NSW GOVERNMENT | Planning & Infrastructure

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MAJOR PROJECT ASSESSMENT
Armidale Dumaresq Region Landfill
MP 06_0220

Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979
April 2012

Cover photo: Looking north-west toward the proposed landfill site.

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EXECUTIVE SUMMARY

Armidale-Dumaresq Council currently operates a waste management centre and landfill in Long Swamp Road near Armidale. Council estimates there is less than one year of landfill capacity remaining and now propose a new 750,000 tonne, 50-year landfill. Waste processing would continue at the Long Swamp Road facility and three trucks per day would transport up to 15,000 tonnes per year of processed waste to the proposed landfill.

After an extensive site selection process, the Council and a 'Landfill Community Consultative Committee' settled on an undulating, mostly cleared, 86-hectare farm site. The site is close to Armidale. It can satisfy modern environmental guidelines for landfill design and it includes a 61-hectare biodiversity offset area.

The Department has considered the Community's waste profile and its improving resource recovery efforts and has determined that additional landfill security is necessary. Notwithstanding, the Department has recommended approval for only two of five proposed landfill cells. This recommendation is not an environmental limit, but a strategic waste limit to ensure the Council continues to update its waste recovery planning in-line with the NSW waste recovery targets.

The recommended limit is volume-based (i.e. 422,000m^3) to give certainty about the shape of the final landform while also encouraging good waste compaction practices. The proposed volumetric limit should give capacity for approximately 300,000 tonnes of waste over 20 to 25 years. The Council may apply in the future to operate the remaining three cells.

The Department received 95 objections to the project during a three-month exhibition. Among other things, the objections were primarily concerned with impacts on the Oxley Wild Rivers National Park downstream of the site, local scenic and recreational values and the adequacy of the Council's process for selecting the site. Migration of leachate from the site was a particular issue of concern because leachate could impact on national and UNESCO world heritage values in the National Park.

The Department has closely examined the risks to downstream heritage and biodiversity values. The proposed landfill design includes a dual leachate-liner and a comprehensive leachate recirculation and monitoring system. It is a 'no-discharge' system and there will be no licensed leachate discharge point. The system complies with the Benchmark Techniques specified in the *Environmental Guidelines: Solid Waste Landfills* (1996, Environment Protection Authority). Specifically, it complies with the strictest specifications for sites with hydrological risks.

The project requires clearing of 20.3 hectares of vegetation including 0.6 hectares of Critically Endangered (but degraded) Box Gum Woodland. The Department and the EPA are satisfied the impact on the Critically Endangered Woodland is minor and acceptable. There are mitigation and offset measures to address other impacts on threatened species. Impacts arising from transport and landscape modification are acceptable. The Department also recommends contemporary conditions of approval to ensure proper control of noise, dust and odour emissions.

There were agency submissions from the NOW, EPA, and RMS. The Commonwealth Department of SEWPC has declared an earlier version of the project a 'Controlled Action' for the likely impacts of leachate on the world heritage values of the National Park (see Appendix F). The Council will also need approval for the project from the Commonwealth.

The Department has assessed the merits of the project and is satisfied that the potential impacts have been addressed in the Environmental Assessment, the Council's statement of commitments and the Department's recommended conditions of approval.

Consequently, the Department believes the project is in the public interest and should be approved subject to the imposition of strict conditions.

1. PROPOSED PROJECT

Armidale Dumaresq Council (Council) proposes to construct and operate a new 750,000-tonne solid waste landfill to receive up to 15,000 tonnes of solid waste per year for 50 years.

The new landfill would be licensed to receive putrescible waste although Council would continue reducing putrescible waste content by improving waste avoidance and recovery measures. There would be no waste processing on the site. Waste processing and recovery would continue at the Long Swamp Road waste centre and approximately three trucks per day would transport up to 15,000 tonnes per year of processed waste to the proposed landfill for emplacement.

Table 1 below describes the main components of the project. Figure 1 on page 3 shows the project site layout.

Notwithstanding the project proposed by Council that is described below, following a detailed merit assessment of the proposal, the Department has recommended conditions of approval that would limit the proposal to the development of the first two landfill cells (422,000m^3), giving a capacity for approximately 300,000 tonnes of waste over 20-25 years. This recommendation is not intended as an environmental limit, but a strategic waste limit that will ensure the Council continue to update its waste recovery planning in-line with the NSW waste recovery targets. A detailed assessment of this matter is in section 5.1 on page 10.

Table 1 *- Main components of the project*

Component	***Description***
Project Summary	• A new landfill providing approximately 750,000 tonnes of capacity over 50 years, emplacing up to 15,000 tonnes per annum (tpa) of waste .
Proposed key infrastructure	• Five landfill cells; • Leachate containment and recirculation system; • Internal access road and new access junction at Grafton Rd (Waterfall Way); • Diesel storage tank and bund area, soil stockpiles, office and staff amenities; • Clearing 20.3-hectares of vegetation including 0.6-hectares of Critically Endangered Woodland; and • A 61-hectare biodiversity offset scheme.
Rehabilitation	• Rehabilitation of the final landform so that it is compatible with the landscape.
CIV	• $15 Million
Truck movements	• Forecasted daily trip generation: – 3 waste vehicles (trucks); – 1 cover-material/soil vehicle (truck); and – 2 staff vehicles (cars).
Landfill Environmental Management Plan (LEMP)	• A Landfill Environmental Management Plan to deal with construction and operation matters under the Benchmark Techniques specified in the *Environment Protection Authority (1996) Environmental Guidelines: Solid Waste Landfills* including: – Cell and leachate barrier design and construction parameters; – Operations management including waste screening, compaction, tip-face control and site security; – Leachate management and ground and surface water monitoring. – Contamination incident remediation; – Landfill gas, odour, noise and dust management; and – Landfill closure including capping, revegetation and monitoring.
Hours of operation	• 7am to 5:30pm on weekdays; • 8am to 6:30 pm on Saturdays; and • Sunday and public holidays closed except for emergencies.
Number of employees	• Operational: 2 Construction: Up to 15
Subdivision	• Subdivision of the project site to create a new lot of 86-hectares, which includes a 61-hectare biodiversity offset area.

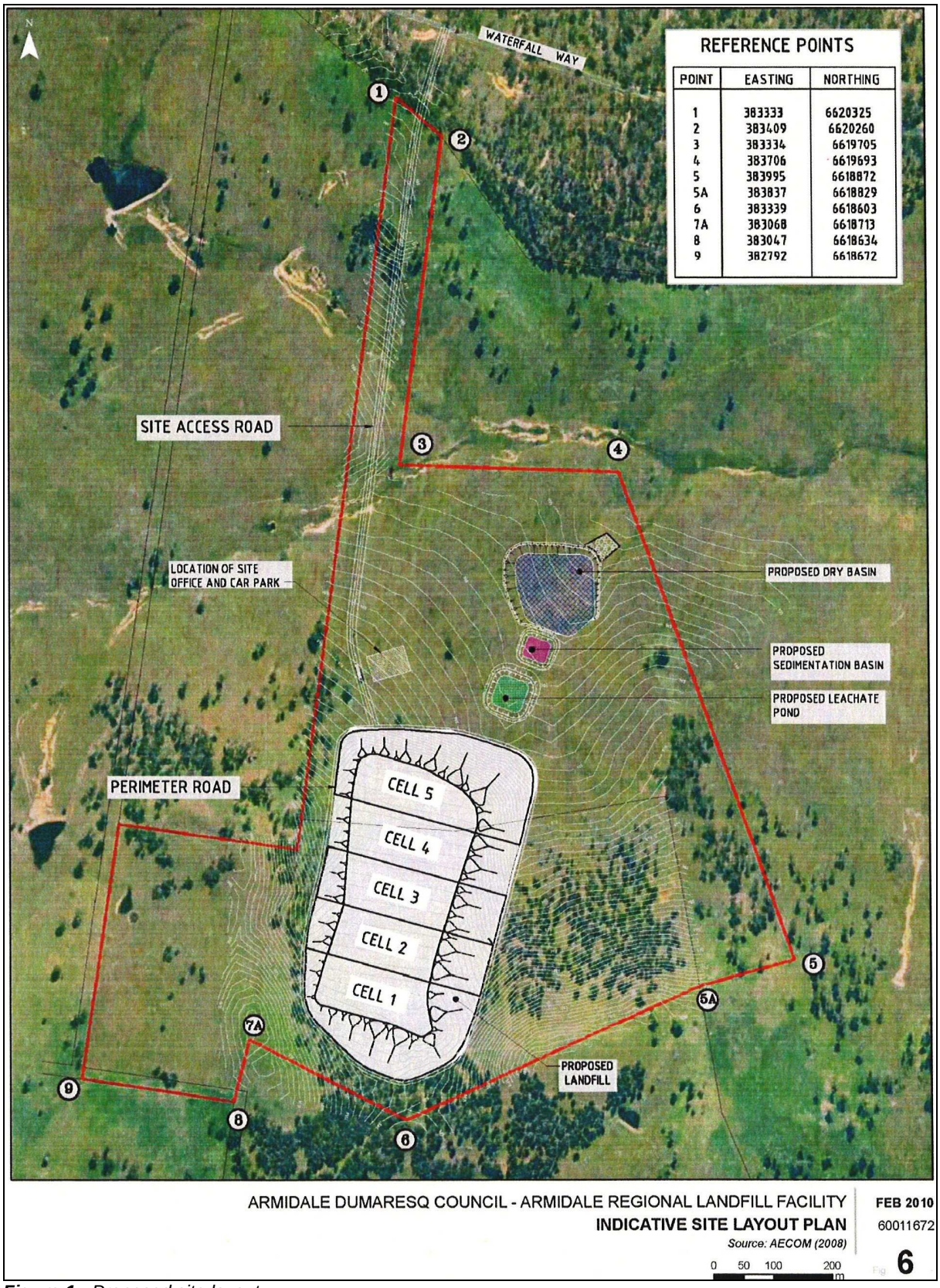

Figure 1 *- Proposed site layout*

2. BACKGROUND

Armidale Dumaresq Council estimate less than one year of landfill capacity remains at the Armidale Waste Management Centre in Long Swamp Road. In 2004, the Council revised its Environment Protection Licence to allow for more landfill capacity at Long Swamp Road in a 'piggy-back' cell design above the existing landfill cells. However, this was an interim measure pending a long-term waste solution. Land area and height limitations mean there are extremely limited opportunities to expand the existing centre to accommodate longer-term landfill demands.

2.1 Site selection

The Council's site selection occurred over almost 20-years and involved detailed review of 11 sites.

In 1993, Armidale City Council first identified need for a new landfill site. By 1998, Armidale City Council and its rural neighbour, Dumaresq Shire Council, had commissioned a preliminary study of seven potential sites and formed a joint Landfill Regional Advisory Committee to consider them. The Committee later disbanded after the two Councils amalgamated in 2001.

In 2002, a NSW Public Works study identified two more potential landfill sites and recommended a farm called 'Ballantrae' as the preferred site. However following objections and discussions, 'Ballantrae' was discontinued as the preferred site of the time.

In 2003, with no new landfill site identified, the amalgamated Armidale Dumaresq Council formed a Landfill Community Consultative Committee in 2004 and commissioned another study to evaluate 11 possible sites, including the nine that had previously been identified. The study was exhibited resulting in 16 public submissions.

The Council and the Committee considered the study recommendations and public submissions before selecting the project site; made up of part of two farms 'Eddington' and 'Sherraloy', located 12 kilometres by road east of Armidale. The favourable site attributes were considered to be:

- location outside sensitive or unsuitable areas as identified in the *EIS Guidelines for Landfills*;
- geological conditions that should provide a suitable barrier to groundwater movement;
- topography that is conducive to long term leachate control and monitoring;
- protected from views from the west, south and east by existing topography and vegetation, and potential to screen views from the north;
- relatively low bush fire hazard as the area is mostly clear of vegetation; and
- lower haulage costs because of shorter distances and good quality haulage roads.

2.2 Site description

The site is located off Grafton Road approximately 12 kilometres by road to the east of Armidale. Grafton Road is part of the 'Waterfall Way', which is a scenic road from Armidale to Bellingen. The nearest residences are 410m south, 1.9km east, 1.4km and 1.5km north, and 1.9km north-west. An olive farm and residence is 950m west (see red-star markers in Figure 2 on page 5).

Council would need to create the site by subdivision and acquire it from private landowners. Its undulating terrain is class four agricultural land, which is suitable for grazing but not cultivation.[1] Vehicular access is off Grafton Road and traverses a 'travelling stock route' that contains a Critically Endangered Ecological Community of Box Gum Woodland.

The site has a northerly aspect and drains via intermittent drainage lines for one kilometre north-east to the Gara River. The Gara River then flows four kilometres south to the Oxley Wild Rivers National Park. The National Park includes parts of the Gondwana Rainforests of Australia. The Gondwana Rainforests exist in around 50 reserves in NSW and QLD and have world and national heritage values for their rare and threatened rainforest species that are often unchanged from those in fossil records.

[1] Agricultural Land Classification Map (1986), NSW Agriculture

Figure 2 shows the project site and the nearest dwellings on a locality map.

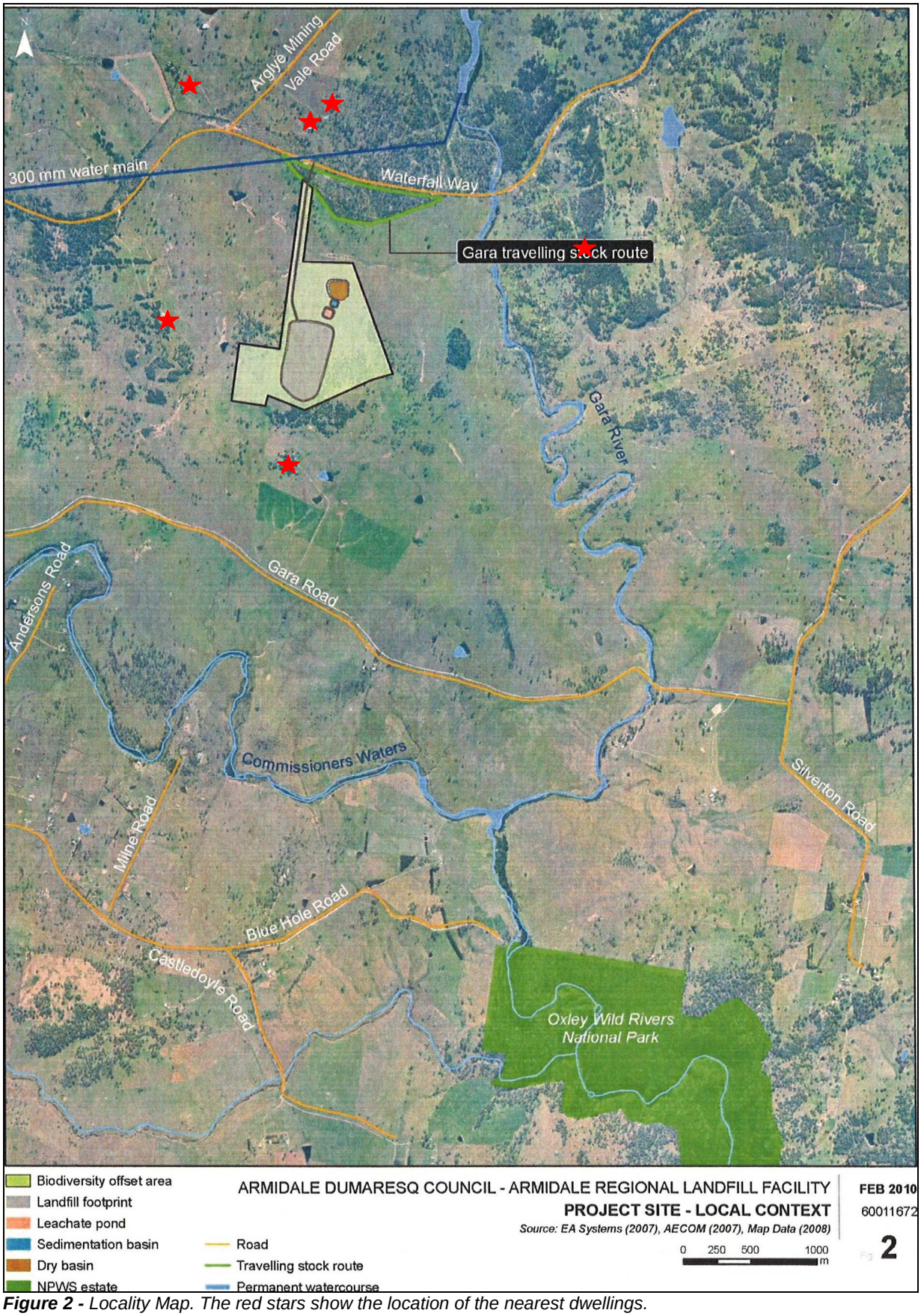

Figure 2 - *Locality Map. The red stars show the location of the nearest dwellings.*

3. STATUTORY CONTEXT

3.1 NSW 2021

NSW 2021 aims to increase recycling to meet the 2014 NSW waste recycling targets in the *Waste Avoidance and Resource Recovery (WARR) Strategy 2007*. The Department has considered this project for additional landfill space in the context of waste avoidance and recovery initiatives.

The Department has assessed the need for the project in section 5.1 on page 11. This includes an appraisal of landfill demand, waste recovery initiatives and alternatives to a new landfill. The Department recommends approval conditions limiting volumetric capacity to encourage further development of waste recovery planning to help achieve the NSW targets. Based on the assessment in section 5.1 and the recommended conditions, the Department is satisfied that the project is consistent with NSW 2021.

3.2 Part 3A – Environmental Planning and Assessment Act 1979 (the Act)

On 2 September 2008, the Director General declared the project a Major Project to which Part 3A of the Act applies. The proposed landfill exceeds the threshold capacity of 650,000 tonnes for a regional putrescible landfill specified in Clause 27(1)(b), Schedule 1, SEPP (Major Development) 2005.

Under the EP&A Act the Minister is the approval authority for Part 3A projects. However, as more than 25 submissions were received by way of objection on the project, the application will be determined by the NSW Planning Assessment Commission in accordance with the Minister's Instrument of Delegation, dated 14 September 2011.

3.3 Part 3A Repeal - Savings and transitional

Part 3A of the Act, as in force immediately before its repeal on 1 October 2011 and as modified by Schedule 6A, continues to apply to transitional Part 3A projects. The Director-General's Environmental Assessment Requirements were issued for this project before 1 October 2011 and the project is therefore a transitional Part 3A project.

Consequently, this report has been prepared in accordance with the requirements of Part 3A and associated regulations, and the Minister (or his delegate) may approve or disapprove of the carrying out of the project under section 75J of the Act.

3.4 Other Approvals

The Proponent also requires:

- an Environment Protection Licence from the EPA under the *Protection of the Environment Operations Act 1997*;
- approval from RMS under the *Roads Act 1993* for the new site-entry on Grafton Road;
- a 'Controlled Action' approval from the Commonwealth Department of Sustainability, Environment Water Population and Communities (SEWPC) under the *Environment Protection and Biodiversity Conservation Act 1999*.

The Department has consulted with the EPA, RMS, NOW, and the Commonwealth Department of SEWPC (see section 4.1 on page 9). The matters raised by the different agencies have been addressed in this report and where relevant appropriate conditions have been recommended. There were no specific agency objections.

3.5 Environment Protection and Biodiversity Conservation Act 1999

On 1 October 2007, the Department of Environment and Water Resources (now Department of Sustainability, Environment, Water, Population and Communities, DSEWPC) declared the project a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC

Act) because it would affect matters of national environmental significance (i.e. threatened species or ecological communities).

Therefore, following approval of this project, the Proponent would need to obtain the approval of the Commonwealth under the EPBC Act.

Notwithstanding this, the Commonwealth DSEWPC was consulted on the Department's recommended conditions of approval for this project (see section 4.1 on page 9).

3.6 Permissibility

The land is zoned 1(a) General Rural under the Armidale LEP 2008. The project is categorised as a 'waste disposal facility' and it is permissible with development consent. This zone is equivalent to zone 'RU1' under SEPP (Infrastructure) 2007 and the project is also permissible in zone RU1.

3.7 Environmental Planning Instruments

Section 75I of the Act requires the Director-General's report to include a copy of or reference to Environmental Planning Instruments that substantially govern carrying out of the project. Those instruments are:

- SEPP No. 33 – Hazardous and Offensive Development
- SEPP No. 44 – Koala Habitat Protection
- SEPP No. 55 – Remediation of Land
- SEPP (Major Development) 2005
- SEPP (Infrastructure) 2007
- Armidale Dumaresq LEP 2008

The Department has assessed the project against the relevant instruments and considers:

- The project is not an 'industry' to which SEPP No 33 – Hazard and Offensive Development applies;
- There is no 'core koala habitat' on the site or in the surrounding area and a Koala Management Plan is not required under SEPP No 44 – Koala Habitat Protection;
- The land is not contaminated in a manner that requires preparation of a Preliminary Contamination Investigation under SEPP No 55 – Remediation of Land;
- The proposed waste capacity is above the threshold criteria in SEPP – Major Development, and the project has been declared a 'Major Project' to which Part 3A of the Act applies;
- The site is in prescribed zone 'RU1 Primary Production' and the project is permissible with development consent under SEPP (Infrastructure) 2007. There is an assessment of the project under the matters for consideration in Clause 123 of SEPP (Infrastructure) 2007 in section 5.1 on page 11 and Table 9 on page 29; and
- The project satisfies the relevant Armidale Dumaresq LEP 2008 provisions.

3.8 Statement of Compliance

For the purpose of section 75I(2)(g) of the Act, the Department is satisfied that the Proponent as complied with the Director General's environmental assessment requirements.

3.9 Objects of the Environmental Planning and Assessment Act 1979 (the Act)

The Minister is required to consider the objects of the Act as set-out in Section 5. The Department has fully considered there objects. In particular, the Department has considered:

- whether the landfill project is orderly and economic development by examining need and justification for new landfill space in the context of waste recovery initiatives and alternatives;
- all environmental aspects of the project and in particular, it has closely examined the potential for impact on biodiversity and down-stream world heritage values; and

- the principles of ESD and in particular, it has drawn on the Precautionary Principle to draft strict approval conditions for the 'no-discharge' leachate containment system to minimise to the greatest extent possible the risk of environmental harm downstream of the site.

4. PUBLIC EXHIBITION AND CONSULTATION

The Environmental Assessment was publicly exhibited for an extended period of 14 weeks from 3 June 2010 to 3 September 2010. The Department received 104 submissions during the exhibition period. There were also several submissions that were received after the exhibition period, which have been considered in the Department's assessment. The Proponent's Submissions Report including a copy of all submissions received during the exhibition period is included at Appendix D).

4.1 Public agency submissions

All agencies were supportive of the project provided strict conditions were in place to prevent and monitor any environmental impacts. Copies of the agency submissions are in Appendix C.

Environment Protection Authority (EPA) recommends a comprehensive suite of approval conditions dealing with leachate management, noise impacts, biodiversity offsets and environmental monitoring.

Roads and Maritime Services (RMS) recommends widening of the Waterfall Way to accommodate a modified Basic Auxiliary Right (BAR) site access, and other ancillary requirements.

NSW Office of Water (NOW) recommends approval conditions that require the proponent to prepare suitable water, leachate and water quality management plans, and other ancillary requirements.

Kempsey Shire Council did not raise any objections, provided the proposed mitigation and management measures are employed.

Department of Sustainability Environment Water Population and Communities (SEWPC) recommended the implementation of the mitigation measures and monitoring as suggested by the EPA and NOW.

4.2 Special interest groups

Gara Valley Environment Preservation Association lodged several comprehensive submissions during and after the exhibition period detailing concern for a range of potential impacts and particularly for the potential leachate impacts on the Gara River catchment and Oxley Wild Rivers National Park;

Humane Society International raise concern about impact on the Oxley Wild Rivers National Park; threatened species; and the risk of poor long-term environmental management;

The Wilderness Society raise concern about impact on the Oxley Wild Rivers National Park; and

National Parks Association raised concern about impacts on the Oxley Wild Rivers National Park; threatened species; down-stream recreational areas; tourist values of the scenic 'Waterfall Way'; impacts resulting from noise, odour, litter, dust, insects and vermin; and adequacy of the Council's processes for site selection and public consultation.

4.3 Individual submissions

Figure 3 over the page shows a graph plotting the frequency of issues raised in the submissions. Table 2 on the same page shows an issues key for the graph.

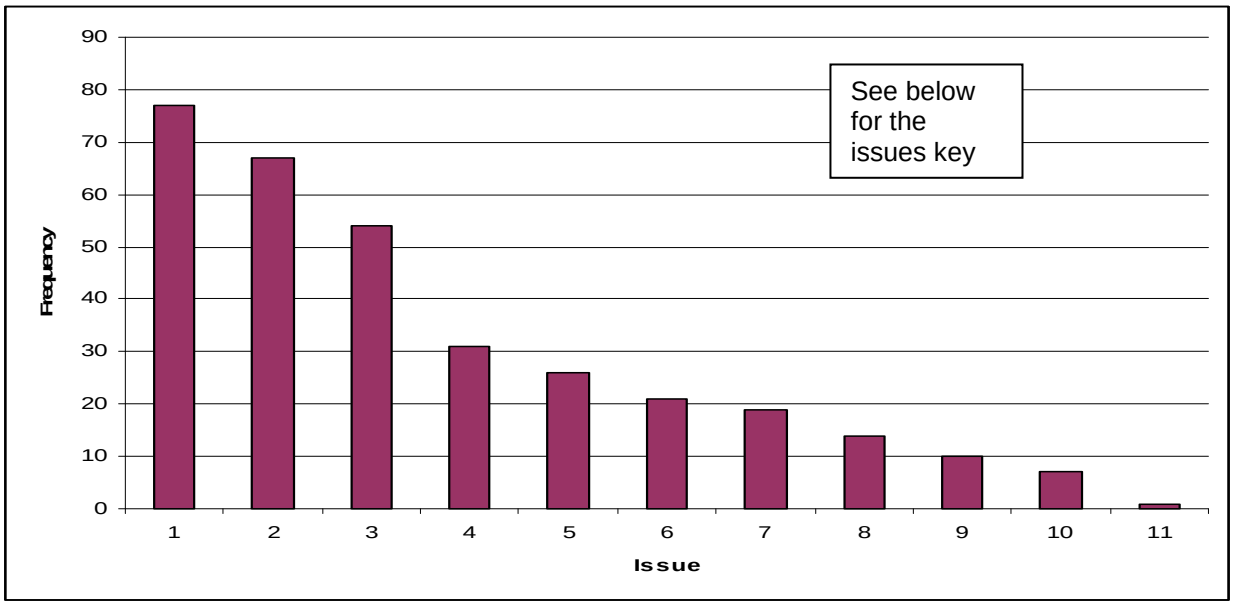

Figure 3 - *Graph showing frequency of issues in the individual public submissions.*

Table 2 - *Issues key for Figure 3*

Key	*Issue*	*Description*
1	*Water quality*	Most public submissions raised issue with the impact of leachate escaping the landfill and entering the Gara River catchment. Issues include reduced water quality affecting the natural values and biodiversity of the catchment, direct impact of toxic substances on groundwater, fauna, and the impact of leachate on the national and international heritage values of the national park (see section 5.2 on page 15). This category includes the risks posed by geological faults and flooding on leachate containment (see items 2, 3 and 4 in Table 10 on page 30). Some submissions were concerned about the lack of base-line data and impact assessment on down-stream environments. This matter is specifically addressed under the heading "Justification for applying the Precautionary Principle" on page 17.
2	*Project need*	Issues include that the project is not necessary because of alternate sites or waste technology, or alternate facilities in other Council areas (see section 5.1 on page 11). This category includes public concern on whether a wide enough selection of possible sites was considered and suggestions that the site selection process was politicised (see item 10 in Table 10 on page 30).
3	*Visual impact*	Issues include impact on views from nearby residences and the impact on tourism of views from the Waterfall Way scenic-drive (see item 1 in Table 10 on page 30). This category includes the impacts of leachate on the 'blue-hole' swimming area in the Gara River downstream of the site (see section 5.2 on page 15).
4	*Biodiversity*	Issues include the impact of clearing and site operation on biodiversity (see section 5.3 on page 23).
5	*Costs and economic impacts*	Issues include whether the Council could afford to construct the landfill and whether the cost would result in the decline of other services. This matter is outside the scope of the Department's assessment obligations. This category also included the economic impacts on subdivision potential nearby (see item 9 in Table 10 on page 30).
6	*Operational issues*	Issues include the proliferation of litter, weed, dust and vermin from poor management. (see item 1 in Table 9 on page 29).
7	*Air quality*	Issues include odour, noise, greenhouse gases and dust (see items 2, 5 and 6 in Table 10 on page 30).
8	*Application quality and consultation*	Issues include inaccurate or poor quality Environment Assessment documents (see section 3.8 on page 7) and an inadequate consultation and exhibition (see section 4 on page 9).
9	*Traffic*	Issues included the impacts of truck movements on the road network and the 'scenic route' values of the Waterfall way (see item 4 in Table 9 on page 29).
10	*Other*	Issues include whether appropriate consultation was undertaken with local Aboriginal groups (see item 7 in Table 10 on page 30). The likely risk of bushfire (see item 11 in Table 10 on page 30). Also, Whether the heritage values of the Travelling Stock Route were adequately considered (see item 8 in Table 10 on page 30).
11	*Support*	There was one letter of support for the project.

5. ASSESSMENT

In assessing the merits of the project, the Department has considered:

- The Proponent's Environmental Assessment (see Appendix B);
- All submissions and the Proponent's Submissions Report (see Appendix D);
- The objects of the *Environmental Planning and Assessment Act 1979* (the Act), including the object to encourage Ecologically Sustainable Development (see 3.9 on page 7);
- Relevant Environmental Planning Instruments (see 3.7 on page 7);
- Advice from an independent waste expert, Mr Greg Freeman (see Appendix E);
- The Commonwealth Department of SEWPC 'Controlled Action' declaration (Appendix F);
- Relevant guidelines and policies (including the *Environment Protection Authority (1996) Environment Guidelines: Solid Waste Landfills*); and
- Relevant statutory requirements of the Act and Regulation.

The Department considers the key issues for detailed assessment in this report align with the primary issues arising in the Commonwealth 'Controlled Action' declaration and those in the public objections.

Therefore, this report presents detailed assessment of the risk of downstream impacts on the Gara River and Oxley Wild Rivers National Park, biodiversity and the project need. A summary assessment of all other relevant issues is included in Table 9 on page 29 and Table 10 on page 30.

5.1 Project Need

5.1.1 Issue

The Department considers that any new landfill should only be approved if there is a genuine demand for landfill space. The Director General's Requirements for this project specify that the Council must demonstrate demand for landfill space in a strategic context and consider alternative ways of dealing with waste.

Clause 123 of SEPP (Infrastructure) 2007 also specifies matters that a consent authority must consider when considering a development application for landfill. The matters include:

- whether there is a suitable level of waste recovery, 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;
- best practice landfill design and operation;
- maximising gas capture and energy recovery;
- whether the land is already degraded and in a location that does not cause conflict; and
- optimal transport links.

The SEPP (Infrastructure) 2007 applies to Part 4 development applications and not to a Part 3A application. However, the Department considers that the SEPP matters for consideration are relevant to the current project and in the public interest. The matters are highly relevant to the main objects of the Act and the principles of Ecologically Sustainable Development.

5.1.2 Consideration

To assist its evaluation of landfill demand and waste recovery, the Department sought independent advice from waste expert, Mr Greg Freeman. A full copy of Mr Freeman's report is in Appendix E. The Department's assessment of landfill demand and waste recovery is below while Table 9 on page 29 sets out the Department's assessment of other clause 123 considerations.

<u>Landfill demand</u>

The design capacity for the proposed landfill is 15,000 tonnes per year. The Department has observed the following annual trends in waste-to-landfill in data collected for the existing Long Swamp Road landfill;

- Between 1998 and 2005, annual topographical surveys showed that the landfill increased in size by an average of 24,208m^3 every year. Allowing about 20% of the volume for capping material, the actual amount of land-filled waste would have averaged just under 20,000m^3 per year. The Council has not given compaction data, but a moderate compaction rate of 0.75 tonnes per cubic metre corresponds to an average of about 14,500 tonnes of land-filled waste per year, while a higher rate of 0.85 corresponds to about 16,500 tonnes;

- For the period 2006 to 2008, there were large projects under way in Armidale including two major shopping centres and remediation of the former gasworks. The landfill increased in size by an annual average of 46,266m^3 in 2006 and 2007, and by 31,693m^3 in 2008. The large projects dramatically increased land-filled waste during 2006 and 2007, but waste volumes were quickly returning to normal by 2008; and

- Weighbridge data for the years 2007 to 2009 confirm that land-filled waste volumes returned to the longer-term average as the large projects wound-up. The weighbridge data recorded an annual average of 15,500 tonnes of land-filled waste for this period, with a reported decline in 2009 coinciding with the end of the large projects in the town.

Future demand for landfill space is likely to decrease modestly. The 2001 to 2006 census period recorded a small population decline for the Armidale Dumaresq local government area (from 23,920 people to 23,368 people). The demand for landfill space will also reduce as newer technologies for waste recovery and compaction are added to the existing waste-processing facility in Long Swamp Road. Demand for landfill space may be propped-up by the closure of smaller out-lying landfills in neighbouring council areas as they reach full capacity, but not by a significant amount.

The Department concludes that the long-term average of waste to landfill is likely to be marginally less than 15,000 tonnes per year. The Department is satisfied that the design capacity of the project is comparable to the established demand for landfill.

The Department also asked the Council to provide further economic analysis of waste management measures other than landfills to help justify the present application. The Council provided the analysis in its Submissions Report (See Appendix D). Table 3 below outlines the Department's analysis of each of these alternatives.

Table 3 *– Consideration of alternative waste disposal options*

Alternative	***Department's assessment***
Waste-baling	In this case, baling waste ($40 per tonne) is more expensive than normal waste compaction ($36 per tonne) over a 50-year landfill life. It appears some of the economic benefits such as higher compaction rates and ease of handling are offset by higher capital and operation costs. The Council can utilise their existing compactor, for example, whereas a waste baler would need to be acquired. Environmental benefits of waste baling such as easier management of leachate, litter and vermin are not considered by the Department to be justified in view of the extensive leachate containment and landfill environmental management already proposed. In any case, baled waste must still be disposed of to landfill.
Transport out of area	The cost of transporting waste to Coffs Harbour (190km) or Tamworth (110km) is extremely sensitive to the price of fuel and creates social equity issues about the burden of landfill-space and long-haul transport. Such a proposal carries a high acceptance risk and will inevitably bring forward the need for additional landfill space in the receiving communities. The Department is satisfied that transport to other areas is not a suitable alternative.
Best practice domestic recycling (240-litre mobile garbage bin)	A 240-litre domestic recycling-bin system compares cost-wise with Council's contract for 50-litre recycling-crate collection and processing ($75 per household per year). The bin system is ostensibly better at waste recovery than the crate system. However, Armidale Council reports recyclables recovery at 307kg per household per year, which is comparable to the reported performance of a bin system. The Department is satisfied that the Council need not immediately adopt the bin system on performance grounds, but should do so when its economic or comparative performance improves in the future.
Food and garden waste collection	Council plans to continue fortnightly collection of domestic garden waste in a 240-litre bin. Based on expert advice from Mr Freeman, the Department considers the Council should implement best-practice weekly collection of combined garden waste and food to improve recovery of putrescible waste. However, this does not fully satisfy demand for landfill space as non-compostable residue from this process can be as high as 40% of the original volume.

Based on the assessment in Table 3, the Department is satisfied that there is currently no other genuine and highly suitable alternative to landfill that is available to the Council for waste disposal. The Department's expert advisor, Mr Freeman, concurs and advises that landfill security in the area is important for the Council and its community.

Waste recovery

The NSW Government is committed to waste avoidance and resource recovery from all waste streams across NSW. This is reflected in the *Waste Avoidance and Resource Recovery Strategy (WARR) 2007.* The relevant aim of this strategy is to ensure:

- Firstly, avoidance of unnecessary resource consumption;
- Secondly, resource recovery including reuse, reprocessing, recycling and energy recovery; and
- Lastly, disposal.

The WARR strategy sets targets for resource recovery across the state for 2014. Table 4 sets out the Council's performance in 2009-10 against the state average for 2008-09 and the 2014 targets.

Table 4 *– Armidale Dumaresq Council's waste recovery performance*

Waste stream	***2014 WARR targets***	***Council performance 09-10***	***NSW State average 08-09[2]***
Municipal	66%	(Combined) 60.6%	44%
Commercial /industrial	63%		52%
Construction/demolition	76%	90%	73%

Table 4 shows that Council's waste recovery performance is better than the NSW State average, but that improvement is required in the combined municipal/commercial sector to comply with the 2014 WARR targets. Council's performance in the construction/demolition sector in 2009-10, which is well above the State average and the 2014 WARR target, may have been influenced by the three major construction and demolition projects that were under way during the preceding years. Table 5 below outlines the recovery initiatives that Council has already implemented.

Table 5 *– Armidale Dumaresq Council waste recovery initiatives*

Initiative	***Description***
Regional synergies	Contributing to the Northern Inland Regional Waste Group of Council's on waste processing activities such as mulching, concrete crushing, drum-muster, scrap metal, oil and chemical collection.
Gate penalties and concessions	Sorted domestic recyclables and scrap metal are accepted free of charge. Garden waste, timber and building rubble are accepted at half charge. Unsorted commercial and industrial waste attracts a 2 to 2.5 times penalty.
Existing materials recycling facility at Long Swamp Road	Contracting to a private business (on the same site) to sort incoming commercial, industrial, construction and demolition waste streams. Funding is partly derived by a gate penalty for unsorted waste.
Domestic Recyclables	Week-about kerb-side collection of 50-litre domestic recycling crates. One week for paper and the other for containers.
E Waste	Helping a local non-profit organisation to refurbish computers and recycle e-waste that is delivered to the Long Swamp Rd facility.
Resource Recovery Centre	Re-sale of saleable products recovered from the waste stream.
Waste Transfer Stations	No public access to landfill. All light vehicles are directed to large bins at the transfer station so that recoverable or recyclable waste is sorted. Penalty rates apply to waste that is not to be sorted.
Chemical Wastes etc	A secure chemical compound at the Long Swamp Rd facility for drop-off of chemicals, oils and paint.
Compact Fluorescent Lighting	A collection program for used light bulbs involving 'muster' points in the city and at the existing Long Swamp Rd facility.
Food organics collection (being trialled at time of EA lodgement)	Collection and stabilisation of domestic food waste in proprietary systems such as Groundswell or Bio-cells.
Higher gate prices (planned for	Higher gate prices for un-sorted commercial and industrial waste to

[2] Reducing Waste: Implementation Strategy 2011-2015 (2011), Department of Environment, Climate Change and Water (NSW)

Initiative	*Description*
2011-12)	incentivise more waste sorting at source.

The Department's expert waste advisor, Mr Freeman, suggests that the municipal waste recovery practices as outlined in Table 5 are good for a regional town, but they are not best-practice and could be improved (see full advice in Appendix E). By way of example:

- municipal waste is collected weekly in a 120-litre bin. Best practice involves a fortnightly waste collection;
- garden organics are collected fortnightly in a 240-litre bin. Best Practice is a weekly collection of combined food and garden organics in a 240-litre bin; and
- recyclables are collected in crates every week (one week for containers and the other for paper). Best practice is either weekly collection of two 120-litre bins, or fortnightly collection of one 240-litre bin. (Although, note that Council claims a recovery rate of 307kg per household per year with their crate/transfer station system, which is comparable to best-practice).

These best practice measures drive behavioural change in the community, improving waste separation at source, which leads to higher resource recovery. For the Council, a food and garden organics processing facility with the following attributes would be an economical way to improve the community's waste recovery:

- better utilisation of the existing 240 litre garden organics service, which could be changed to weekly and accommodate food quite easily;
- expansion of food organics collection into the commercial and industrial sector;
- utilisation of the existing landfill site to locate a processing facility;
- potential addition of other organic wastes (such as bio-solids and other industry and agricultural waste);
- sale of processed compost back into the local marketplace; and
- reduction in food organics to landfill, therefore making a non putrescible landfill more likely and reducing methane emissions.

The *NSW Reducing Waste: Implementation Strategy 2011-2015* corroborates Mr Freeman's advice. It states that 40% of household waste is food and could be added to garden waste to form a consolidated organic waste stream, some of which can be diverted away from landfill.

Conclusion

On balance, the Department concludes that there is a need for additional landfill space in the area for the Armidale Dumaresq community. There are extremely limited opportunities to expand the existing landfill at Long Swamp Road and transporting waste outside the region is costly and carries a risk that the receiving community may object.

Nevertheless, approval for a new landfill should not come at the expense of continuing improvements in waste minimisation and recovery. The Department is of the view that despite the Council's current good performance, the community should pursue improved waste recovery initiatives to work toward the 2014 municipal waste recovery target of 66%.

The Council presently does not clearly articulate strategic waste priorities and objectives in a waste strategy. A 50-year approval, as originally proposed, could hinder development of a waste strategy with adopted waste reduction targets. The proposed landfill space could encourage the community to be lenient with waste planning. While the Council have demonstrated a firm commitment to continue improving recovery rates, the Department cannot be certain without an adopted waste strategy that waste recovery will ultimately align with NSW targets.

The Department recommends approval of 422,000m^3 of landfill capacity for cells one and two (out of a proposed five), which would approximate 300,000 tonnes of waste and give 20 to 25 years capacity. This would satisfy genuine demand for landfill space and ensure the current project is viable (whereas the capital costs for just one cell may be prohibitive).

It would be open to the Council in the future, to apply to operate cells three to five when a waste strategy is in place, which outlines how the community will achieve the State's waste recovery targets and justifies the additional long-term demand for landfill.

5.2 Downstream impacts on Oxley Wild Rivers National Park

5.2.1 Issue

The site is in the Gara River catchment, which flows immediately to the Oxley Wild Rivers National Park (see locality map in Figure 2 on page 3). The main risk of impact from the project is the potential release of leachate to surface and ground water.

Leachate is formed by rainwater percolating through a landfill and collecting the by-products of decomposing waste. Leachate can be harmful to the environment. It can cause nutrient enrichment and algal blooms in a waterway, and it often carries high levels of toxic substances that are harmful to flora and fauna. Should it enter the Gara River and the National Park, it may impact on the Park's natural and recreation values, ecosystems including groundwater ecosystems, and rare or threatened species including groundwater stygno-fauna.

Eighty percent of public submissions were concerned with the likely downstream impacts of leachate and it is a primary reason for the Commonwealth's 'Controlled Action' declaration (see Appendix F).

5.2.2 Consideration

Consideration of this issue is set-out in two parts:

- Firstly, a description of the sensitivity of downstream receiving environments including justification for applying a precautionary approach to the assessment of the project, and
- Secondly, a description of the proposed measures to minimise the risk of downstream impacts, which includes an appraisal of:
  - the site attributes that are conducive to leachate containment and those that present a risk of leachate escaping (i.e. hydro-geological risks);
  - the proposed 'no-discharge' leachate containment system; and
  - the potential for failure and the capacity to repair the leachate containment system.

Sensitive downstream environments

The Gara River already has a very high 'stress' rating[3]. Existing municipal and farm dams in the Gara catchment have reduced water-flow that is necessary for river health. There is already erosion and sedimentation resulting from extensive land clearing and historically poor riparian-zone management. There is evidence of nutrient enrichment, which might come from different urban and rural sources.

For example, in the wider catchment up to Guyra (see Figure 4 over the page), there are many pollution sources including rural households with on-site sewerage systems and farms where pesticides and fertilisers might be used for stock or crop management and pasture improvement. The Armidale sewage treatment plant discharges to a tributary of the Gara, and the existing Long Swamp Road waste facility is within the catchment of another tributary of the Gara.

Dumaresq Creek flows to the Gara after it runs through Armidale collecting polluted stormwater from streets, highways, car parks, and industrial estates (see Figure 5 over the page). The creek also collects leachate from sports fields, golf courses and contaminated sites. During heavy rainfall, gross pollutant traps in the urban area can fail adding rubbish and organic matter to the mix of pollutants carried down-stream from the town.

[3] Stressed Rivers Assessment Report NSW State Summary (1998), Department of Land and Water Conservation (NSW)

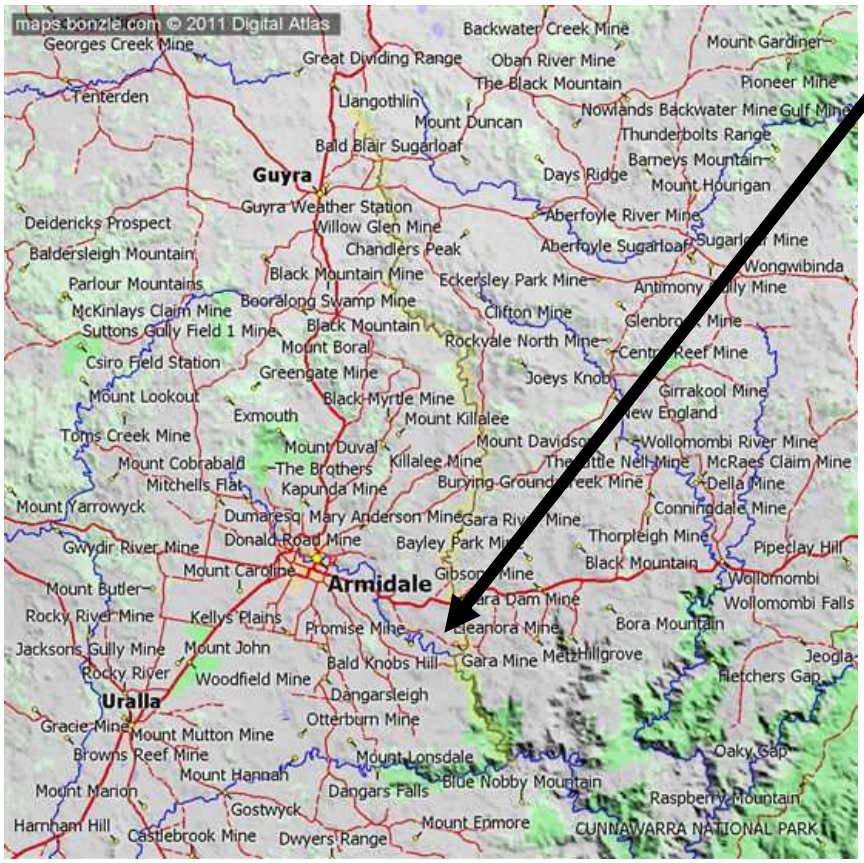

Figure 4 *– The subject site is marked with arrow, east of Armidale.*

The Gara River can be seen (highlighted in yellow) originating north of Guyra near Llangothlin. It traverses extensively cleared farmland before passing the subject site east of Armidale and entering the Oxley Wild Rivers National Park in the bottom right of the map. This map also shows former gold and antimony mines throughout the catchment.

Figure 5 *– Originating northwest of the Madgwick university campus in the upper left of this photo, Dumaresq Creek can be seen bisecting the town of Armidale before running east to join Commissioners Waters adjacent to the Armidale sewage treatment plant and thereafter joining the Gara River slightly downstream of the subject site.*

Justification for applying a precautionary approach

The better water quality found down-stream in the Oxley Wild Rivers National Park indicates the Gara catchment has the ability to 'absorb' stress from existing human activity. However, the extent to which the catchment can (or should) absorb any additional pollution loads from leachate is uncertain and therefore requires the Department to apply a precautionary approach in this assessment.

In taking this approach, the Department must assume that any additional pollution would have unacceptable impacts on the catchment and therefore must ensure appropriate impact prevention measures are in place.

Site attributes that are conducive to leachate containment

Soil and groundwater conditions help determine the likelihood of successfully containing leachate on the site. The Proponent's EA included the following technical reports (see Appendix B):

- Hydro-geological assessment (EA Systems, 2006);
- Hydro-geological investigation (RCA Australia, 2007);
- Salinity assessment (EA Systems, 2006);
- Report on geological logging of diamond drill core … (PM Ashley, 2005); and
- Hydrological (Leachate) Assessment (AECOM, 2010).

Soils of the site are shallow and rocky at the hillcrest and become thicker further down the slope. Sodicity increases and permeability decreases with depth. Clays in the proposed landfill footprint are generally 1.2m to 1.5m deep overlying weathered mudstone.

Weathering of the mudstone indicates infiltration of fresh water from the surface, although the water-table is at least 6.3m below the lowest part of the landfill footprint and generally 21m-28m below the landfill cells. Groundwater sampling shows a high natural concentration of chlorides and sulphates, which indicates slow movement through the mudstone northeast towards the Gara River.

A computer model of the worst-case-scenario shows that if leachate reaches the water-table, it would be diluted nearly 80 times in the first metre of groundwater. Thereafter, the diluted leachate would take 300 years to flow downhill to the site boundary, and 700 years to reach the Gara River at its nearest point, one kilometre to the northeast.

After 10,000 years of concentrated leachate escaping the landfill, its diluted concentration at the Gara River would still be 0.1% of the original and indistinguishable from the natural concentration of chlorides and sulphates in the local groundwater. In practice, contaminants in the leachate would also oxidise and biologically degrade over time.

The Department is satisfied that the risk of down-stream impacts according to the modelled soil and groundwater conditions is generally very low. Groundwater movement is very slow through impermeable mudstone under the site. If leachate escapes the landfill, it will dilute and biologically degrade to the point where it will be indistinguishable from existing groundwater before it reaches the Gara River.

Site attributes that present a risk of leachate escaping (hydro-geological risks)

Despite the modelled soil and groundwater conditions described above, there are site attributes that could increase the risk of leachate migrating from the site in higher and more harmful concentrations. These include:

- subsurface flow in shallow soils during heavy rainfall could undermine a leachate barrier and seep to the surface escaping control devices (see Figure 6). While not known to be prevalent across the site, there is evidence of an occasional lateral flow 200-350mm below the surface through a layer of permeable soil in the A2 soil-horizon (see Figure 7 on page 18);
- a 26m diamond-drill core shows deep weathering of the mudstone around fractures and foliation lines (see Figure 8 on page 18). This indicates that fracturing and foliation could act as conduits that can channel surface water (and leachate) underground; and

- The sodic subsoils are dispersive and prone to swelling and gully erosion, which might affect the cell-liner foundations and may produce high sediment loads leading to reduced capacity in the leachate containment system.

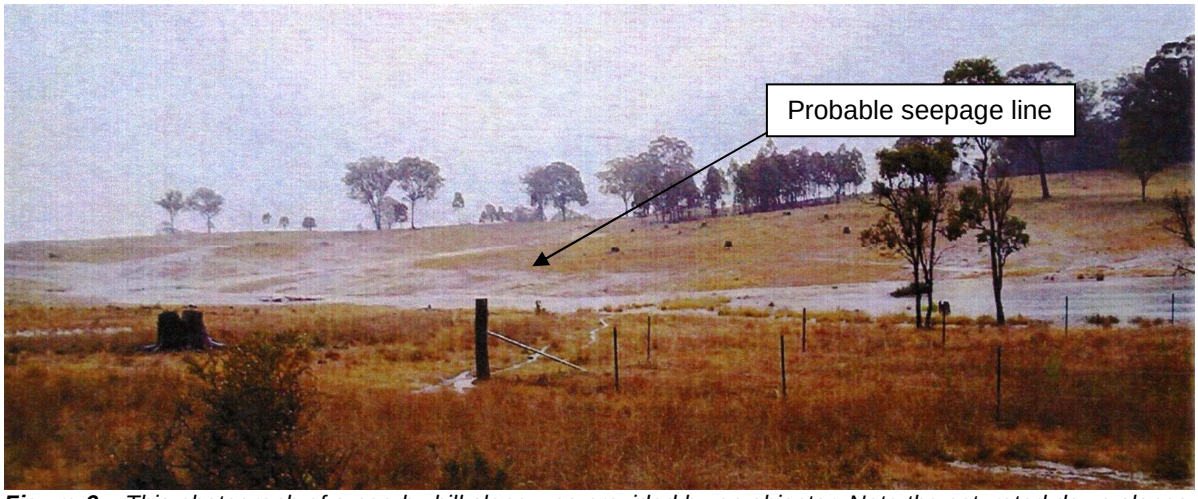

Figure 6 *– This photograph of a nearby hill-slope was provided by an objector. Note the saturated down-slopes. The saturation could result from lateral sub-surface flows in a shallow soil horizon like the A2 horizon on the subject site.*

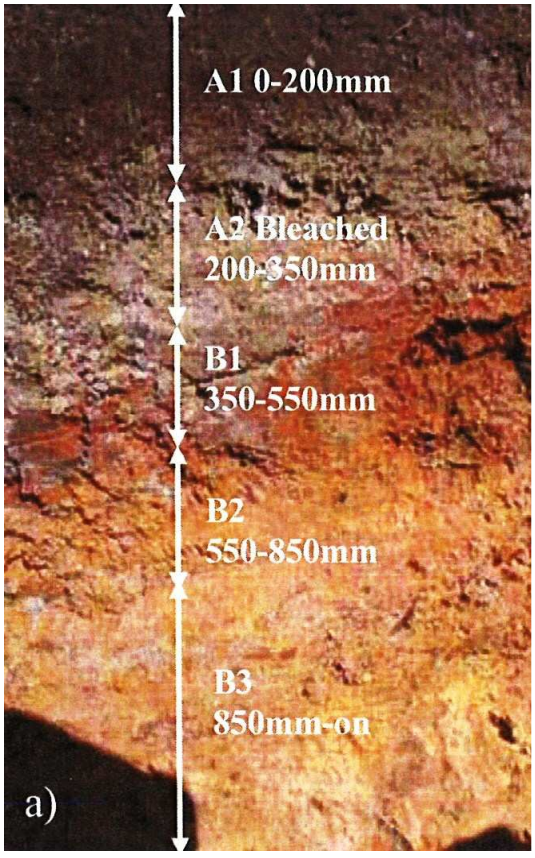

Figure 7 *(left) Typical mid-slope soil profile from the subject site. The bleaching (white colour) in the A2 horizon probably indicates occasional lateral groundwater flow above a layer of less permeable clay in the B1 horizon. This lateral flow can destabilise a foundation, or channel leachate away from water control devices.*

Figure 8 *(below) A diamond drill core sample from the site. The centre core (with the coin) is approximately 8.7m deep. Note the rock fractures that can act as conduits for liquid to flow through otherwise impermeable rock. The green colouring in the centre core indicates oxidation, which means the fractures have been penetrated by oxygen-laden water from the surface.*

<u>"No-discharge" leachate containment system</u>

The primary means of preventing leachate escaping the site is a 'no-discharge' leachate containment system that is engineered to be physically independent of the site's hydro-geological attributes. The system collects and recirculates leachate through the landfill cells. It relies on evaporation, oxidation and biological processes to treat the toxic substances. Eventually the leachate will achieve 'final-storage-quality' and will no longer be harmful to the environment.

The system comprises a **leachate barrier** under the landfill cells to prevent groundwater contamination, and a 'no-discharge' leachate **collection and recirculation system** that includes a large storage and evaporation pond.

The **leachate barrier** is installed at the base of the landfill and is designed to prevent leachate escaping to groundwater. It would have three layers (See Figure 9). From bottom to top, there is:

- a 900mm layer of re-compacted clay (or geo-synthetic clay) with very low permeability;
- a 1.5mm High Density Polyethylene (HDPE) liner, which is a kind of thick plastic and is virtually impermeable; and
- a 300mm gravel drainage layer with geo-textile cover to protect the plastic liner and provide a medium to drain leachate from underneath the waste.

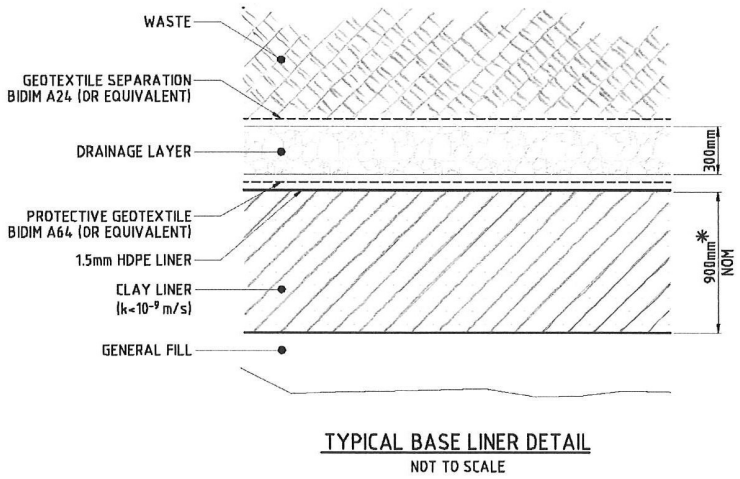

***Figure 9** – Cross section of a typical leachate barrier. Note the HDPE liner is comparatively thin and must be installed carefully.*

When constructing the re-compacted clay liner, the Council must deal with the dispersive subsoils so that they no longer pose a structural or leachate containment risk. Dispersive soil in the A2 horizon could be removed during construction because it is shallow. Sodic subsoil in the deeper B1 horizon will require compaction (if dry) or lime (if wet) to improve its foundation properties before the re-compacted clay liner can be constructed.

The polyethylene liner must also be installed carefully because it is very thin. Cracking or tears from poor installation or over-loading, ultra-violet light exposure or temperature extremes will shorten its service life. A degraded polyethylene liner is more vulnerable to the chemicals that form in landfill waste and will not be an effective leachate barrier. However, a properly selected and installed polyethylene liner that is protected from extreme temperature, excessive loading and sunlight should have an operational life of approximately 200 years. In other words, the landfill will achieve its 'final storage capacity' (i.e. 750,000 tonnes) well before the liner would be expected to breakdown.

The Department has recommended conditions of approval to ensure that the leachate barrier complies with the strictest standards in Benchmark Techniques for *"a landfill located in an area of poor hydrological conditions or otherwise [presenting] a significant potential threat to surface of ground waters"*. These approval conditions include:

- specifications for the clay liner below the polyethylene barrier; and
- selection and installation requirements for the polyethylene barrier.

The Department and the EPA are satisfied that the proposed leachate barrier, including the primary polyethylene layer and secondary re-compacted clay layers would effectively minimise the risk of groundwater contamination underneath the landfill.

The **leachate collection and recirculation system** includes sumps, drains and a leachate storage and evaporation pond. Figure 10 over the page shows the basic layout of the system on the site. Leachate collects in the drainage medium above the leachate barrier before draining to collection sumps, which are pumped to the leachate pond. The pond would be constructed with the same re-

compacted clay and installed with the same polyethylene liner as the leachate barrier to prevent groundwater contamination.

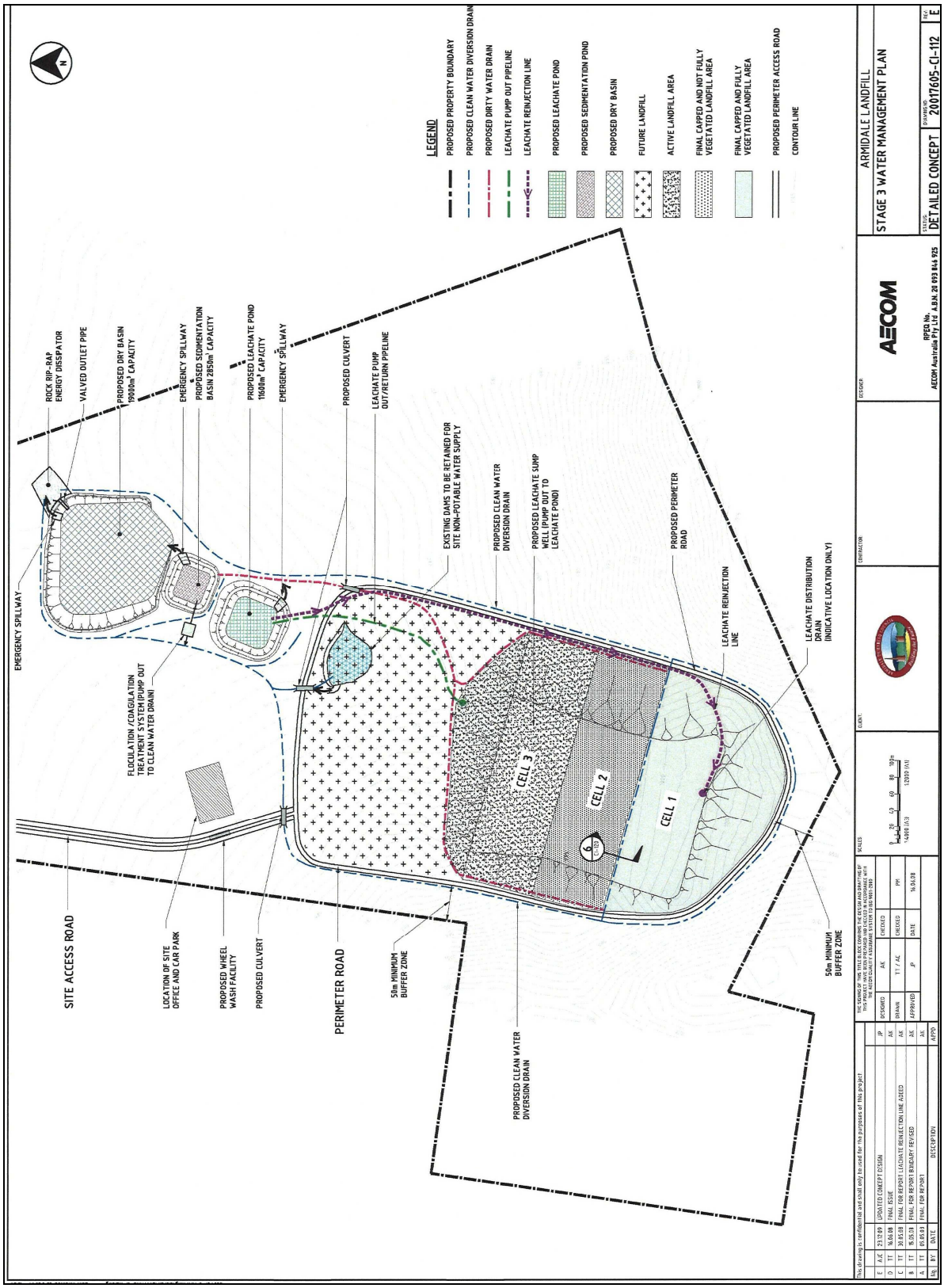

Figure 10 – *Stage 3 Water and Leachate Management Plan (typical)*

The leachate pond would have an overall spill-volume of 17,627m^3. There is capacity for 12ML of leachate and an additional 300mm freeboard to accommodate wave-action and rainfall over the pond surface from a 24 hour, 1-in-25-year storm. This capacity is based on the specifications for a leachate

pond in the Benchmark Techniques and a 70-year water balance using the average daily rainfall data from between 1982 and 1991 (see Figure 11). Twenty percent more rainfall was added to the model after 20 years of operation to account for any climate change. Leachate recirculation would be in the order of 7-10m^3 per day, which would ensure the leachate pond does not overflow. In the case of an emergency, excess leachate could be transported by truck for treatment at a sewage treatment plant.

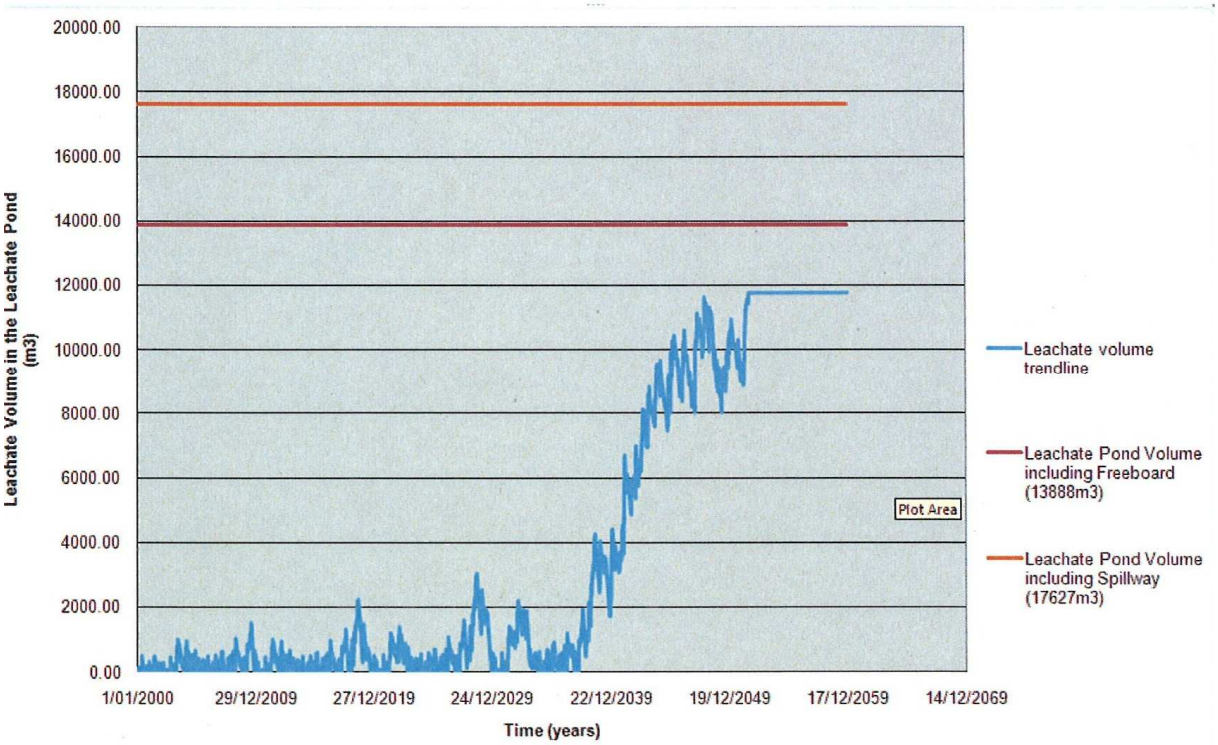

Figure 11 *– Model of leachate volume in the leachate pond over time (blue line). Note evaporation and reinjection would keep pond volume generally below 2ML for the first 30 years, and at all times below 12ML. The 70-year balance was not graphed. Only 50 years are shown here.*

The Department has included a condition that requires the leachate pond to be contained within a re-compacted clay bund with the capacity to hold 110% of the pond's capacity in case of pond wall failure. The project also includes a 19ML dry detention basin, which is adequate to hold surface run-off from the entire landfill site during a very severe 24 hour, 1-in-100 year storm (154mm of rain).

EPA has advised the Department that the water balance calculations are acceptable. The proposed leachate system is a no-discharge design and the Environment Protection Licence for the landfill would not allow a formal discharge point for leachate. This means any release of leachate into waters would be an offence under the *Protection of the Environment Operations Act 1997*. The Department has included a recommended approval condition that requires an annual audit of water balance calculations to ensure the system retains adequate capacity.

Based on the specifications of the proposed leachate system, the Department is satisfied that the proposed landfill would present a very low risk of adding pollution loads to the catchment during either normal operation or extreme wet weather.

Containment system failure and repairs

As a final redundancy measure, should any of the leachate containment system fail in a manner that cannot be directly observed and fixed, a surface and ground water monitoring program would be installed to detect any leachate migrating away from the site. Monitoring points would need to be installed in many locations to ensure a high likelihood of detecting leachate leaks (see Figure 12 over the page for groundwater monitoring locations). The NSW Office of Water recommended additional monitoring points on the east and west side of the landfill and these additional points have been

included in the recommended approval conditions. A deep monitoring bore on the uphill side of the landfill would provide baseline groundwater data.

The Department is satisfied that the proposed surface and groundwater monitoring program would be sufficient to detect any leachate migration from the site in the unlikely event that it occurred. This will allow timely remediation work, which might include one or a combination of repairs to the barrier or containment system, cut-off trenches that prevent further movement of groundwater, or groundwater extraction and treatment. Any detection of leachate outside the containment system would need to be reported to and remediated in consultation with the EPA under the Benchmark Techniques.

Figure 12 *– Indicative groundwater monitoring points. The recommended conditions require at least 3 additional ground water monitoring points as required by the NOW to ensure adequate coverage.*

Table 10 on page 29 includes an assessment of other factors that could contribute to the risk of leachate leaving the landfill such as flooding, stormwater including ground-water seepage, erosion and the likelihood of a geological fault nearby.

Conclusion

Given the sensitivity of downstream environments, the Department considers that the project must provide a high degree of certainty that the landfill design and operation would fully contain all leachate on the site while-ever it is harmful.

The proposed system is a no-discharge design and complies with the latest Benchmark Techniques specified in the *Environmental Guidelines: Solid Waste Landfills* (1996, Environment Protection Authority). Specifically, it complies with the strictest specifications for sites with hydrological risks. The recommended conditions include a requirement for an annual audit of the system capacity to ensure ongoing compliance with the Benchmark Techniques.

Should leachate migrate from the collection areas despite the proposed management measures, it would be detected by surface and groundwater monitors or enable remediation action to occur. The Department is satisfied that the monitoring program would ensure leachate containment and timely repairs to the system.

With all proposed and recommended measures in place, the Department is satisfied that the project would present a negligible and hence acceptable risk of environmental harm to the Gara River Catchment and Oxley Wild Rivers National Park.

5.3 Biodiversity impacts

5.3.1 Issue

The project involves a number of key threatening processes that could impact on threatened species and endangered ecological communities. Those processes are clearing of native vegetation; removal of dead wood and hollow bearing trees; competition from feral rabbits; and fox predation.

Overall, there are five vegetation communities present on the subject site but only the box Gum Woodland is an endangered community. The others are quite common in the region. The overall diversity of tree species on site is quite poor and there are few mature or hollow bearing trees. The shrub layer is sparse and the grass layer has been grazed.

Other sites with higher biodiversity values were not selected for the project. Nonetheless, the project will require clearing of:

- 12.7 ha of Stringybark Woodland involving a significant impact on vulnerable bird species;
- 0.6 ha of Critically Endangered Box Gum Woodland in the travelling stock reserve;
- 6.5 ha of grassland (part of which is degraded Endangered Box Gum Woodland);
- 0.5 ha of sedge-land; and
- 2 small farm dams.

5.3.2 Consideration

Consideration of this issue is set-out in three parts:

- Firstly, consideration of the species and communities present on the site;
- Secondly, consideration of the impact avoidance, minimisation and mitigation; and
- Thirdly, consideration of the proposed bio-diversity offset strategy to compensate for the likely impact on vulnerable bird species resulting from habitat loss.

Species and communities present

Table 6 lists the species and communities that were observed and their status under the *Threatened Species Conservation Act 1995*. Figure 13 on page 24 shows a map of the vegetation communities present. Figure 14 on page 25 shows a map of fauna species present on or near the site.

Table 6 *– Species and communities that were observed on or near the site.*

Status	***Fauna***		***Flora***
Vulnerable (TSCA Act)	Birds:	Speckled Warbler Diamond Firetail Finch Scarlet Robin* Varied Sittella* Little Eagle*	Narrow-leaved Black Peppermint
	Mammals:	Koala Eastern bent-wing bat	
Endangered ecological community	-		Box Gum Woodland
Critically endangered ecological community (EPBC Act)	-		Box Gum Woodland
ROTAP locally significant species	-		Bendemeer White Gum

** At the time of the EA Systems survey these species were the subject of a preliminary determination and not listed as vulnerable species. Since the survey, the species have been listed as vulnerable species.*

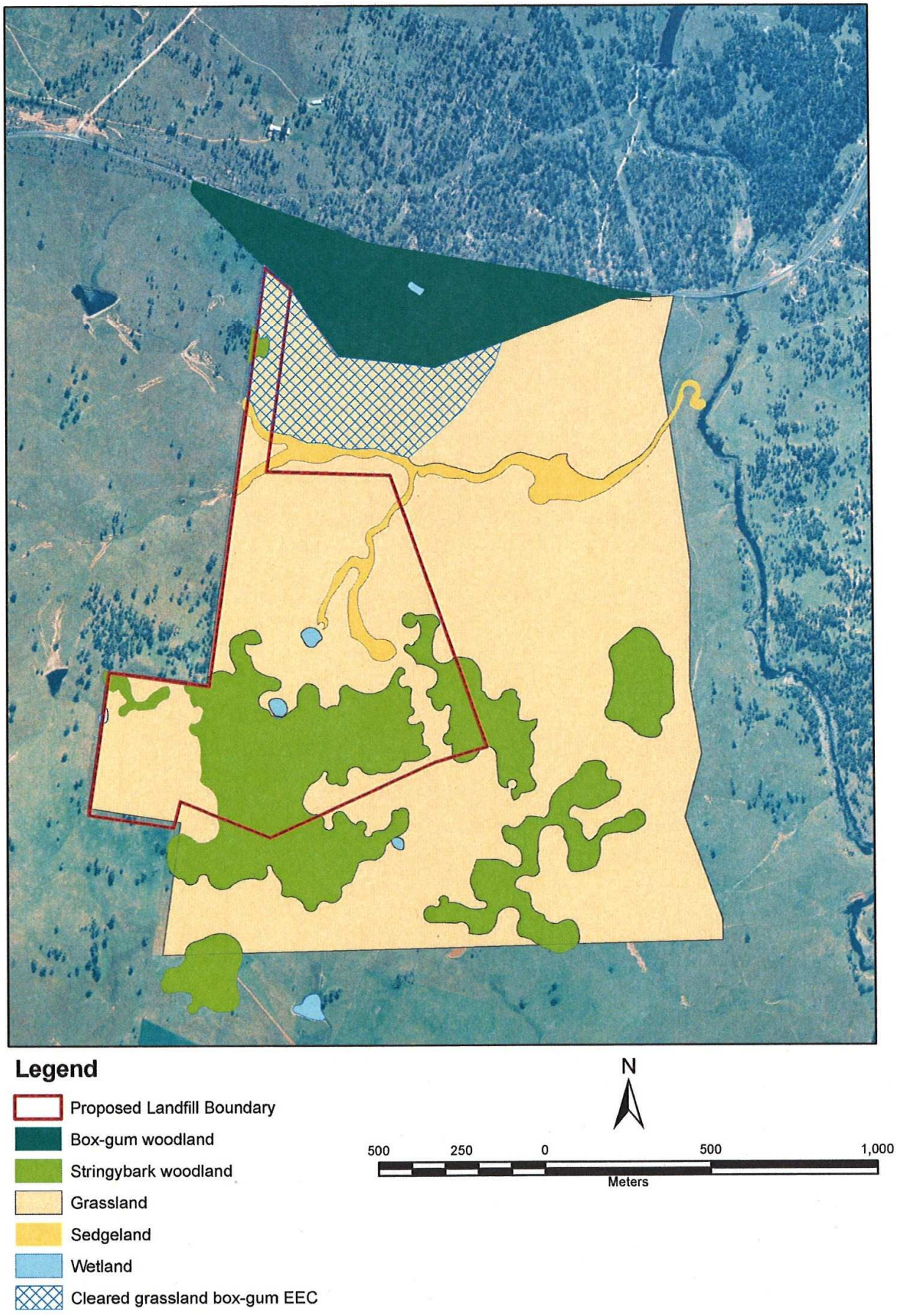

Figure 13 *– A map of all vegetation communities present on the site. The dark green shading indicates Critically Endangered 'Box Gum Woodland' in the travelling stock reserve.*

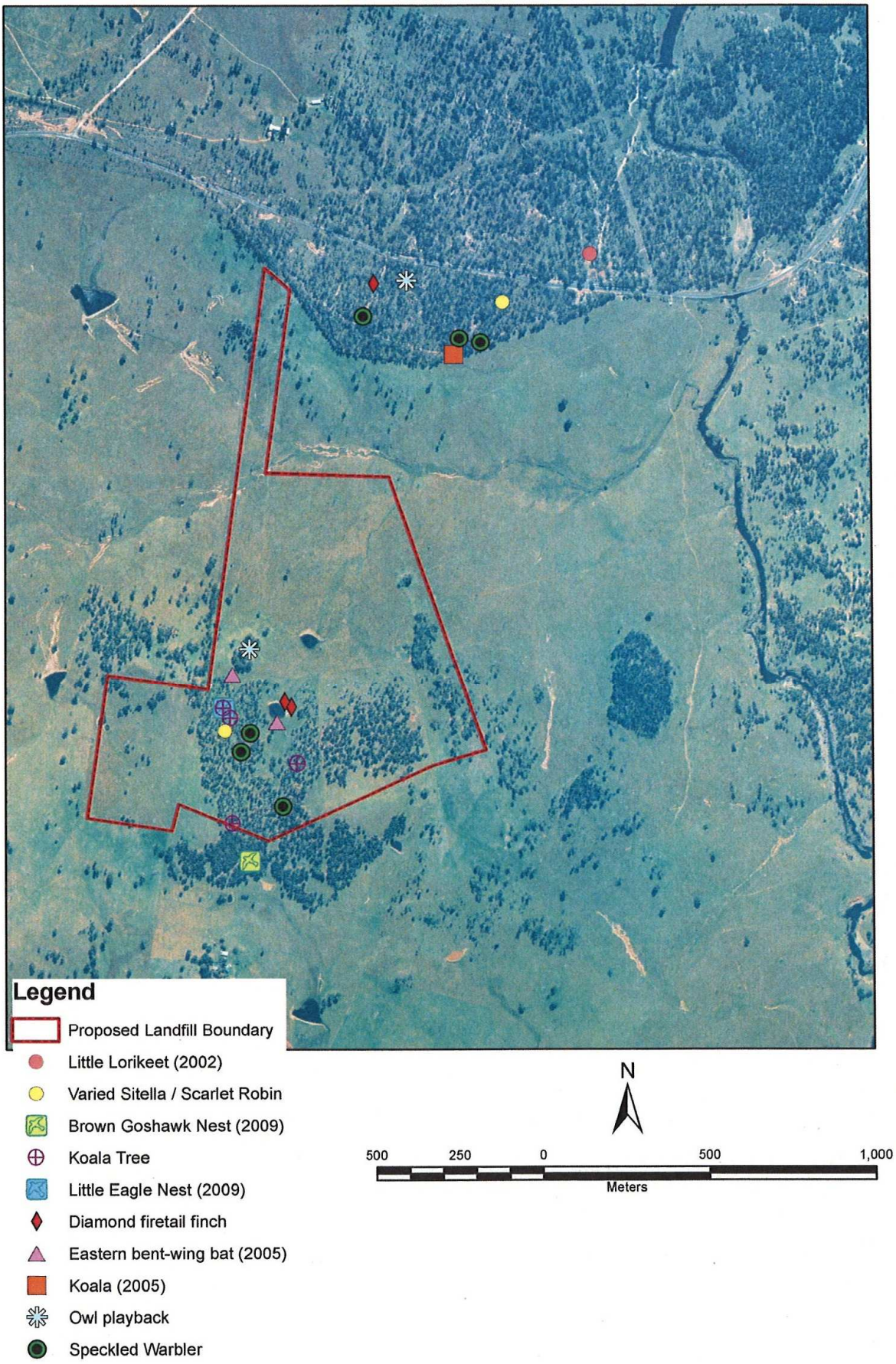

Figure 14 *– A map showing the species recorded on the site.*

Impact avoidance, mitigation and minimisation

The project employs a range of impact avoidance, minimisation and mitigation measures to reduce impacts on threatened species. Table 7 outlines these key elements of the project.

***Table 7** – Measures to avoid minimise or mitigate impacts on threatened species, habitat and EECs.*

Measure	***Description***
Impact avoidance	The proposed landfill is located in an area that is not densely wooded. The landfill footprint is partly within Stringybark Woodland that was cleared around 20 years ago, and part grassland. There are few mature or hollow bearing trees and the overall diversity of tree species is quite poor. The shrub layer is sparse and the grass layer has been grazed.
	The project avoids altogether the need to fell individual stands of vulnerable species (i.e. Narrow-Leaved Black Peppermint trees identified in the northwest of the site).
	Habitat trees will be marked so that they are avoided during clearing operations where possible.
	Hollow bearing stags and isolated logs will be retained as habitat where possible.
	Ground cover would be maintained in areas not required for landfill operation.
	Clearing would take place only during late summer and autumn where possible to avoid disturbing spring breeding birds such as the Little Eagle.
	Proliferation of plastic and other waste that is harmful to fauna would be managed by tip-face control and regular litter collection.
Impact minimisation	The proposed access road is in an already degraded portion of the critically endangered woodland in the Gara travelling stock reserve. Less than 5% of the community on the southern side of Waterfall Way would be affected, which is less than 1% of the local community.
	Land clearing would take place progressively as needed, which means clearing for cells three to five (albeit predominantly grass-land), if approved, would not be undertaken for 20 to 40 years.
	Signage will be installed along the roadway noting the area as 'important habitat' and that roadside 'dumping' is illegal.
Impact mitigation and bio-diversity offset	Existing log-piles (from former clearing activity) would be broken up and redistributed so that they provide better habitat for native species and are less useful to pest species like rabbits.
	Fringes of water storage dams would be revegetated to repair damage from stock watering and improve their habitat quality.
	Monitoring and eradication of weeds and pest animals, including professional pest extermination when necessary. Proposed vehicle wash-down and sedimentation controls help to prevent the proliferation of weeds.
	Fencing to exclude livestock from the site and assisting rehabilitation of native vegetation areas (see biodiversity offsets).
	The completed landfill cells will be progressive rehabilitated with native shrubs and grasses so that the final landform is compatible with the existing landform.

The EPA make recommendations for the final management plans to address potential difficulties in restoring endemic woodland communities, the management of koalas, the access road, and the retention of coarse woody debris inside the offset areas. Council has agreed to address these issues in the final management plans and the Department has included this in the conditions of approval.

Biodiversity offset

After all impact avoidance, minimisation and mitigation measures are employed, the loss of habitat due to the project will have an impact on local populations of vulnerable species of birds. To compensate for the loss of habitat for threatened and vulnerable bird species the project includes a biodiversity-offset scheme.

The proposed biodiversity offset scheme includes 61 hectares of the project site. The offset area would be made up of 40 hectares of Stringybark Woodland with stands of mature trees and 21 hectares of grassland set aside for conservation and revegetation. Figure 15 on page 28 shows a map of the proposed off-set area. Table 8 below shows key features of the offset scheme.

***Table 8** – Key features of the biodiversity offset scheme*

Feature	***Description***
Location	Surrounding the landfill site and connecting to the Gara Travelling Stock Reserve to the North via a vegetation buffer along the access road and to remnant habitat to the south and east.

Rehabilitation	Fencing and removal of livestock to eliminate grazing pressure, reverse soil structure decline from cloven-footed animals, and reduce nutrient loads.
	Assisted revegetation with local provenance stocks of grasses, shrubs and trees where natural revegetation within the offset area is slow after one year.
	Deep ripping soil in the south-east corner of the offset area to reduce compaction.
	Revegetation of capped landfill cells with local grasses and shrubs and stockpiled local topsoil.
	Planted vegetation buffers in key locations in the offset area within access corridor and immediately surrounding the landfill footprint.
Management	Progressive clearing. Parts of the landfill footprint may retain habitat value for 20+ years.
	Minimise removal of mature trees. Mark trees for retention.
	Check hollow bearing trees and stags for nestlings and arboreal mammals before work. Relocate fauna to the offset area.
	Weed control including twice annual weed inspection and removal, and operational measures to prevent weed proliferation.
	Feral animal control by way of habitat modification. Breaking up blackberry thickets and dispersing bulk log piles reduces colonisation by rabbits, which in turn reduces fox and cat numbers. Any feral animal outbreak is to be attended to by an expert exterminator.
	Selected low-intensity thinning where necessary to improve structural complexity, which improves habitat value for native species.
Monitoring	Ongoing monitoring of regeneration in the offset area.
	Monitoring understorey response to grazing removal to determine whether revegetation assistance is necessary. More than 2000 stems per 5 hectares is adequate response.
	Establish monitoring plots and photo points to assist ongoing diversity and quality assessment.

The total offset package is in the ratio of three parts offset to one part vegetation loss and the conditions require that the offset area is secured in perpetuity to the satisfaction of the EPA. The Department and EPA are both satisfied with this ratio because the package involves intensive rehabilitation of the offset area.

Conclusion

Based on the measures described in Table 7, Table 8 and the recommended conditions, the Department is satisfied that:

- the project avoids the need to remove individual stands of tree species listed as vulnerable (i.e. the Narrow Leaved Black Peppermints in the northwest of the site);
- impact on the critically endangered ecological community is not significant because of the minor extent of clearing that is necessary for access construction;
- as a result of the avoidance, minimisation and mitigation measures employed in the project, the impact on threatened or vulnerable species, habitats and endangered ecological communities is acceptable, except for the impact on vulnerable bird species due to habitat removal; and
- a biodiversity offset scheme is warranted because of the project's impact on the vulnerable bird species. The proposed 61-hectare scheme is acceptable.

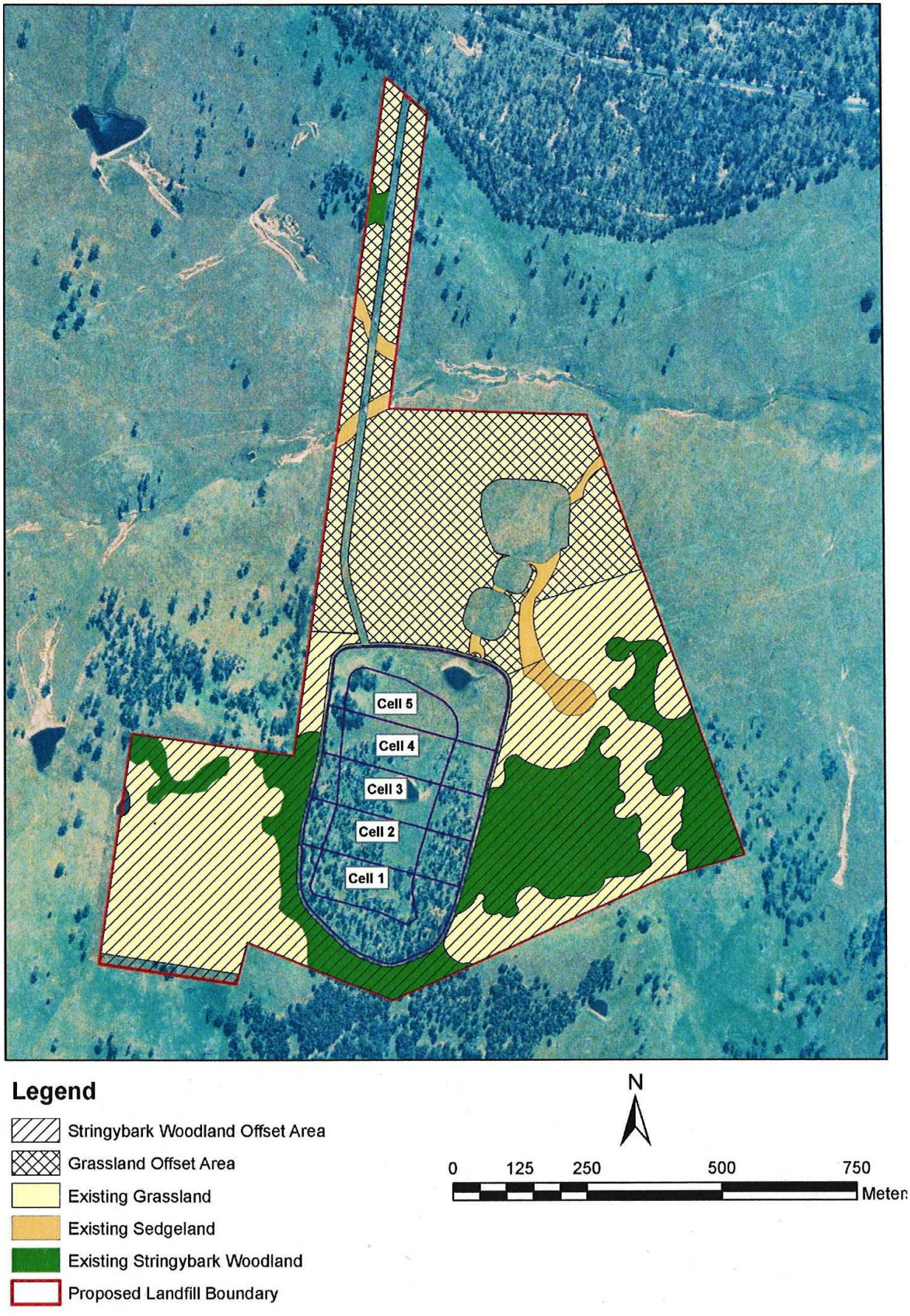

Figure 15 *– A map of proposed bio-diversity offsets.*

5.4 Other Issues

The Department is satisfied that other environmental issues are acceptable or can be adequately managed with approval conditions.

Table 9 below sets out the Department's assessment of matters specified in clause 123 of SEPP (Infrastructure) 2007, which have not already been considered in section 5.1 on page 10. Table 10 on page 29 outlines the Department's summary assessment of environmental issues that have not been assessed in detail in section 5.3 on page 22.

Table 9 *- Assessment of Clause 123 SEPP Infrastructure*

No	***Issue***	***Department's assessment***	***Recommendation***
1	*Best Practice landfill design and operation*	Best practise landfill design and operation is set out in the Benchmark Techniques specified in Appendix A of Environment Protection Authority (1996) *Environmental Guidelines: Solid Waste Landfill.* The proposed design and operation satisfies the Benchmark Techniques and is therefore best practice. Notably, the leachate barrier complies with the requirements for sites that have hydrological risks. The Department has formalised the best practice requirements in the approval conditions by specifying leachate barrier and stormwater design, and the need for the proponent to finalise a Landfill Environmental Management Plan (LEMP) for the project to address operational matters such as dust, litter and vermin control.	Approval conditions for LEMP and landfill design and operation in accordance with Benchmark Techniques.
2	*Landfill gas capture and energy recovery*	The proposed waste volumes are quite small and are not likely to generate viable quantities of gas for energy recovery. The Proponent will review greenhouse gas emissions with possibility to retrofit other gas management devices. The Department has formalised the Proponent's commitment with a condition that requires a greenhouse-gas management plan.	Condition requiring greenhouse gas management plan.
3	*Location and potential land-use conflicts*	The site is outside 'environmentally sensitive areas' specified in Table 1, and suitably distant from land-uses specified in Table 2 to the Department's *EIS Guideline for Landfilling*. Design specifications, mitigation strategies and biodiversity offsets adequately address impacts on endangered ecological communities and intermittent drainage lines. This site is not a disused mine-site, although the site is mostly cleared with degraded natural values. The site is not 'prime' agricultural land but class 4 with relatively low production values.	Site is suitably located. LEMP and offset package address location issues.
4	*Optimal transport links*	The proposed landfill is 12km by road to Armidale. The project would generate on average four return truck-trips per day, and two return car-trips per day, which can easily be accommodated on the route from Armidale without significant impacts. Other sites that were investigated as part of the site selection process were more distant from Armidale, or required the haul route to traverse inferior quality roads. Other waste disposal options such as transport to Coffs Harbour or Tamworth introduce an undesirable social impact associated with long-haul transport such as higher exposure to the risk of traffic accidents, higher green-house gas emissions and higher sensitivity to the price of fuel and objections based on social equity in transporting waste out of region. The Department is satisfied that the subject site is optimally located in terms of transport links.	No conditions necessary for transport links.

Table 10 *- Assessment of other issues*

No	*Issue*	*Department's assessment*	*Recommendation*
1	*Visual impact*	The proposed landfill is generally protected from public vantage points along the Waterfall Way by the existing topography and vegetation. Parts of cell 5 (the final and most down-hill cell) might have been visible from a short stretch of the roadway, except that re-vegetation in the biodiversity offset will be fully mature and providing adequate screening by the time cell 5 commences operation in 40 or so years. The proponent has provided computer rendered perspectives of the fully capped landfill from each of the nearby residences with views of the site. The perspectives show varying degrees of visibility through the sparse vegetation already present. The Department considers that these views will be increasingly screened from view with the advancing maturity of vegetation in the bio-diversity offset area so that by the time the landfill is fully capped and rehabilitated, the site would be virtually indistinguishable from the landscape.	No additional conditions required.
2	*Flooding*	There are intermittent natural drainage lines that traverse the northern part of the site. There are public objections concerning the likelihood of flooding (including the attendant risks for leachate control) and the absence of a flood study in the EA. The Proponent's 'Manning formula' calculations show, in accordance with *Australian rainfall and runoff*, a 40m^3/s flow in the drainage channel during 100 year Average Recurrence Interval storm resulting in a floodplain up to 50m wide and 1.5m deep above the bank, but 8m below the operational parts of the landfill. The Department is satisfied that the risk of inundation in the operational parts of the landfill is extremely low and acceptable. A full flood study might map the flood-plain, water depth, sheer-zones, hydraulic gradients and flow velocity, but this is unnecessary as the operational parts of the site are well above the flood-plain. The proposed site access road traverses the drainage line and will require the construction of a culvert to ensure flood-free access to the landfill. As a result, the Department has formalised this requirement into a recommended condition of approval.	Condition requiring a culvert over affected drainage line(s) to allow for vehicular access to the landfill during a 100-year average recurrence interval flood.
3	*Stormwater and erosion*	Stormwater run-on to active tip areas could have implications for leachate generation and control. Sedimentation build-up may impact on the capacity and effectiveness of the leachate containment system and stormwater control measures. The proposed stormwater system will divert clean water around the landfill. Rainfall over the site that is not contaminated by waste is directed to a sediment pond. To prevent excessive erosion and sedimentation from dispersive soils, stormwater diversion bunds must be keyed into the soil profile. To comply with the Benchmark Techniques, the sedimentation pond must be maintained with capacity for 90th percentile 5 day rainfall to ensure proper settlement of sediment. A stormwater dry-basin is proposed below the whole site. The dry-basin will have capacity to accommodate a 24hr, 100 year Average Recurrence Interval storm (153mm rain) from the entire site. It is a redundancy feature to contain all run-off from the site during very severe wet weather to prevent any downstream impacts. The Department is satisfied that the proposed erosion and stormwater controls comply with the Benchmark Techniques and are adequate.	Conditions require consultation with EPA and the Department for detailed design of stormwater infrastructure in accordance with Benchmark Techniques.
4	*Geological fault line*	A published 1:250k geology map shows a geological fault striking at 50° across the southern portion of the site adjacent to Cell 1. A geological fault could facilitate leachate release and in an earthquake, it may compromise cell and leachate barrier integrity. Expert field observations and review of remote sensing data provided in the EA show no significant evidence of fault on the site or for a distance of 1 to 2km along the mapped strike. There is no explanation in the published geological notes for the mapped position of the fault. Based on the expert's evaluation, the Department is satisfied that there is little risk of the presence of a fault on the subject site.	No conditions required.
5	*Air quality*	The EA included an air quality assessment report by Holmes Air Science showing odour and dust impact modelling for nearby rural residential receivers. The report concluded that dust and odour impacts are likely to be low and below the relevant EPA criteria. The	Proponent's draft LEMP to be finalised and approved by the

No	Issue	Department's assessment	Recommendation
		Department and the EPA have reviewed and support those conclusions. The landfill is 450m from the nearest rural residence to the south. Good landfill management according to the Benchmark Techniques is likely to be effective at controlling dust and odour. The proponent's Draft Landfill Environmental Management Plan includes practices for odour and dust control. The proponent must keep a register of complaints should they arise. The Department can review the complaints register as part of the annual environmental reporting. The Department and EPA are satisfied that the air quality impacts will be acceptable.	Department.
6	*Noise*	The EA included a noise impact assessment report showing noise impact modelling for nearby rural residential receivers. The report concluded that because of the low ambient noise levels in the locality, site operations would need to be controlled to ensure compliance with the *Industrial Noise Policy* criteria. The draft Landfill Environmental Management Plan includes such measures as silencers on heavy machinery, broadband reversing alarms and locating stockpiled material on the south and west sides of an active landfill cell, where practical, to provide sound attenuation. A minor non-compliance with the maximum noise criteria occurs at the nearest residential receiver ('Sherraloy': 450m south) during capping operations (at height) for cell 1. The EPA has reviewed the non-compliance and has deemed the affected residence as part of the Project Site because the affected landowner also owns the subject site. The Department has included a condition for the creation of a noise easement on the affected property to ensure future land-owners are aware of the potential for non-compliance. The Department has also specified operating hours and noise emission limits in the approval conditions to ensure that noise impacts are acceptable.	Approval conditions for operating hours and noise emission criteria. Approval condition for noise easement over Sherraloy.
7	*Aboriginal heritage*	The EA includes a 2006 Archaeological assessment, which involved consultation and site survey with interested Aboriginal groups. There were 2 isolated finds outside the development footprint and these were registered with NPWS as required by the NPW Act. By way of impact mitigation measures, the project includes site induction for personnel, monitoring by on Aboriginal Sites Officer during ground breaking and NPWS stop work protocols for isolated finds. The EPA have not objected to the findings in the Archaeological assessment and the Department is satisfied that matters of Aboriginal heritage have adequately been taken into account.	No additional conditions required. The project already includes impact mitigation measures in the Statement of Commitments.
8	*European heritage*	The proposed access road traverses the Gara Travelling Stock Route. There are no listed European heritage values recorded for the route. Stock routes are quite common. There are no other listed or recorded European heritage values on the site.	No conditions required.
9	*Potential for rural dwelling subdivisions nearby*	Public submissions and the EPA raised an issue about the potential for future rural subdivision nearby resulting in more constrained or prohibitive operational parameters for the landfill. There is only limited potential for rural dwelling subdivision in the locality because of the 1(a) zone. The Armidale LEP specifies minimum size and productivity standards for new rural lots. Any merit assessment of a DA to subdivide rural land that might allow the erection of a dwelling near the landfill would need to consider proximity as a matter of site suitability.	No conditions required.
10	*Site selection process*	Many public submissions raise issue with politicisation and bias in the site selection process. The Department has reviewed the process and can confirm that it occurred over 20 years. It involved detailed review of 11 sites. While the first community selection committee disbanded after the Councils amalgamated, they later developed a weighted selection criteria and ultimately decided on the subject site after considering a consultant's findings and submissions from the community. The Department is satisfied that the site selection process was sufficiently rigorous and considered a range of alternative sites in an open and scientific manner. It is not necessary or indeed open to the Department to review each site on its merits. Many objections were	No conditions required.

No	Issue	Department's assessment	Recommendation
		concerned that only sites offered for-sale were considered whereas a more suitable site might have been found with a wider search. However, the Department considers 'availability for sale' a proper site selection criterion because a project cannot proceed if the land it requires cannot be acquired.	
11	*Bushfire*	Bushfire risks from the landfill operation and other hazards will need to be managed according to the Benchmark Techniques under the Landfill Environmental Management Plan (LEMP). The draft version submitted with the EA includes appropriate measures.	Proponent's draft LEMP to be finalised and approved by the Department prior to operations.

6. CONCLUSION

The Department has assessed the merits of the project having regard to the objects of the EP&A Act and the principles of ecologically sustainable development. This assessment has concluded that with the implementation of the recommended conditions of approval, the impacts of the project can be mitigated and/or managed to ensure an acceptable level of environmental performance.

There is no need of an appraisal on the effect of pollution on downstream environments because the 'no-discharge' leachate containment and monitoring system is specifically engineered to prevent the release of leachate into the environment, irrespective of the site's hydro-geologically risky attributes. The Deparatment has taken a precautionary approach to the assessment of the proposal, and is confident the project will not add to existing pollution loads in the catchment.

The Department recognises the importance of landfill security for the community and acknowledges the Council's ongoing commitment to increase resource recovery. To ensure the community's waste performance will ultimately align with the NSW waste recovery targets, the Department has included a volume-based condition limiting approval to the first two cells. The Council has tentatively agreed to all proposed conditions, but raise an issue with the volume limit because the proposed site infrastructure is based on the full-size landfill and it may not be economical to commence with approval for just two cells. Nevertheless, the Department believes the condition should remain to give the Armidale Council incentive to improve recycling, progress initiatives in waste minimisation and achieve greater landfill compaction rates. The Council may request the condition be reviewed (under application) once a suitable waste strategy is prepared and adopted.

The Department believes that the project is in the public interest, and should be approved subject to conditions.

7. RECOMMENDATION

It is RECOMMENDED that the Planning Assessment Commission:

- approve the project application; subject to conditions; and
- sign the attached instrument of approval (Tagged B).

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A/Senior Planner

Felicity Greenway 5/4/12
Felicity Greenway
Project Manager

5/4/12
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8/4/12
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