growth becomes more stable and mature. A Closure Management Plan would be prepared which would incorporate monitoring of leachate and infiltration rates (compared to site rainfall) towards the end of the life and post closure. The plan would be used to determine and assess the most appropriate post-closure leachate disposal option/s based on the monitoring results. The Closure Management Plan would be developed well ahead of closure and would therefore provide sufficient time to develop the post-closure disposal method best suited to the predicted quantity and quality of leachate that would be generated and to ensure any risk of environmental impact is minimised. Further, consultation would be undertaken with the DECCW at the time of preparing the Closure Management Plan, to agree the most appropriate option for post-closure leachate management.
DECCW_5	W4	Offsite disposal of leachate would be considered in advance of the leachate pond reaching its maximum effective storage capacity (less freeboard) and in consideration of potential future heavy rainfall events. It is envisaged that only finite volumes of leachate would be transported from the site to a suitably licenced facility.
DECCW_6	W4	Recommendation noted. The requirement for annual monitoring and reporting of leachate volumes held in the pond as well as leachate volumes injected and irrigated, will be included in the Water and Leachate Management Plan and LEMP.
DECCW_7	P4	The leachate pond will incorporate a gauge board to accurately determine leachate volumes held in the pond.
DECCW_8	W4	In order to assess performance against modelled predictions, a review of the water balance and modelling would be undertaken when the capacity of the leachate pond exceeds 5ML. The requirement to undertake this performance assessment will be included in the LEMP and Water and Leachate Management Plan.
DECCW_9	P4	It is proposed to install a leachate barrier system that provides lower leakage rate and improved performance than the standard Benchmark Technique 1 (BT1) for solid, waste landfills, to mitigate potential impacts on downstream environmental values. The leachate barrier will be based on design incorporating 900 mm thick clay with in-situ coefficient of permeability of less than 10^{-9} m/s overlain by a flexible membrane liner (HDPE) with a minimum thickness of 1.5mm and permeability of 10^{-14} m/s.
DECCW_10	P4	The leachate pond will be built to the same standard as the landfill liner and both liners will comply with the NSW Solid Waste Benchmark Techniques, specifically Bench Mark 2: Leachate Collection Systems. If a HDPE liner is designed for the leachate pond, the polyethylene material will be specified with an appropriate

<table>
<tr><td></td><td></td><td>carbon black content which is well dispersed by pre-compounding that will maximise the protection against degradation of the material by ultraviolet light. Alternatively, a sacrificial protection cover layer could be proposed over the HDPE liner to protect against UV light. This will be assessed at detailed design stage. In the long-term, if the HDPE liner of the leachate pond has deteriorated, then it will be replaced as part of the site's LEMP. The pond would be de-watered and de-sludged prior to any maintenance and repairs required.</td></tr>
<tr><td>DECCW_11</td><td>P4</td><td>The proposed hours of operation are as follows:
<table>
<tr><td colspan="2">Construction</td></tr>
<tr><td>Monday to Friday</td><td>7:00am to 5:00pm</td></tr>
<tr><td>Saturdays</td><td>8:00am to 1:00pm</td></tr>
<tr><td>Sundays and Public Holidays</td><td>No work unless in emergencies and with prior approval of DECCW</td></tr>
<tr><td colspan="2">Operation</td></tr>
<tr><td>Monday to Friday</td><td>7:00am to 5:30pm</td></tr>
<tr><td>Saturdays</td><td>8:00am to 6:00 pm</td></tr>
<tr><td>Sundays and Public Holidays</td><td>No work unless in emergencies and with prior approval of DECCW</td></tr>
</table></td></tr>
<tr><td>DECCW_12</td><td>N1</td><td>Council will seek a negotiated agreement with the landowner of Sherraloy, during the land acquisition phase of the project, for acceptance of increased noise levels resulting from the landfill.

If an agreement can not be reached with the landowner of Sherraloy, it is noted that DECCW would prescribe an increased noise limit of 38 dB(A) for the Sherraloy property in the conditions of approval and EPL.</td></tr>
<tr><td>DECCW_13</td><td>FF1</td><td>Comments are noted and, in consultation with DECCW, will be incorporated into the final management plans for the site. .</td></tr>
<tr><td>DECCW_14</td><td>FF1</td><td>The mechanism for the long term security of the proposed biodiversity offset area will be determined prior to construction and in consultation with DECCW. Examples of potential mechanism could be covenants on land title, voluntary conservation agreements and covenants through the Nature Conservation Trust.</td></tr>
<tr><td>DECCW_15</td><td>P4</td><td>It is confirmed that the description of the stormwater management design provided in the submission is consistent with the proposed design for managing stormwater from the premises. The only uncontrolled stormwater discharge off site would be from the dry basin when its storage capacity is exceeded following a design 1 in 100 year, 24 hour duration storm event. The dry basin overflow would consist of clean water only.</td></tr>
<tr><td>DECCW_16</td><td>W5</td><td>Additional groundwater monitoring locations to the east, west and south of the landfill will be included in the final Water Quality Monitoring Program and Management Plan. These additional locations will utilise groundwater wells installed by RCA in 2007 in the following locations:
• BH10: southern end of eastern boundary of landfill cells – screened in Argillite (total depth 47.0m, groundwater detected at 41.0m
• BH11: northern end of western boundary of landfill cells – screened in Sandstone (total depth 36.0m, groundwater detected at 31.0m)
• BH12: northern end of eastern boundary of landfill cells –screened in Argillite (Sandstone to 30m, total depth 40.0m, groundwater detected at 35.0m)</td></tr>
</table>

Armidale Regional Landfill
Environmental Assessment - Submissions Report
AECOM

DECCW_17	W5	The Water Quality Monitoring Program and Management Plan and Water and Leachate Management Plan, which form Appendix A and B of the LEMP respectively) set out the groundwater and surface water and leachate monitoring proposed for the site during construction and operation. The plans would be finalised prior to construction and in consultation with DECCW, NOW and other government departments as required.
DECCW_18	W5	The requirement to prepare and submit an Annual Environmental Monitoring Report is noted and will be included in the final LEMP.

Public Submissions

SAT, 03-JUL-10 23:19 [redacted] [redacted] P.01

3RD JULY 2010

[redacted]

NSW GOVERMENT PLANNING
INDUSTRY MINING & INDUSTRY PROJECTS
BRIDGE ST OFFICE
GPO BOX 39
SYDNEY NSW 2001

DEAR SIR OR MADAM,

SUBJECT: ARMIDALE DUMARESQ LANDFILL PROJECT (060220)
— EXHIBITION OF ENVIRONMENTAL ASSESSMENT

MY SUBMISSION ON THIS PROPOSED LANDFILL SITE IS THAT I STRONGLY OBJECT TO ANY FURTHER DEVELOPMENT IN THE WATER CATCHMENT OF A WORLD HERITAGE AREA. S001_1

THE OXLEY WILD RIVERS NATIONAL PARK IS A UNTOUCHED ENVIROMENT, WITH MANY SPECTACULAR WATERFALLS AND GORGES FULL OF WILDLIFE LIKE THE PLATYPUS.
THIS AREA IS JUST THE BEGINNING FOR TOURISIUM IN THIS AREA AND THIS LANDFILL SITE IS ON ONE OF AUSTRALIAS MAJOR TOP TEN ROAD TOURIST DRIVES (THE WATERFALL WAY) WHICH LINKS ARMIDALE TO THE COAST. S001_2

IF THIS PROJECT PROCEEDS THIS WILL PUT MANY TRUCKS ON THE WATERFALL WAY, AND WILL CAUSE MORE ACCIDENTS ON A DANGAROUS TURN TO THE LANDFILL SITE. S001_3

I WAS THE PREVIOUS OWNER OF THE NEIGHBOURING LAND BESIDES THE LANDFILL SITE AND HAVE SEEN FLASH FLOODING IN THIS AREA AND A COLLECTION SYSTEM OF DAMS WOULD NOT HOLD THIS AMOUNT OF WATER IN THESE TIMES. S001_4

WITH 15,000 TONNES OF WASTE GOING INTO THIS PROJECT A YEAR THIS WILL EVENTUALLY POLLUTE THIS WORLD HERITAGE AREA. S001_1

PLEASE LOOK AGAIN AT THIS PROJECT.

YOURS SINCERELY

[redacted]

Submission S001

Issue Number	Topic	Response
S001_1	H1	The impact on the GRAWHA has been assessed under the EPBC Act 1999 and a referral lodged with the then Department of Environment, Water, Heritage and the Arts (DEWHA), now the Department of Sustainability, Environment, Water, Populations and Communities (DSEWPC). DSEWPC determined that the proposal constitutes a controlled action under the EPBC Act 1999. However, stringent environmental controls to manage dirty stormwater runoff, leachate containment and emergency storage would be implemented which would reduce the likelihood of impacts to surface and groundwater. In the unexpected event of a leak, diluted concentrations downstream would not pollute the existing environment at the OWRNP or have a significant impact on the World Heritage Area.
S001_2	SE3	It is noted that the Waterfall Way is a National tourist drive and this is acknowledged in the EA. It is envisaged that views of the proposed landfill facility from Waterfall Way would be partially masked by existing vegetation and further obscured once vegetation in the offset area has matured. The existing landfill on Long Swamp Road has not impeded development or tourism in the surrounding area and the proposed new landfill is not likely to have an impact on tourism along Waterfall Way.
S001_3	T3	It is noted that the Waterfall Way is an existing haulage route for several existing facilities in the region. Waterfall Way is currently operating at a Level of Service (LoS) A, which means it has considerable capacity to accommodate future traffic growth. Traffic modelling has been undertaken as part of the EA and has determined that Waterfall Way would continue operating at LoS A, as the increase in traffic movements from the proposed landfill facility of 6 movements per day (one way), of which only 4 would be heavy vehicles would be negligible. Given that volume of waste to be directed to landfill is expected to decrease over time due to increasing recycling rates (refer to **Section 2.4**), traffic movements to the proposed landfill facility will remain stable or may decrease over time and thus potential impacts on traffic generation are considered acceptable.
S001_4	W3	The proposed landfill site is located within the upper reaches of the catchment and runoff from the site falls to the north towards an ephemeral creek which flows east into Gara River. A flood assessment was conducted along this creek, opposite the site, in accordance the Australian Rainfall and Runoff guidelines, which are used for the analysis and prediction of flood events in Australia for design purposes. Flooding will occur along the existing ephemeral creek during high rainfall events. The extent of the flooding will encroach the north-eastern boundary of the site (adjacent to the line of the creek) as per existing (natural) conditions however the leachate pond, sedimentation pond, dry basin and the landfill itself are all located outside the extent of the predicted 1in 100 year floodplain. The Water and Leachate Management Plan details all aspects of the design and operation of the collection system, Leachate Pond, Sedimentation Basin and Dry Basin. All dirty water would be contained on site or disposed of at the Sewage Treatment Plant (STP) during emergency events such as significantly high rainfall. The Surface and Groundwater Monitoring Program and Management Plan (appended to the LEMP) details procedures for the management of surface water during operation.

Re: Armidale Dumaresq Landfill Project (06_0220) – Exhibition of Environmental Assessment

S002a

Concern about Environmental Impact, especially World Heritage Properties

Email submission to:

Major Development Assessment
Department of Planning
GPO Box 39
SYDNEY NSW 2001

Email: plan_comment@planning.nsw.gov.au

From:

[redacted]

Phones: [redacted]

Date and Time emailed: **Thursday, 5 August, 2010 at 11.55 am**

Please confirm receipt

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re: Armidale Regional Landfill – Environmental Assessment Project Application Number 06_0220

The Gara Valley Environment Preservation Association (GVEPA) seeks intervention by the NSW and Australian Governments to prevent the construction of a new putrescible landfill anywhere within the catchment area of the Oxley Wild Rivers National Park, which is part of the Gondwana Rainforests of Australia World Heritage Area (GRAWHA).

In seeking this intervention, GVEPA believes that this Environmental Assessment (EA) is no more convincing than was the 2007 Referral, that the proposed landfill will not, sooner or later, further pollute the Oxley Wild Rivers National Park. In terms of the key concerns that we identified in our submission on that occasion, this EA:

- **confirms our assertions that leachate security is highly problematic in any landfill;**
- **fails to offer a leachate-containment technology that hasn't already been discredited by studies reported in the international literature;**
- **implies an inevitable violation of the Australian Government's obligations under the World Heritage Convention to ensure '*the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage*'[1]**
- **continues to dismiss the fact that a Critically Endangered Ecological Community (CEEC) will be disturbed and further degraded by the proposal;**
- **continues with its unacceptably myopic focus upon a landfill site within its immediate local government boundary, when what is needed is a facility located where it can serve the longer-term future needs of several Local Government Authorities AND does not threaten the integrity of the Gondwana Rainforests of Australia World Heritage Area.**

Given that additional alternative landfill sites exist in the soon-to-be-created New England Regional Council, and the Proponent's admission that the current site is not necessarily the best site available, GVEPA argues that it is absolutely unnecessary to run the risk of causing significant damage to the Gondwana Rainforests of Australia World Heritage Area and consequently that this proposal should be rejected.

We elaborate on these issues below.

[1] Article 4 – see http://www.worldheritagedump.com.au/Briefing/World%20Heritage%20Values%20080625.pdf

Water Quality is of Paramount Importance

It is important to be clear, from the outset, about why we argue that *water quality is of paramount importance.*

First, the NSW DLWC *Groundwater Quality Protection Policy* states[2] unequivocally that:

> ***All groundwater systems should be managed so that the most sensitive identified beneficial use (or environmental value) is maintained.***
>
> *... Potential dischargers need to either establish that their activity does not contaminate the groundwater system, or show that their proposal will not affect the beneficial use selected. This is consistent with the 'polluter pays' principle, which requires the costs of pollution prevention, or cleaning up pollution, to be met by the polluter.*
>
> *It must be clearly understood by all members of society that no-one has the right to contaminate groundwater in such a way as to create a significant risk to public health, critical ecosystems or other valued users of water (NWQMS, 1995).*

S002a_1

In this case, the 'identified beneficial use' is a 'critical ecosystem' in the form of the **aquatic environment** within the Oxley Wild Rivers National Park, part of the Gondwana Rainforests of Australia World Heritage Area.

Second, the EPBC has made it abundantly clear that concern over water quality is the fundamental reason for its declaration, in 2007, that this proposal would be a 'controlled action'. This is revealed in correspondence between the EPBC and the Proponent[3], in which the latter indicated its difficulty in identifying specific information about what makes the Gondwana Rainforests of Australia World Heritage Area worthy of inscription on the World Heritage register. The Proponent wrote:

> *... I haven't found a great deal of supporting literature or data that would assist in specifying in detail the ecological areas of the GRAWHA. Do you know of any sources (outside those available that generically discuss all GRAWHA sites) that would assist in more accurately defining the GRAWHA downstream of the proposed landfill site, ...*

to which the EPBC's Assessment Officer responded as follows:

> *The department considers that the sources you have identified accurately reflect those currently available in relation to specific information on the Oxley Wild Rivers National Park. The department considers that this information would then be interpreted against the World Heritage listing information found at*

[2] NSW DLWC, 1998, p.18

[3] EA, Appendix B / Appendix B / Appendix A, *DEWHA Correspondence*, pp. 1-3.

> *http://www.environment.gov.au/heritage/places/world/gondwana/values.html.*

The World Heritage values listed on that web page include habitats associated with:

- *frogs in the families Myobatrahidae and Hylidae;*
- *reptiles such as chelid turtles, leaf-tailed gecko and angle-headed dragon;*
- *... and*
- *invertebrate fauna with origins in Gondwana, including fresh-water crays, land snails, velvet worms, mygalomorph spiders, flightless carabid beetles, bird-wing butterfly and glow-worms.*

and the EPBC response further stated that:

> ***The department does consider that the values most at risk are those which will be most affected by water quality (our emphasis)**, and also where weeds are likely to reduce values. Weeds are most likely to cause degradation of values in riverine environments, however, they could also be an issue in other environments.*

In short, the EPBC's reason for declaring the proposed landfill a 'controlled action' lies in its judgement that **the proposal poses a very real threat to the quality of water entering the Oxley Wild Rivers National Park from the Gara River.**

S002a_1

This exchange between the EPBC and the Proponent also reveals, unequivocally, that while the Gondwana Rainforests of Australia World Heritage Area is recognised as being a priceless natural environment, **it has not yet been subject to detailed scientific study, so that assessment of impacts from leachate pollution cannot be made with any confidence.**

A Cumulative Effect

At a time when the wider society is showing signs of increasing awareness of the need for additional efforts aimed at environmental preservation[4], it is unacceptable that we have a Council failing to take the (once-in-a-lifetime) opportunity to begin to relieve stress on the Gara River system.

The Gara River system is acknowledged unequivocally as being in a highly stressed condition, partly because of, *inter alia*, fertilizer run-off from agricultural activities, mining activities and the Armidale community's sewage and garbage facilities[5], both of which ultimately discharge into it. While those existing facilities will remain for years to come, and continue to discharge their effluent into the river, *by building its new landfill in a location that **does not drain eastwards** into the World Heritage properties, **the Council has a rare opportunity to divert future leachate discharges generated by future solid waste deposits, away from this ecologically sensitive area.***

[4] See for example, *The Great Eastern Ranges* initiative, another arguing that these ranges provide drinking water for 93% of the eastern seaboard population, so that the 'maintenance of the health of these catchments is essential for the future health and wellbeing' of that population. See http://www.greateasternranges.org.au/nature/catchments-and-water/catchments-and-water

[5] EA, p. 143

From this perspective, the building of this proposed landfill effectively constitutes a *cumulative effect* because it is ensuring the on-going, and increasing, pollution burden upon the river system (as population and waste also increase). We note the Proponent's implied claim that since there are no other major developments listed for future implementation, then there will be no cumulative effect[6]. Of course, this assumes that over the life of the landfill (projected to be 50 yrs) no unforeseen developments will take place. It also fails to recognise that it is, in itself, effectively a cumulative effect by virtue of its perpetuation, and subsequent increase, of an existing source of pollution. S002a_2

GVEPA argues that in the interests of improving, rather than further degrading, the water quality within the Gondwana Rainforests of Australia World Heritage Area, **this proposed landfill must not be built in this location.** Underpinning GVEPA's assertions on this point is its conviction that there is currently no technology available that can guarantee the containment of leachate on-site for the long period of time that the landfill will be potentially polluting. As noted above, once groundwater is contaminated, it is virtually impossible to cleanup and rehabilitate. We must conclude that there is a high probability that this landfill will, sooner or later, release leachate into the Gara R and so the Gondwana Rainforests of Australia World Heritage Area waterways, with unanticipatable consequences. S002a_3

Leachate Insecurity: Acknowledged but NOT Managed

In reporting the conclusions to be drawn from its literature review on Landfill Liner Defects, the EA (p. 158) states:

> *There is potential, albeit limited, for defects to occur during the construction of the landfill liner, resulting in potential leaks to the groundwater. During operation, a well-designed and installed liner may be expected to experience some degradation or aging with time that would eventually lead to localised failure.*

It goes on to summarise the 'main findings' in the following terms:

- *Composite liner systems must be used appropriately and in accordance with site specific design and in strict adherence to construction specifications ...*
- *The available laboratory and field evidence, combined with modelling, indicates that primary Leachate Collection and Conveyance Systems in municipal solid waste landfills have a finite service life, which could range from less than 70 years to more than a century depending on the design, waste characteristics, material and exposure conditions and mode of operation. ...*
- *Leachate quality and quantities would be dictated by the type of waste received, the design of the landfill and how the landfill is constructed and operated. ...*

all of which are consistent with GVEPA's previous assertions that sooner or later, landfill liners inevitably will fail! ***This is a significant, and welcome, concession on the part of the Proponent***

[6] EA, pp. 264,265

over the position it argued in the Preliminary Environmental Assessment of 2007, in which the problem of leachate insecurity was not even countenanced! (GVEPA, 2007:5).

Recognised negative impacts of leachate loss are listed in the EA (p. 144,145):

> *Leachate would be generated by the landfill and, if released to the environment, could impact on water quality through:*
>
> - *Input of nutrients at elevated levels.*
> - *Rapid growth of weeds, supported by the high nutrient levels.*
> - *Death of aquatic organisms within the creek such as fish and macro-invertebrates.*
> - *Lower dissolved oxygen levels in the creek.*
> - *Odour emissions from the river, mainly during periods of low flow.*
> - *Other pollutants of concern that may potentially be contained in surface water runoff from the Project Site include weed propagules (i.e. seeds or other plant matter), bacteria, other organic matter, oil and grease from operational plant and machinery, heavy metals and other toxins.*

Having finally admitted that landfills are prone to leakage (and the cause of sundry other environmental affronts), not surprisingly, the proponent goes on to assure all and sundry that this is really not at all problematic:

> *However, the landfill would be designed to ensure that no operational water (i.e. leachate or dirty stormwater) is released to the environment, therefore it is unlikely that the proposed landfill would impact on water quality of the unnamed intermittent creek or Gara River.* S002a_4

And by implication, if the unlikely event of leakage did occur, then (EA, p.227)

> *... identified potential impacts from the proposed landfill can be appropriately managed through the implementation of specific mitigation measures and commitments outlined in this assessment.*

GVEPA does not share the Proponent's conviction that the risks associated with escaped leachate are either minimal, or that they can be 'adequately managed'.

Risk Management Problematic re: Leachate

The Proponent's 'Risk Profile' (EA, 9.274) identifies 18 'Issues' (which are forms/dimensions of risk), of which just 6 are categorised as 'Low', 9 are 'Low/Medium', 2 are 'Medium' and 1 is 'High/Medium'. In short, ***the Proponent acknowledges that there is a broad base of risk associated with this proposal.***

Each of these summary judgements of risk reflect a combination of two separate dimensions of each risk issue, its *significance* and its *manageability*. Each of these, in turn, is fundamentally a matter of personal judgement: they are NOT 'truths' to be accepted without question. Neither is the mapping of those judgements onto numerical scales. The main point of difference that GVEPA would emphasise here[7] is the optimistic judgement that the *management* of all of these issues is 'Standard' or at worst, 'Straightforward'. Against the agreed understanding that landfill liner systems must be assumed to leak sooner or later, it is essential that we examine closely the implications of such failure for the management of leachate, then assess the adequacy of the Proponent's management measures.

It is GVEPA's judgement that leachate loss into the Gara River and then Gondwana Rainforests of Australia World Heritage Area must be anticipated via both surface water (primarily flooding caused by infrequent extreme weather events) and groundwater (caused by liner failure).

(i) Surface Water Contamination

The proponent's assumption is that leachate will be contained within the landfill so that management is a simple matter of dealing with what can be seen and collected as per the pipes/pondages depicted in Fig 8, Section 5.2.6 (EA, p.59). This is elaborated (EA, p. 146):

> *In order to appropriately manage leachate water, the proposal would include the construction of a permanent leachate pond where all leachate would be collected, stored and treated. This would also include all waters that are potentially contaminated due to their contact with waste or with any areas of land that have been contaminated with waste.*
>
> *The volume of all leachate water produced would be regulated and would be required to undergo regular monitoring in accordance with the site EPL under the POEO Act. In the unlikely or "emergency" case that the leachate pond overflows, all overflow waters would be transferred to the permanent sedimentation basin for emergency storage and appropriate treatment.*

The claim that 'all leachate would be collected, stored and treated' in the on-site pondage system outlined above[8] is crucial to note, as is the assumption that no leachate will be lost beneath the landfill. Mitigation measures are said to be 'stringent', with pondages and back-up collection systems all built to meet 1 to 100 yr rainfall events[9]. S002a_4

However, the EA (p. 144) goes on to admit that

[7] GVEPA contests the judgement that the issue of 'Biodiversity' is appropriately rated at 4 on the Significance scale and that ' National Environmental Heritage' is appropriately rated at 3. It can be argued that each should be higher, at 5 and 4 (even 5) respectively.

[8] EA, p. 158

[9] Though we note that the leachate pond 'pond has been sized to capture the 1 in 25 year, 24hr storm event from direct rainfall' – see EA, p.147

> *No flood studies have been conducted in this area, instead, calculations using Manning's equation were used to estimate the 100 year Average Recurrence Interval (ARI) flow and the 100 year flood level in these creeks. The results of these calculations indicate that the proposed landfill site is well outside the extent of the 100 year floodplain.*
>
> *The design for the landfill and stormwater ponds (dry basin) incorporates adequate freeboard to contain 100 year ARI flows on site.*

So the design specifications of the siting and size of leachate containment pondages are based on *theoretical calculations of average flows and flood levels,* rather than actual data gathered from the site. S002a_5

GVEPA argues there are good reasons for questioning the adequacy of theoretical modelling and the specifications derived from them. The site is known to be prone to flooding, as Council's previous consultant had already advised[10]:

> *... the site is located mid-catchment, with potential for flooding and there is previous evidence of flooding at the site.*

GVEPA's PowerPoint presentation includes a recent photograph of the main gully taken near where the landfill watercourse joins it[11]. Even after just 58 mm of normal rain, the volume of run-off was impressive. When extreme rainfall does hit the area, then we must expect that local flooding will be severe. Increasingly, extreme weather events have been encountered in recent years, and by definition, **these are not average occurrences**, so that design specifications based on average events can be expected to be inadequate.

An outstanding example of such an event on the Tablelands was the Timbarra Gold Mine[12] disaster, which stands as an inescapable testimony to the fact that both industry consultants and the Government approval process alike cannot always be relied upon to 'get it right'. No doubt the experts behind that proposal were confident that they 'had it right', and Government authorities obviously agreed, because cyanide leachate was involved.

One factor in the Timbarra case was unusually high rainfall. We understand that the design specifications for water containment were designed to meet a once-in-400 year level. *But still it failed, with disastrous consequences.* One of GVEPA's consultants, who is familiar with the Timbarra case, draws the comparison with the current proposal[13]:

> *Despite repeated mention within project documentation that the site will not have any undue adverse impacts upon the World Heritage property, it is apparent that considerable potential exists for major deleterious downstream impacts upon World Heritage values within Oxley Wild River National Park. Recent experiences on the Timbarra Plateau (1999-2001), a site of very*

[10] Maunsell, March 2004, *Regional Landfill Siting Study: Final Report,* p. 67

[11] See http://www.worldheritagedump.com.au/v4flashfast/GVEPAPPS08v4compressfast/pps.html

[12] See for example, http://en.wikipedia.org/wiki/Timbarra_Gold_Mine, http://www.bigscrub.org.au/timbarra.html

[13] Graham, M S, 2007, *A Review of EPBC Matters Relevant to the Site of the Proposed Regional Landfill – Gara River.* p.1

> *similar climatic and landscape context to the proposed landfill site, have shown that it is impossible to engineer a facility adequate to withhold runoff from peak summer rainfall events. In the case of the Timbarra gold mine, this resulted in considerable downstream leachate and sediment contamination of the headwaters of the Clarence River.*

This could also be a factor in the Gara landfill proposal. Climate change is being widely blamed for an increasing frequency of extreme weather events and sooner or later we might expect the Gara region to experience extreme rainfall. The risk then is that leachate pollution will escape directly and quickly into the Gara River. S002a_6

A further element of disquiet about the adequacy of the mitigation measures designed to control surface water within the landfill relates to the intention to transport 'excess leachate', such as might accumulate in the proposed site's holding ponds in an "emergency" event, to the ADC's licensed Sewage Treatment Plant (EA, p. 147 & Appendix B, p.53).

Presumably it would be dumped there and eventually find its way out onto the fodder-growing paddocks as irrigation water. During heavy rain, run-off water from these paddocks flows down-catchment through small dams and finally joins the Commissioners Waters, which in turn end up in the Gara River. In short, *the leachate would not be contained, just released via a more circuitous route*! Rumour has it that already these paddocks are showing increased levels of heavy metals in the soil, presumably due to the sewage system effluent. This strategy for leachate management is not at all satisfactory. S002a_7

In summary, the *Water and Leachate Management Plan* for the containment of leachate within the landfill site is problematic because it does not appear to be designed with extreme weather events in mind. The Timbarra Mine disaster occurred even though its design parameters were more stringent than those proposed for this landfill development. Further, the proposal to transfer excess leachate to the Armidale Sewage Treatment Plant is quite unacceptable because that effectively transfers effluent out onto nearby paddocks with rain runoff directly into the Gara River.

In terms of the Risk Assessment matrix, GVEPA's contention is that the ***Significance*** of flood water carrying leachate into the Gara River is **HIGH:** the receiving environment has been determined as **SENSITIVE** by both the EPBC and its World Heritage designation, and as demonstrated above (see p. 4), that environment is not well understood so that potential **IMPACTS ALSO ARE NOT WELL UNDERSTOOD.** With respect to ***Manageability of Effects***, given the theoretical nature of the risk of flooding, coupled with the increasing occurrence of extreme weather events, the rating of this dimension is at best Straightforward, and more likely **SUBSTANTIAL.** S002a_5

Taken together, there is, at least, a HIGH/MEDIUM risk of surface water pollution damaging the World Heritage environment downstream.

(ii) Groundwater Contamination

GVEPA has long argued that landfill liners must be assumed to fail, sooner or later. We welcome the proponent's concurrence with this same conclusion (see above, p. 6).

In the event of the liner being breached, because of such influences as, *inter alia,* natural deterioration over time, contact with leachate, holes/tears created at time of construction, or because of punctures resulting from differential pressures created by the waste load (EA, p. 158), leakage S002a_8

through the base of the landfill must be presumed and anticipated. This possibility is acknowledged in the EA (Appendix I, p. 9):

> *In conjunction with the barrier system the leachate level within the landfill is designed to be maintained not to exceed 300 mm above the base of the liner by a leachate collection system. Therefore, 'leakage' from the base of the landfill is considered to be negligible in practice. However, it is necessary to assess the potential impact of leakage on the basis that there is potential, albeit limited, for defects in construction of the HDPE liner. Leakages from the liner would then enter the environment, migrate downwards through the vadose zone, until the saturated zone is reached and then migrate laterally toward the Gara River.* S002a_8

Research in the US reveals that when leachate enters the vadose zone, commonly and initially via a small hole in the HDPE liner, its migration away from the landfill is usually in the form of a narrow plume that might be as little as 600mm wide. Even if there are several of these, it is more by good luck than good management that a down-gradient monitoring bore system will pick it up. Furthermore, monitoring down-slope from the landfill using detection bores is ultimately not useful because once the leachate is out, then there is little that can be done to retrieve it. S002a_9

When a hole in the liner does occur, the migration of leachate can be surprisingly quick. The EA (p.159) suggests that in the case of its proposal, and by its calculations, this time could be as short as 17 years!

> *Given these assumptions and the conclusions of the literature review, the estimated time for leakage to escape the landfill (approximately 17 years) is highly conservative.*

GVEPA's literature review has revealed calculated times that are similarly short (Lee and Jones-Lee, 2009, p.5):

> *... simple calculations show that it would take about 25 years for leachate that passes through a hole in the plastic sheeting liner under 1 ft of leachate head, to penetrate a 2-ft compacted clay liner.*

so perhaps the EA's estimate is not as conservative as the proponent might want to think.

And over a projected *active* life of 50 years[14], followed by a lifetime of further chemical reactions within the landfill after it is finally capped, this **rightly-conservative** estimate is alarming in its implications. The community might be lucky and get a landfill that holds up well, but the **probability is low[15] and certainly an unacceptable risk in the face of the obligations imposed by the World Heritage status of the Oxley Wild Rivers National Park.**

[14] In an update (June, 2010) of their 'Flawed technology' paper, Lee and Jones-Lee review Canadian, Swiss and US data that leachate generation continues long after capping, perhaps even for thousands of years, depending upon the nature of the waste deposited in them.

[15] Lee & Lee-Jones (June, 2010, p.9) notes a study in the US in the mid-1990s, that of 544 sites assessed in California, 72% were leaking, another 14% were indeterminate, with just 14% not leaking.

The *Water and Leachate Management Plan* sets out a variety of monitoring strategies/techniques, frequency of testing, reporting and reviewing, ***but there is absolute silence about what would be done, beyond more monitoring, in the event of groundwater pollution to remediate that situation.*** **The following statement of likely remedial actions to be taken, appears to indicate that *further monitoring* would be the extent of the action** (EA, Appendix B, p.57): S002a_10

- *Internal review and amendment of the leachate monitoring program.*
- *External review and recommendations for amendment of the leachate monitoring program (by monitoring specialist).*
- *Additional monitoring points included into the leachate monitoring program.*
- *Review and amendment of the analytes tested for.*
- *Increase in the frequency of monitoring undertaken on site.*

GVEPA is NOT surprised by this apparent lack of a plan for mitigating action should leachate escape through the bottom of the landfill. As the *NSW Groundwater Protection Policy* has asserted, once ***'groundwater becomes polluted it is difficult or impossible to clean up completely'.*** GVEPA's research has not encountered any literature that offers hope in this regard.

It is apparent that managing leachate containment is highly problematic. Once the landfill is built, there is little that can be done to manage liner deterioration, and detection of leakage is little more than a case of 'shutting the gate after the horse has bolted'. **As far as GVEPA can ascertain, there is NO management measure proposed in this EA, or discussed anywhere in the wider literature, that can remedy leachate loss through the liner.** S002a_10

On these grounds, its conclusion is that the residual environmental risk associated with groundwater pollution is at least HIGH in the Residual Risk Matrix. GVEPA argues further, however, that since there is no proven mitigation measure available to manage this probable eventuality, the environmental risk here is *OFF THE SCALE.*

The tenor of GVEPA's analysis is consistent with that of its independent consultant[16]:

> *In regard to Table 74 (Section 10.2 Residual Risk Analysis) - disagree with the risk category for groundwater (3 for significance of effects (may be correct); however, **strongly disagree with their assessment of the ability to manage the risk if impacted groundwater is migrating off-site** (3 - straight forward) **(our emphasis).***

(iii) Geology not helpful

It appears as though the geology of the site is less than ideal for a landfill because the underlying rock is both highly weathered and fractured, rendering it permeable to groundwater. This is implied S002a_11

[16] EDO Expert Reviewer, 2010, p.6
NOTE: The Environmental Defender's Office engaged an Independent Expert Hydro Geologist from its scientific register of experts to review components of the Environmental Assessment. The expert has particular expertise in contaminant hydrogeology and experience in landfill impacts on water quality.

in the EA's brief description of the geology and soils at the site (EA, p. 157), and is corroborated by drill-core data. Commissioned drill-core analysis shows considerable fracturing and weathering of rock in the vicinity of the landfill, to a depth of at least 26m. The report of these data includes the geologist's judgement that 'potential for considerable groundwater transmission' might exist (EA, Appendix N, 'Implications', no pagination): S002a_11

> *Fracturing and weathering effects observed in the drill core would have implications on the transmission of groundwater and potential leachate from a landfill. The fact that weathering effects in the deeper part of the drill core are concentrated along fractures indicates that oxidising groundwater penetrates at least to the depth of the bottom of the hole (26 m). Zones of strong fracturing and clay development in the weathered zone might have the potential for considerable groundwater transmission.*

This interpretation of the drill core data doesn't seem to tally with EA assertions about slow migration of leachate into the Gara River that are presented in the Hydrogeological (Leachate) Assessment (Appendix I, p.21)

> *These estimates are largely based on assumed and uniform conditions and are considered likely to represent conservative estimates.*
>
> *Potential leakage from the landfill was estimated as approximately 100 L/day.*
>
> *The time taken for leachate to escape from potential defects in the liner and traverse the clay layer was calculated as approximately 17 years.*
>
> *Travel time from there to the saturated zone was calculated as 13 days. Upon mixing with the underlying groundwater, leachate is calculated to be significantly diluted (80 times) over a depth of approximately 1 m in the groundwater.*
>
> *Leachate contaminants would then take approximately 1000 years to reach the Gara River.*

The interesting part is the claim that although it could take as little as 13 days for leachate to traverse the vadose zone, and despite the evidence of highly fractured sub-soil rock that shows clear evidence of groundwater movement, it would be a further 1000 years before leachate would travel that last 1 km to the Gara River!

GVEPA's consultant, an EDO Expert Reviewer[17], also disputes this time-frame:

> *The reviewer disagrees with the statement ... that a long time frame may be required for groundwater migration in the bedrock.*

We note too the Proponent's admission that 'a groundwater model is a simplified approximation of a heterogeneous and highly complex physical system'. a point also made by the EDO Expert Reviewer:

[17] EDO Expert Reviewer, 2010, p. 6

S002a_11

> *Further, the reviewer disagrees ...(with respect to)... the potential migration velocity in the fractured rock. Whilst the overall bulk permeability of the rock may be low, the groundwater velocity in the fractured media would be dependent upon the cube of the fracture aperture and the hydraulic gradient (which might be significant considering the local topography and proximity to recharge areas).* ***The groundwater velocity and rate of contaminant transport might be significantly faster than suggested. However, this would be difficult to prove since fractured rock is a complex hydrogeological environment (our emphasis).***

Further, we note the Proponent's acknowledgement of this complexity and that uncertainty surrounds the validity of such calculations because of that complexity:

> *Notwithstanding the simplifying assumptions made in the assessment, a groundwater model is a simplified approximation of a heterogeneous and highly complex physical system. As such, whilst models may be used to assess and predict aquifer behaviour and responses to a range of stresses, a degree of uncertainty is inherent in all models.*

From GVEPA's perspective, reliance upon such uncertain 'scientific' modelling to inform crucial decisions about the behaviour of complex hydrogeological system, *carries with it considerable risk.* **Such risk is amplified when resultant actions have the potential to violate Australia's international obligations to preserve its World Heritage environment**

Where there is inadequate scientific information to properly assess the risk, the 'Precautionary Principle' should be invoked, and we strongly believe that this principle should be applied in this case.

(iv) Residual Environmental Risk re Leachate Cannot be Managed

In light of the above conclusions that the Residual Risk Management associated with Surface Water is HIGH/MEDIUM (not *Low/Medium* as suggested in the EA) and that associated with Groundwater is HIGH, or more likely, ***OFF THE SCALE*** (certainly not *Medium* as suggested in the EA), it must be concluded that the probability of eventual leachate contamination of the World Heritage aquatic environment is **SO HIGH AS TO BE UNACCEPTABLE**.

S002a_12

There is a clear lack of sufficient knowledge about BOTH the nature of the aquatic ecology that is at risk, AND the nature of the leachate that will be generated by the landfill, for the Proponent to begin to understand just what the impact of leachate loss will be on that environment. Consequently, **GVEPA argues that the Precautionary Principle must be invoked and the landfill not being permitted to proceed on the chosen site.**

We emphasise the point made in relation to the failure of the Timbarra Mine disaster, that decision-makers in the past have approved projects, presumably in good faith, yet failures have occurred. Indeed, we live in a time of some spectacular instances of technical and/or management failure that have lead to environmental degradation (eg Chernobyl - Nuclear, Bhopal - Gas, Alaska [Exxon Valdez] - Oil, & the Gulf of Mexico - Oil, and who knows how many more smaller scale instances, which have been 'invisible' to the news media,). **GVEPA believes that it is no accident that the**

EA is silent on the question of mitigation measures to manage the case of liner failure, the eventuality that is most likely in the long-run: there are none available! Against the backdrop of the US-based research into the high frequency and high probability that any landfill will leak, sooner or later, **we are reinforced in our conclusion that the Precautionary Principle must prevail to stop this proposal proceeding *on this site*.**

S002a_10

Landfill Design is Outdated

The design outlined in the EA (Section 5.2) appears to be essentially the same as that ***discredited*** by the USEPA in 1991 when it was abandoned in favour of the so-called 'Dry Tomb' design concept[18]. That pre-1991 design had a composite bottom liner to which was added a clay liner upon capping, which is precisely what the EA is proposing for the Gara River site. However, it was (begrudgingly) recognised by the USEPA as being ineffective in controlling leachate and following public court action, it was finally abandoned. What is particularly interesting to GVEPA here is the explicit accusation that the persistence of landfill designs that were known to provide inadequate protection to the environment (and nearby residents) may well have been essentially a governmental strategy to keep costs minimal (Lee & Jones-Lee, 2010, p.5):

S002a_13

> *The evolution of liner and cover systems for landfills – from no liner, to a clay/soil liner, to a plastic sheeting liner, to the current composite liner – was not based on a finding that any of these liners could potentially prevent groundwater pollution by wastes for as long as the wastes in the containment system were a threat. The clay/soil liner was based on using the* ***next least expensive*** *material to no liner. When it was realized that clay/soil liners had significant problems, plastic sheeting was the* ***next least expensive*** *to clay/soil. There was never an evaluation that showed that clay/soil or plastic sheeting would be expected to prevent groundwater pollution for as long as the wastes were in the landfill.* ***The same situation applies to the composite liner system that is used today****. It is only a matter of time until that liner system fails to prevent leachate from passing through it which can pollute groundwaters, rendering them unusable for domestic and many other purposes.*

The question that GVEPA would now ask, is "WHY" is Australia travelling down that same pathway? Why are we not learning from the well-researched and documented experience of others, and at least adopting designs similar to their current 'best-practice'?

But even though a 'Dry Tomb' landfill has a composite top liner, researchers claim that while this is an improvement, it still will NOT afford adequate long-term protection to the environment. All that is achieved is that the deleterious effects are delayed. This has led Lee & Jones-Lee to advocate a double composite bottom liner be used on any 'Dry Tomb' landfill (Lee & Jones-Lee, 2010, p.33 for diagram). Again, such a strategy is one of delaying leachate loss as long as possible in the expectation that when leachate loss does occur, its level of toxicity will have been reduced considerably.

[18] For an overview of the evolution of landfill design requirements, driven by acknowledgement of failure to protect the environment, see Lee & Jones-Lee, 2010, p.3

NOTE – might use Lee & Jones-Lee 2010 design diagrams p.4 & p.33 as appendices – p.4 looks like the EA design?

It seems that at best, even 'dry tomb' landfill designs provide no more than a temporary delay in the discharge of leachate. GVEPA argues that where World Heritage Values are at risk, this is not good enough, the more so when it is recognised that alternatives sites exist that do not threaten these values. Accepting that the Armidale Dumaresq Council (or its replacement Regional Council) needs to establish a new landfill in the short-term future, GVEPA urges both the NSW and Commonwealth governments to direct that a new site be chosen that does not drain into the Gondwana Rainforests of Australia World Heritage Area (See below: p. 25). S002a_13

Threats to Biodiversity

The threat to biodiversity that is posed by the proposed landfill has two main dimensions to it: one is its *impact on the site chosen* in terms of land clearing, removal and degradation of habitat while the other is the inevitable *impact of pollution to groundwater* that will be caused by leachate escaping from the landfill and affecting the aquatic ecosystem in the Oxley Wild Rivers National Park.

Critical Aquatic Ecosystem Downstream

The identification of water quality as the major driver behind the EPBC's decision in 2007 to declare the proposed landfill a 'controlled action' has been clarified above (see p. 4) and sits in stark contrast with the assertion made in the EA's Flora and Fauna Assessment (EA, Appendix E, p. iii): S002a_14

> *No groundwater dependent ecosystems have been identified in the study area or in the Oxley Wild Rivers National Park downstream of the proposed new landfill (DNR 2002). Thus, the proposed new landfill is not likely to have any impacts on groundwater dependant ecosystems in the study area or further downstream in Oxley Wild Rivers National Park.*

This is a remarkable claim because it flies in the face of the EPBC's declaration of reasons for its World Heritage status. It is perhaps understandable given the revelation noted above that there is little detailed scientific data available that describes the aquatic ecosystem that is so highly valued by the World Heritage inscription. Presumably the 2002 Policy upon which the Proponent's assertion was based, also did not take cognizance of the World Heritage inscription of the Gondwana Rainforests of Australia World Heritage Area.

Whatever the reason for the EA's claim, GVEPA argues that it is manifestly false and that consequentially, it is incumbent upon the Proponent to meet the expectation of the NSW Groundwater Protection Policy[19]:

> ... *Potential dischargers need to either establish that their activity does not contaminate the groundwater system, or show that their proposal will not affect the beneficial use selected*

In this case, that 'beneficial use' is the 'critical ecosystem' of the Gondwana Rainforests of Australia World Heritage Area. Until the nature of that 'critical' aquatic ecosystem is adequately established, the Proponent cannot meet this requirement. Equally, as GVEPA's consultant observed

[19] NSW DLWC, 1998, p.18

in 2007[20], until detailed identification of the likely leachate contaminants is established, no claims about possible ecological damage can be substantiated. S002a_14

In short, neither cause, nor effect, can be precisely established by the proponent given the current state of knowledge about both the aquatic ecosystem in the Gondwana Rainforests of Australia World Heritage Area and the nature of the leachate likely to be produced by the landfill. Consequently, it is simply not possible to claim that these undefined risks can be managed!

In terms of the Residual Risk Matrix, the management of unidentified pollutants upon the sensitive, 'world-valued' yet poorly understood aquatic ecosystem downstream, is anything but 'Straightforward', as the Proponent claims (EA, p. 274). From the environmental perspective, this must be regarded as **COMPLEX at least,** leading to an overall assessment of **HIGH** residual risk rather than High/Medium as the Proponent claims.

As GVEPA understands it, this is a classic case in which the ***Precautionary Principle should be invoked***. There simply is not an adequate knowledge base upon which to confidently claim that the proposed landfill will not cause environmental damage. And when the environment under scrutiny lies within a designated World Heritage property, the stakes are so much higher: this landfill must not be allowed to proceed!

Landfill Site

The threat to biodiversity posed by the landfill footprint is primarily its acknowledged, likely deleterious effect upon particular threatened/vulnerable fauna and flora species as well as a Critically Endangered Ecological Community (CEEC) in the form of a Box-Gum Woodland. The New England Tablelands environment has been severely degraded by extensive clearing for grazing purposes since European settlement[21], which makes all remnants of former vegetation extremely valuable in ecological terms. This is the logic driving the current *The Great Eastern Ranges initiative*, its mission being:[22] S002a_15

> *to engage the New South Wales community – including state government agencies and local government, landowners, industry representatives, community groups and researchers – in an effective long-term partnership to conserve, connect, protect and rehabilitate plant and animal habitats and catchments of the Great Eastern Ranges of Australia along 1,200 km of NSW.*

In the context of that endeavour, the proposal to build a new landfill by one local government authority in one of these water catchments runs starkly counter to the mood of the times!

Apart from the threat posed by the landfill to water quality, it runs counter to another of the *Great Eastern Ranges Initiative's core values* by causing further, acknowledged fragmentation of the woodlands on the tablelands[23]:

[20] GVEPA, 2007, p.5

[21] EA, Appendix E, p. 26

[22] See http://www.greateasternranges.org.au/vision/mission/mission

[23] EA, Appendix A, p. 34