



# Additions to Awaba Waste Management Facility

Environmental Assessment - VOLUME 1 (Main Report)

Reference: 600308/Rep2744v4

29 August 2012

Prepared for Lake Macquarie City Council  
138 Main Road Speers Point NSW 2284



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## Document Control

Version	Status	Date	Author		Reviewer	
1	Draft	22 November 2011	Sarah Fitzsimons / Shani Archer	SKF / SCA	Chris Holloway / Kester Boardman	CGH / IKB
2	For Adequacy Review	22 December 2011	Sarah Fitzsimons / Shani Archer	SKF / SCA	Chris Holloway / Kester Boardman	CGH / IKB
3	For Supplementary Adequacy Review	6 July 2012	Sarah Fitzsimons / Shani Archer	SKF / SCA	Chris Holloway / Kester Boardman	CGH / IKB
4	For Public Exhibition	29 August 2012	Sarah Fitzsimons / Shani Archer	SKF / SCA	Chris Holloway / Kester Boardman	CGH / IKB

Cover Photo: Awaba Waste Management Facility (Source: Lake Macquarie City Council)

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## Statement of Certification

This Environmental Assessment has been prepared under Part 3A of the Environmental Planning and Assessment Act 1979. Although Part 3A of the EP&A Act has since been repealed the provisions still apply to this proposal in accordance with Schedule 6A of the EP&A Act.

### Environmental Assessment Approved by:

Name:	Kester Boardman
Company:	Cardno (NSW/ACT) Pty Ltd
Position:	Manager – Environment and Sustainability
Qualifications:	BSc (Hons), MIEMA, CEnv
Address:	Cardno, Level 9, The Forum, 203 Pacific Highway, St Leonards NSW 2065

### Project to which the Environmental Assessment relates:

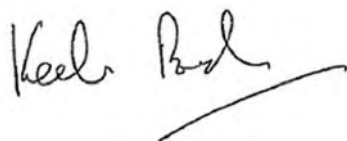
Project Description:	Proposed Additions to Awaba Waste Management Facility, Lot 372 DP 723259, Wilton Road, Awaba
Applicant's Name:	Lake Macquarie City Council
Applicant's Address:	126 – 138 Main Road Speers Point NSW 2284

### Certification:

I certify that I have approved this Environmental Assessment and to the best of my knowledge:

- It has been prepared in accordance with Part 3A of the EP&A Act 1979 and the Regulations (under the provision of Schedule 6A as a transitional Part 3A project);
- It has been prepared in accordance with the Director-General's Requirements dated 21 September 2010; and
- It does not contain information that is either false or misleading.

Signature:



Kester Boardman

Manager – Environment and Sustainability

Date: 29 August 2012

## Executive Summary

Lake Macquarie City Council (LMCC) is proposing to expand the capacity of the Awaba Waste Management Facility (AWMF) located off Wilton Road, Awaba within the Lake Macquarie Local Government Area (LGA). The AWMF is situated on Crown Land that is controlled by LMCC as the appointed Corporate Manager of the Awaba Waste Management Reserve Trust (R170042).

The majority of the proposed works are situated within Lot 372 DP 723259, which has an area of 32.5ha including the existing landfill operations. Approximately 23.5ha comprises the existing AWMF facility and the majority of the remaining 9ha comprises natural bushland. The proposed works include the construction of a sewer pipeline route between the AWMF and Rathmines No.6 WWPS to dispose of excess leachate. The sewer pipeline will follow the route of an existing road reserve, and is the only component of the proposed works located outside of Lot 372 DP 723259.

### LMCC's Waste Strategy

The proposed additions to the AWMF form part of LMCC's Waste Strategy, which proposes a sustainable way forward for the management of the city's waste. Under current conditions, the AWMF receives approximately 100,000 tonnes of waste annually, with an expected increase by approximately 1.2 to 1.3% per year. At this rate the AWMF likely has only four years of landfill volume remaining. The proposed development will enable the existing AWMF to be extended through the provision of additional landfill cells which will extend the lifespan of the landfill site by an estimated 20 years.

The focus of LMCC's Waste Strategy is to implement resource recovery and diversion actions to minimise waste generated and maximise resource recovery rates. LMCC is already in the process of implementing a Phased Three Bin Source Separated Organics waste management process, which will include three domestic household waste bins with different coloured lids for residents to sort their waste into; general rubbish (red), recycling (yellow) and garden/food waste (green). Tenders for LMCC's Organics Waste Processing Project (Tender T903P) and Green and Organic Waste Collection and Bin Supply Services (Tender T903C) were released on 30 November 2011 and both close on 3 April 2012. With the implementation of sustainable measures such as this it is anticipated that waste management in the Lake Macquarie LGA will not be dominated by landfilling in the future. However, there will always be a portion of future waste streams that will not be recoverable for beneficial re-use and as such a suitable disposal mechanism will be required into the future.

The additions to the AWMF only form part of LMCC's Waste Strategy and will manage the unavoidable non-recoverable component of future waste into the future. The Project will also extend the lifespan of the existing landfill whilst additional sustainable waste minimisation practices are being developed. Extension of the current landfill site is preferred to development of a new landfill site elsewhere, particularly as the site is already disturbed from existing landfill operations, acknowledging the potential biophysical, social and economic impacts of the Project in comparison to alternative sites.

## Description of Proposed Works

The key components of the Project are described in the table below.

Infrastructure Component	Key Aspects
Additional landfill cells	<ul style="list-style-type: none"> <li>▪ Excavation of two additional areas on site to create two new landfill cells (Area A and Area B). Excavation would be undertaken in stages as part of the leachate management process;</li> <li>▪ Area A and Area B each have a required excavation volume of 92,000 m<sup>3</sup>;</li> <li>▪ Area C, which will be constructed above the existing landfill area, involves no excavation but will continue to have waste deposited to a higher emplacement (approximately 110m AHD), hence Area C is included in the staging plan;</li> <li>▪ Approximately 2,500,000 tonnes of additional landfill space would be provided; and</li> <li>▪ The final emplacement level would be a maximum of 110m AHD.</li> </ul>
Leachate management system	<ul style="list-style-type: none"> <li>▪ Decommissioning of the existing leachate basin located within Area A, at the north of the AWMF site;</li> <li>▪ Construction of a new leachate basin to the south-west of the site with an 8ML capacity;</li> <li>▪ Retention of the existing 6ML leachate basin to act as a maturation pond; and</li> <li>▪ Construction of a new leachate management system to service the extension of Area A and Area B and above the existing landfill (Area C).</li> </ul>
Landfill gas management	<ul style="list-style-type: none"> <li>▪ Retention of the existing landfill gas management system; and</li> <li>▪ Construction of additional landfill gas and extraction manifold wells.</li> </ul>
Surface water, stormwater and groundwater management	<ul style="list-style-type: none"> <li>▪ Construction of additional groundwater monitoring wells;</li> <li>▪ Construction of surface water diversion and stormwater management infrastructure;</li> <li>▪ Expansion of the existing sediment basin to the south of the AWMF site; and</li> <li>▪ Consolidation of the three existing sediment basins into two new sediment basins adjacent to Area B.</li> </ul>
Green waste processing	<ul style="list-style-type: none"> <li>▪ Relocate existing green waste processing area (3,500m<sup>3</sup>).</li> </ul>
Amenities and reuse centre	<ul style="list-style-type: none"> <li>▪ Retention of the existing reuse centre; and</li> <li>▪ Construction of an additional reuse centre with amenities to expand the recycling and reuse capability of the AWMF.</li> </ul>
Transfer station	<ul style="list-style-type: none"> <li>▪ Construction of a transfer station, where waste is transferred from domestic/commercial vehicles to the transfer station; and</li> <li>▪ Waste will then be transported to the tip face by LMCC vehicles on site, allowing for more efficient waste management and reduce the number of vehicles at the active tipping face.</li> </ul>
Wheel wash facility	<ul style="list-style-type: none"> <li>▪ Installation of a wheel wash facility, to minimise the transportation of sediments from the tipping face onto sealed roads.</li> </ul>

Infrastructure Component	Key Aspects
Weighbridges	<ul style="list-style-type: none"> <li>▪ Demolition of the existing weighbridges (inbound and outbound); and</li> <li>▪ Construction of new weighbridges to meet the future needs of the site.</li> </ul>
Package pumping station and rising main	<ul style="list-style-type: none"> <li>▪ Construction of a package pumping station on site at the AWMF and rising main from the AWMF package pumping station to the Rathmines No. 6 WWPS, to provide a suitable means of disposal for additional leachate generated by the landfill;</li> <li>▪ Construction of the 3.4km DN140 sewer pipeline will be primarily within road reserves to minimise environmental impacts, including: the access road to the AWMF, Wilton Road, Wangi Road, Dorrington Road and the access road to the WWPS;</li> <li>▪ Installation of an aeration system into the leachate management system to undertake preliminary treatment of leachate on site; and</li> <li>▪ Revegetation and landscaping of the pipeline route upon completion of the works.</li> </ul>
Access road	<ul style="list-style-type: none"> <li>▪ Construction of an access road around the perimeter of the site.</li> </ul>

The expansion of the AWMF landfill will occur in 11 stages such that each cell area is lined, filled with waste and capped in a progressive manner to minimise the volume of uncapped waste exposed to incident rainfall, in order to minimise the volume of leachate produced.

Each landfill cell will be progressively revegetated as they are exhausted and capped, in order to minimise visual impacts for the surrounding area and erosion and sedimentation impacts at the AWMF site.

The key components of the staging plan are shown in the table below.

Landfill Area	Landfill Cell	Total Footprint Area (m <sup>2</sup> )	Total Waste Quantity (Tonnes)	Area to be Capped in Stage (m <sup>2</sup> )	Net Waste Capacity for Stage (Tonnes)	Estimated Stage Completion
A	A1	23,585	418,547	11,685	286,160	August 2014
A	A2	17,860	269,206	16,810	257,525	December 2016
A	A3	13,912	132,662	14,262	136,555	February 2018
B	B1	17,269	248,790	15,694	231,268	February 2020
B	B2	17,269	248,790	17,794	254,630	April 2022
B	B3	18,573	250,775	12,098	178,741	October 2023
B	B4	18,573	250,775	20,848	276,085	December 2025
C	C1	25,928	430,440	26,453	436,280	May 2029
C	C2	12,194	116,799	15,344	151,843	July 2030
C	C3	18,072	93,343	21,747	134,228	July 2031
C	C4	24,084	75,263	34,584	192,075	December 2032

## Planning and Approvals Process

LMCC (the proponent) is seeking project approval under Part 3A of the EP&A Act. In accordance with Clause 6 (and Schedule 1) of *State Environmental Planning Policy (Major Development) 2005*, the Minister is of the opinion that Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) applies to the proposed additions to the AWMF. Although Part 3A of the EP&A Act has since been repealed the provisions of Part 3A still apply to this proposal, in Schedule 6A of the EP&A Act for transitional Part 3A projects. As the AWMF and proposed additions are situated on Crown land, land owner consent is required and has been issued by the former Land and Property Management Authority (LPMA).

LMCC prepared and submitted a Major Project application, accompanied by a Preliminary Environmental Assessment (LMCC, 2010) on 11 August 2010. Following consultation with relevant government authorities, Director-General's Requirements (DGRs) were issued under Part 3A of the EP&A Act on 21 September 2010. Amended DGRs were subsequently issued by the Director-General of the Department of Planning and Infrastructure (DP&I) on 3 July 2011 to include the requirements of the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) in response to the proposed works being declared a controlled action under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

All actions that are considered to have a likely significant impact on matter of National Environmental Significance require referral to the DSEWPaC. Flora and fauna investigation at the AWMF site identified a potential impact on species listed under the EPBC Act. As such, a referral to the DSEWPaC was prepared and submitted on 18 May 2011. Following formal exhibition of the referral and consideration by the Minister, the proposed actions were deemed to be a controlled action on 17 June 2011.

The DGRs specified a review of the Project against Clause 123 of the *State Environmental Planning Policy (Infrastructure) 2007*. Clause 123 of the Policy lists considerations for a consent authority when determining a development application for a landfill. The proposed additions to the AWMF are considered to be consistent with the requirements of Clause 123 of the Policy.

The proposed additions to the AWMF, in conjunction with LMCC's Waste Strategy would support the objectives of the *Lower Hunter Regional Strategy* (DoP, 2006) and its partner document the *Lower Hunter Regional Conservation Plan* (DECCW, 2009b) by providing essential infrastructure to allow the continued growth of the region. Without a suitable waste management facility additional social, economic and environmental pressures would likely be placed on the Lake Macquarie community and the Lower Hunter region. Overall, LMCC's Waste Strategy, including this Project are considered to align with the waste minimisation and management principles in the *NSW Waste Avoidance and Resource Recovery Strategy 2007* (DECC, 2007b).

The additions to the AWMF have been undertaken in accordance with the NSW Government's *Environmental Guidelines: Solid Waste Landfills* (EPA, 1996), and as such the proposed design and operation and is considered to comply with best practice.

LMCC has an existing Landfill Environmental Management Plan (LEMP) in place for the current operations at the AWMF. This LEMP will be updated to incorporate the proposed works, to ensure environmental hazards and risks, and occupational health and safety (OH&S) risks are addressed appropriately for the proposed additions to the AWMF site and operations.

### ***Approvals Required***

Under the *Protection of the Environment Operations Act 1997* the operation of the AWMF is considered a scheduled activity and as such an Environment Protection Licence (EPL) is required from the Office of Environment and Heritage (OEH). LMCC hold an EPL (No. 5873) for the current operation of the AWMF, last issued on 25 January 2011 following review. This EPL will either need to be reissued should the Project be approved by the Minister or a new EPL will be required for the additional operations.

In accordance with Section 15 of the *Mine Subsidence Compensation Act 1961* approval under this Section would also be required, should the Project be approved by the Minister.

### **Stakeholder and Community Consultation**

LMCC has undertaken extensive consultation during development of their Waste Strategy. In total, over 50 activities to date have been conducted with the community and LMCC staff to seek feedback on the development of the Strategy.

During the development of the DGRs for the Project, the DP&I consulted with a range of Government agencies and public authorities. Key issues raised and advice provided by the OEH, Office of Water, Department of Primary Industries (DPI) and Rural Fire Services formed the basis of the DGRs. As required by the DGR's further consultation has been undertaken with the OEH, Office of Water, the former Roads and Traffic Authority and the Mine Subsidence Board during the Environmental Assessment process.

With regards to community consultation, two information sessions were conducted on 4 May 2011, including a daytime session held at the Council Chambers and an evening session held at the Toronto Workers Club. Subsequent to this Council held another community meeting at Awaba on 20 July 2011. Local residents were invited to the consultation sessions and advertisements were placed in two local newspapers.

The sessions included presentations by the Project team, interactive components where the community were asked specific questions in relation to the Project and open floor time where attendees were given the opportunity to raise concerns or ask questions of LMCC and the Project team. Issues raised by the community have been addressed in the Environmental Assessment.

### ***Indigenous Community Consultation***

Aboriginal community consultation for the project was also undertaken by both Insight Heritage and Niche for the AWMF site and sewer pipeline site, respectively, with regards to potential heritage impacts. In accordance with the DGRs, consultation was undertaken in accordance with the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005).

Four Aboriginal parties registered their interest in the project, including:

- Awabakal Traditional Owners Aboriginal Corporation;
- Awabakal Descendants Traditional Owners Aboriginal Corporation;
- Awabakal Local Aboriginal Land Council on behalf of Koombahtoo Local Aboriginal Land Council; and
- Cacatua Culture Consultants.

In accordance with the DEC (2005) guidelines the following consultation process was undertaken as part of this Project:

- Notification of the Project and request for registration of interested Aboriginal persons or groups (14 day registration period);
- Review of proposed assessment methodology by registered stakeholders (21 day review period);
- Site surveys of the AWMF site (undertaken 7 and 8 April 2011) and sewer pipeline site (undertaken 4 November 2011) with registered stakeholders; and
- Review of draft assessment report by registered stakeholders (21 day review period).

### **Environmental Impact Assessment**

The Environmental Assessment (EA) Report has been prepared to provide an assessment and analysis of key issues in relation to the Project as specified in the DGRs. The Assessment Report details the existing environment, potential impacts of the proposed works (both in the construction and operational phases) and proposes mitigation and management measures as required to minimise the environmental impacts of the proposed works.

A number of specialist studies were commissioned for the proposed works including a geotechnical assessment, a water quantity and quality assessment, leachate modelling, several flora and fauna assessments and a biodiversity offset assessment, an air quality and odour assessment, several Aboriginal heritage assessments, a visual impact assessment, greenhouse gas modelling and a traffic assessment.

In accordance with the DGRs environmental impacts have been assessed in the EA categorised into the following subheadings:

- Waste management;
- Soils and contamination;

- Water quality and hydrology;
- Leachate;
- Flora and fauna;
- Air quality and odour;
- Aboriginal heritage;
- Non-Aboriginal heritage;
- Visual landscape;
- Greenhouse gas;
- Traffic and transport;
- Hazards and risk;
- Noise and vibration; and
- Cumulative impacts.

A risk assessment was also undertaken for the Project, with each identified risk considered as part of the EA. Proposed management measures to effectively mitigate and manage identified risks were developed where practicable. An overview of the residual environmental risk is also provided in the EA.

### ***Key Environmental Impacts***

The following subheadings indicate the key environmental issues that are anticipated with the works.

#### *Soils and contamination – Mine Subsidence*

The proposed works are located within the West Lake Mine Subsidence District. The NSW Mine Subsidence Board advised that the proposed AWMF landfill cells are underlain by coal seams likely to be mined sometime in the future by Centennial Coal Company Limited, who owns the mining lease.

Centennial Coal (Newstan Colliery) is currently preparing a comprehensive mine subsidence risk assessment in partnership with LMCC, the Mine Subsidence board, GSS Environmental (environmental consultants to Centennial Coal), GHD (Landfill designers), and MSEC (subsidence engineers). Prior to construction, LMCC will consider the results of both this assessment and the existing Geotechnique Report (Appendix F) and undertake a design review to ensure that the final design considers the worst case mine subsidence parameters, and will accommodate the worst case ground movement identified in either document without suffering structural failure or compromising environmental protection.

#### *Soils and contamination – Acid Sulfate Soils (ASS)*

Encountering ASS is not considered likely for works at the AWMF site (within Lot 372 DP 723259).

However, it is anticipated that ASS will be encountered along the sewer pipeline route (based on OEH's ASS risk mapping), particularly in the vicinity of the Rathmines No. 6 WWPS, as it is located close to the Lake Macquarie estuary. An ASS Management Plan will be prepared to manage this issue.

### *Leachate*

Leachate modelling for the proposed landfill expansion indicated that surplus leachate will be produced that requires disposal off site as it is in excess of the volume which can be managed on site. To manage this issue the on-site package pumping station and sewer pipeline from the AWMF to the Rathmines No. 6 WWPS were incorporated into the proposed works to provide a suitable means of disposal for additional leachate generated by the landfill. The Rathmines No. 6 WWPS is operated by Hunter Water Corporation; however, the proposed sewer pipeline will be privately owned and operated by LMCC.

To manage leachate quality leaving the AWMF site aeration will be incorporated into the existing 8ML leachate pond, while a second proposed 6ML leachate pond will act as a maturation pond to settle the sludge. Odour, septicity and slime growth within the pipeline are key issues that will need to be managed during its operation.

### *Flora and fauna – Threatened Species*

Murray *et al* (2012) identified a total area of 8.55ha of Lot 372 to be impacted as part of the AWMF expansion works

No Endangered Ecological Communities (EECs) were identified at the AWMF site; however, the threatened flora species *Tetradlea juncea* (Black-eyed Susan) is located within the direct footprint of the works on the AWMF site. *Tetradlea juncea* is listed as vulnerable under both the *Threatened Species Conservation Act 1995* and the EPBC Act. It was determined that 2,302 *Tetradlea juncea* plants will need to be removed to facilitate the proposed works on the AWMF site. Other threatened flora and fauna species were located within Lot 372 DP 723259; however, not within the direct footprint of the proposed expansion works.

Approximately 1ha of vegetation is located within the direct footprint of the sewer pipeline works and will need to be removed to facilitate the proposed works. The majority of this is comprised of native and non-native herbaceous groundcovers, not substantial vegetation, and no EECs or threatened flora species are located within the direct footprint.

The proposed works at the AWMF will have a significant impact of the population of *Tetradlea juncea* at the AWMF site, but not on the local population. As *Tetradlea juncea* is listed under the EPBC Act and the proposed works are considered to have a likely significant impact on this threatened species, a referral to the Minister of the DSEWPaC was required. As discussed above, the proposed works were deemed to be a controlled action on 17 June 2011.

Due to the location of *Tetradleca juncea* (Black-eyed Susan) over the AWMF site, it is not possible to avoid or minimise impacts on this species due to the AWMF expansion works, which will include the removal of 2,302 *Tetradleca juncea* plants. No other threatened flora species were located within the direct footprint of the works and no threatened fauna species were considered to be significantly impacted by the proposal.

LMCC has made the decision to formalise a BioBanking agreement for the proposed works in order to uphold the "maintain or improve" principle and also facilitate the approval of the development. It is proposed to utilise the remainder of Lot 372, a portion of Lot 373 and an additional suitable area of land (yet to be determined) to offset the impacts of the proposed development on Lot 372. Council has acquired Lot 373 and is currently in the process of identifying an additional area of land to purchase in order to provide additional offsets.

Niche (2012a) conducted a biodiversity offsetting assessment for the site, which includes calculations for ecosystem and species credits that may be used as part of a BioBanking agreement in offsetting the development. Of the 8.55ha of land to be impacted on lot 372 identified by Murray *et al* (2012), Niche (2012a) identified 7.2ha of native vegetation types to be considered in a biodiversity offsetting assessment (2.16ha of Smooth-barked Apple – Red Bloodwood open forest [HU621] and 5.04ha of Scribbly Gum – Red Bloodwood health woodland [HU610]).

Upon establishment of the proposed BioBank Site, 33,853 *Tetradleca juncea* Species Credits will be retired within the BioBanking Scheme. The Species credits created on the parts of the proposed BioBank Site already in Council ownership (i.e. parts of Lots 372 and 373) are well in excess of the Species Credits required to offset the proposed development impact on *Tetradleca juncea*.

The parts of Lots 372 and 373 to be used as a BioBank site will also provide 153 Ecosystem credits for the required vegetation types (of the 392 which are required). LMCC will purchase suitable additional land in order to provide the remaining 239 Ecosystem Credits for the required vegetation types which are required.

Once full details of the proposed BioBanking site are known, LMCC will provide DP&I with a *BioBank Site Management Plan* that commits the proposed Awaba BioBank Site to in-perpetuity management, with required management actions being determined in consultation with OEH.

### *Aboriginal Heritage*

The project area is located within the country of the Awabakal. Insight Heritage conducted an Aboriginal Cultural Heritage Impact Assessment for the expansion works on the AWMF site and Niche conducted a subsequent assessment for the proposed pipeline route.

The Aboriginal Heritage Information Management System (AHIMS) search for the AWMF site indicated that no previously recorded artefacts occurred on Lot 372 with a 50m buffer.

Similarly, the AHIMS search for the sewer pipeline indicated that no previously recorded artefacts were recorded within the impact area of the pipeline, although two midden sites are noted to occur in close proximity (40m west) of the proposed pipeline route near the access road to the Rathmines No. 6 WWPS.

Site surveys of the project area were undertaken. A site survey of the AWMF was undertaken on 7 April 2011 by Insight Heritage and identified three previously unregistered Aboriginal sites, all modified trees. Only one tree is anticipated to be impacted as it is located within the footprint of proposed cell Area B. Although this tree is already dead it may be possible to relocate this artefact prior to the commencement of construction works. It is recommended that the other two modified trees remain in-situ, surrounded by adequate protection during construction to avoid accidental damage.

On 8 April 2011 sub-surface testing was undertaken at the AWMF site by Insight Heritage. A total of seven test probes were used, and only test probe 7 revealed an artefact, which was an isolated silcrete broken flake considered to be of low archaeological significance.

In addition to the above artefacts, Insight Heritage identified an area of potential archaeological sensitivity at the south-western portion of the AWMF site, on the northern side of the creek line through the site. This sensitive area is within the southernmost proposed leachate basin, around test probe 7. Insight Heritage recommended that additional excavation works be undertaken in this area prior to impact.

A site survey of the sewer pipeline route was undertaken on 4 November 2011 by Niche and identified two previously unregistered Aboriginal sites within the pipeline impact area:

- An isolated broken silcrete flake on a heap of construction spoil (low archaeological significance); and
- A midden, consisting of approximately 50 fragments of shell, located on an exposed track immediately north of Wilton Road (moderate archaeological significance).

The proposed sewer pipeline works will impact on a portion of the identified midden and the Aboriginal object; however, these site types are considered to be well represented in the wider landscape (Niche, 2012b). Niche recommends further sub-surfacing testing of the midden site to determine its full nature, extent and significance.

Along with other proposed mitigation measures, this EA recommends that a Cultural Heritage Management Plan be prepared for the project in partnership with registered Aboriginal stakeholders. It is also recommended that Aboriginal stakeholders (Registered Aboriginal Parties) be engaged to monitor all sections of the excavations (ground surface impacts) to allow collection of any artefacts that may be disturbed in excavated areas.

### *Visual Landscape – Visual Impacts*

The visual assessment indicated that the proposed additions to the AWMF will have minor impacts on the visual amenity and landscape features of the area, with impacts primarily being observed in the suburb of Awaba.

This proposed staging of the landfill expansion will accommodate a substantial temporal buffer prior to visual impacts being experienced by potential receivers during the final stages of emplacement. The visible surface of the eventual landfill emplacement will also be revegetated and landscaped so that colours and visual textures would complement and blend in with the surrounding landscape.

### *Traffic and Transport – Traffic Impacts*

There will be minor traffic impacts during the construction phase for the sewer pipeline works, during trenching and installation. These impacts should be localised to Wilton, Wangi and Dorrington Roads and are expected to be relatively short in duration. Once installation and revegetation of the pipeline route is complete there will be no further traffic impacts associated with this component of the works.

The traffic modelling undertaken for the proposed works indicated that the existing intersection of Wilton and Wangi Roads currently underperforms, particularly for vehicles trying to turn right onto Wangi Road. As a result of population increase in the future within the Lake Macquarie LGA some additional trips for waste vehicles will be anticipated to the AWMF. In order to make the intersection of Wilton and Wangi Roads safer and to reduce average delays experienced at the intersection for vehicles turning right onto Wangi Road, LMCC will investigate upgrading this intersection in the future (not as part of the proposed works being assessed but as future works).

### *Hazards and Risk – Bush Fire Impacts*

Due to the proposed removal of vegetation at the AWMF site areas of bush fire prone land and vegetation buffers will change. LMCC has an existing LEMP in place for current operations and conditions at the AWMF site. This LEMP will be updated prior to the commencement of construction works such that environmental hazards and risks and OH&S issues for the expanded site are considered and accounted for appropriately, including changed bush fire conditions at the AWMF site.

### *Noise and Vibration*

Noise and vibration impacts for works at the AWMF site are considered to be minimal given the large distances to the nearest receivers. Works along the sewer pipeline, particularly rock-breaking activities, will generate noise and vibration impacts on nearby surrounding receivers including the Toronto Country Club / users of the Toronto Golf Course, the business park along Dorrington Road (near the roundabout intersection with Wangi Road) and the few residential properties at Rathmines located in close proximity (approximately 10m) to the access road to the WWPS.

Noise calculations determined that jackhammer or rock-breaker operations along the pipeline route would produce a maximum received noise level of 96 dB(A) or 93 dB(A), respectively, at the facades of residences near the access road to the WWPS at the closest receiver distance (10m). These values are well above the “highly noise affected level” of 75 dB(A) prescribed by the DECC (2009b) guidelines for construction noise received at residences. However, the noise calculations are considered to be highly conservative.

Construction noise at these maximum levels should not be experienced for more than a few days at any one location as trenching and installation works should proceed along the pipeline route relatively quickly. In addition the noise calculations demonstrate that noise levels decrease with increasing distance from the sewer pipeline route, such that receivers over 110m from pipeline works within the road reserves should not be experiencing noise above the “highly noise affected level” of 75 dB(A).

### Statement of Commitments

The table below summarises the statement of commitments for LMCC detailing the environmental management and mitigation measures that will be put in place during the construction and operation of the Project to minimise any identified adverse impacts on the environment, along with other commitments associated with the Project. The commitments have been prepared based on the environmental risk analysis and impact assessment undertaken as part of the Environmental Assessment.

Commitments
<b>General</b>
LMCC will undertake the proposed works as described in this EA in accordance with the mitigation and management measures identified in this EA.
LMCC will ensure that a <i>Construction Environmental Management Plan</i> (CEMP) is prepared and implemented for the proposed works. The CEMP will detail appropriate mitigation measures for a range of construction activities and will address soil erosion and sediment control, slope stability, uncovering of contaminated, saline and/or acid sulfate soil, spill management, dust suppression, construction noise and vibration (as a minimum).
LMCC will gain all necessary approvals and permits supporting both the construction and operational phases, including: <ul style="list-style-type: none"> <li>▪ Updating and obtaining a reissue of the existing EPL (Licence No. 5873) for the site, or obtaining a new EPL for the site; and</li> <li>▪ Obtaining approval under Section 15 of the <i>Mine Subsidence Compensation Act 1961</i>.</li> </ul>
LMCC will update and continue to apply the existing LEMP for the AWMF to incorporate any new management/mitigation measures and monitoring requirements considered necessary for the proposed works.
LMCC will undertake community consultation as identified in <b>Section 4.4</b> during the exhibition period of this EA Report, including holding information sessions for the community and stakeholders.
LMCC will ensure that site monitoring is undertaken in accordance with the existing and future Environmental Protection Licence (EPL) for the site.
<b>Waste Management</b>
LMCC will ensure that during construction the site will be kept clear of unnecessary construction waste. Waste materials generated during the construction phase on both the AWMF site and along the sewer pipeline route will

## Commitments

be recycled or reused wherever possible in the first instance.

LMCC will stockpile and reuse soil and vegetation required to be excavated/cleared for the new landfill cells and either reuse these resources as daily cover material for the active tipping face (soil) or process as green waste and use as mulch (vegetation).

LMCC will, wherever practical, place any felled trees or tree limbs in nearby surrounding bushland to act as potential habitat for fauna and reduce the volume of green waste.

LMCC will extend the gas extraction infrastructure into the proposed new landfill Areas A, B and C on a progressive basis into the future so that the capacity for gas capture and energy generation will be enhanced.

LMCC will continue to apply cover material to the active tip face to suppress any litter from becoming airborne during strong winds and escaping into the surrounding environment. LMCC will also continue to undertake litter patrols to manage stray litter.

LMCC will construct the additional facilities at the AWMF out of recycled materials, wherever possible.

LMCC will adopt a phased “three-bin source separated organics” processing system as its preferred waste processing technology for targeting domestic waste, which includes the implementation of a three bin system for domestic use (general rubbish, recycling and garden/food waste).

## Soil and Contamination

LMCC will ensure that an *Erosion and Sediment Control Plan* (ESCP) will be prepared and implemented in accordance with the *Managing Urban Stormwater: Soils and Construction Volume 2* series (DECC, 2008a, 2008b and 2008c) prior to works commencing. The ESCP should include a range of measures in accordance with best practice, including but not limited to progressive/staged vegetation clearing, implementation of sediment fences and flow diversion structures, covering or wetting of stockpiles, usage of excavation materials as future daily cover, ceasing of works and checking the integrity of erosion and sediment controls during heavy rainfall, stabilisation of access points and the installation of rumble grids at access points, and rapid backfilling of excavated pipeline trenches.

LMCC will ensure that an *Acid Sulfate Soils Management Plan* must be prepared for the proposed works in accordance with the *Acid Sulfate Soils Manual* (Stone et al., 1998) that will focus on the trenching works for the installation of the sewer pipeline.

LMCC will ensure that a *Salinity Management Plan* will be prepared for the proposed works that will focus on the trenching works for the installation of the sewer pipeline.

LMCC will ensure that a *Contamination Management Plan* is prepared and implemented in the event that contaminated land is encountered during excavation. In such an event, works would cease immediately and OEH would be notified. Emergency measures (such as diversion of surface runoff away from contaminated areas) would also be implemented in a timely fashion.

Prior to construction, LMCC will consider the existing Geotechnique Report (Appendix F) and the results of the subsidence risk assessment currently being undertaken by Centennial Coal to support an application being prepared to support future mine-workings. (This report is currently being prepared in partnership with LMCC, the Mine Subsidence Board, Centennial Coal, GSS Environmental, GHD and MSEC). LMCC will undertake a design review to ensure that the final design considers the worst case mine subsidence parameters, and will accommodate the worst case ground movement identified in either document without suffering structural failure or compromising environmental protection.

LMCC will facilitate the management of erosion and sediment in the operational phase through stability control measures, utilisation of the proposed wheel was facility, progressive revegetation of capped landfill area and utilisation of the proposed road to minimise surface and vegetation disturbance.

## Water Quality and Hydrology

In accordance with the sites EPL, LMCC currently undertakes groundwater quality monitoring using annual or quarterly grab samples at five sites. Parameters monitored include alkalinity (as calcium carbonate), aluminium,

## Commitments

ammonia, arsenic, biochemical oxygen demand (BOD), barium, benzene, cadmium, calcium, chloride, chlorinated volatile compounds, chromium (hexavalent), chromium (total), cobalt, conductivity, copper, ethyl benzene, fluoride, iron, lead, magnesium, manganese, mercury, nitrate, organochlorine pesticides, organophosphate pesticides, PCBs, phosphate, polycyclic aromatic hydrocarbons, potassium, sodium, sulfate, toluene, total phenolics, total dissolved solids, total organic carbon, total petroleum hydrocarbons, zinc, pH. It is expected that the EPL will be amended for the site to account for the proposed site changes, and LMCC will continue to undertake monitoring according to the amended licence conditions. In addition, LMCC propose to install additional groundwater monitoring wells as shown in in **Figure 5.5** to enable improved monitoring of groundwater quality.

LMCC will ensure that, should dewatering of groundwater be required as part of any excavation works, a licence is sought under the *Water Management Act 2000*.

LMCC will ensure that a *Stormwater Management Plan* is prepared and implemented for the construction phase of the proposed works to mitigate the impacts on water quality.

LMCC will ensure that temporary stormwater quantity and quality management measures are implemented during the construction phase, including the installation of silt curtains, hay bale filters and stormwater diversions.

In accordance with the sites EPL, LMCC currently undertakes stormwater quality monitoring using annual or quarterly grab samples at four sites. Parameters monitored include alkalinity (as calcium carbonate), aluminium, ammonia, arsenic, biochemical oxygen demand (BOD), barium, benzene, cadmium, calcium, chloride, chlorinated volatile compounds, chromium (hexavalent), chromium (total), cobalt, conductivity, copper, ethyl benzene, fluoride, iron, lead, magnesium, manganese, mercury, nitrate, organochlorine pesticides, organophosphate pesticides, PCBs, phosphate, polycyclic aromatic hydrocarbons, potassium, sodium, sulfate, toluene, total phenolics, total dissolved solids, total organic carbon, total petroleum hydrocarbons, total suspended solids, zinc and pH.

LMCC will ensure that the quality of stormwater leaving the site will be in accordance with the limits outlined by ANZECC (2000) and the existing EPL

LMCC will ensure that a 30m buffer zone will be established from the watercourse centre-line and that all water management measures, both temporary construction phase measures and permanent measures, are located outside of this buffer.

LMCC will ensure that the proposed expansion will incorporate appropriate design principles for leachate basins, including ensuring that basin liners are utilised, active storage depths in the proposed basins are 0.75m from the permanent water level to the level of the primary spillway, and overflows from the basins are conveyed to the outfall(s) via 0.5m deep rock lined channel with base widths of 2m and side slopes of 1(V):2(H).

## Leachate

Leachate will be managed in accordance with best practice:

- The entire new landfill area will be lined (implementing a 'piggyback' liner over the existing waste using a LLDPE liner);
- Leachate will be collected, treated and managed/disposed of appropriately for the operational lifetime of the landfill; and
- The landfilling operations will be carefully staged, with care taken at all times to minimise the inflow of water into active landfill areas.

LMCC will incorporate aeration in the proposed 8ML leachate pond, as discussed in **Section 6.4.4** and determined in consultation with HWC, such that surplus leachate disposed of to the sewer network (via the proposed sewer pipeline) meets HWC's quality requirements. The existing 6ML leachate pond will be retained, and operated in series to provide additional physical treatment.

LMCC will ensure that engineering cell design drawings that meet EPA specifications (including the provision of cross sections, cell extension lining, anchoring and capping, leachate collection and disposal system and gas collection system) will be developed as part of the detailed design. LMCC note that this information is also required as part of the required application to vary the existing EPL (Licence No. 5873) to permit the construction of the cell extension.

## Commitments

LMCC will seek to establish a Trade Wastewater Agreement with HWC for the discharge of leachate from the AWMF site to the HWC sewer system.

LMCC will ensure that a sewer flowmeter is installed, and a sampling point established, at the AWMF package pumping station so that volumes and quality of leachate discharged to the HWC sewer network can be monitored.

LMCC currently undertakes leachate quality monitoring via quarterly grab samples at one location, and this includes testing for alkalinity (as calcium carbonate), ammonia, biochemical oxygen demand (BOD), calcium, chloride, fluoride, iron, magnesium, manganese, nitrate, organochlorine pesticides, potassium, sodium, sulfate, total phenolics, total organic carbon, total petroleum hydrocarbons, total suspended solids and pH. LMCC will ensure that leachate quality monitoring continues in accordance with the conditions of the new EPL to be issued for the site.

## Flora and Fauna

LMCC will ensure that a BioBanking Agreement is formalised for the site. LMCC will finalise a *BioBanking Statement* for the Lot 372 Development Site and a *BioBanking Agreement* for the proposed BioBank Site (comprising part of Lot 372, part Lot 373 and an additional suitable area of land (yet to be determined)) to offset the removal of 2,302 *Tetratheca juncea* plants and 7.2ha of native vegetation communities at the site (of a total 8.55ha of vegetation to be impacted). LMCC will make provision for these offset sites to be preserved and managed in-perpetuity.

LMCC will provide DP&I with a *BioBank Site Management Plan* that commits the proposed Awaba BioBank Site to in-perpetuity management and a fund deposit calculated on this basis. The required management actions will be determined in consultation with OEH and can be estimated using Part A of the BioBanking Credit Pricing Spreadsheet (OEH, 2011c)

Upon establishment of the Awaba Biobank Site, LMCC will ensure that 392 Ecosystem Credits of the required vegetation types and 33,853 *Tetratheca juncea* Species Credits will be retired within the BioBanking Scheme.

LMCC will ensure that a *Vegetation Management Plan* is prepared and implemented prior to commencement of the proposed works that will include details pertaining to procedures for clearing, landscaping and revegetation/rehabilitation works that are planned for the AWMF site during the construction, operational and post-closure phases and also immediately following completion of the installation of the sewer pipeline. The plan will include a *Vegetation Clearing Protocol* and a *Weed Management Sub-Plan*.

LMCC will ensure that a *Fauna Management Plan* is prepared and implemented prior to commencement of the proposed works that will provide a protocol for responding to the detection and relocation of native fauna present in trees, hollows and logs that lie within the proposed areas for clearing. LMCC will ensure that details regarding the most appropriate season(s) to undertake clearing with regard to reducing disturbance to fauna (especially nestlings) are included in addition to details regarding the proposed management of pest species during the proposed works. Where they have been prepared and where applicable, LMCC will consider the details set out in *Recovery Plans*, *Threat Abatement Plans* or *Priority Action Statements* for listed threatened species and incorporate relevant mitigation measures into the *Fauna Management Plan*.

## Air Quality and Odour

LMCC will ensure that a *Construction Environmental Management Plan* is prepared and implemented prior to commencement of the proposed works, and that this plan will include management/mitigation procedures for air quality, odour and dust, including minimising the number of stockpiles on site, limiting unnecessary vegetation clearing, and reducing/controlling the number of trips and trip distances where possible.

LMCC will ensure that standard odour management practices for landfill sites will be utilised in the operational phase of the works, including the continuation of current practices such as daily covering/capping of the active tip face, gas monitoring programs and an odour complaints register.

LMCC will ensure that standard air quality management practices for landfill sites will be utilised in the operational phase of the works, including the maintenance of gas collection infrastructure, power generation unit, flare stack, and plant and equipment on site, and a flare stack emission monitoring program.

## Commitments

LMCC will ensure that air quality, odour and dust mitigation measures are implemented during the operational phase of the works, including covering/capping of waste, gas emission monitoring programs, and maintenance of gas infrastructure and site plant/equipment.

LMCC currently undertakes environmental monitoring of methane which includes monthly, in-situ monitoring of %(v/v) methane inside buildings at the site and also on the surface of the landfill. LMCC will ensure that this monitoring continues. Additional gas monitoring locations are proposed as part of the works as shown in Figure 5.4.

## Aboriginal Heritage

LMCC will ensure that a *Cultural Heritage Management Plan* is prepared in partnership with the registered Aboriginal stakeholders and implemented for the construction phase of the proposed works. The CHMP will demonstrate that effective community consultation with local Aboriginal communities has been undertaken during the preparation of the Plan. The CHMP will include procedures for ongoing Aboriginal consultation and involvement, management of all Aboriginal cultural heritage values associated with the project area, the responsibilities of all stakeholders, details of proposed mitigation and management strategies of all sites; including any additional investigation processes, salvage activities, monitoring, etc.; procedures for the identification and management of previously unrecorded sites (excluding human remains), and compliance procedures in the unlikely event that non-compliance with the CHMP is identified.

LMCC will ensure that further archaeological survey around the creek lines at the AWMF site and sub-surface testing of the midden site identified along the pipeline route is undertaken prior to the commencement of construction works to determine the full nature and extent of these archaeologically sensitive areas. These investigations will initially comprise a series of 1m<sup>2</sup> probes spaced evenly over the area of impact along the creek line, but may be expanded if artefact densities warrant further investigation or salvage. A monitoring and collection program will then be undertaken by the registered Aboriginal stakeholders during all proposed sub-surface excavations to allow collection of any artefacts that may be disturbed in this area (with subsequent relocation and reburial “in country” and in a location that will not be subject to any future impacts).

LMCC will ensure that a minimum buffer of 5m around culturally modified trees to be retained will be delineated and enforced to reduce the impacts on these sites. LMCC will conduct further investigations during the detailed design phase as to whether an increase in the size of the buffer distance around culturally modified trees of the project is achievable given site constraints.

LMCC will provide an opportunity for the Registered Aboriginal Parties (RAPs) to monitor the initial ground disturbance works associated with all sections of the excavations (ground surface impacts) so that any potentially impacted artefacts may be collected by the RAPs.

LMCC will develop and implement an Aboriginal Cultural Heritage Induction Program for all personnel associated with the project, to make them aware of the site’s Aboriginal heritage values and artefacts that are to be conserved at the site.

LMCC will ensure that any new Aboriginal artefacts located uncovered due to the development and/or sub-surface excavation or monitoring activities will be recorded and registered with the EPA as part of the assessment process in accordance with the requirements of Section 89A of the NPW Act.

LMCC will ensure that work is ceased immediately in the event that any bone or stone artefacts, discrete distributions of shell or any other objects of potential cultural association are uncovered during earthmoving or other activities, in accordance with the *National Parks and Wildlife Act 1974*, “stop work” provisions.

LMCC will ensure that strategies for the management of Aboriginal sites will be developed in collaboration with the Registered Aboriginal Parties and documented in an Aboriginal Cultural Heritage Management Plan, as recommended by the two Aboriginal Cultural Heritage Assessment Reports (ACHAR).

LMCC will ensure that archaeological excavations of known or Potential Archaeological Deposit/archaeological sensitivity will be conducted (as recommended by the ACHAR) where impacts may result from construction works. The objective of any such excavations will be to confirm whether there is a likelihood of any objects being present (and therefore impacted by the works), and where this is the case to develop appropriate management strategies in collaboration with the Registered Aboriginal Parties and to formalise these in an Aboriginal Cultural

## Commitments

Heritage Management Plan.

### Non-Aboriginal Heritage

LMCC will ensure that none of the non-Aboriginal heritage items identified in the vicinity of the proposed works will be impacted by the proposed works by making the Contractors aware of the items and ensuring the Contractors avoid them.

### Visual Landscape

LMCC will progressively excavate, fill and re-vegetate Areas A and B and subsequently fill and re-vegetate Area C (11 cell areas in total across Areas A, B and C) as shown in the Staging Plan in **Figure 6.9**, which has been developed to minimise the visual impacts of the proposed works.

LMCC will ensure that the application of daily cover to the active tipping face is continued during the construction and operational phases of the works to ensure regular concealment of the landfill emplacement.

LMCC will ensure that revegetation and rehabilitation will be undertaken at the site once the landfill has reached capacity, so that effective concealment of the emplacement will be achieved in the long term.

### Greenhouse Gas

LMCC will continue to recover gases produced by the AWMF for energy generation and to minimise GHG emissions from the AWMF landfill. LMCC will increase the potential for landfill gas harvesting and electricity generation on site through the expansion of gas extraction infrastructure at the site.

Prior to the commencement of the proposed works, LMCC will review the design of the final landfill gas management infrastructure to ensure that it meets the objective of capturing the majority of the gases from the landfill emplacement.

LMCC will continue to monitor landfill gases generated for reporting purposes.

### Traffic and Transport

LMCC will ensure that a *Construction Traffic Management Plan* is prepared and implemented for the proposed works.

LMCC will ensure that the intersection of Wilton/Wangi Roads is upgraded to appropriately provide for existing traffic volumes and to reduce average delays experienced at the intersection for vehicles turning right onto Wangi Road.

### Hazards and Risks

LMCC will continue to undertake the procedures detailed in the *Awaba Landfill Environmental Management Plan* (LMCC, 2006) to achieve compliance with the EPL issued for the site.

LMCC will undertake a detailed risk review during the detailed design of the proposed additions, and any additional mitigation measures identified as being required will be incorporated into the *Awaba Landfill Environmental Management Plan*.

LMCC will revise the site-specific *Fire Management Plan* within the *Awaba Landfill Environmental Management Plan* to ensure it remains current considering the proposed works.

LMCC will continue to implement OH&S practices and adhere to relevant OH&S standards to ensure employee and user safety at the AWMF site.

LMCC will work with HWC, as required, to enable the AWMF, pipeline and WWPS risks to be managed in an integrated manner.

### Noise and Vibration

LMCC will ensure that a *Noise and Vibration Management Plan* is prepared in accordance with the *Interim*

### Commitments

*Construction Noise Guideline* (DECC, 2009b) and implemented for the construction phase of the proposed works.

LMCC will continue to undertake the procedures detailed in the *Awaba Landfill Environmental Management Plan* (LMCC, 2006) to mitigate operational noise at the site.

This EA concludes that overall the proposed additions to the existing AWMF will not have a significant environmental impact, providing mitigation and management measures specified in this report are employed and implemented during construction and operation.

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Appendix N Sewer Pipeline Aboriginal Heritage Report

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Appendix P Traffic Report

Appendix Q Landfill Gas Management

## Glossary and Abbreviations

ADTOAC	Awabakal Descendants Traditional Owners Aboriginal Corporation
AHD	Australian Height Datum. A geodetic datum for altitude measurement in Australia
HIMS	Aboriginal Heritage Information Management System
ALALC	Awabakal Local Aboriginal Land Council
ANZECC	Australian and New Zealand Environment Conservation Council
ASS	Acid Sulfate Soil
ASSMAC	NSW Acid Sulfate Soil Management Advisory Committee
ATOAC	Awabakal Traditional Owners Aboriginal Corporation
AVD	Average Delay. Provides an indication of the length of delay experienced by vehicles at an intersection and is measured in seconds
AWMF	Awaba Waste Management Facility
AWS	Automatic Weather Station
AWT	Alternative Waste Treatment
BioBanking	A biodiversity banking and offsets scheme, which enables proponents to offset biodiversity impacts through a scheme of acquiring credits which can be traded
BOD	Biochemical Oxygen Demand
BoM	Australian Bureau of Meteorology
Bonn Convention	Convention on the Conservation of Migratory Species of Wild Animals, under the EPBC Act
C&D	Construction and Demolition waste
C&I	Commercial and Industrial waste
CAMBA	China-Australia Migratory Bird Agreement. A bilateral agreement relating to the conservation of migratory birds, under the EPBC Act
CEMP	Construction Environmental Management Plan
CH <sub>4</sub>	Methane
CHMP	Cultural Heritage Management Plan
CO	Carbon monoxide
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> -e	Carbon dioxide equivalent emissions, used to measure the GWP of other GHGs
CTMP	Construction Traffic Management Plan
dB	Decibel. A scale used in sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure
dB(A)	A value used for 'A-weighted' sound pressure levels. 'A' frequency weighted is an adjustment made to sound-level measurement to approximate the response of the human ear
DBYD	Dial Before You Dig
DCCEE	Australian Department of Climate Change and Energy Efficiency
DEC	Former NSW Department of Environment and Conservation (now OEH)
DECC	Former NSW Department of Environment and Climate Change (now OEH)
DECCW	Former NSW Department of Environment, Climate Change and Water (now OEH)
DGRs	Director-General's Requirements

DOC	Degradable Organic Carbon. The portion of organic carbon present in solid waste such as paper, food and green waste that is susceptible to biochemical decomposition
DoP	Former NSW Department of Planning (now DP&I)
DoS	Degree of Saturation. A measure of intersection performance between 0 and 1 that relates to the length of intersection queues and delays in traffic
DP&I	NSW Department of Planning and Infrastructure
DPI	NSW Department of Primary Industries
DSEWPaC	Australian Department of Sustainability, Environment, Water, Population and Communities
EA	Environmental Assessment
EEC	Endangered Ecological Community, listed under Schedule 1 of the TSC Act
EOI	Expression of Interest
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPA	NSW Environment Protection Authority
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
EPL	Environment Protection Licence, issued under the PoEO Act
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically Sustainable Development. Development that aims to meet the needs of people today, while conserving ecosystems for the benefit of future generations
FMP	Fauna Management Plan
GHG	Greenhouse Gas. Gases that contribute to global warming, known as the Greenhouse Effect. There are several GHGs, and they all have varying GWP
GIS	Geographical Information Systems
GLC	Ground Level Concentration of odour
GPS	Global Positioning System
GWP	Global Warming Potential. The higher the GWP of a gas, the more impact each tonne of that gas has on the Greenhouse Effect. To standardise GHGs for reporting and accounting purposes GHGs can be expressed as tonnes of carbon dioxide equivalent emissions, where carbon dioxide has a GWP of 1
H <sub>2</sub> S	Hydrogen sulphide
HFC	Hydrofluorocarbon
HIR	Hunter Integrated Resources
HWC	Hunter Water Corporation
I&I NSW	Former Industry and Investment NSW (now DPI)
Infrastructure SEPP	<i>State Environmental Planning Policy (Infrastructure) 2007</i>
IPCC	Intergovernmental Panel on Climate Change
JAMBA	Japan-Australia Migratory Bird Agreement. A bilateral agreement relating to the conservation of migratory birds, under the EPBC Act
L <sub>p</sub>	Sound pressure level (noise), at a given distance
L <sub>w</sub>	Sound power level, at the source of the noise
LEMP	Landfill Environmental Management Plan
LGA	Local Government Area
LLDPE	Linear Low Density Polyethylene. Impermeable material that can be used as a liner

LMCC	Lake Macquarie City Council
LoS	Level of Service. Related to AVD and uses letters (A to F) as rankings to represent the performance of the intersection (A being a good level of service and F being a poor level of service)
LPI	NSW Land and Property Information
LPMA	Former NSW Land and Property Management Authority
Major Development SEPP	<i>State Environmental Planning Policy (Major Development) 2005</i>
MSC Act	<i>Mine Subsidence Compensation Act 1961</i>
MSW	Municipal Solid Waste
MUSIC	Model for Urban Stormwater Improvement Conceptualisation. A program used to model stormwater quality
NEPC	National Environment Protection Council
NES	National Environmental Significance. Matters of NES are listed under the EPBC Act
NGA	National Greenhouse Accounts
NGER Act	<i>National Greenhouse and Energy Reporting Act 2007</i>
NO	Nitric oxide
NO <sub>2</sub>	Nitrogen dioxide
NO <sub>x</sub>	Oxides of Nitrogen
NPWS	National Parks and Wildlife Service
O <sub>2</sub>	Oxygen
OEH	NSW Office of Environment and Heritage
OH&S	Occupational Health and Safety
PAD	Potential Archaeological Deposit
PFC	Perfluorocarbon
PoEO Act	<i>Protection of the Environment Operations Act 1997</i>
Putrescible waste	Waste being food or animal matter (including dead animals or animal parts), or unstable or untreated biosolids
PWWF	Peak Wet Weather Flow
Ramsar	An international treaty which identifies wetlands of international importance
RFS	NSW Rural Fire Service
RTA	Former NSW Roads and Traffic Authority, now NSW Roads and Maritime Services
Scope 1 emissions	Direct (or point source) GHG emissions generated directly by an activity
Scope 2 emissions	Indirect GHG emissions generated outside of an activity's boundaries to provide energy to the activity
Scope 3 emissions	Upstream and indirect GHG emissions due to third party supply chains that are in direct relation to an activity
SEPP	State Environmental Planning Policy
SF <sub>6</sub>	Sulphur hexafluoride
SIA	Sustainable Infrastructure Australia
Solid Waste Class 1 landfill	All solid waste including putrescible wastes and other wastes approved by the EPA are accepted at the landfill
Solid Waste Class 2 landfill	All solid waste with the exception of putrescible wastes and other wastes approved by the EPA are accepted at the landfill

SO <sub>2</sub>	Sulphur dioxide
SOER	Specific Odour Emission Rates. The quantity (mass) of odour emitted per unit time from a unit surface area (OU.m <sup>3</sup> /m <sup>2</sup> /s)
SSO	Source Separated Organics
STA	NSW State Rail Authority
Stormwater	In the case of this project, refers to surface runoff that comes into contact with the landfilled areas.
Surface waters	In the case of this project, refers to surface runoff that is diverted around the landfill areas.
TKN	Total Kjeldahl Nitrogen
TP	Total Phosphorus
TSC Act	<i>Threatened Species Conservation Act 1995</i>
TWA	Trade Waste Agreement
VMP	Vegetation Management Plan
VOC	Volatile Organic Compound
WARR Act	<i>Waste Avoidance and Resource Recovery Act 2001</i>
WWPS	Waste Water Pump Station
WWTW	Waste Water Treatment Works

# 1 Background to the Project

This chapter provides a brief introduction to the proposed additions to the Awaba Waste Management Facility and details the structure of the environmental assessment report.

## 1.1 Overview

Lake Macquarie City Council (LMCC) is proposing to expand the capacity of the Awaba Waste Management Facility (AWMF) located off Wilton Road, Awaba within the Lake Macquarie Local Government Area (LGA) (**Figure 1.1**). The AWMF is situated on Crown Land that is controlled by LMCC as the appointed Corporate Manager of the Awaba Waste Management (R170042) Reserve Trust (Gazette of 20<sup>th</sup> July 2001, folio 5478).

The proposed additions to the AWMF form part of LMCC's *Waste Strategy*, which proposes a sustainable way forward for the management of the city's waste. The landfill operates under an existing development consent for a maximum emplacement level of 94mAHD. Mitchell McCotter (1993) projected that based on this approved level, landfill capacity equates to 2.9 million cubic metres (if final cover material and topsoil are deducted). Under current conditions, the AWMF receives approximately 100,000 tonnes of waste annually, with an expected increase by approximately 1.2 to 1.3 percent per year. At this rate it has been estimated that the AWMF has only four years of landfill volume remaining.

The proposed development will enable the existing AWMF to be extended through the provision of two additional excavated landfill cells (Areas A and B) and continued emplacement over the existing landfill area (Area C) which will extend the lifespan of the landfill site by an estimated 20 years.

The focus of LMCC's *Waste Strategy* is to implement resource recovery and diversion actions to minimise waste generated and maximise resource recovery rates. With the implementation of sustainable measures such as this it is anticipated that waste management in the Lake Macquarie LGA will not be dominated by landfilling in the future. However, there will always be a portion of future waste streams that will not be recoverable for beneficial re-use and as such a suitable disposal mechanism will be required into the future.

The additions to the AWMF only form part of LMCC's *Waste Strategy* and will manage the unavoidable non-recoverable component of future waste into the future. The Project will also extend the lifespan of the existing landfill whilst additional sustainable waste minimisation practices are being developed. Extension of the current landfill site is preferred to development of a new landfill site elsewhere, particularly as the site is already disturbed from existing landfill operations.

The key components of the project include the following and the majority are shown on **Figure 1.2**:

- Staged excavation of two new areas on-site to create additional landfill space (Areas A and B);
- Additional emplacement over the existing landfill Area C;
- Expansion of the on-site leachate management system;
- Installation of a package pumping station on-site and a rising main to transfer excess leachate to the No. 6 Waste Water Pump Station (WWPS) at Rathmines;
- Installation of additional sediment management basins;
- Expansion of the landfill gas management system;
- Construction of a permanent transfer station;
- Construction of a wheel wash facility;
- Replacement of the existing weighbridges; and
- Construction of an additional reuse centre with amenities.

A more detailed description of the project can be found in **Section 5**.



## Site Location

ADDITIONS TO AWABA WASTE MANAGEMENT FACILITY ENVIRONMENTAL ASSESSMENT

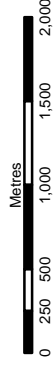
### Legend

- Site Boundary
- Lake Macquarie



FIGURE 1.1

1:45,000 Scale at A4



Map Produced by Cardno NSW/ACT Pty. Ltd 2812  
Date: 2012-04-26  
Coordinate System: GDA 1984 MGA Zone 56  
Project: 12000008  
Map: C10101\_Site\_Overview.mxd 02  
Imagery supplied by LMCC and associated third party suppliers

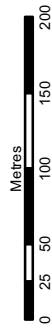


# Key Components of Proposed Additions

- ADDITIONS TO AWABA WASTE MANAGEMENT FACILITY ENVIRONMENTAL ASSESSMENT**
- Legend**
- Site Boundary
  - Existing Final Approval Footprint
  - Existing Creekline (to be retained)
  - Existing Gas Lines (to be retained)
  - Proposed Sewer Pipeline
  - Proposed Excavation Extent
  - Proposed Design Contours
  - Proposed Transfer Station
  - Proposed Weighbridge
  - Proposed Reuse Centre
  - Proposed Wheel Wash Facility
  - Proposed Roads
  - Proposed Gas Lines and Wells
  - Existing Leachate Basin (to be retained)
  - Existing Leachate Basin (to be removed)
  - Existing Sediment Basin (to be retained)
  - Existing Sediment Basin (to be removed)
  - Existing Reuse Centre (to be retained)
  - Existing Reuse Centre (to be removed)
  - Existing Storage Building (to be retained)
  - Existing Weighbridge (to be removed)
  - Proposed Green Waste Processing Area
  - Proposed Leachate Ponds
  - Proposed Sediment Ponds
  - Cadastre
- Staging**
- Proposed Area A
  - Proposed Area B
  - Proposed Area C

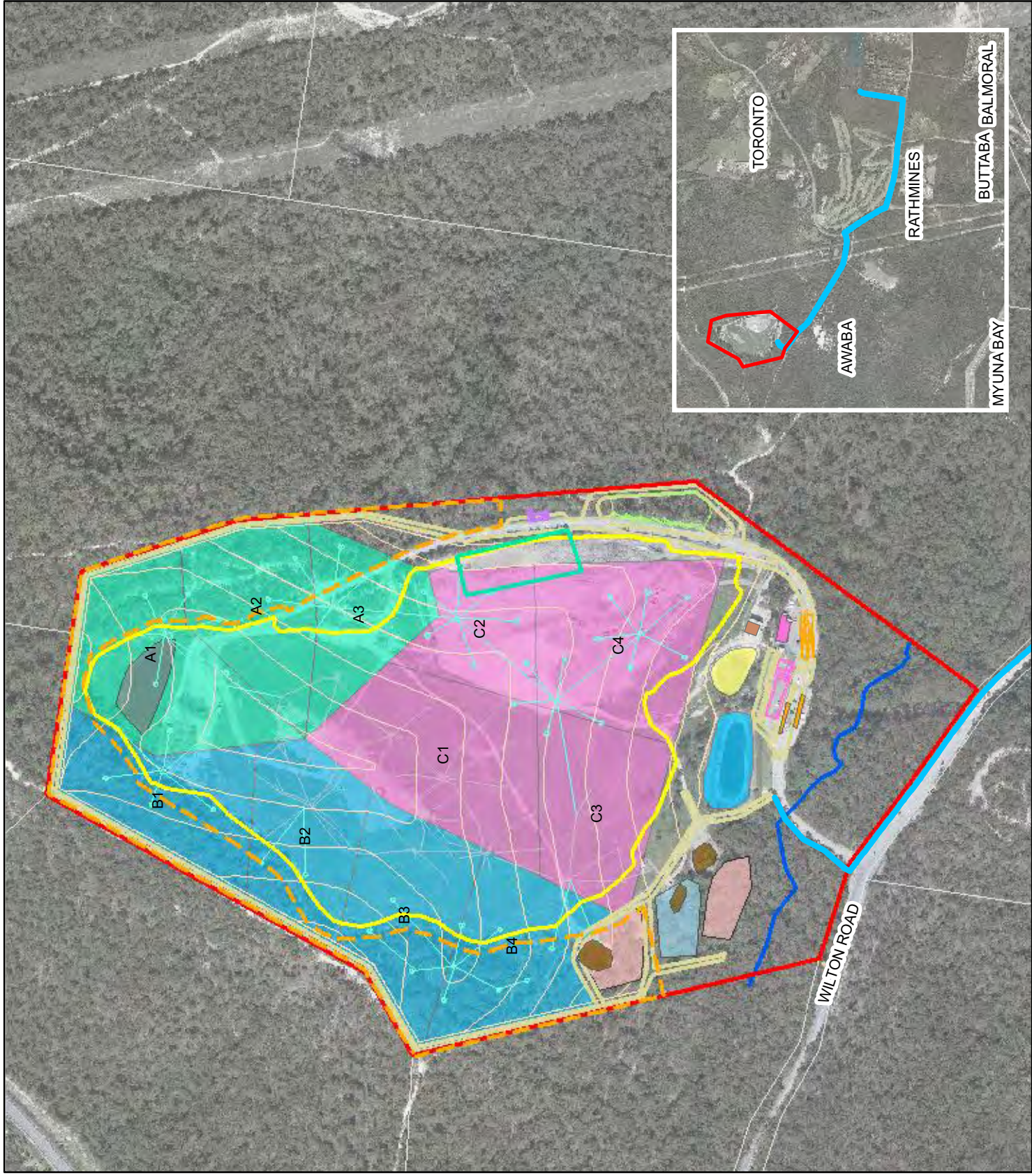


FIGURE 1.2  
1:5,000 Scale at A4



Map Produced by Cardno NSW/ACT Pty Ltd 2812  
Date: 2012.06.05  
Coordinate System: GDA 1984 MGA Zone 56  
Project: 600308  
Map: G1002\_ProposedAdditionsA3.mxd 02

Imagery supplied by LMCC and associated third party suppliers



## 1.2 Purpose and Structure of the Environmental Assessment Report

In accordance with Clause 6 (and Schedule 1) of *State Environmental Planning Policy (Major Development) 2005* (Major Development SEPP), the Minister is of the opinion that the proposed additions to the AWMF are of a kind to which Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) applies. Although Part 3A of the EP&A Act has since been repealed the provisions of Part 3A still apply to this proposal as it is considered to be a transitional Part 3A project under Schedule 6A of the EP&A Act. As such, LMCC (the proponent) is seeking project approval under Part 3A of the EP&A Act (refer to **Section 3** for further discussion of the planning and assessment process).

This Environmental Assessment (EA) Report has been prepared to provide an assessment and analysis of key issues in relation to the Project as specified by the Director-General of the Department of Planning (DoP) (now the Department of Planning and Infrastructure) in consultation with key government authorities. The environmental assessment includes consideration of:

- Waste Management;
- Soil, water and leachate;
- Flora and fauna;
- Air quality and odour;
- Heritage (Indigenous and European);
- Visual;
- Greenhouse gas;
- Traffic and transport;
- Hazards and risk; and
- Noise.

**Table 1.1** outlines the structure of the EA Report and provides a brief description of the information contained within each chapter.

**Table 1.1: Structure of the Environmental Assessment Report**

Report Chapters and Appendices	Description
Chapter 1: Background to the Project	This chapter provides a brief introduction to the proposed additions to the Awaba Waste Management Facility and details the structure of the environmental assessment report.
Chapter 2: Need for the Project	This chapter provides discussion on the need for and justification of additional capacity at the AWMF. The strategic and planning context of the Project is considered along with discussion on how the Project relates to the overarching Waste Strategy for the LGA.
Chapter 3: Planning and Assessment Process	This chapter discusses the statutory environmental and planning requirements for the Project under Commonwealth and State legislation. Consideration of

Report Chapters and Appendices	Description
	the Project in the context of Ecologically Sustainable Development is also provided.
Chapter 4: Stakeholder and Community Consultation	This chapter describes the consultation undertaken to date during the preparation of the EA Report and provides an overview of consultation undertaken during the development of LMCC's Waste Strategy. It includes consultation with relevant local, State and Commonwealth Government authorities, service providers, community groups and affected landowners as per the DGRs.
Chapter 5: Study Area and Project Description	This chapter presents an introduction to the study area and provides a more detailed description of each of the key aspects of the proposed extension to the AWMF.
Chapter 6: Assessment of Environmental Impacts	This chapter identifies the potential environmental impacts associated with the construction and operation of the proposed additions to the AWMF. The assessment and analysis of key issues has been undertaken in accordance with the DGRs and includes a range of measures to mitigate and manage the potential impacts on the environment.
Chapter 7: Environmental Risk Assessment	This chapter details the environmental risk assessment undertaken for the Project. Each risk was considered as part of the environmental assessment and mitigation and management measures were developed where practicable. An overview of the residual environmental risk is also provided.
Chapter 8: Statement of Commitments	This chapter provides a Statement of Commitments for LMCC detailing the environmental management and mitigation measures that will be put in place during the construction and operation of the Project to minimise any identified adverse impacts on the environment, along with other commitments associated with the Project.
Chapter 9: Conclusions	This chapter provides a summary of the findings of the environmental assessment and gives consideration to the likely residual impacts of the Project in light of the mitigation and management measures proposed.
Chapter 10: References	Provides the references used in the preparation of the EA Report. Additional references are also included in specialist technical reports where appropriate.
Appendix A: EPBC Referral Decision	Includes the Notification of Referral Decision and Decision on Assessment Approach by DSWEPAc under the EPBC Act, issued on 17/6/2011. Also attached is the notice of decision relating to the variation of the proposed works to include the pipeline.
Appendix B: Director General's Requirements	Includes the amended DGRs for the Project, issued on 3/7/2011, following the EPBC referral decision.
Appendix C: Consultation Summary for LMCC Waste Strategy	Includes the <i>Community Consultation Report Waste Strategy Project (Processing Technology) 2010</i> by LMCC.

Report Chapters and Appendices	Description
Appendix D: Design Drawings by GHD	Includes design drawings 21-19318-SK013 (Revision C, dated March 2011), 22-15548-A001 (Revision 2, dated 12/7/2011) and 22-15548-A002 (Revision 0, dated 30/6/2011) by GHD.
Appendix E: AWMF Waste Audit Report	Includes the <i>Awaba Landfill Waste Audit Report</i> by MRA, issued in May 2010.
Appendix F: AWMF Geotechnical Report	Includes the letter prepared by Geotechnique detailing their geotechnical investigations undertaken for the Project, issued on 13/12/2011.
Appendix G: Water Quantity and Quality Report	Includes the <i>Awaba Waste Management Facility – Water Quantity and Quality Assessment</i> report undertaken for the Project by Cardno, issued in December 2011.
Appendix H: Leachate Model	Includes the leachate inputs and model (generated in excel), prepared by Cardno for the Project.
Appendix I: AWMF Site Flora and Fauna Report	Includes the <i>Flora and Fauna Investigations Awaba Landfill Lot 372 DP723259</i> report prepared by Murray <i>et al.</i> The report details the flora and fauna investigations undertaken specifically for the landfill expansion works and additional facilities at the AWMF site.
Appendix J: Sewer Pipeline Flora and Fauna Report	Includes the <i>Flora and Fauna Assessment Proposed Pipeline From Awaba Waste Disposal Facility to Rathmines SPS</i> report prepared by Niche. The report details the flora and fauna investigations undertaken specifically for the proposed sewer pipeline.
Appendix K: Biodiversity Offset Report	Includes the <i>Awaba Waste Facility Offsetting Assessment Report</i> prepared by Niche for the Project.
Appendix L: Air Quality and Odour Report	Includes the <i>Air Quality and Odour Assessment – Awaba Landfill Extension</i> report prepared by PAE Holmes for the Project.
Appendix M: AWMF Aboriginal Heritage Report	Includes the <i>Aboriginal Cultural Heritage Impact Assessment – Proposed Expansion Awaba Waste Treatment Facility, Awaba, NSW</i> report prepared by Insight Heritage for the Project, issued in December 2011.
Appendix N: Sewer Pipeline Aboriginal Heritage Report	Includes the <i>Aboriginal Cultural Heritage Assessment – Awaba Waste Management Facility Proposed Pipeline, Awaba</i> report prepared by Niche for the Project.
Appendix O: Greenhouse Gas Model	Includes the greenhouse gas inputs and model (generated in excel), prepared by Cardno for the Project.
Appendix P: Traffic Report	Includes the <i>Awaba Waste Management Facility Traffic Impact Assessment</i> report prepared by Cardno for the Project, issued in December 2011.

### 1.3 The Proponent

For the purposes of Part 3A of the EP&A Act, the proponent for this Project is Lake Macquarie City Council (LMCC). Lake Macquarie is one of the fastest growing cities in the Hunter, and one of the largest cities in NSW. The Lake Macquarie LGA covers an area of 644km<sup>2</sup>.

Lake Macquarie's population is fast approaching 200,000 and is the Hunter's largest city, accounting for 37% of the Lower Hunter population. The population of Lake Macquarie is expected to grow by 60,000 – 70,000 people over the next 25 years, which will create a demand for approximately 36,500 new dwellings and provide increased pressures for waste management services in the LGA.

## 2 Need for the Project

This chapter provides discussion on the need for and justification of additional capacity at the AWMF. The strategic and planning context of the Project is considered along with discussion on how the Project relates to the overarching Waste Strategy for the LGA.

### 2.1 Strategic and Planning Context

#### 2.1.1 Lower Hunter Regional Strategy

The Lower Hunter Regional Strategy (DoP, 2006) applies to the five local government areas of Newcastle, Lake Macquarie, Port Stephens, Maitland and Cessnock. The Strategy was developed to ensure that adequate land is available and appropriately located to sustainably accommodate the projected housing and employment needs of the Region's population for the period 2006 to 2031.

The primary purpose of the strategy is to:

- Ensure that sufficient employment lands are available to cater for 66,000 new jobs;
- Plan for an additional 160,000 residents and 115,000 new dwellings;
- Establish important green corridors, to protect and even enhance the Region's strong environmental and biodiversity assets; and
- Reinforce the role of the Newcastle City Centre as a regional City.

The proposed additions to the AWMF, in conjunction with LMCC's *Waste Strategy* would support the objectives of the Lower Hunter Regional Strategy (DoP, 2006) by providing essential infrastructure to allow the continued growth of the region. Without a suitable waste management facility it is considered that additional social, economic and environmental pressures would be placed on the community within the Lake Macquarie LGA and the Lower Hunter region.

The Lower Hunter Regional Strategy operates in conjunction with the Regional Conservation Plan (refer **Section 2.1.2**) to ensure that future growth of the Lower Hunter provides a positive contribution to the protection of sensitive environments and biodiversity within the region.

#### 2.1.2 Lower Hunter Regional Conservation Plan

The *Lower Hunter Regional Conservation Plan* (DECCW, 2009b) 'sets out a 25-year program to direct and drive conservation planning and efforts in the Lower Hunter Valley and is a partner document to the Lower Hunter Regional Strategy. The Regional Conservation Plan identifies areas with significant conservation values, which provide habitat for endangered ecological communities or threatened flora and fauna and proposes a range of mechanisms to protect these areas.

The Plan is focused on the next 25 years and seeks to establish a framework to guide conservation efforts in the Lower Hunter. The first stage of the plan has been implemented, and has included the transfer of approximately 20,000ha of high conservation value Government lands to the Office of Environment and Heritage (OEH).

The primary objectives of the Regional Conservation Plan are to complement the Lower Hunter Regional Strategy by:

- Describing the conservation values of the Lower Hunter Region;
- Analysing the current status of biodiversity within the region, and assessing the likely impacts of development on biodiversity;
- Assessing the biodiversity values of the region, at a landscape scale, and identifying strategic areas for biodiversity protection, enhancement or restoration;
- Contributing to a practical framework that can secure, improve or maintain biodiversity values as the Hunter grows over the next 25 years; and
- Guiding local level planning with respect to biodiversity, including the development of local biodiversity conservation strategies and the development of new Local Environmental Plans that can merit biodiversity certification.

Whilst the works would require impact to an area of approximately 8.55ha (7.2ha of which contains vegetation which requires biodiversity offsetting), it will also provide significant conservation of key habitats and communities through the provision of biodiversity and species offsets (refer **Section 6.5**). As such, the proposed additions to the AWMF are considered to be consistent with the objectives of the Regional Conservation Plan.

### **2.1.3 Lake Macquarie City Council Waste Strategy**

#### *2.1.3.1 Background*

In November 2009, in response to the demise of the regional waste management solution (**Section 2.3.1**), LMCC commenced the Waste Strategy Development Project to formulate a new domestic waste service for the Lake Macquarie LGA. The Waste Strategy Project is being developed to respond to the pressures of:

- Finite, limited landfill capacity;
- Increasing waste levies;
- Potential carbon pollution taxes;
- NSW waste diversion policies; and
- Community Expectations.

LMCC's initial efforts are being focussed on advancing the understanding and responses to the management of the domestic waste stream, although it is acknowledged that other waste streams will need to be targeted in due course. Domestic waste is being targeted as it currently comprises 70% of all material presenting at the AWMF for filling.

As well as the volume of domestic waste to be managed, the makeup of the waste within the domestic stream indicates some immediate opportunities to divert significant proportions of the domestic waste stream.

### 2.1.3.2 'No Regrets' Activities

At the outset of the Waste Strategy Project a number of 'no regrets' activities were identified by LMCC. These activities are considered 'no regrets' as they make a positive contribution to the City's waste management problem regardless of the strategy adopted by LMCC on a waste solution. These activities included:

**Additions to Awaba Waste Management Facility:** Even though LMCC's waste strategy will not be dominated by landfilling in the future, there will be a portion of the waste stream that is not recoverable for beneficial re-use. Additionally, the implementation of the strategy once adopted may take two to three years to implement, due to development approval, tendering and financing processes. An increased capacity at Awaba represents a safety net to Lake Macquarie while the new waste strategy is being devised and implemented, and a solution for disposal of residual wastes that cannot be economically recovered from the waste stream.

An engineering analysis was undertaken to determine whether, in concept, an extension of the capacity at the AWMF was feasible on the current land holding. That feasibility is documented in *Report for Awaba Waste Management Facility: Feasibility Analysis* (GHD, 2010). The analysis returned a positive result and LMCC resolved in June 2010 to pursue a project approval for the extension, the subject of this EA Report.

**Awaba Site Extension:** LMCC recognised that the waste strategy, when adopted, would likely include the provision of new waste processing infrastructure. Both a two bin and three bin system require receipt, pre-treatment, composting vessel, maturation, post treatment and storage facilities. Most of these facilities will need to be within structures that are serviced by odour control plant. All waste management facilities require weighbridges in order to comply with approval and licensing provisions and ideally are remote from sensitive land uses.

LMCC determined that securing a site adjacent to the existing waste management facility at Awaba represents a feasible site for any future waste processing facility. To this end, a licence to occupy has been obtained from the NSW Department of Primary Industries (DPI) – Crown Lands Division (formerly LPMA) for the property immediately to the east of the existing AWMF site. The licence will allow LMCC to evaluate the site for the purpose of a waste processing facility. LMCC have recently completed the compulsory acquisition process for Lot 373.

**Home Composting Trial:** Under any waste strategy scenario, home composting remains a highly desirable activity for Lake Macquarie City residents. Accordingly, a home composting program has been prepared with a view to maximising participation in home composting in the LGA. The aim of the home composting program is to empower Lake Macquarie City residents with the resources and training to manage household organic waste at home, effectively diverting these organics from landfill.

The Home Composting Program will;

- Empower the community to take direct action to contribute to waste diversion and minimisation/consumption;
- Raise awareness of waste issues more broadly within the community; and
- Reduce exposure to carbon pollution reduction scheme liabilities from putrescible wastes deposited in the Awaba landfill.

Two home composting trials have now been completed and were considered successful for those that participated. The two trials focused on alternative methods to encourage residents to commence and maintain home composting to maximise participation, with the ultimate aim of implementing the Home Composting Program within 10% of households.

### 2.1.3.3 Analysis of Waste Processing Technology Options

In developing a waste management strategy for the Lake Macquarie LGA, LMCC commissioned an investigation to describe and evaluate the most likely technology solutions for inclusion in the waste strategy. Ten potential technology solutions were considered in detail, and are outlined in **Table 2.1**.

**Table 2.1: Consideration of Processing Technologies**

Waste Treatment Option	Description
Three Bin Source Separated Green Waste – Windrow Composting	Green garden waste only (i.e. excluding food waste) collected in a third bin and composted in open windrows.
Three Bin Source Separated Organics - In-vessel Composting	Green and food waste collected in a third bin and composted in enclosed tunnels.
Phased Three Bin Source Separated Organics – In-vessel Composting	Green and food waste collected in a third bin and composted in enclosed tunnels. Same end situation as option 2, but staged so that the third bin collection starts out with garden waste only, composted in open windrows (same as option 1). When LMCC chooses (+3 years used for analysis), food waste collection in the third bin commences and composting occurs in enclosed tunnels.
Three Bin Source Separated Organics – Anaerobic Digestion	Green and food waste collected in a third bin and composted without oxygen, (anaerobic digestion). Methane produced would be captured and burnt for energy.
Two Bin Landfill	Mixed waste collected (red lidded bin) and deposited directly in a landfill. Same as current waste system.
Two Bin bioreactor	Mixed waste collected (red lidded bin) and deposited directly into a land fill specially designed to accelerate and maximise methane generation while maximising methane capture. Methane burnt for energy.
Two Bin In-vessel composting	Mixed waste collected (red lidded bin) and composted in enclosed tunnels.
Two Bin In-vessel composting (Port Stephens)	Mixed waste collected (red lidded bin), transferred to the Port Stephens composter at Raymond Terrace for processing in a drum composter

Waste Treatment Option	Description
	followed by enclosed windrow composting.
Two Bin In-vessel composting (Port Stephens) plus Energy from Waste	Mixed waste collected (red lidded bin), transferred to the Port Stephens composter at Raymond Terrace for processing in a drum composter followed by enclosed windrow composting. Additionally, energy is generated from Biogas and/or reject material at the facility, hence energy from waste. The energy component is a proposed future addition to the Port Stephens facility.
Two Bin Anaerobic Digestion	Mixed waste collected (red lidded bin) and composted without oxygen, (anaerobic digestion). Methane produced, captured and burnt for energy.

The options outlined in **Table 2.1** were identified by examining Lake Macquarie’s existing domestic waste stream to determine what fractions needed to be processed or recovered to achieve the NSW Domestic Waste Diversion target of 66%. Available technologies were then identified and their performance, particularly in Australia, determined. Following the analysis of each option LMCC proposed the adoption of a Phased Three Bin Source Separated Organics (SSO) processing system as its preferred waste processing technology. The phasing to comprise;

- Phase 1: A fortnightly garden waste only collection coupled with processing by open windrow composting and a continued weekly mixed solid waste collection.
- Phase 2: A weekly source separated organics (including food with the garden waste) coupled with in-vessel composting and a reduced fortnightly mixed solid waste collection.

The Phased Three Bin SSO system was the highest scoring option and has the following identified advantages:

- Implementation can start sooner providing immediate rewards in the form of improved waste diversion (phased implementation);
- Gate fees are lower therefore it is the cheapest solution;
- Tunnel composting of SSO is well proven, tried and tested (lower risk);
- Achieves the 66% WARR diversion target once fully operational;
- Produced compost is clean and of high quality;
- Unlimited market for clean compost (including in agriculture);
- Very competitive market for tunnel composting; and
- Preferred by LMCC residents.

At LMCC’s meeting of 28 February 2011, the preferred option of a Phased Three Bin Source Separated Organics processing systems was adopted. The new waste system includes three bins (standard 240-litre size) with different coloured lids for residents to sort their waste into general rubbish (red), recycling (yellow) and garden/food waste (green). The green waste bin is likely to be delivered to residents in January 2012. Initially, it will only be available for garden waste, with the facility for food waste collection being added after two to three years (subsequent to the development of a suitable waste processing plant) (LMCC, 2011c).

#### 2.1.3.4 Alternative Waste Treatment Facility

As part of LMCC's Waste Management Strategy, Council propose to develop an Alternative Waste Treatment (AWT) facility. The proposed AWT is intended to include an in-vessel aerobic composting plant with a capacity to process between 60,000 to 100,000 tonnes of source-separated organic waste annually. LMCC are currently seeking a staged develop with Stage 1 comprising site clearance and earthworks and Stage 2 comprising facility development. Implementation of an AWT would contribute significantly to LMCC's goal of reducing the volume of waste disposed of to landfill. LMCC have currently committed to investigating Stage 1 of the project.

## 2.2 Justification for the Project

### 2.2.1 Benefits and Impacts of the Project

With the implementation of LMCC's Phased Three Bin Source Separated Organics waste management process, it is anticipated that waste management in the Lake Macquarie LGA will not be dominated by landfilling in the future. A portion of future waste streams however will not be recoverable for beneficial re-use and as such a suitable disposal mechanism will be required.

An extensive assessment of waste management options for the Lake Macquarie LGA has been undertaken (**Section 2.3**) and the proposed extension of the AWMF is considered to represent the most appropriate approach to managing the landfill requirements of the LGA over the coming years.

One of the key considerations in selecting the existing AWMF for further expansion rather than establishing a new landfill site is the acknowledgement of the potential biophysical, social and economic impacts of the project in comparison to alternatives. The NSW Government's *Environmental Guidelines: Solid Waste Landfills* (EPA, 1996) provide guidance on areas considered as environmentally sensitive and also on areas considered inappropriate for landfilling. This includes consideration of factors with potential environmental, social and economic impacts and specifies a number of objectives for landfill waste management. To assess the potential for suitable landfill sites within the Lake Macquarie LGA, LMCC undertook a mapping and assessment exercise. This utilised the factors from the guidelines to develop a series of constraint buffers, which excluded land within:

- 50 metres of a permanent or intermittent waterbody (including rivers, lakes, bays or wetlands);
- 250 metres of LEP Environmental Protection Zones (E1, E2, E3 and E4);
- 250 metres of heritage items or areas;
- 250 metres of areas mapped under SEPP 14 Coastal Wetlands and SEPP 26 – Littoral Rainforests;
- 400 metres of LEP Residential Zones (R1, R2 and R3);
- The 100 year flood extent;

- Any land nominated as a Special Area by Hunter Water for water supply purposes; and
- 250 metres of any lands nominated as Special Areas by local water supply authorities or in the vicinity of a groundwater bore used as drinking water.

Using the buffer distances prescribed above highlights the social and environmental value of the land within the Lake Macquarie LGA and demonstrates that the landscape of the LGA has very limited suitable land for new landfill developments. The main outcome of the mapping exercise was the realisation that the utilisation and expansion of an existing landfill site would provide considerably less impact than the creation of a landfill at a new location. The AWMF is the only currently active landfill site in the Lake Macquarie LGA and is considered the most suitable option for the future landfill needs.

#### *2.2.1.1 Biophysical Considerations*

The Lake Macquarie LGA is rich in natural resources with a landscape that provides an extensive contrast in environments, from highly urbanised areas to extensive rugged mountain ranges to the coastal/estuarine environment of Lake Macquarie (DoP, 2006).

The proposed extension to the AWMF falls within the bounds of the existing 32.5ha site (lot 372), which includes the landfill operations and areas of bushland. The vegetation within the site is comprised of three broad habitat types, Open Forest/Woodland, Riparian Forest and Cleared Grassland. The majority of the subject site is cleared to cater for the existing waste disposal facility, roads and infrastructure. A minor creekline is located in the southern portion of Lot 372, which flows from west to east. This creekline eventually feeds into Kilaben Creek, which then drains to the Lake Macquarie estuary, approximately 2.6km downstream of the AWMF site. To facilitate the proposed works, vegetation would be removed within a total footprint area of 8.55ha, (including 7.2ha of vegetation which requires biodiversity offsetting), and removal of 2,302 *Tetradlea juncea* plants would be required.

Development of the concept design for the proposed works has included consideration of potential and likely impacts and where practicable has provided measures to avoid these or minimise the impacts through development of mitigation and management strategies. This has included the provision of biodiversity offsets, development of best practice odour management, and design of leachate management systems.

Given the environmental value of much of the remaining land within the Lake Macquarie LGA, the proposal to extend the existing landfill site is likely to have a significantly lesser impact on environmental values than other alternative options. The local community also prefer their waste to be managed locally with the Lake Macquarie LGA.

The “do nothing” option is also not considered to be environmentally responsible. The current AWMF has only a short remaining lifespan. Without an alternative landfill site, LMCC would be forced to transport waste outside of the LGA and at considerable cost. It is also considered that transportation of waste outside the LGA does not promote responsible management and is not likely to assist in LMCC’s efforts to minimise the volume of waste entering landfill.

### 2.2.1.2 *Economic Considerations*

The proposed additions to the AWMF are considered a more economically viable option than the explored alternative options when considering the long term waste management requirements for the Lake Macquarie LGA. The demise of the *Hunter Regional Waste Project (Section 2.3.1)* was, at least in part, due to economic factors, and the need for a realistic approach to waste management in the post-GFC economic climate is now considered critical for the future development of the LGA.

The option to develop a new landfill site would have much larger economic impacts than the proposed extensions to the existing landfill at the AWMF, due to generally lengthier processes of site selection, site acquisition costs, community and stakeholder consultation, impact assessments and environmental and planning approvals/licences associated with the development of a completely new site. In addition, construction materials/labour costs and operational costs would be higher for a new landfill development compared to expanding an existing site both in the short and long term.

The do nothing option would require the transportation of waste from the LGA to a location outside the LGA and would substantially increase operational costs. With no viable disposal facility within four years, LMCC would be required to go to the open market to seek a waste disposal option, with little to no ability to source a competitive solution. Over the long term, the net present value of recurrent transportation costs and landfilling fees would far exceed the short term capital costs of construction associated with the proposed additions to AWMF.

The extensions to AWMF will allow for the creation of a number of jobs as part of the construction phase and maintenance of the existing workforce during the extended operational life of the facility.

### 2.2.1.3 *Social Considerations*

The Lake Macquarie LGA is the Hunter's largest city, accounting for 37% of the Lower Hunter population, and is the fourth most populous city in NSW. Lake Macquarie's population is fast approaching 200,000, and the population is anticipated to increase by 60,000 – 70,000 people over the next 25 years (LMCC, 2011a). Given these demographic projections, there will be an increased need for appropriate waste management within the LGA into the future.

It is acknowledged that there are likely to be some negative social impacts associated with the proposed additions to the AWMF, and the suburb of Awaba has been identified as the primary area of affectation. This is because of the proximity of the AWMF site to the Awaba township with the closest residences being approximately 800 metres from the site. The Awaba township is the community most likely to be affected by the proposed development in the construction phase and in particular the operational phase. Operational phase impacts may include visual impact (primarily over the long term rather than short term) and continued operational traffic. These issues have been considered in **Section 6**.

## 2.2.2 Project Justification

The proposed additions to the AWMF is considered to be the most appropriate option overall for the Lake Macquarie LGA in terms of addressing the current and future waste management needs of the community. The explored alternatives to the preferred option of proposed additions to the AWMF include the “do nothing” option which would require the transportation of waste outside the LGA boundary for disposal. This option would be likely to transfer social impacts/costs to another region outside the Lake Macquarie LGA, which has implications in terms of social equity. The “do nothing” option is not acceptable in a social context, nor is it appropriate in the context of Council’s waste strategy and the guidelines of the *NSW Waste Avoidance and Resource Recovery Strategy 2007* (DECC, 2007b).

The AWMF is the only functioning landfill site in the Lake Macquarie LGA. The landfill operations operate under an existing development consent for a maximum emplacement level of 94mAHD. Mitchell McCotter (1993) projected that based on this approved level, landfill capacity equates to 2.9 million cubic metres (if final cover material and topsoil are deducted). Conservative assumptions were used to derive the capacity, namely:

- A higher waste generation rate than is currently occurring ( $0.96\text{m}^3/\text{person}$  compared to  $0.92\text{m}^3/\text{person}$ );
- No allowance was made for the removal of vegetation from the waste stream going to landfill. The amount of vegetation contained in the waste stream has not been measured but in a similar council area (Shoalhaven City) vegetation was measured to be 12 per cent (by weight) of the waste stream. It is proposed to remove vegetation from the waste-stream; and
- Consideration was not made for reductions in the waste stream due to recycling. The encouragement of recycling is consistent with government policy and also community expectations.

The expansion of this existing site is considered to provide the lowest impact solution whilst accommodating the LGA’s waste requirements in accordance with Council’s waste strategy. Expanding the existing facility means that there would be no requirement to utilise another, separate site for a new landfill facility (which would cause disturbance and social impacts for another new area).

Due to the nature of the proposed development (i.e. extensions to an existing facility), changes in land use would not be required, and demographic changes to the Awaba township or the Lake Macquarie LGA would be unlikely to occur. The proposed development is not anticipated to generate changes to the level of income across the community, nor instigate changes to the community structure, character or beliefs of the Awaba township or the LGA as a whole. Social cohesion and quality of life in the vicinity of the proposal is not anticipated to change given that the AWMF is an already operational, existing facility.

The health and safety of the community is unlikely to be negatively impacted by the proposed development due to the stringent waste treatment and hazard management controls that are currently occurring and that would continue to be implemented at the AWMF. The proposed additions have been designed using industry best-practice techniques and standards so that environmental and health and safety issues can be sufficiently addressed. Some isolated incidents of criminal activity have occurred at the site in the past, mainly relating to vandalism. Criminal activity and anti-social or nuisance behaviour is unlikely to increase as a result of the proposal, given that the AWMF is an existing facility. In addition, design features of the proposed development aim to inhibit such illegal behaviour.

The installation of new waste treatment facilities can have negative social outcomes including decreased housing affordability for areas within close proximity of a new site (e.g. Bouvier *et al.*, 2000 and Nelson *et al.*, 1992). However, in the case of the AWMF, housing affordability will unlikely be affected by the proposed extensions, given that the site is already used as a waste treatment facility and has been since the 1980s.

### 2.2.3 NSW Waste Avoidance and Resource Recovery Strategy

The NSW Government established a waste hierarchy under the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) which prioritises waste management actions as follows (OEH, 2011b):

- **Avoidance:** Actions to reduce the amount of waste generated by households, industry and all levels of government. Waste avoidance is the most preferable waste management measure because it reduces the extraction of raw materials and encourages the community, industry and government to be more efficient in their use of resources. Waste avoidance is a preventative measure for waste management;
- **Recovery:** Actions that recover a resource so that the conversion of that resource to waste is prevented or at least postponed. Includes reuse, reprocessing, recycling and energy recovery. The recovery action will vary according to the resource type but should be consistent with the most efficient use of the resource. Resource recovery actions provide numerous environmental, social and economic benefits; and
- **Disposal:** The disposal of waste into facilities such as landfills represents the least preferred waste management action due to potentially negative environmental and social impacts. Management and mitigation of these negative impacts is integral in waste disposal.

The *NSW Waste Avoidance and Resource Recovery Strategy 2007* (DECC, 2007b) builds on the above hierarchy and the previous *NSW Waste Avoidance and Resource Recovery Strategy 2003* (Resource NSW, 2003) to provide a framework for maximising conservation of our natural resources and minimising environmental harm from waste management and disposal of solid waste.

The 2003 Strategy by Resource NSW identified waste avoidance and resource recovery goals in four key result areas.

These were retained in the 2007 Strategy by DECC and are:

- Preventing and avoiding waste;
- Increasing recovery and use of secondary materials;
- Reducing toxicity in products and materials; and
- Reducing litter and illegal dumping.

A series of targets were developed in 2003 and were retained in the 2007 Strategy. These are:

- Increased recycling of municipal waste from baseline 26% to 66% by 2014;
- Increased recycling of commercial and industrial waste from baseline 28% to 63% by 2014; and
- Increased recycling of construction and demolition waste from baseline 65% to 76% by 2014.

The proposed additions to the AWMF provide an approach to waste management in the Lake Macquarie LGA that is consistent with the provisions of the *NSW Waste Avoidance and Resource Recovery Strategy* and the *Lake Macquarie City Council Waste Strategy*. It is recognised that waste disposal into landfill is only one facet of a diverse waste management approach. The proposal forms only one part of the wider waste strategy for the LGA as discussed in **Section 2.1.3**.

As the implementation of the wider waste strategy for the LGA may take two to three years to implement, the expansion of the existing landfill area at the AWMF will provide a safety net to Lake Macquarie while the new waste strategy is being devised and implemented. LMCC's waste strategy will not be dominated by landfilling in the future; however, there will always be a portion of the waste stream that is not recoverable for beneficial re-use and the expanded landfill area at the AWMF will provide capacity to dispose of this non-recoverable waste.

A number of the additional facilities proposed at the AWMF (such as the additional reuse centre and relocated green waste processing area) will increase recovery and reuse of waste materials by diverting more waste from landfill. With regards to preventing and avoiding waste, the Phased Three Bin Source Separated Organics (SSO) processing system, to be implemented in the Lake Macquarie LGA under the Home Composting Program, will also form part of the waste strategy and aims to facilitate home composting by 10% of households.

## 2.3 Alternatives Considered

### 2.3.1 Hunter Integrated Resource Regional Waste Project

Prior to the commencement of the current Waste Strategy Project, LMCC's previous long term waste strategy was to participate in a regional two bin solution where all mixed solid waste from Maitland, Cessnock, Newcastle and Lake Macquarie LGAs would be delivered to a central point for processing.

The process was modelled to achieve 70% diversion of waste from landfill, generate energy, and in addition to processing 100% of collected domestic waste, would have had capacity to receive and process commercial waste streams. To deliver this solution, the four Councils formed a company, Hunter Integrated Resources (HIR), to manage procurement and administration of the service.

Compost produced by this facility would have been Alternative Waste Treatment Derived Organic Rich Fraction (AWTDORF) compliant, which is a standard now in place that applies to NSW.

The delivery of the service was delayed by the complexity of the solution, which at the time of conception would have been unprecedented in Australia. There was also significant difficulty in obtaining assurances from relevant State agencies about regulations that would govern the operation of the plant and the products emanating from the facility. Finally, the advent of the Global Financial Crisis led to a dramatic and unaffordable increase in the cost of delivering the processing facility. These barriers led to the project being abandoned by mutual agreement of the parties.

### **2.3.2 Waste Management Options**

Following the termination of the Regional Waste Facility as a viable option, LMCC faced the position that its primary waste facility (i.e. the AWMF) would reach capacity within a period of four years. LMCC commissioned Sustainable Infrastructure Australia (SIA) in March 2009 to undertake a review to assess the following:

- Identify infrastructure options for LMCC in recognition of the current capacity constraints of the AWMF;
- Provide recommendations on the structure of the LMCC waste management system;
- Identify international and national best practice waste infrastructure, solutions and systems; and
- Identify areas of key risk and strategies to mitigate those key risks.

The investigations by SIA (2009) provided an assessment of five options for the management of waste within the Lake Macquarie LGA, comprising:

- Extension of the current AWMF;
- Development of a new landfill site within the Lake Macquarie LGA;
- Development of an Alternative Waste Treatment (AWT) facility with the Lake Macquarie LGA;
- Export of residual waste to facilities (landfill/AWT) outside of the Lake Macquarie LGA; and,
- A waste management system focussed on source segregation and specific recovery/management of each waste stream.

Each of the five options was evaluated against a range of criteria, developed to provide guidance to LMCC in the development of a future waste strategy. The criteria included:

- Technical and operational review of infrastructure option;
- Assessment of waste diversion impact;
- Flexibility of infrastructure option for future planning;
- Assessment of capital cost;
- Greenhouse gas risk and impact;
- Impact on the broader waste management strategy;
- Short term actions required;
- Social and community issues;
- Risk assessment; and
- Waste hierarchy impact.

SIA (2009) provided a series of strategic considerations and recommendations to LMCC, as outlined in **Table 2.2**.

**Table 2.2: Waste Management Considerations and Recommendations (SIA, 2009)**

Consideration / Recommendation	Description
Strategic Consideration	<ul style="list-style-type: none"> <li>▪ The timelines for infrastructure and system development are limited and LMCC needs to get started on delivery of its preferred approach as soon as possible otherwise it runs considerable risk both in terms of cost and limitation of options.</li> <li>▪ LMCC needs to develop a key decision path in the short term to establish its primary approach to waste management considering the three options of a) Landfill, b) AWT or c) alternative waste management approach.</li> <li>▪ LMCC needs to give detailed consideration to ensure that options pursued align with its core requirements (short term and long term).</li> </ul>
Recommendation 1	<p>SIA recommended that LMCC:</p> <ul style="list-style-type: none"> <li>▪ take a multiple level approach to reducing and diverting waste;</li> <li>▪ implement a separate organic/green waste kerbside collection service for residents;</li> <li>▪ take a market driven approach and tender the treatment of organic/green waste from kerbside collection;</li> <li>▪ roll out an optional home composting facilitation service on a campaign basis;</li> <li>▪ take immediate steps to extend the existing life of the Awaba landfill;</li> <li>▪ pursue both the extension of the Awaba landfill site and waste export options as a disposal alternative;</li> <li>▪ establish a waste transfer station/resource recovery facility; and</li> <li>▪ fund a substantive and ongoing education and awareness campaign alongside key initiatives to drive waste reduction and waste diversion.</li> </ul>
Recommendation 2	<ul style="list-style-type: none"> <li>▪ LMCC clearly articulate its desired waste management outcomes and put this out to the market as an expression of interest (EOI) to determine optimal infrastructure and commercial solutions that may be available; and</li> </ul>

Consideration / Recommendation	Description
	<ul style="list-style-type: none"> <li>▪ Based on the result of the EOI, LMCC may be able to achieve an optimal or improved outcome for part or all of its waste management requirements.</li> </ul>

Each option assessed by SIA and the subsequent recommendations have been considered by LMCC and have formed the basis for the development of LMCC’s *Waste Strategy* (**Section 2.1.3**). This includes the recommendation to take immediate steps to extend the life of the existing Awaba landfill.

### 2.3.3 Additions to Awaba Waste Management Facility

The expansion of the AWMF is considered a necessary component of LMCC’s *Waste Strategy* as discussed in **Section 2.1.3**, and as such LMCC engaged GHD to undertake a feasibility analysis to determine if:

- It is technically feasible to extend the land-filling operations within the site boundary; and,
- If so:
  - What are the expansion options available and what are the technical, environmental and operational constraints?
  - What is the approximate airspace gained, and what is the approximate construction cost estimate associated with each option?

A range of options were investigated within each area resulting in the selection of five options with varying alignments, in addition to the ‘do nothing’ option, for development and assessment. The preferred option as recommended by GHD was adopted by LMCC following internal review of the options analysis. This would require the removal of a larger area of vegetation and subsequently could be considered to have a greater impact on the environment within the bounds of the project site. The other options, however, would not provide sufficient landfill space and would likely necessitate the construction of a waste disposal facility elsewhere in the future. The do-nothing option and construction of an additional site are not acceptable to LMCC and, in the long term, are likely to have significantly higher environmental impacts than the proposed option.

It is considered that the preferred option would:

- Maximise landfill airspace and extend the life of the site;
- Prevent or considerably delay development of another landfill site for inert waste and therefore prevent the environmental impacts associated;
- Avoid hauling waste elsewhere which would result in considerable additional environmental impacts; and
- Promote responsibility for waste management within Lake Macquarie LGA and the local community.

## 3 Planning and Assessment Process

This chapter discusses the statutory environmental and planning requirements for the Project under Commonwealth and State legislation. Consideration of the Project in the context of Ecologically Sustainable Development is also provided.

### 3.1 Commonwealth Legislation

#### 3.1.1 Environmental Protection and Biodiversity Conservation Act 1999

The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) establishes the framework for the management and protection of nationally and internationally significant flora, fauna, ecological communities and heritage places. These are defined by the EPBC Act as matters of National Environmental Significance (NES), which include:

- World heritage sites;
- National heritage places;
- Wetlands of international importance (Ramsar wetlands);
- Nationally threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas;
- The Great barrier Reef Marine Park; and
- Nuclear actions.

The EPBC Act also covers actions that are considered to have a significant impact on the environment for Commonwealth land or where works are undertaken by a Commonwealth agency.

Should the Minister for Sustainability, Environment, Water, Population and Communities determine that an approval is required under the EPBC Act, then the proposed works are considered a 'controlled action'. Assessment and approval under the EPBC Act must then be obtained prior to the commencement of works.

A bilateral agreement between the Commonwealth and NSW governments has been signed that accredits the environmental assessment process of Part 3A of the EP&A Act for assessment under the EPBC Act. This bilateral agreement applies to actions that the Minister for Sustainability, Environment, Water, Population and Communities has deemed controlled actions under the EPBC Act (excluding nuclear actions and works on Commonwealth land or by a Commonwealth agency).

Whilst the bilateral agreement accredits the Part 3A process, approval from the Commonwealth is still required where the works are deemed to be a controlled action.

Approval by the Commonwealth, under the EPBC Act, would only be issued after approval has been obtained from the NSW Minister for Planning under the EP&A Act.

All actions that are considered to have a likely significant impact on matter of National Environmental Significance require referral to the Minister for Sustainability, Environment, Water, Population and Communities.

The detailed flora and fauna investigation undertaken for the project site (**Section 6.5**) identified a potential impact on species listed under the EPBC Act. As such, a referral to the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) was prepared and submitted on 18 May 2011. Following formal exhibition of the referral and consideration by the Minister, the proposed actions were deemed to be a control action on 17 June 2011. A copy of the Minister's EPBC referral decision is provided in **Appendix A**. The Minister also declared that the project will be assessed by accredited assessment under the NSW EP&A Act (see **Appendix A**).

A request for variation to the proposal to include the proposed 3.4km rising main and additional facilities on site was made to DSEWPaC on 29 November 2011. The proposed variation, which has been assessed within this EA document, was accepted by the minister on 22 December 2011. A copy of the variation decision notice is provided in **Appendix A**.

The proponent has never been subject to any proceedings under Commonwealth laws for the protection of the environment or the conservation and sustainable use of natural resources. For proceedings under State laws see **Section 3.2.5**.

## 3.2 NSW Legislation

### 3.2.1 Environmental Planning and Assessment Act 1979

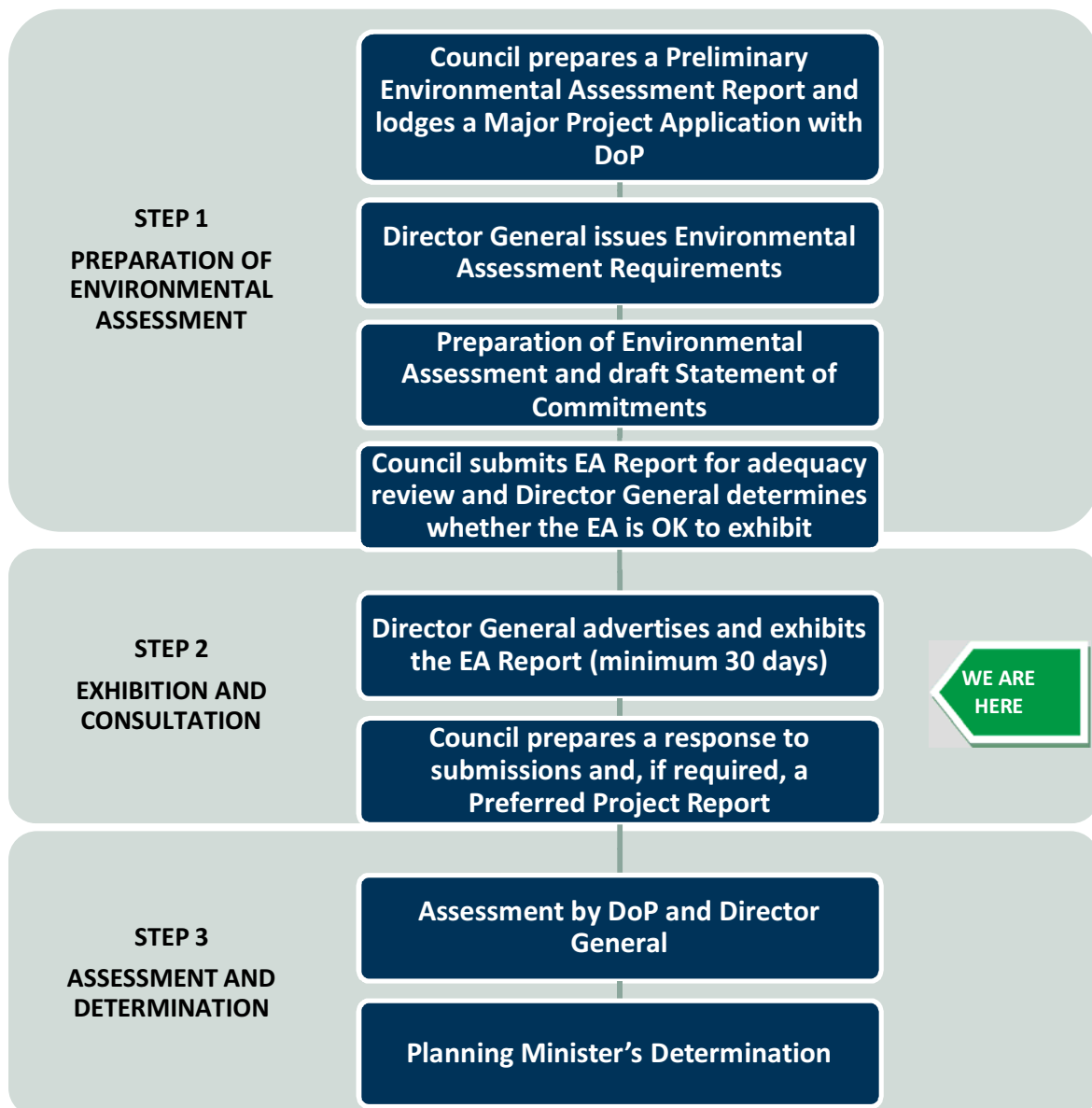
The EP&A Act and subordinate legislation provide the legal framework and planning and assessment process for consideration of all developments within NSW. The EP&A Act aims to encourage the proper management, development and conservation of natural and artificial resources to ultimately promote the environment and the economic and social welfare of the community. In addition to this, it seeks to promote the sharing of responsibility between state and local government and facilitate public involvement in the planning and assessment process.

In accordance with Clause 6 (and Schedule 1) of *State Environmental Planning Policy (Major Development) 2005* (Major Development SEPP), the Minister is of the opinion that the proposed additions to the AWMF are of a kind to which Part 3A of the EP&A Act applies. As such, LMCC (the proponent) is seeking project approval under Part 3A of the EP&A Act. Since the commencement of preparation of this EA Report, Part 3A of the EP&A Act was repealed. However, in accordance with Schedule 6A of the EP&A Act, Part 3A of this Act continues to apply to and in respect of a transitional Part 3A project.

The proposed additions to and expansion of the AWMF is considered a transitional Part 3A project as it is:

*A project for which environmental assessment requirements for approval to carry out the project, or for approval of a concept plan for the project, were notified or adopted before the relevant Part 3A repeal date*

As such, the provisions of the now repealed Part 3A of the EP&A Act apply to this project. An overview of the three key steps in the Part 3A process is provided in **Figure 3.1**.



**Figure 3.1: Part 3A Environmental Assessment Process**

LMCC prepared and submitted a Major project application, accompanied by a Preliminary Environmental Assessment, on 11 August 2010.

Following consultation with relevant government authorities, the Director-General of the Department of Planning prepared and issued the Director-General's Requirements (DGRs) under Section 75F of the EP&A Act. The Director-General issued the DGRs to LMCC for the additions to the AWMF on 21 September 2010.

Amended DGRs were issued by the Director-General of the Department of Planning and Infrastructure on 3 July 2011. The DGRs were amended to include the requirements of DSEWPaC in response to the proposed works being declared a controlled action under the EPBC Act.

A copy of the complete DGRs for the project are attached in **Appendix B** and summarised in **Table 3.1**, including a reference to where they are addressed within this EA Report.

**Table 3.1: Summary of Director Generals Requirements**

Issue	Requirement	EA Report Section Where Addressed
General Requirements	Executive Summary	Executive Summary
	Detailed Description of the Project	Section 5.2
	Consideration of whether the development is consistent with the Lower Hunter Regional Strategy (DoP, 2006)	Section 2.1.1
	A risk assessment	Section 7
	A detailed assessment of key environmental issues	Section 6
Waste Management	<ul style="list-style-type: none"> <li>▪ Waste handling process</li> <li>▪ Quantity and type of waste received</li> <li>▪ Classification, stockpiling and waste recovery methods</li> </ul>	Section 6.1
Soil, Water and Leachate	<ul style="list-style-type: none"> <li>▪ Proposed erosion and sediment controls</li> <li>▪ Stormwater management</li> <li>▪ Acid sulfate soils, salinity and contamination</li> <li>▪ Leachate management</li> </ul>	Section 6.2 (Soils and Contamination) Section 6.3 (Water Quality and Hydrology) Section 6.4 (Leachate)
Flora and Fauna	<ul style="list-style-type: none"> <li>▪ Threatened species populations and communities</li> <li>▪ DSEWPaC requirements</li> </ul>	Section 6.5
Air Quality and Odour	<ul style="list-style-type: none"> <li>▪ Quantitative assessment of potential air quality and odour impacts</li> <li>▪ Compliance with PoEO Act</li> </ul>	Section 6.6
Heritage	<ul style="list-style-type: none"> <li>▪ Indigenous heritage assessment</li> </ul>	Section 6.7 (Aboriginal) Section 6.8 (Non-Aboriginal)

Issue	Requirement	EA Report Section Where Addressed
Visual Impact	<ul style="list-style-type: none"> <li>Assessment of potential visual impacts on the amenity of the surrounding areas</li> </ul>	Section 6.9 (Visual Landscape)
Greenhouse Gas	<ul style="list-style-type: none"> <li>Quantitative assessment of scope 1 and 2 emissions</li> <li>Measures to be implemented to minimise energy use, including landfill gas capture and electricity generation</li> </ul>	Section 6.10
Traffic and Transport	<ul style="list-style-type: none"> <li>Details of traffic volumes generated</li> <li>Impact of traffic on surrounding road network</li> </ul>	Section 6.11
Hazards and Risk	<ul style="list-style-type: none"> <li>Preliminary Hazard Analysis</li> </ul>	Section 6.12
Noise	<ul style="list-style-type: none"> <li>Construction, operational and traffic noise</li> </ul>	Section 6.13 (Noise and Vibration)

### 3.2.2 NSW Environmental Planning Instruments

#### 3.2.2.1 State Environmental Planning Policy (Major Development) 2005

A development may be declared as a major project and is subsequently assessed under Part 3A of the EP&A Act. Projects assessed under Part 3A require approval from the Minister for Planning. A project may be determined as a major project either by:

- State Environmental Planning Policy (Major Development) 2005; or
- An order by the Minister for Planning published in the NSW Government Gazette.

Clause 6 (1) of the Major Development SEPP states that:

*Development that, in the opinion of the Minister, is development of a kind:*

*(a) that is described in Schedule 1 or 2, or*

*(b) that is described in Schedule 3 as a project to which Part 3A of the Act applies, or*

*(c) to the extent that it is not otherwise described in Schedules 1–3, that is described in Schedule 5,*

*is declared to be a project to which Part 3A of the Act applies.*

The Minister is of the opinion that the proposed additions to the AWMF are of a kind to which Part 3A of the EP&A Act applies, as described in Section 27 of Schedule 1 of the Major Development SEPP. As such, LMCC (the proponent) is seeking project approval under Part 3A of the EP&A Act.

It is noted that Clause 6 of the Major Development SEPP has been repealed since the Part 3A of the EP&A Act was determined to apply to this project. See **Section 3.2.1** for further discussion.

### 3.2.2.2 State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP) aims to facilitate the effective delivery of infrastructure across the State. As part of the Director-General's Requirements for the Project, a review of the project against Clause 123 of the Infrastructure SEPP is required.

Clause 123 (1) of the Infrastructure SEPP states:

*In determining a development application for development for the purpose of the construction, operation or maintenance of a landfill for the disposal of waste, including putrescible waste, the consent authority must take the following matters into consideration:*

*(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, and*

*(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*

*(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*

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

Clause 123 (2) defines putrescible waste as general solid waste (putrescible) within the meaning of Clause 49 of Schedule 1 to the *Protection of the Environment Operations Act 1997*.

**Table 3.2** reviews the proposed additions to the AWMF against the requirements of Clause 123 of the Infrastructure SEPP.

**Table 3.2: Review against Infrastructure SEPP Clause 123**

Infrastructure SEPP Requirement	Description of Compliance
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	The proposed additions to and expansion of the AWMF provide an approach to waste management in the Lake Macquarie LGA that is consistent with the provisions of the <i>NSW Waste Avoidance and Resource Recovery Strategy 2007</i> (DECC,

Infrastructure SEPP Requirement	Description of Compliance
<p>is minimised before it is placed in the landfill.</p>	<p>2007b) and the <i>Lake Macquarie City Council Waste Strategy</i>. The proposal forms only one part of the wider waste strategy for the LGA as discussed in <b>Section 2.1.3</b>.</p> <p>The expansion of the existing landfill area at the AWMF will provide a safety net to Lake Macquarie while the new waste strategy is being devised and implemented, also providing future capacity for the non-recoverable portion of the waste stream that will always be present.</p> <p>With regards to recovery of waste, some of the facilities proposed at the AWMF, including the additional reuse centre and the relocated green waste processing area, will allow more waste that enters the AWMF to be diverted for recovery and reuse, minimising the amount of waste that is placed in the landfill.</p> <p>As part of the <i>Lake Macquarie City Council Waste Strategy</i> a Phased Three Bin Source Separated Organics (SSO) processing system will be implemented in the Lake Macquarie LGA. Additionally a Home Composting Program, which ultimately aims to facilitate home composting by 10% of households, will be implemented.</p>
<p>Adoption of best practice landfill design and operation.</p>	<p>The design of the landfill has been prepared in accordance with the NSW Government's <i>Environmental Guidelines: Solid Waste Landfills</i> (EPA, 1996) and therefore is considered to be in accordance with best practice landfill design and operation.</p> <p>The proposal includes infrastructure to manage leachate and gases generated by the landfill to managing the long term impacts of the landfill. This management infrastructure incorporates current best practice technologies, such as using a linear low density polyethylene (LLDPE) liner to capture and manage leachate from the landfill, which provides a very high level of environmental protection.</p>
<p>Reduction of 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.</p>	<p>Landfill gas capture and energy recovery is already undertaken at the existing site. The proposal will be expanding and improving on these existing operations and increasing energy recovery capabilities at the AWMF.</p>
<p>The land on which the development is located is degraded land such as a disused mine site.</p>	<p>The proposed works are an extension of the existing AWMF. A significant portion of the additional landfill capacity would be achieved by extending above the current operational landfill. It is considered that the utilisation of the existing degraded site with expansion around the perimeter will provide less environmental impact than the creation of a new landfill site.</p>
<p>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.</p>	<p>The proposed additions to and expansion of the AWMF, in conjunction with LMCC's Waste Strategy will provide essential infrastructure to allow the continued growth of the region. Without a suitable waste management facility it is considered that additional social, economic and environmental pressures would be placed on the community within the Lake Macquarie LGA and the Lower Hunter region.</p> <p>To assess the potential for suitable landfill sites within the Lake Macquarie LGA, LMCC undertook a mapping and assessment exercise, highlighting the social and environmental values of the</p>

Infrastructure SEPP Requirement	Description of Compliance
	<p>land within the Lake Macquarie LGA. This mapping exercise demonstrated that the landscape of the LGA has very limited suitable land for new landfill developments. The main outcome of the mapping exercise was the realisation that the utilisation and expansion of an existing landfill site would provide considerably less impact than the creation of a landfill at a new location. The AWMF is the only currently active landfill site in the Lake Macquarie LGA and is considered the most suitable option for the future landfill needs (see <b>Section 2.2</b> for full justification details).</p>
<p>Transport links to the landfill are optimised to reduce the environmental and social impacts associated with transporting waste to the landfill.</p>	<p>Traffic and transport investigations as part of the proposed works by Cardno (2011a) determined that the intersection of Wilton and Wangi Roads is currently constrained even under existing operating conditions. LMCC waste service vehicles will be provided with a 'recommended truck route map' to optimise transport links to the AWMF site (see <b>Section 6.11</b> for details).</p> <p>Excess leachate will need to be removed from the AWMF site as part of leachate management. As part of the proposed works a package pumping station will be constructed at the AWMF site and a rising main will connect this on-site station to the Rathmines No. 6 WWPS to facilitate disposal of excess leachate to the sewer network. This aspect of the proposal has been incorporated to eliminate the need to tanker excess leachate off site on a permanent basis (under normal circumstances), which would place excess strain on traffic links to/from the landfill.</p>

Based on the review of the proposed additions to the AWMF as outlined in

Table 3.2, it is considered that the project is consistent with the requirements of Clause 123 of the Infrastructure SEPP.

### 3.2.2.3 State Environmental Planning Policy No 44 – Koala Habitat Protection

*State Environmental Planning Policy No. 44 – Koala Habitat Protection* (SEPP 44) aims to 'encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline'. Schedule 1 of SEPP 44 identifies areas of land that are classified as being 'Core Koala Habitat' and Schedule 2 identifies feed tree species pertaining to 'Potential Koala Habitat'. These areas are defined as follows:

- 'Core Koala Habitat' is an area of land with a resident population of koalas, evidenced by attributes such as breeding females (that is, females with young), recent sightings, and historical records of a population; and
- 'Potential Koala Habitat' is areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15 per cent of the total number of trees in the upper or lower strata of the tree component.

An assessment against SEPP No 44 was undertaken as part of the specialist flora and fauna studies for the AWMF site (Murray *et al.*, 2012) and the sewer pipeline route (Niche, 2012b), as discussed in **Section 6.5**.

Based on the SEPP44 habitat assessments, one Schedule 2 tree species occurs in the AWMF site, which indicates occurrence of 'Potential Koala Habitat' as defined by SEPP44. However, there is no evidence of Koalas utilising the AWMF site, sewer pipeline route or wider study area based on scat and spotlight searches. No 'Core Koala Habitat' as defined by SEPP44 occurs on the AWMF site or sewer pipeline route as no evidence of a resident Koala population was determined. There are no recent sightings of Koalas in the Awaba locality since the early 1970s.

Based on the results of the habitat assessment and spotlight and scat searches of the AWMF area, no 'Core Koala Habitat' occurs on the AWMF site or the sewer pipeline route, as determined by Murray *et al.* (2012) and Niche (2012b), respectively.

#### *3.2.2.4 State Environmental Planning Policy No 55 – Remediation of Land*

The objectives of *State Environmental Planning Policy No 55 – Remediation of Land* (SEPP 55) are to provide for a State-wide planning approach to the remediation of contaminated land. In particular, SEPP 55 aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment:

- By specifying when consent is required, and when it is not required, for a remediation work;
- By specifying certain considerations that are relevant in rezoning land and in determining development applications in general and development applications for consent to carry out a remediation work in particular; and
- By requiring that a remediation work meet certain standards and notification requirements.

Clause 7 requires consideration is given to whether the land to which a development application relates is contaminated. Specifically it states that:

*(1) A consent authority must not consent to the carrying out of any development on land unless:*

*(a) it has considered whether the land is contaminated, and*

*(b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and*

*(c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.*

*(2) Before determining an application for consent to carry out development that would involve a change of use on any of the land specified in subclause (4), the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land planning guidelines.*

An appraisal of contamination has been undertaken as part of this environmental assessment and is discussed further in **Section 6.2**.

### **3.2.3 Other NSW Legislation**

#### *3.2.3.1 Crown Lands Act 1989*

The objectives of the *Crown Lands Act 1989* are to ensure that Crown land is managed for the benefit of the people of NSW. The management of Crown land is undertaken in accordance with the following principles:

- That environmental protection principles be observed;
- That the natural resources of Crown land be conserved wherever possible;
- That public use and enjoyment of appropriate Crown land be encouraged
- That, where appropriate, Crown land should be used and managed in such a way that both the land and its resources are sustained in perpetuity; and
- That Crown land is used in the best interests of the State consistent with the above principles.

The AWMF and proposed additions are situated on Crown land. The land is managed and controlled by LMCC as the appointed Corporate Manager of the Awaba Waste Management (R170042) Reserve Trust (refer Gazette of 20<sup>th</sup> July 2001, folio 5478). Land owner consent is required and has been issued by the former Land and Property Management Authority (LPMA).

#### *3.2.3.2 Protection of the Environment Operations Act 1997*

The *Protection of the Environment Operations Act 1997* (PoEO Act) aims to protect, restore and enhance the quality of the environment in NSW, to reduce risk to human health and to rationalise, simplify and strengthen the regulatory framework for environmental protection. Chapter 3 of the PoEO Act requires that an Environment Protection Licence (EPL) is obtained where activities associated with the proposed works are determined to be a scheduled activity in accordance with Schedule 1 of the Act.

The operation of the AWMF is consistent with the definition of a scheduled activity and as such an EPL is required. LMCC hold an EPL (Licence No. 5873) for the current operation of the AWMF. A review of this licence was recently undertaken in accordance with Section 78 of the Act and a revised licence was issued on 25 January 2011.

The proposed additions to the AWMF will require a new licence or the existing licence to be updated or reissued should the Project be approved by the Minister.

#### 3.2.3.3 *National Parks and Wildlife Act 1974*

The *National Parks and Wildlife Act 1974* aims to provide for the conservation of nature, including habitats, ecosystems, and biological diversity at the community, species and genetic levels. The Act also protects objects, places and features of cultural value within the landscape, including those of significance to Aboriginal people, place of value to the people of NSW and places of historic, architectural or scientific significance.

Consideration of the impact of the proposed additions to the AWMF on items and areas of Aboriginal and cultural significance and on native flora and fauna is provided in **Sections 6.7** and **6.5**, respectively.

#### 3.2.3.4 *Threatened Species Conservation Act 1995*

The *Threatened Species Conservation Act 1995* (TSC Act) protects threatened species, communities and critical habitat in NSW. The objectives of the TSC Act are to:

- Conserve biological diversity and promote Ecologically Sustainable Development (ESD);
- Prevent the extinction and promote the recovery of threatened species, populations and ecological communities;
- Protect the critical habitat of those threatened species, populations and ecological communities that are endangered;
- Eliminate or manage certain processes that threaten the survival or evolutionary development of threatened species, populations and ecological communities;
- Ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed; and
- Encourage the conservation of threatened species, populations and ecological communities by the adoption of measures involving co-operative management.

Specialist ecological investigations undertaken for the project have identified the presence of threatened species within the area to be impacted by the proposed additions to the AWMF. Consideration of the impact of the project and proposed mitigation and management measures are discussed on **Section 6.5**.

#### 3.2.3.5 *Mine Subsidence Compensation Act 1961*

The *Mine Subsidence Compensation Act 1961* (MSC Act) makes provision for the payment of compensation where improvements on the surface or household effects are damaged by subsidence following the extraction of coal or shale.

Should approval for the Project be granted by the Minister then approval would be required in accordance with Section 15 of the MSC Act. It is noted that Section 75V of the EP&A Act includes provisions that prevent refusal of approval of a kind necessary for carrying out an approved project, including approval under Section 15 of the MSC Act.

### 3.2.3.6 *Waste Avoidance and Resource Recovery Act 2001*

The *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) makes provisions to:

- Encourage the efficient use of resources and to reduce environmental harm in accordance with the principles of ESD;
- Ensure that resource management options are considered against an established hierarchy;
- Provide for the continual reduction in waste generation;
- Minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste;
- Ensure that industry shares with the community the responsibility for reducing and dealing with waste;
- Ensure the efficient funding of waste and resource management planning, programs and service delivery;
- Achieve integrated waste and resource management planning, programs and service delivery on a State-wide basis; and
- Assist in the achievement of the objectives of the PoEO Act.

Consideration of the project within the context of the WARR Act is provided in **Section 2.2**. Discussion of waste management during the construction and operation of the proposed additions to the AWMF is provided in **Section 6.1**.

### 3.2.3.7 *Water Management Act 2000 and Water Act 1912*

The *Water Management Act 2000* makes provisions to provide for the sustainable and integrated management of the water resources of the State for the benefit of both present and future generations. The Act aims to:

- To apply the principles of ESD;
- To protect, enhance and restore water sources, their associated ecosystems, ecological processes and biological diversity and their water quality;
- To recognise and foster the significant social and economic benefits to the State that result from the sustainable and efficient use of water, including benefits to the environment, urban communities, agriculture, fisheries, industry, recreation, culture and heritage, and to the Aboriginal people in relation to their spiritual, social, customary and economic use of land and water;

- To recognise the role of the community, as a partner with government, in resolving issues relating to the management of water sources;
- To provide for the orderly, efficient and equitable sharing of water from water sources;
- To integrate the management of water sources with the management of other aspects of the environment, including the land, its soil, its native vegetation and its native fauna;
- To encourage the sharing of responsibility for the sustainable and efficient use of water between the Government and water users; and
- To encourage best practice in the management and use of water.

The *Water Act 1912* relates to matters surrounding water rights, water and drainage, drainage promotion and artesian wells.

The proposed project is located within the North Lake Macquarie Water Source under the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* regulation. The North Lake Macquarie Water Source includes all surface waters and water contained within alluvial sediments. Accordingly, the *Water Management Act 2000* applies to all surface waters and water within alluvial sediments at the AWMF site. The *Water Act 1912* applies to groundwater in the bedrock at the AWMF site.

Outside of that prescribed by the existing Environmental Protection Licence, no taking of water from any surface or groundwater sources for use on site is proposed at this stage. However, if any taking of water from surface or groundwater sources, such as for amenities or wheel wash facilities, is required, it is noted that it must be authorised by an access licence under the relevant water legislation. It is noted that the proposed installation of groundwater wells is for the purpose of long term monitoring of groundwater quality, and that no groundwater extraction is proposed for the operation of the site.

Dewatering during excavations may be required if groundwater is encountered. This is discussed further in **Section 6.3**. If any dewatering of excavations, such as for construction of the landfill cells or sewer pipeline, is required, such dewatering activities must be authorised by a licence under the relevant water legislation.

### 3.2.4 Other Legislative Approvals

Although Part 3A of the EP&A Act has now been repealed, the provisions of this Part still apply to this proposal in accordance with Schedule 6A (transitional Part 3A projects).

Section 75U of the EP&A Act (now repealed under Part 3A) included provisions stating that a range of approvals did not apply should the NSW Minister for Planning approve the proposed additions to and expansion of the AWMF, in accordance with Section 75J of the EP&A Act (also now repealed under Part 3A). In accordance with the provisions of Section 75U of the EP&A Act the following authorisations are not required for an approved project:

- Concurrence under Part 3 of the *Coastal Protection Act 1979* of the Minister administering that Part of the Act;

- A permit under Section 201, 205 or 219 of the *Fisheries Management Act 1994*;
- Approval under Part 4, or an excavation permit under Section 139, of the *Heritage Act 1977*;
- An Aboriginal Heritage Impact Permit under Section 90 of the *National Parks and Wildlife Act 1974*;
- An authorisation referred to in Section 12 of the *Native Vegetation Act 2003* (or under any Act to be repealed by that Act) to clear native vegetation or State protected land;
- A Bush Fire Safety Authority under Section 100B of the *Rural Fires Act 1997*; and
- A water use approval under Section 89, a water management work approval under Section 90 or a Controlled Activity Approval under Section 91 of the *Water Management Act 2000*.

Also, Division 8 of Part 6 of the *Heritage Act 1977* does not apply to prevent or interfere with the carrying out of an approved project.

In addition, should the Project be approved by the Minister, Section 75V of the EP&A Act (also now repealed under Part 3A) included provisions that prevent refusal of relevant approval of a kind necessary for carrying out an approved project. Such approvals must also be substantially consistent with the approval under Part 3A of the EP&A Act. This includes:

- An aquaculture permit under Section 144 of the *Fisheries Management Act 1994*;
- An approval under Section 15 of the *Mine Subsidence Compensation Act 1961*;
- A mining lease under the *Mining Act 1992*;
- A production lease under the *Petroleum (Onshore) Act 1991*;
- An EPL under Chapter 3 of the PoEO Act (for any of the purposes referred to in Section 43 of that Act);
- A consent under Section 138 of the *Roads Act 1993*; or
- A licence under the *Pipelines Act 1967*.

Despite the provisions of Section 75U of the EP&A Act, the approvals as outlined in **Table 3.3** may be required for the construction and operation of the proposed additions to the AWMF.

**Table 3.3: Additional Approvals and Licences**

Legislation	Requirement
<i>Mine Subsidence Compensation Act 1961</i>	Approval under Section 15 of the Act
<i>Protection of the Environment Operations Act 1997</i>	EPL under Chapter 3 for purposes as outlined in Section 43 of the Act

### 3.2.5 Proceedings under State Laws

With respect to the proponent having ever been subject to any proceedings under State laws for the protection of the environment or the conservation and sustainable use of natural resources,

LMCC was fined \$40,000.00 pursuant to the former *Environmental Offences and Penalties Act 1989* and repealed *Clean Waters Act 1970*, following an inspection of the AWMF site by the Environment Protection Authority on 7 August 1997. The action was due to an overspill from an on-site leachate and sedimentation pond following 10 days of heavy rain. As a result the sizing of ponds on site was enlarged and new management practices were implemented. No other relevant proceedings involving the proponent are known.

## 3.3 Sustainable Development

### 3.3.1 Overview

Ecologically Sustainable Development (ESD) is development that aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations. The *National Strategy for Ecologically Sustainable Development* (ESDSC, 1992) sets out the broad strategic and policy framework for governments to cooperatively make decisions and take actions to pursue ESD in Australia. The Strategy defines ESD as “*using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased*”.

### 3.3.2 Principles of Ecologically Sustainable Development

In NSW, Section 5(a)(iiv) of the EP&A Act states that ESD is a primary objective of the planning process under the Act. In accordance with the EP&A Act, Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* sets out the principles of ESD as follows:

- **The precautionary principle** – if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decisions should be guided by:
  - Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and
  - An assessment of the risk-weighted consequences of various options;
- **Inter-generational equity** – the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations;
- **Conservation of biological diversity and ecological integrity** – that conservation of biological diversity and ecological integrity should be a fundamental consideration;
- **Improved valuation pricing and incentive mechanisms** – environmental factors should be included in the valuation of assets and services, such as:
  - Polluter pays, i.e. those who generate pollution and waste should bear the cost of containment, avoidance or abatement;
  - The users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste; and
  - Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

The above principles, in conjunction with biophysical, economic and social matters, have been considered during the assessment of this project.

### 3.3.3 Application of Principles

The following outlines how each of the principles of ESD have been addressed within the environmental assessment for additions to AWMF.

#### 3.3.3.1 *The Precautionary Principle*

This EA report has been prepared using the most accurate information and data available at the time of writing. Preparation and review of the document has been undertaken by specialist and experienced environmental professionals. Assessments and investigations have been undertaken for potential impacts on all aspects of the environment, and specialist investigations undertaken for those components of the environment where higher levels of impact were anticipated. Environmental and residual risk assessments have also been undertaken as part of this EA report. These risk assessments provide an indication of the likely environmental consequences of implementation of the additions to AWMF project. To minimise the risks associated with potential environmental impacts, environmental impact mitigation and management measures have been recommended based on best-practice environmental standards.

#### 3.3.3.2 *Inter-Generational Equity*

The proposed additions to AWMF provide a strategy to manage the landfill demands of Lake Macquarie over the next 25 years. This project has been selected from a number of alternative options as the most appropriate to provide Lake Macquarie with a suitable waste management strategy based on due consideration of environmental, social and economic values. Implementation of this project means that suitable management of landfill waste in the LGA can be undertaken now, rather than being deferred and likely transferred to future generations, which would be unacceptable in terms of inter-generational equity.

#### 3.3.3.3 *Conservation of Biological Diversity and Ecological Integrity*

Design considerations for the additions to AWMF have attempted to avoid or minimise impacts on native vegetation. However, implementation of the project would have impacts due to the removal of vegetation within a total footprint area of approximately 8.55ha (7.2ha of which requires biodiversity offsetting), including removal of one threatened species, *Tetratheca juncea*. This impact will be managed through the BioBanking of suitable areas of land to provide a sufficient number of both Species Credits for *Tetratheca juncea* and Ecosystem Credits of the required vegetation type. Parts of Lot 372 (in the south of the AWMF site), and part of the adjacent Lot 373 are expected to be included within the BioBank site. The proposed BioBanking strategy would allow for the Offset Sites to be set aside and managed by LMCC in-perpetuity to conserve the natural vegetation and fauna habitat on these sites.

#### *3.3.3.4 Improved Valuation Pricing and Incentive Mechanisms*

The City of Lake Macquarie Council is committed to reducing landfill amounts. The proposed additions to AWMF fall under the wider Waste Strategy that Council has adopted, which focuses on waste avoidance, reduction, reuse and recycling. Even though LMCC's waste strategy will not be dominated by landfilling in the future, there will be a portion of the waste stream that is not recoverable for beneficial re-use. An increased capacity at Awaba represents a safety net to Lake Macquarie while the new waste strategy is being devised and implemented, and a solution for disposal of residual wastes that cannot be economically recovered from the waste stream in the future.

The costs associated with land fill are funded through user charges. At the AWMF itself, incentive mechanisms are in place in terms of the pricing of "at gate" fees, which encourage reductions in land fill waste.

## 4 Stakeholder and Community Consultation

This chapter describes the consultation undertaken to date during the preparation of the EA Report and provides an overview of consultation undertaken during the development of LMCC’s Waste Strategy. It includes consultation with relevant local, State and Commonwealth Government authorities, service providers, community groups and affected landowners as per the DGRs.

### 4.1 Consultation during Waste Strategy Development

LMCC initiated the Waste Strategy Project in November 2009 to formulate a new domestic waste service for the Lake Macquarie LGA. A critical component of this project is a community consultation program which aims to:

- Get a sense of the community’s priorities, attitudes and risk thresholds associate with the existing and future waste management options;
- Raise awareness of Lake Macquarie’s waste issues;
- Gauge community views of LMCC’s preferred waste processing technologies (two and three bin system); and
- Seek feedback on the Draft Waste Strategy to gain further knowledge on issues and concerns regarding the three bin system.

An overview of the consultation framework utilised to date in the development of the Waste Strategy is provided in **Table 4.1**. In total, over 50 activities have been conducted with the community and LMCC staff to seek feedback on the development of the Waste Strategy.

**Table 4.1: Summary of the Consultation Framework during Waste Strategy Development**

Stage	Summary
Round One: Quadruple Bottom Line Analysis	<p>The aim of this event was to gauge the community’s existing awareness and views of LMCC’s current waste services. The workshop began with focus questions asking the participants what they like or dislike about LMCC’s waste services and what other waste services and systems they know of. Presentations were delivered outlining the drivers for the Waste Strategy Project, LMCC current waste issues and the future plan to develop a waste strategy.</p> <p>Feedback from participants was facilitated through a quadruple bottom line analysis weighting exercise. Participants were split into working groups and were asked to score environmental, social, financial and governance issues in order of importance and value. The workshops concluded with an open discussion and questions from participants. The workshop was closed with an overview of proposed further community consultation opportunities and project timeframes.</p>
Round Two: Preferred Waste Processing Technologies	<p>The framework for this round focused on conveying how LMCC arrived at two preferred waste processing technologies (two and three bin system) and to seek feedback on the preferred options. The workshop included a detailed presentation outlining the top ten suitable waste processing technologies for Lake Macquarie. The second part of the presentation explained LMCC’s two preferred options in detail -</p>

Stage	Summary
	<p>the two and three bin system.</p> <p>After the presentation the community were invited to indicate any aspects of the two short listed options that they liked or had concerns about and to ask questions with expert waste consultants. Following this open discussion, participants were asked to indicate whether they had a clear preference for one of the two options presented, or were comfortable with either of them, or not comfortable with any option being implemented.</p>
Round Three: Draft Waste Strategy	<p>With the Draft Waste Strategy on public exhibition, this round of consultation was structured as an information session with feedback sought in the form of written submissions. An overview of the Waste Strategy Project and waste management challenges facing LMCC was provided including the steps taken in developing the Draft Waste Strategy and the context for the preferred three bin system. A facilitated questions and discussion session was held which focussed on a number of key questions to encourage participation.</p>
Public debate: The Great Waste Debate	<p>A community debate was held on 1 December 2010 at Lake Macquarie Performing Arts Centre to engage and encourage discussion with a variety of age groups on the Draft Waste Strategy. Local schools and members of community groups (Community Advisory Group and Lake Macquarie Youth Advisory Committee) were brought together to form the debating teams to debate the advantages and disadvantages of the three bin system as outlined in the Draft Waste Strategy. The debate topic was “That a three bin system is the best option for Lake Macquarie”. An independent external adjudicator adjudicated the debate and approximately 40 residents and local media were in attendance.</p>
Online Forum: Have Your Say Lake Mac-Future of Waste	<p>An online discussion forum was set-up to engage the online community in discussions on the development of the Waste Strategy Project and to provide an alternative forum for participation for those that could not attend workshops. The forum posted a number of topics for participants to express their views and encourage discussion.</p> <p>The topics were similar to the community workshop focus questions that sought the public’s awareness and likes and dislikes of LMCC’s current waste services. As the project developed, topics became more focused on the two and three bin systems and potential implementation issues.</p>
Community Advisory Group	<p>Three workshops were held with the Community Advisory Group over the course of the consultation. In general, the workshop topics reflected that of the broader community workshops with presentations delivered on the background of the Waste Strategy Project, the drivers for the project, a quadruple bottom line analysis weighting, the 10 suitable waste processing technologies and the two preferred waste processing technologies.</p> <p>At each of the sessions there was robust discussion on the advantages and disadvantages of the various solutions for Lake Macquarie with some members becoming so involved as to conduct their own neighbourhood surveys on the two and three bin systems.</p>
Lake Macquarie Youth Advisory Council	<p>Two workshops were held with the Lake Macquarie Youth Advisory Council where a presentation was delivered with open discussion and questions. The youth group were engaged in the topic and expressed diverse views on the importance of the environment and what they thought of the impacts would be of either the two or three bin system within their own households.</p>
Shopping Centre Visits- Mergence of Waste Awareness Campaign	<p>Throughout the exhibition period of the Draft Waste Strategy, 15 shopping centre visits were conducted across the city to merge the Waste Awareness Campaign messages with the Draft Waste Strategy. Stalls were set-up at the city’s major shopping centres to highlight the link between Lake Macquarie’s waste issues and</p>

Stage	Summary
	the solution LMCC is proposing in the Draft Waste Strategy. The visits were also an opportunity to encourage feedback from the community via submissions.

A complete summary of consultation undertaken to date in the development of the Waste Strategy, including a summary of the issues raised, is provided in **Appendix C**.

## 4.2 Development of the DGRs

During the development of the DGRs for the Project, the NSW Department of Planning and Infrastructure consulted with a range of Government agencies and public authorities. A summary of the key issues raised that formed the basis of the DGRs is provided in **Table 4.2**. The DGRs are included in **Appendix B**.

**Table 4.2: Consultation during Development of the DGRs**

Agency	Issues Raised
NSW Rural Fire Service	<ul style="list-style-type: none"> <li>▪ The site is mapped as bush fire prone land; however, as the proposal is not for residential purposes it is not integrated development under Section 91 of the EP&amp;A Act and will not require a Bush Fire Safety Authority from the RFS</li> <li>▪ Developments of this type shall address the aims and objectives of <i>Planning for Bush Fire Protection</i> (RFS, 2006) within the environmental assessment</li> </ul>
Department of Primary Industries (formerly Industry & Investment NSW)	<ul style="list-style-type: none"> <li>▪ No significant fisheries/aquatic habitat issues are identified</li> <li>▪ The location of the proposal means that it does not affect agricultural resource land and is also very unlikely to directly impact on agricultural operations. Consideration should be given to the guidelines <i>Agricultural Issues for Landfill Developments</i> (I&amp;I NSW, 2010) on rural lands where relevant</li> <li>▪ The site is within the Centennial Newstan Pty Ltd Lease 1452 mineral resource title area, exploration Licence 5138 and AGL Operations Pty Ltd petroleum exploration licence 267. Consultation should be undertaken with the Mine Subsidence Board</li> </ul>
Office of Environment and Heritage (formerly Department of Environment, Climate Change and Water)	<p>OEH noted that the impact on the following environmental issues needs to be assessed, quantified and reported on:</p> <ul style="list-style-type: none"> <li>▪ <b>Aboriginal cultural heritage:</b> A detailed Aboriginal cultural heritage assessment including assessment of impacts in consultation with the community and preparation of actions to avoid, mitigate or compensate unavoidable impacts</li> <li>▪ <b>Air Quality:</b> A comprehensive Air Quality Impact Assessment, including assessment of risks, description of receiving environment, consideration of 'worst case' and assessment of cumulative impacts</li> <li>▪ <b>Biodiversity:</b> A detailed report of the biodiversity of the area and assessment of impacts should be prepared including field survey in accordance with relevant guidelines, assessment of impacts on threatened species, preparation of mitigation and offset measures and referral to the Commonwealth on matter of National Environmental Significance</li> <li>▪ <b>Contaminated Site Assessment:</b> A preliminary assessment of contamination should be undertaken and include details of remediation of any sites if required</li> </ul>

Agency	Issues Raised
	<ul style="list-style-type: none"> <li>▪ Noise and Vibration: An assessment of noise impacts should be undertaken in accordance with the relevant guidelines, including assessment of road traffic noise</li> <li>▪ Soils: As assessment of potential impacts on soil and land resources should be undertaken</li> <li>▪ Waste (General): Assessment of waste management at the facility should be undertaken including any hazardous waste</li> <li>▪ Waste (Site Specific): A detailed assessment of leachate management should be undertaken and commitment given to development of concept designs and management plans provided prior to submission for licences. Commitment should be made to the construction, quality and types of leachate management proposed</li> <li>▪ Water: Assessment of water including proposal description, background conditions, impact assessment, proposed monitoring</li> </ul> <p>Specific guidance on the assessment requirements for each of the above areas was provided and has been considered in the preparation of the environmental assessment</p>
Office of Water	<p>The Office of Water noted that the environment assessment should:</p> <ul style="list-style-type: none"> <li>▪ Take into account the objectives and water management principles of the <i>Water Management Act 2000</i> if in an area covered by a WSP</li> <li>▪ Satisfy approval requirements under NSW water legislation</li> <li>▪ Demonstrate consistency with the rules of any water sharing plan for the locality</li> <li>▪ Take into account the relevant NSW government policies</li> <li>▪ Take into account the Guidelines for Controlled Activities</li> <li>▪ Address any predicted potential stormwater impacts</li> <li>▪ Address any predicted potential groundwater impacts including on groundwater dependant ecosystems</li> <li>▪ Identify how a sustainable and efficient water supply is to be sourced and secured for the proposal having regard to any embargoes and water trading mechanisms</li> <li>▪ Ensure that any potential hydraulic connection between the proposed development and stormwater and groundwater sources is identified and quantified</li> <li>▪ Ensure that impacts on stormwater and groundwater systems (including GDE), basic landholder's rights and affected licensed water users are minimised and accounted for</li> <li>▪ Provide stormwater and groundwater monitoring plans</li> <li>▪ Provide contingency strategies linked to monitoring and rehabilitation plans</li> </ul>

## 4.3 Consultation during EA Report Preparation

### 4.3.1 Government Agencies

In addition to the consultation undertaken in preparing the DGR's for the Project, a range of further consultation activities have been undertaken with various government agencies.

As required by the DGR's specific consultation has been undertaken with the Office of Environment and Heritage, the Office of Water, the former Roads and Traffic Authority, and the Mine Subsidence Board. Letters outlining details of the project were sent to each of these agencies to seek any additional feedback. A summary of the issues raised, in addition to those in the DGR's is provided in **Table 4.3**.

**Table 4.3: Government Agency Consultation with EA Report Preparation**

Agency	Issues Raised
Office of Environment and Heritage	No further comments beyond those given in the development of the DGR's were provided in response to the consultation letter.
Office of Water	No further comments beyond those given in the development of the DGR's were provided in response to the consultation letter.
Former Roads and Traffic Authority (now Roads and Maritime Services)	<p>The former RTA (now Roads and Maritime Services) provided guidance on applicable legislation and guidelines to be considered in preparation of the environmental assessment and specifically requested a traffic study in accordance with the RTA's (2002) <i>Guide to Traffic Generating Developments</i>. The study should include:</p> <ul style="list-style-type: none"> <li>▪ Identification of all relevant traffic routes and intersection for access to / from the subject area;</li> <li>▪ Current traffic counts for all of the above traffic routes and intersections;</li> <li>▪ Likely daily and peak traffic movements likely to be generated by the proposed development and the increase in the level and type of traffic associated with the proposal;</li> <li>▪ Consideration of the traffic impacts on affected intersection and in particular the capacity of the intersection of Wilton and Wangi Roads (MR217) and Wilton and Awaba Roads (MR220) to safely and efficiently cater for any additional vehicular traffic generated; and</li> <li>▪ Details of the anticipated route of trucks on the major arterial and local road network.</li> </ul>
Mine Subsidence Board	The District Supervisor of NSW Mine Subsidence Board office at Newcastle advised that the proposed landfill cells are underlain by coal seams, which are likely to be mined sometime in the future by Centennial Coal Company Limited, which owns the mining lease. Centennial Coal Company Limited were contact to obtain the mine subsidence parameters relevant for design of proposed landfill extension. The written response provided by Centennial Coal Company Limited is attached within the Geotechnical report in <b>Appendix F</b> .

Several meetings have also been held between LMCC and key government agencies such as the Office of Environment and Heritage and the Department of Planning and Infrastructure to discuss specific aspects of the project and to provide feedback on the progress of the environmental assessment.

#### **4.3.2 Service Provider Consultation**

LMCC initiated discussions with Hunter Water Corporation (HWC) regarding the proposed sewer pipeline and the discharge of excess leachate from the AWMF site to the HWC sites. During this consultation, four pipeline route options were discussed. These were as follows:

- **Option 1:** This option involved construction of a pipeline from the AWMF site to the Rathmines 6 Water Pumping Station, with the majority of the pipeline being constructed in existing road reserves. Following a comparison of the four options, this was considered to be the most sustainable option, which resulted in the least environmental impact;
- **Option 2:** This option involved construction of a pipeline from the AWMF site to the Rathmines 6 Water Pumping Station, with the pipeline following the most direct (shortest) route. When compared to Option 1, this option was considered to result in significantly greater environmental impact, but in other ways to offer a similar outcome. The option was therefore not preferred.
- **Option 3:** This option was to tanker excess leachate from the AWMF site to Dora Creek WWTW using road transport. This was determined to be the least sustainable and most expensive option. It was also the only option to introduce the added risk of regular tanker movements on local roads. The option was therefore not preferred.
- **Option 4:** This option was to pump leachate to a Hunter Water facility in Grevillea Grove, Toronto West. However this connection was not supported by HWC as it only provided 2 hours emergency storage capacity, which is below their minimum requirement of 4 hours. The option was therefore discounted as not being technically feasible.

Following assessment of the four options it was therefore resolved by LMCC that Option 1, which involves the pumping of leachate from the leachate pond to Access Chamber F3590 located adjacent to the Rathmines 6 Waste Water Pumping Station (WWPS), is the preferred option. This is the option which has been assessed in this EA.

HWC made the following comments with regards to Option 1 (correspondence in **Appendix C** dated 12/08/2012):

- The proposed leachate discharge location (AC F3590) is within the Toronto Waste Water Treatment Works (WWTW) catchment, with the nearest connection point lying within the Rathmines 6 WWPS catchment;

- Rathmines 6 WWPS currently receives 420 L/s of total peak wet weather flow (PWWF) although it has a duty pumping capacity of 480 L/s. The ultimate leachate discharge rate of 8.1 L/s will increase the total PWWF to 428.1 L/s, which is below the operating capacity of the pump station;
- Rathmines 6 WWPS should also have sufficient emergency storage capacity to cater for the proposed leachate discharge. It should be noted that there is a complex arrangement where this station receives flows from Dora Creek WWTW in some circumstances; however, with the current arrangement it is considered that this will not significantly affect the proposed connection;
- The connection to Rathmines 6 WWPS is via a 3.7km rising main with pumping for just 4 hours per day. Hunter Water anticipates that detention times will be significantly above 4 hours, and odour control will be a concern. Hunter Water will require an odour control plan to be submitted by LMCC to support the application, which considers odour control measures such as flushing, wet well washers, venting, chemical dosing etc.;
- The access chamber to which discharge is proposed will require epoxy lining to prevent corrosion and a vent to Hunter Water standards;
- Additional trade waste requirements include:
  - Additional water quality testing demonstrating acceptable dissolved metal concentrations will be required before final acceptance of leachate;
  - A sewer magflow meter will need to be installed to measure discharge. This meter will also be used for rating purposes;
  - A suitable sample point will need to be agreed upon; and
  - Inspection points along the rising main will need to be installed to verify the ongoing integrity of the pipe and to avoid possible environmental issues from leaks and breaks.

Correspondence received from HWC is provided at the back of **Appendix C**.

### **4.3.3 Community Consultation**

#### *4.3.3.1 Information Sessions*

The proposal to expand the AWMF was first raised as a part of LMCC's consultation undertaken for the overall waste strategy (refer **Section 4.1**). Additional consultation has also been undertaken to focus on the proposed expansion and to identify key areas of community concern in relation to the Project. Two information sessions were conducted on 4 May 2011, including a daytime session held at the Council Chambers and an evening session held at the Toronto Workers Club. Invitations to the consultation sessions were sent to residents living within a 2.5km radius of the landfill site, and advertisements were placed in two local newspapers.

The format of the sessions included presentations of the overall waste strategy and an overview of the key environmental areas that were being considered as part of the environmental assessment. The sessions also included interactive components where the community were asked specific questions in relation to the Project. Two questions were asked of the attendees at each session. A summary of the issues raised in response to each question is provided in **Table 4.4.**

**Table 4.4: Community Responses to Questions during Community Consultation Sessions**

Question	Key issues/questions raised by the community
<p>Question 1: What do you think of LMCC's plans to expand the current landfill site? Do you have alternative suggestions?</p>	<ul style="list-style-type: none"> <li>▪ The aim should be to eliminate the amount of waste going to landfill</li> <li>▪ Mine site pits or already cleared land should be used as an alternative to expanding the AWMF</li> <li>▪ LMCC could introduce incentive programs like a chicken farm where organic contributors receive eggs</li> <li>▪ Can we eventually have waste to energy option?</li> <li>▪ Use ex coal seam workings, overfill with ash from power stations in turn covered with top soil from previous digging and restore natural endemic vegetation</li> <li>▪ Good idea if properly lined</li> <li>▪ We don't want any more dumping in our town, we are sick of our town being the dumping ground for everything that no one else wants (gun club, motor bike club, car rally club)</li> <li>▪ LMCC needs to investigate other sites that have already been disturbed/ destroyed by mining and other industrial activity</li> </ul>
<p>Question 2: What are your key concerns about the expansion proposal?</p>	<ul style="list-style-type: none"> <li>▪ Environmental impact</li> <li>▪ Visual impact</li> <li>▪ Odour impact SE and NE wind direction</li> <li>▪ Social impact</li> <li>▪ Mud on Wilton Road</li> <li>▪ Rehabilitation Program</li> <li>▪ Future use of the site</li> <li>▪ Financial impact (what will the cost increase be to the community)</li> <li>▪ Quality of the lining of landfill cells</li> <li>▪ Property value</li> <li>▪ Traffic impact</li> <li>▪ Timeframes (many residents expected landfill would end operation, shock that it is going to continue being used)</li> <li>▪ Consultation</li> <li>▪ Illegal Dumping</li> <li>▪ Health concern</li> </ul>

Attendees at each of the consultation session were also given the opportunity to raise concerns or ask questions of LMCC and the project team. A summary of the key issues raised during the consultation sessions is provided in

Table 4.5.

**Table 4.5: Summary of Key Issues Raised during Community Consultation Sessions**

Issue Area	Key Issues/Questions Raised by the Community	Answer / Addressed in EA Report
Planning Process	<ul style="list-style-type: none"> <li>▪ Does the development application process for landfill expansion apply to all LMCC's projects?</li> <li>▪ Has the expansion to the AWMF already been approved?</li> </ul>	<ul style="list-style-type: none"> <li>▪ No, only major projects are assessed under the former Part 3A process. It is also noted that the Part 3A process is under review, and may not apply to future projects.</li> <li>▪ The proposed works have not been approved yet.</li> </ul>
Consideration of alternatives	<ul style="list-style-type: none"> <li>▪ Has consideration been given to the use of open cut mines?</li> <li>▪ Is LMCC considering any long term alternatives to the AWMF?</li> <li>▪ Have alternative technologies been considered?</li> <li>▪ Are Hawkmount Quarry or the Pasminco site suitable alternatives?</li> <li>▪ Landfill should be extended out not up</li> </ul>	<ul style="list-style-type: none"> <li>▪ One open cut mine site exists in the Lake Macquarie LGA, which is still being extracted and will not be available within the required timeframe relevant to this proposal. Discussions with the site owner identified their intention for alternative uses.</li> <li>▪ See Section 2.3.</li> <li>▪ Yes, an Alternative Waste Treatment facility is currently being considered to divert recyclable/reusable waste from the AWMF.</li> <li>▪ Hawkmount Quarry has inadequate capacity and there are access constraints due to the mine haul road and Eraring power station secure access arrangements. The Pasminco site is unsuitable due to landform, proximity to existing urban areas and the need to manage contaminated material on site associated with previous smelting activities.</li> <li>▪ Both will be occurring, but primarily emplacement will be extended horizontally rather than vertically.</li> </ul>
Flora and Fauna	<ul style="list-style-type: none"> <li>▪ What flora and fauna is on the site and what will be impacted?</li> <li>▪ How will rehabilitation be monitored?</li> <li>▪ Where are the biodiversity offsets going to be and will they establish habitat connectivity?</li> <li>▪ Will there be an opportunity to comment on the referral to the</li> </ul>	<ul style="list-style-type: none"> <li>▪ See Section 6.5.</li> <li>▪ Through the revised Landfill Environmental Management Plan.</li> <li>▪ See Section 6.5.4.</li> <li>▪ Yes.</li> </ul>

Issue Area	Key Issues/Questions Raised by the Community	Answer / Addressed in EA Report
	Commonwealth in regards to <i>Tetratheca juncea</i> ?	
Visual Impact	<ul style="list-style-type: none"> <li>▪ Impact of the landfill from Awaba village</li> </ul>	<ul style="list-style-type: none"> <li>▪ See Section 6.9.</li> </ul>
Traffic Impacts	<ul style="list-style-type: none"> <li>▪ Frequency of mud on Wilton Road</li> </ul>	<ul style="list-style-type: none"> <li>▪ The proposed wheel wash facility will significantly reduce the occurrence of mud on Wilton Road from the AWMF site.</li> </ul>
Leachate Management	<ul style="list-style-type: none"> <li>▪ What is the quality of the lining for the landfill cells?</li> </ul>	<ul style="list-style-type: none"> <li>▪ See Section 6.4.</li> </ul>
Social Impact	<ul style="list-style-type: none"> <li>▪ Will the fire trail to the west of the site still be accessible to the community</li> <li>▪ Impact of the expansion on house values</li> <li>▪ Illegal dumping</li> <li>▪ Rubbish blowing off vehicles</li> <li>▪ What will Awaba residents get out of the proposed landfill extension?</li> <li>▪ Are LMCC going to extend the landfill again in the future?</li> <li>▪ Other issues should be resolved as the AWMF is expanded (sewage, roads etc.)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Yes.</li> <li>▪ See Section 2.2.1.</li> <li>▪ LMCC now funds a dedicated ranger to target illegal dumping.</li> <li>▪ All loads should be covered and council waste vehicles are enclosed.</li> <li>▪ See Section 2.2.1.</li> <li>▪ This is considered unlikely.</li> <li>▪ LMCC will investigate upgrading the intersection of Wilton and Wangi Roads subsequent to the proposed works.</li> </ul>
Waste Management	<ul style="list-style-type: none"> <li>▪ Does LMCC accept waste from other areas?</li> <li>▪ Does LMCC make money at the AWMF?</li> <li>▪ What is the timeframe for tendering of the waste strategy?</li> </ul>	<ul style="list-style-type: none"> <li>▪ Yes, but LMCC tries to price it out.</li> <li>▪ No.</li> <li>▪ Tenders for LMCC's Organics Waste Processing Project (Tender T903P) and Green and Organic Waste Collection and Bin Supply Services (Tender T903C) were released on 30 November 2011 and both close on 3 April 2012.</li> </ul>
Air Quality	<ul style="list-style-type: none"> <li>▪ How much more odour will the residents of Awaba receive with the expansion of the AWMF?</li> </ul>	<ul style="list-style-type: none"> <li>▪ See Section 6.6.</li> </ul>
Consultation	<ul style="list-style-type: none"> <li>▪ The community should have been involved earlier and invited to a site inspection</li> </ul>	<ul style="list-style-type: none"> <li>▪ Noted.</li> </ul>

Issue Area	Key Issues/Questions Raised by the Community	Answer / Addressed in EA Report
	<ul style="list-style-type: none"> <li>▪ More information meetings are needed</li> <li>▪ Meeting objectives need to be made clear to attendees</li> <li>▪ More consultation with members of the Awaba community is required</li> <li>▪ No Councillors from the west ward were present at the consultation sessions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Noted.</li> <li>▪ Noted.</li> <li>▪ In response to this Council held a subsequent community meeting at Awaba on 20 July 2011.</li> <li>▪ Noted.</li> </ul>

It should be noted that a number of issues were raised by the community that are not specifically related to the proposed expansion of the AWMF. These issues are being addressed by LMCC separately.

In addition to the above issues raised during the consultation session, a report entitled *Protecting Biodiversity in Western Lake Macquarie: A Conservation Proposal* (McLean *et al.*, 2011) was provided by a community member for information. The report recommends the conservation of several areas of natural vegetation in the Western Lake Macquarie area. Whilst the location of the AWMF falls outside the proposed conservation areas, the principles outlined in this report have been considered in relation to the proposed biodiversity offsets for the project (**Section 6.5**).

#### 4.3.3.2 Awaba Community Meeting

In response to a number of issues that were raised during the information sessions on 4 May 2011, LMCC held a community meeting at Awaba on 20 July 2011. The forum was held to discuss issues associated with the extension of the landfill and other issues of concern to the local community. The agenda for the meeting included discussion of the following issues:

- Environmental assessment process and project overview;
- Odour impact and complaints;
- Visual impacts;
- Litter and bin collections;
- Illegal dumping;
- Wilton Road and bridge; and
- Water pressure and sewerage.

Attendees were again given the opportunity to raise concerns or ask questions of LMCC. A summary of the responses provided by LMCC to key question and issues raised during the Awaba community meeting is provided in Table 4.6.

**Table 4.6: LMCC Responses to Key Questions and Issues Raised during the Awaba Community Meeting**

Key Issues/Questions Raised by the Community	LMCC Response
<ul style="list-style-type: none"> <li>▪ Visual impact from resident's homes in Awaba township</li> </ul>	<ul style="list-style-type: none"> <li>▪ LMCC made arrangements with the residents that requested photographs be taken from their property. Only one resident request a photo was taken, however views towards the landfill from the property investigated were obscured by vegetation.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Illegally dumped waste on LMCC land</li> </ul>	<ul style="list-style-type: none"> <li>▪ Residents are encouraged to report illegally dumped waste by contacting LMCC's Customer Service Centre on 4921 0333.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Pedestrian path on bridge on Wilton Road</li> </ul>	<ul style="list-style-type: none"> <li>▪ LMCC is investigating works to the pedestrian path.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Care and control of Awaba Community Hall</li> </ul>	<ul style="list-style-type: none"> <li>▪ LMCC recommends that Awaba community representatives contact the Crown Lands Division to directly negotiate the possibility of the community regaining care and control of the Awaba Community Hall.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Recent odour complaints by the Awaba community, potentially caused by the existing AWMF</li> </ul>	<ul style="list-style-type: none"> <li>▪ LMCC's Waste Sites and OH&amp;S Coordinator has offered to take any resident that experiences an odour issue to the AWMF site to try and identify the cause of the odour. The Coordinator has also offered to take residents of Awaba on a site visit of the AWMF to see how operations work.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Explanation of the development application process</li> </ul>	<ul style="list-style-type: none"> <li>▪ Done at the meeting by LMCC and subsequently in a letter sent to Awaba residents in response to the meeting (dated 11 August 2011).</li> </ul>

#### 4.3.4 Indigenous Heritage Consultation

Aboriginal community consultation for the project was initiated and conducted by Insight Heritage in accordance with the DGRs. Consultation was undertaken in accordance with the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005) as required for Part 3A projects.

Four Aboriginal parties registered their interest in the project, including:

- Awabakal Traditional Owners Aboriginal Corporation (ATOAC);
- Awabakal Descendants Traditional Owners Aboriginal Corporation (ADTOAC);
- Awabakal Local Aboriginal Land Council (ALALC) on behalf of Koompahtoo Local Aboriginal Land Council; and
- Cacatua Culture Consultants (CCC).

In accordance with the DEC (2005) guidelines Insight Heritage undertook the following consultation process for the works proposed at the AWMF site (Lot 372):

- **Step 1:** Notification and registrations of interest:
  - An advertisement was placed in public notices section of the Newcastle Herald on 7 February 2011 calling for registrations from Aboriginal persons or groups who may have an interest in the project;

- Project notification letters and request for details of Aboriginal parties who may have an interest in the project were sent to various Aboriginal stakeholders as listed in Insight Heritage (2011) on 7, 22 and 23 February 2011 with a 14 day registration period;
- **Step 2:** Review of proposed assessment methodology by registered stakeholders:
  - The proposed methodology for cultural and archaeological assessment was circulated to all registered stakeholders on 17 March 2011 with a 21 day review period (closing 7 April 2011);
  - A survey of the AWMF site was undertaken on 7 April 2011 by Insight Heritage and sub-surface testing was undertaken on 8 April 2011. Both site visits were attended by several representatives from ATOAC, ADTOAC and ALALC;
- **Step 3:** Review of draft assessment report by registered stakeholders (undertaken in June 2011):
  - The reviewed assessment methodology was executed and a draft Cultural Heritage Assessment Report was produced by Insight Heritage (2011);
  - This draft Assessment Report was circulated to registered stakeholders with a cover letter for review with a 21 day review period (closing 27 June 2011); and
  - On 8 November 2011 an email was sent to registered stakeholders advising of the updated infrastructure plan for the proposed works and requesting further comments.

A consultation log with all responses received from Aboriginal stakeholders and the registered Aboriginal parties for the proposed works at the AWMF site is provided in Appendix B of Assessment Report by Insight Heritage (2011).

Subsequently further Aboriginal community consultation for the sewer pipeline component of the works was undertaken by Niche. As the pipeline works are part of the previously advertised project notification and registration of interested parties (Step 1 above) was not repeated by Niche. In accordance with the DEC (2005) guidelines Niche undertook the following consultation process for the works proposed along the sewer pipeline route:

- **Step 2:** Review of proposed assessment methodology by registered stakeholders:
  - Previously registered Aboriginal parties were provided with project information and invited to provide comment and input into the project methodology and timeframes;
  - A survey of the pipeline route was undertaken on 4 November 2011 by Niche and attended by a representative each from the ATOAC, ADTOAC and CCC;
- **Step 3:** Review of draft assessment report by registered stakeholders
  - A draft Aboriginal Cultural Heritage and Archaeological Report, including a proposed methodology, was prepared and presented to the registered Aboriginal parties for comment.

Responses on the draft Report including the methodology were received from ATOAC, ADTOAC and CCC and are provided in Appendix C of the Aboriginal Cultural Heritage Assessment report by Niche (2011).

#### **4.4 Consultation during EA Report Exhibition**

To ensure the community and other stakeholders have the opportunity to provide comment on the Project, the EA Report will be publicly exhibited in accordance with Section 75H of the EP&A Act (although now repealed under Part 3A this Section is still applicable to this proposal). This requires the EA Report to be made publicly available for a period of no less than 30 days and provides the opportunity for any person to make a written submission to the Director-General concerning the Project.

Additional opportunity will also be provided to attend information sessions during the exhibition of the EA Report. These sessions will allow the community and stakeholders to ask specific questions about the Project and will ensure LMCC has addressed all issues during the environmental assessment process.

## 5 Study Area and Project Description

This chapter presents an introduction to the study area and provides a more detailed description of each of the key aspects of the proposed extension to the AWMF.

### 5.1 Overview of the Study Area

#### 5.1.1 Site Location and Operations

The proposed additions to the AWMF are situated within the boundaries of the existing facility, within Lot 372 DP 723259. The site is located approximately 4km west of the suburb of Toronto and approximately 1.2km south-east of the township of Awaba within the Lake Macquarie LGA (see **Figure 1.1**). The works are situated on Crown Land that is controlled by LMCC as the appointed Corporate Manager of the Awaba Waste Management (R170042) Reserve Trust (refer Gazette of 20th July 2001, folio 5478).

Lot 372 has an area of 32.5ha which includes the existing landfill operations (see **Figure 5.1**) and areas of bushland. Approximately 20ha of the site was devoted to the landfill and supporting infrastructure as part of the original project approval in 1986; however, this was expanded by approximately 3.5ha in 1995 to allow for extension of the facility, hence approximately 9ha of Lot 372 is currently still bushland.

The AWMF is situated on undulating terrain, and the highest point of the site is currently 82.6m AHD, with the site sloping down from the north-west to the south-east (LMCC, 2011).

In addition to the works proposed within the existing Lot 372, a rising main (sewer pipeline) is proposed to be constructed between the AWMF and Rathmines No. 6 Waste Water Pump Station (WWPS). The rising main would be contained primarily within the existing road reserves along Wilton, Wangi and Dorrington Roads to minimise the impacts on the environment.

LMCC hold an Environmental Protection Licence (EPL, Licence No. 5873) for the current operation of the AWMF. A summary of key existing operations at the site is provided in **Table 5.2**.

The existing operations at the site will continue indefinitely in accordance with the existing EPL and the existing *Awaba Landfill Environmental Management Plan* (LEMP) (LMCC, 2006). Should the proposed additions be approved, a new EPL would be obtained from OEHL to govern the future operations of the site as a whole.



**Figure 5.1: Existing Operations at Awaba Waste Management Facility (February, 2011)**

## **5.1.2 Key Attributes of the Study Area and Surrounds**

### *5.1.2.1 Topography and Geology*

Soil landscapes across the AWMF site belong to the Awaba Group, which is characterised by rolling low hills on predominantly coarse grained sediments of the Narrabeen group and Newcastle coal measures in the Awaba hills, local relief of 20m to 80m and slope gradient usually of 10% to 25% with some localised steep slopes up to 60% (Geotechnique, 2011). Soil landscapes in the surrounding area and along the sewer pipeline route belong to the Awaba, Doyalson and Wyong Groups. Common and key limitations with these groups include high erosion hazard and strongly acidic soils with low fertility.

Bedrock at the AWMF site is anticipated to be Newcastle Coal Measures comprising shale, sandstone, conglomerate, tuff, chert and coal seams, based on geological maps of the area (Geotechnique, 2011). Similarly, bedrock along the pipeline route is anticipated to be Newcastle Coal Measures and Clifton Sub-group of the Narrabeen Group, comprising claystone, sandstone and shale.

Borehole and test pit logs at the AWMF site show that the combined thickness of topsoil/fill and residual soils across proposed new cell areas A and B varies from approximately 0.2m to 1.5m, so bedrock will be encountered during excavation of the new cells (Geotechnique, 2011).

The AWMF site and proposed sewer pipeline are located within the West Lake Mine Subsidence District. The NSW Mine Subsidence Board advised that the proposed AWMF landfill cells are underlain by coal seams, which are likely to be mined sometime in the future by Centennial Coal Company Limited, who owns the mining lease (Geotechnique, 2011).

### 5.1.2.2 Flora

Intensive flora surveys were conducted for the study area and surrounds by Murray *et al.* (2012). They record a total of 189 plant taxa within the AWMF site (Lot 372) and the adjacent Lot 373. Several native vegetation communities were observed on Lots 372 and 373, namely:

- Sugarloaf Lowlands Bloodwood-apple Scribbly Gum Forest (5.28ha);
- Freemans Peppermint-apple Bloodwood Forest (2.73ha);
- Red Mahogany-paperbark Thicket (1.12ha);
- Coastal Plains Scribbly Gum Woodland (0.83ha); and
- Sugarloaf Lowlands Bloodwood-apple Forest (0.73ha).

These five native vegetation communities total an area of 10.69ha, and none are listed as EEC's in NSW under the TSC Act or nationally under the EPBC Act.

The flora surveys also indicated the presence of two threatened flora species within Lot 372, including *Grevillea parviflora* ssp. *parviflora* (Small-flower Grevillea) and *Tetradlea juncea* (Black-eyed Susan); however, none of the Small-flower Grevillea plants are located within the footprint of the AWMF expansion works.

Niche (2012b) determined that the following native vegetation communities are located along the sewer pipeline route, with those that will be affected by the proposed pipeline marked with an asterisk:

- Swamp Oak-Rushland Forest (EEC);
- Swamp Oak-Sedge Forest (EEC);
- \*Red Mahogany-Paperbark Thicket;
- \*Foresore Redgum-Rough-barked Apple Forest;
- Narrabeen Alluvial Sedge Woodland;
- \*Coastal Plains Smooth-barked Apple Woodland;
- \*Coastal Plains Scribbly Gum Woodland;
- \*Freemans Peppermint-apple Bloodwood Forest; and
- \*Sugarloaf Lowlands Bloodwood-Apple Scribbly Gum Forest.

### 5.1.2.3 Fauna Habitat

Murray *et al.* (2012) conducted fauna surveys over the AWMF site, identifying the following three broad fauna habitat types:

- **Open Forest/Woodland:**
  - Open Forest is dominated by taller trees (to 20m in height) with a tall and low understorey vegetation layer. Tree species occurring in this habitat include Sydney Red Gum (*Angophora costata*), Sydney Peppermint (*Eucalyptus piperita*), Brown Stringybark (*Eucalyptus capitellata*) and Red Bloodwood (*Corymbia gummifera*).

Taller understorey plant species (to 3m in height) include (*Banksia serrata*) and low understorey is dominated by *Banksia spinulosa*, *Banksia oblongifolia* and Mountain Devil (*Lambertia formosa*); and

- Open Woodland includes tree species *Eucalyptus haemastoma* and *Eucalyptus piperita* and is characterised by a very open understorey. Taller understorey species are generally not present; however, the low understorey is dominated by *Banksia spinulosa*, *Xanthorrhoeae latifolia* ssp. *latifolia* and grasses.
- **Riparian Forest:** Occurs along the ephemeral creek lines and supports similar tree species composition to the Open Forest / Woodland. However, due to the more sheltered and moister environment, the trees are taller in height, reaching 22 to 25m. The understorey is taller (to 4m in height) and includes *Leptospermum polygalifolium*, Black Wattle (*Callicoma serratifolia*), Christmas Bush (*Ceratopetalum gummiferum*) and Gynea Lily (*Doryanthes excelsa*). Low understorey and ground layer vegetation include ferns and herbs.
- **Cleared Grassland:** No habitat trees occur within this habitat type. However, this habitat is likely to provide terrestrial foraging areas (e.g. in grassed areas), aquatic foraging areas (e.g. in man-made basins) and sheltering habitat (e.g. near man-made infrastructure) for a number of fauna species.

Fauna habitats within the pipeline footprint are limited to essentially native and non-native herbaceous groundcovers with occasional low shrubs in the road reserves of Wilton, Wangi and Dorrington Roads. Less than 0.1ha of poor-moderate quality native vegetation is located within the direct footprint of the pipeline and hence requires removal to facilitate the proposed works. Approximately 10 mature trees are located in the direct footprint of the pipeline; however, none of these are hollow-bearing trees. Forested areas adjoining the proposed pipeline route are likely to provide a wide variety of sheltering habitat (in the form of hollows or nesting opportunities) and a range of food resources for both threatened and common native fauna (Niche, 2012b).

#### 5.1.2.4 Climate

Based on available data from the closest Australian Bureau of Meteorology (BoM) monitoring station located at Newcastle (Nobbys Signal Station AWS 061055), which has a full record of climate statistics available, the annual average maximum and minimum temperatures experienced are 21.8°C and 14.2°C, respectively. The data indicates that January is the hottest month with an average maximum temperature of 25.6°C, whilst July is the coldest month with an average minimum temperature of 8.4°C (PAE Holmes, 2012).

The annual average humidity reading is 75% at 9am and 66% at 3pm. The month with the highest humidity on average is June with a 9am average of 80%, and the lowest is August with a 3pm average of 56%. Rainfall data from the Newcastle weather station shows that March is the wettest month, with an average rainfall of 119.7mm. The average annual rainfall is 1134.3mm with an average of 99 rain days (PAE Holmes, 2012).

Wind modelling undertaken for the AWMF site indicated there is a distinct seasonal pattern with summer winds from the northeast through southeast, shifting to dominant west-northwest winds during winter (PAE Holmes, 2012).

### 5.1.3 Environmental Performance

LMCC hold an EPL (Licence No. 5873) for the current operation of the AWMF. A review of the EPL held by LMCC was recently undertaken in accordance with Section 78 of the Act and a revised licence issued on 25 January 2011.

The Awaba LEMP (LMCC, 2006) details a range of procedures to achieve compliance with the EPL issued for the site (further details are provided with respect to hazards and risks in **Section 6.12**). Annual Returns are submitted each year to OEHL to provide an indication of the environmental performance of the landfill operations against the compliance conditions of the EPL. Annual Returns since 2009 show that there have not been any instances of non-compliance with the EPL conditions, with the exception of a reduced number of groundwater monitoring samples having been collected each year due to dry conditions. These non-compliances were unavoidable due to the reliance of the samples on rainfall events.

This indicates a high level of environmental performance in terms of operations at the AWMF.

## 5.2 Description of the Project

A preliminary concept design and layout for the proposed additions to the AWMF has been prepared by GHD on behalf of LMCC (see drawings in **Appendix D**). The design of the landfill has been prepared in accordance with the NSW Government's *Environmental Guidelines: Solid Waste Landfills* (EPA, 1996). An overview of the key components of the proposed works is provided in **Table 5.1** and shown in **Figure 1.2**. Further discussion where required on each of these key components is included in the following sections.

**Table 5.1: Key Components of the Proposed Works**

Infrastructure Component	Key Aspects
<p>Additional landfill cells (Noting that projections by Mitchell McCotter (1993) estimated the existing approved landfill capacity as 2,900,000 m<sup>3</sup>).</p>	<ul style="list-style-type: none"> <li>▪ Excavation of two additional areas on site to create two new landfill cells (Areas A and B – see <b>Figure 1.2</b>). Excavation would be undertaken in stages as part of the leachate management process;</li> <li>▪ Area A and Area B each have a required excavation volume of 92,000 m<sup>3</sup>;</li> <li>▪ Area C (see <b>Figure 1.2</b>), which will be constructed above the existing landfill area, involves no excavation but will continue to have waste deposited to a higher emplacement (approximately 110m AHD), hence Area C is included in the staging plan;</li> <li>▪ Approximately 2,500,000 tonnes of additional landfill space would be provided; and</li> <li>▪ The final emplacement level would be a maximum of 110m AHD.</li> </ul>

Infrastructure Component	Key Aspects
Leachate management system	<ul style="list-style-type: none"> <li>▪ Decommissioning of the existing leachate basin located within Area A, at the north of the AWMF site;</li> <li>▪ Construction of a new leachate basin to the south-west of the site with an 8ML capacity;</li> <li>▪ Retention of the existing 6ML leachate basin to act as a maturation pond; and</li> <li>▪ Construction of a new leachate management system to service the extension of Area A and Area B and above the existing landfill (Area C).</li> </ul>
Landfill gas management	<ul style="list-style-type: none"> <li>▪ Retention of the existing landfill gas management system; and</li> <li>▪ Construction of additional landfill gas and extraction manifold wells.</li> </ul>
Surface water, stormwater and groundwater management	<ul style="list-style-type: none"> <li>▪ Construction of additional groundwater monitoring wells;</li> <li>▪ Construction of surface water diversion and stormwater management infrastructure;</li> <li>▪ Expansion of the existing sediment basin to the south of the AWMF site; and</li> <li>▪ Consolidation of the three existing sediment basins into two new sediment basins adjacent to Area B.</li> </ul>
Green waste processing	Relocate existing green waste processing area (3,500m <sup>3</sup> ).
Amenities and reuse centre	The existing reuse centre will be retained and an additional reuse centre with amenities will be constructed. This would expand the recycling and reuse capability of the AWMF and divert waste away from the landfill.
Transfer station	The transfer station will provide an area where waste is transferred from domestic/commercial vehicles to the transfer station. The waste is then transported to the tip face by LMCC vehicles on site. This allows for more efficient waste management and reduces the number of vehicles at the active tipping face.
Wheel wash facility	A wheel wash facility would be installed to minimise the transportation of sediments from the tipping face back onto sealed roads both within and externally to the AWMF site.
Weighbridges	The existing weighbridges (inbound and outbound) would be demolished and new weighbridges constructed to meet the future needs of the site.
Package pumping station and rising main	<p>A package pumping station on site at the AWMF and rising main from the AWMF package pumping station to the Rathmines No. 6 WWPS would be constructed to provide a suitable disposal means for additional leachate generated on site.</p> <p>An aeration system will also be incorporated into the leachate management system to treat the leachate on site.</p>
Access road	Construction of an access road around the perimeter of the site.

### 5.2.1 Additional Landfill Cells

As outlined in **Table 5.1** the proposed additions to the AWMF would require the excavation of two additional areas of 92,000m<sup>3</sup> each. Together with additional emplacement over the existing landfill area (Area C) this will provide for approximately 2.5 million tonnes of additional landfill space. In designing the excavation batters and grades (**Figure 5.3**) the design aims to:

- Maximise landfilling airspace;
- Provide a stable excavation surface based on the material type and local geology;
- Provide suitable grades to promote leachate drainage and collection; and
- Provide material for beneficial re-use as operational material.

The basal excavation grades have been designed to allow leachate flow and collection and incorporate a minimum of 3% transverse fall. The basal grades have been designed to utilise the sites existing natural fall towards the south and as such provides an overall fall which meets or exceeds the minimum design criteria outlined in the NSW Government's *Environmental Guidelines: Solid Waste Landfills* (EPA, 1996).

The designed excavation grades have a maximum slope of 1(V):2.5(H) to provide a stable excavation surface and allows the use of readily available geo-synthetic lining materials and standard anchor trench designs. The potential to utilise excavated material onsite for operational purposes (i.e. daily cover) will depend on the volume, types and quality of material excavated. It is considered likely that excavated soils may be utilised in daily cover and capping works (GHD, 2010).

If the proposed additions are approved, LMCC would obtain a new EPL for future site operations. Proposed excavation would commence in stages as part of the leachate management process as described in **Section 6.4.3.2** and shown in **Figure 6.9**. Once excavation of the first cell in Area A is complete, operations at the existing active tipping face would cease and interim capping would be applied. Filling of Area A would then commence.

In summary, staging would consist of:

- Excavation of Area A;
- Filling of Area A;
- Excavation of Area B;
- Filling of Area B; and
- Filling of Area C over the existing emplacement area to a maximum final elevation of 110mAHD (no prior excavation of Area C is required).

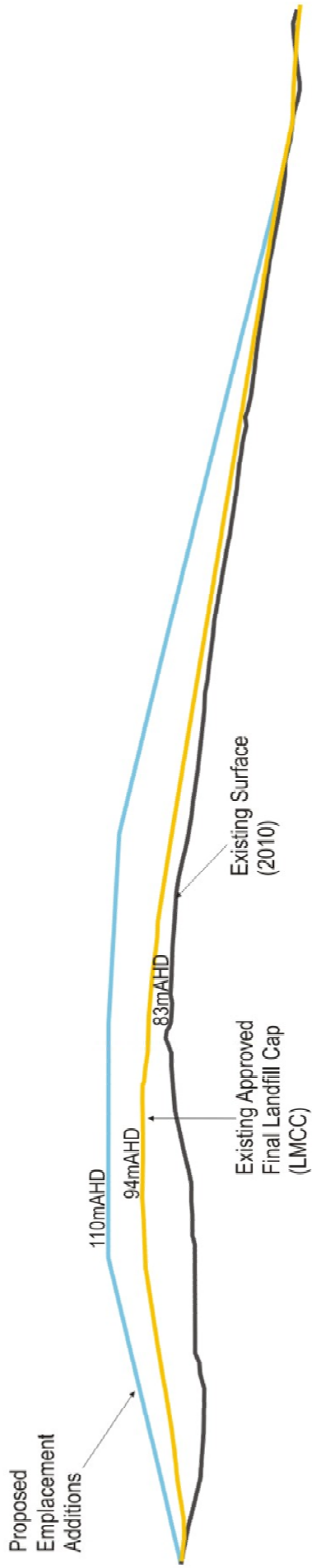
**Figure 1.2** shows the location of each of Areas A, B and C. With regards to staging, it is important to note that the existing and proposed operations would not occur simultaneously, and as such, no cumulative impacts are anticipated in this regard.

The existing final approved elevation at the site is 94mAHD. GHD (2010) indicated that the maximum elevation at the site at that time was approximately 83mAHD. This level is unlikely to have changed since 2010 as filling has not been undertaken at the top of the emplacement. There will be an approximate difference of 27m between the existing site elevation (2010 survey level of 83mAHD) and the proposed final emplacement elevation (110mAHD by 2032).

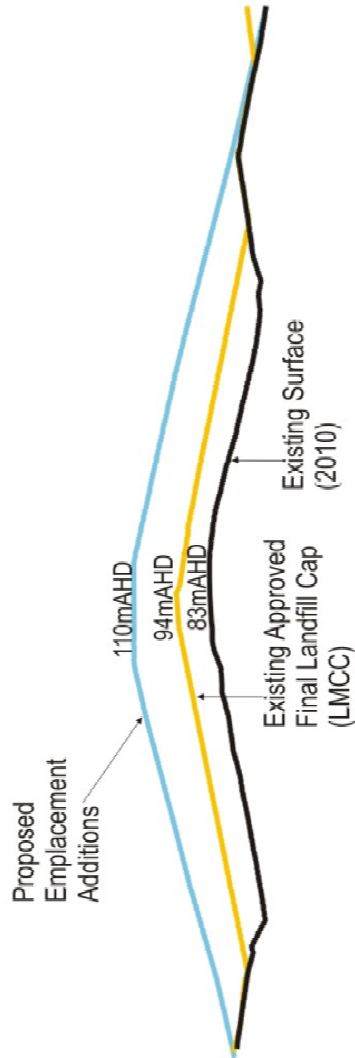
LMCC will ensure that engineering cell design drawings that meet EPA specifications (cross sections, cell extension lining, anchoring and capping, leachate collection and disposal system and gas collection system) will be developed as part of the detailed design. It is noted that this information is also required as part of the required application to vary the existing EPL (Licence No. 5873) to permit the construction of the cell extension.

**Figure 5.2** provides an indication of the existing, existing approved, and proposed additional emplacement elevations. Further visual representation of the proposed emplacement at progressive stages of the works is provided as part of the visual and landscape assessment in **Section 6.9**.

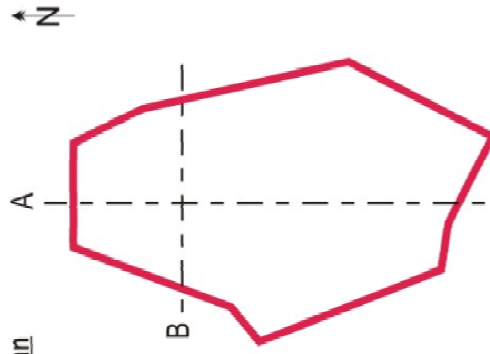
**Section A**



**Section B**



**Plan**





# Excavation of Additional Landfill Areas

ADDITIONS TO AWABA WASTE MANAGEMENT FACILITY ENVIRONMENTAL ASSESSMENT

### Legend

- Site Boundary
- Excavation within Area A and B
- Design Contours
- Cadastre

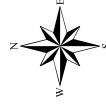
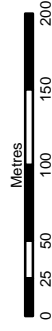


FIGURE 5.3  
1:5,000 Scale at A4



Data Source: Geoscience Australia  
Map Produced by Cardno NSW/ACT Pty Ltd 2812  
Date: 2015-04-26  
Coordinate System: GDA1984 MGA Zone 56  
Map: G5503\_Excavation.mxd 02  
Imagery supplied by LMCC and associated third parties



## 5.2.2 Leachate Management System

Independent leachate collection systems will be provided for Areas A, B and C. The leachate will be collected by gravity systems feeding into a leachate sump within in each of the three areas. Leachate will then be pumped from the leachate collection sumps into leachate ponds.

The existing 6ML leachate pond located south of Area C will be retained and a new leachate pond of approximately 8ML capacity will be constructed in the south-west of the site as shown in **Figure 1.2**. Each of the new cell Areas A and B would be progressively excavated, then lined and the leachate collection system installed in preparation for receiving waste. This will also be the case with cell Area C (located over the existing landfill area). The proposed leachate collection system is compliant with the benchmark technique 2 outlined in the NSW Government's *Environmental Guidelines: Solid Waste Landfills* (EPA, 1996).

It is proposed that a linear low density polyethylene (LLDPE) liner will be used. A LLDPE liner would provide a very low permeability layer, with the advantage of being stable when left exposed. The LLDPE liner can also be easily integrated with the landfill gas extraction system, provides a very high level of environmental protection and is relatively easy to construct.

Surplus leachate that is to be removed from the AWMF site will be pumped from the package pumping station on site to the Rathmines No. 6 WWPS via the rising main, which will be privately owned and operated by LMCC. The Rathmines No. 6 WWPS is operated by HWC and is located approximately 2.5km southeast of the site. Further details of this component of the proposed works are provided in **Section 5.2.6**.

Aeration will be incorporated into the leachate management system to ensure leachate leaving the AWMF site meets HWC quality requirements for entering the sewer system, as determined in consultation with HWC. LMCC will likely install floating surface aerators within the proposed 8ML leachate dam to convert this dam to an aerated pond. The existing 6ML leachate dam will not be aerated but will be plumbed in series following the 8ML aerated pond. This 6ML leachate dam will act as an aerobic / facultative pond (a maturation pond) to settle the sludge that is stirred up during aeration, before surplus leachate is pumped to the on-site package pumping station.

Further discussion of the leachate management system can be found in **Section 6.4**.

## 5.2.3 Landfill Gas Management

The existing gas extraction infrastructure located at the AWMF site will be extended into the proposed new landfill Areas A and B on a progressive basis in the future, which will subsequently increase the capacity for capturing of gas to generate energy and flaring at the site. The proposed layout for the additional gas capture manifolds and wells is provided in **Figure 5.4**. Additional landfill gas monitoring wells would also be installed to meet the monitoring requirements of the EPL (Licence No. 5873) for the operation of the AWMF.



# Proposed Additional Gas Capture Infrastructure

ADDITIONS TO AWABA WASTE MANAGEMENT FACILITY ENVIRONMENTAL ASSESSMENT

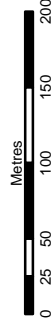
## Legend

- Proposed Gas Monitoring Wells
- Site Boundary
- Proposed Gas Lines and Wells
- Existing Gas Lines
- Existing Engines
- Design Contours
- Cadastral



FIGURE 5.4

1:5,000 Scale at A4



Date Source: Geoscience Australia, GHD  
Map Produced by Cardno NSW/ACT Pty Ltd 2812  
Date: 2015-04-26  
Coordinate System: GDA 1994 MGA Zone 56  
Map: G5004\_ProposedGasLines.mxd 02  
Imagery supplied by LMCC and associated third party suppliers



## 5.2.4 Surface Water, Stormwater and Groundwater Management

Infrastructure associated with the management of stormwater and groundwater will be expanded to account for the proposed additions to the AWMF. As outlined in **Table 5.1** and shown in **Figure 5.5** this will include:

- Construction of additional groundwater monitoring wells;
- Construction of surface water diversion and stormwater management infrastructure;
- Expansion of the existing sediment basin in the south of the AWMF site; and
- Consolidation of the three existing sediment basins in the south-west of the site into two sediment basins adjacent to Area B.

The proposed two new sediment basins and expanded sediment basin in the south of the site will reduce the average annual export of stormwater pollutants to acceptable levels and to retard peak flows to levels lower than under pre-development conditions. The following configuration is proposed for the stormwater basins:

- The proposed basins would be lined to prevent interaction with groundwater;
- The active storage depth in the proposed basins would be 0.75m from permanent water level to the level of the primary spillway;
- Overflows from the basins would be conveyed to the outfalls via 0.5m deep rock lined channel with base widths of 2m and side slopes of 1(V):2(H); and
- Clean surface waters diverted around the landfill area would be directed towards the on-site un-named watercourse via a level spreader(s) and should consider the principles of the guideline *Controlled Activities: Guidelines for Outlet Structures* (NSW Office of Water, 2010b).

## 5.2.5 Existing and Future Operations

**Table 5.2** provides a summary of key existing operations at the AWMF and shows a comparison to the proposed operations at the facility.

The AWMF will continue to operate in accordance with the existing EPL and the existing LEMP (LMCC, 2006) until such time as approval is gained for the proposed works. At that time, a new EPL would be obtained from OEH to govern the operations of the site as a whole.

If approved, staging of the proposed excavation and emplacement fill works would be undertaken in accordance with that outlined in **Section 6.4**, and would include:

- The excavation of Area A;
- Subsequent filling of Area A to capacity;
- Excavation of Area B;
- Subsequent filling of Area B to capacity; and
- Filling of Area C on top of the current landfill emplacement (no excavation of Area C will be required).

**Table 5.2: Summary of Key Existing and Future Operations at the AWMF**

Existing	Proposed
<b>Waste Handling and Recovery</b>	
Waste arrives at the AWMF from a variety of sources, including LMCC collection vehicles, waste collection contractors, and waste self-hauled by businesses and residents. Upon entering the AWMF, the waste is classified and charged in accordance with a number of categories.	This practice will continue.
There is currently a reuse centre at the AWMF, in the southern portion of the existing site. Batteries, oil, dry recyclables and e-waste can be dropped at the centre on site prior to proceeding to the main tip face. LMCC also have procedures in place to scavenge suitable items from the tip face and take material either for metal recycling or to the 'tip shop' for on-selling.	This practice will continue. An additional reuse centre is proposed to allow for increased recovery of reusable wastes. A transfer station is also proposed so that visitors to the landfill will no longer need to visit the active tip face.
Green waste is currently tipped separately at the AWMF. Green waste processing is currently undertaken under contract on a campaign basis, being approximately every eight weeks, using an excavator to load a mobile shredder on site. Green waste processing at the AWMF currently involves shredding and stockpiling the green waste material then transferring it offsite for use and/or composting.	This practice will continue. Relocation of the green waste processing area has been proposed as part of the additions, and would be located on the eastern side of the site.
Street sweepings, dredging and seaweed, along with fill that is purchased by the AWMF site is also tipped separately and then used as cover material (MRA, 2010). It should also be noted that there is currently no separate tipping point for construction and demolition (C&D) waste or hazardous waste; it is all tipped at the main tip face.	This practice will continue.
LMCC currently undertake litter patrols to manage stray litter.	This practice will continue.
<b>Access to Active Tip Face</b>	
The active tipping face is currently accessed by both private/commercial vehicles as well as LMCC waste vehicles.	A waste transfer station is proposed that will mean private/commercial vehicles will deliver their waste to an equipped facility instead of accessing the active tipping face. LMCC waste vehicles will access the active tipping face directly.
<b>Daily Cover</b>	
The active tipping face is sprayed with OEH-approved daily cover at the end of each day. The tipping floor and side batters are covered with traditional earth based cover material (intermediate cover of approximately 300mm depth).	This practice will continue.
<b>Leachate</b>	
The AWMF currently has an operational leachate management system. Under this system leachate spraying is the only form of leachate disposal, in accordance with License No. 5873. Leachate spraying is carried out at the site during appropriate weather	A new leachate management system will be constructed to service the extension of Areas A, B and C. Leachate will be drained from the leachate sumps within the landfill cells to the existing 6ML and proposed 8ML leachate dams and from there to the

Existing	Proposed
<p>conditions, such as dry weather (no rain) with appropriate wind directions. Leachate spraying is monitored to ensure that no leachate runoff occurs off site.</p>	<p>proposed on site AWMF package pumping station. Surplus leachate that requires removal from site will be pumped from the AWMF package pumping station to the Rathmines No. 6 WWPS, operated by HWC. This leachate waste will ultimately be processed at the Toronto WWTW. The proposed sewer pipeline from the AWMF to Rathmines No. 6 WWPS will facilitate this removal of surplus leachate such that, under normal operating circumstances, no tankering of surplus leachate waste from the AWMF site will be required.</p>
<b>Landfill gas</b>	
<p>Landfill gases are currently captured and utilised to generate electricity on site, which is then fed back into the grid. Gas flaring is used only as a fall back option when the generator is not operational.</p>	<p>This practice will continue and gas infrastructure will be expanded to ensure gas capture for additional landfill cells will be adequate.</p>
<b>Waste Monitoring</b>	
<p>LMCC currently collects waste volume and waste stream information for the AWMF and compiles it on a monthly basis.</p>	<p>This practice will continue.</p>
<p>LMCC currently commissions periodic independent audits of the waste entering the AWMF and of the domestic kerbside mobile garbage bins in the Lake Macquarie LGA. This is done to record what types and volumes of waste materials are being brought to the AWMF in each waste stream and also highlight where efforts should be focused to divert certain waste types away from landfill and to increase sustainable practices at the AWMF.</p>	<p>This practice will continue.</p>
<p>LMS monitor the volume of landfill gas flared and captured for electricity generation on a monthly basis and report this to LMCC on a six monthly basis. The percentage of methane (CH<sub>4</sub>) in the landfill gas is also measured and reported for the reporting month.</p>	<p>This practice will continue.</p>



# Stormwater and Groundwater Management Infrastructure

ADDITIONS TO AWABA WASTE MANAGEMENT FACILITY ENVIRONMENTAL ASSESSMENT

## Legend

- Site Boundary
- Existing Groundwater Monitoring Wells
- Proposed Groundwater Monitoring Wells
- Design Contours
- Proposed Surface Water Diversion
- Proposed Stormwater Drain
- Existing Leachate Pond
- Existing Sediment Basin
- Proposed Leachate Pond
- Proposed Sediment Basin
- Cadastre

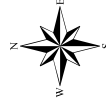
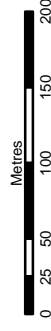
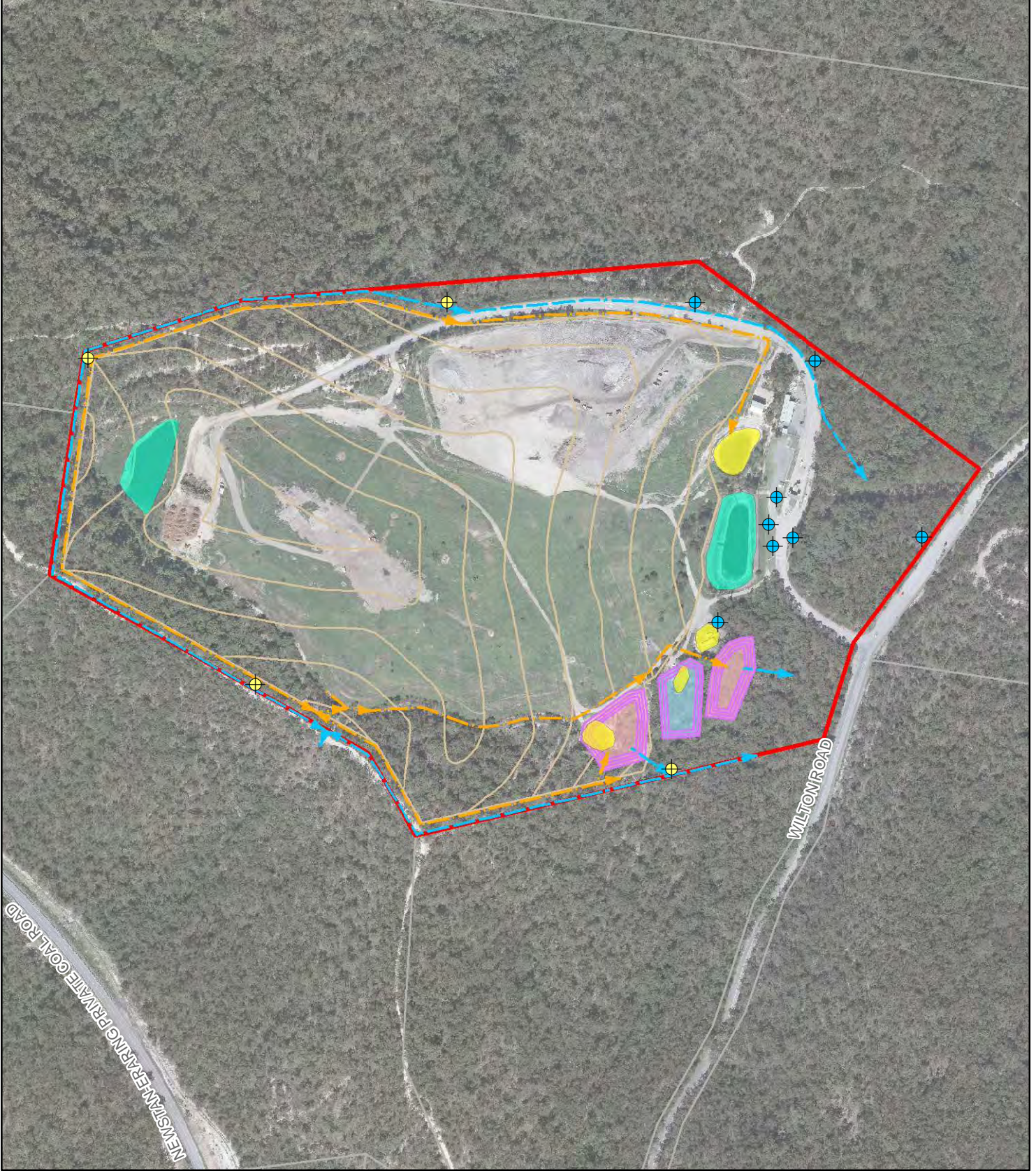


FIGURE 5.5

1:5,000 Scale at A4



Data Source: Geoscience Australia, GHD  
 Map Produced by Cardno WS/ACT Pty Ltd 2812  
 Coordinate System: GDA 1984, MGA Zone 56  
 Project: 600308  
 Map: G5005\_Stormwater.mxd 02  
 Imagery supplied by LMCC and associated third party suppliers



### 5.2.6 Package Pumping Station and Rising Main

In order to dispose of surplus leachate from the AWMF a package pumping station will be constructed on site and a rising main will be installed from the AWMF to the Rathmines No. 6 WWPS, to convey surplus leachate to the sewer system. The WWPS at Rathmines is located approximately 2.5km directly southeast of the AWMF site and is operated by HWC.

The AWMF package pumping station will have a duty and a standby pump. The package pumping station will be located adjacent to the existing leachate dam in the south of the site, near the main entrance to the AWMF. This AWMF pumping station will be connected to the F3590 maintenance hole at the Rathmines No. 6 WWPS via the rising main (sewer pipeline).

The rising main will be approximately 3.4km in length and will be constructed of Polyethylene due to its resistance to corrosion in ASS and also its resistance to internal degradation from the leachate (GHD, 2011). The rising main will be 140mm in diameter (a DN140 pipe) to meet the requirements of the predicted maximum volumes of leachate that will require off-site disposal over the design life of the landfill (5,000kL/month) based on estimated maximum pump rates of 11.6L/s (based on approximately 4 hours of pump operation a day).

The sewer pipeline will be located primarily in road reserves to minimise environmental impacts, as follows within the affected roads:

- Along the AWMF access road (within Lot 372) the pipeline will run within the actual roadway corridor to prevent any further disturbance (i.e. within the tarmac/shoulder);
- Along Wilton Road the pipeline will run along the northern side of the road with a maximum impact area of 3m from the edge of the tarmac (i.e. within the road reserve);
- A trenchless crossing will be used under Wangi Road, with the launch pit located in the already disturbed area on the corner of Wilton and Wangi Roads. A maximum impact area of approximately 3m by 2m is anticipated for launch pits on either side of the Wangi Road trenchless crossing within the road reserves;
- Along Wangi Road the pipeline will run along the eastern side of the road with a maximum impact area of 3m from the edge of the tarmac (i.e. within the road reserve);
- Along Dorrington Road the pipeline will run along the northern side of the road with a maximum impact area of 3m from the edge of the tarmac (i.e. within the road reserve); and
- Along the WWPS access road the pipeline will be located within the bounds of the already disturbed dirt access road to the Rathmines No. 6 WWPS.

## 6 Assessment of Environmental Impacts

This chapter identifies the potential environmental impacts associated with the construction and operation of the proposed additions to the AWMF. The assessment and analysis of key issues has been undertaken in accordance with the DGRs and includes a range of measures to mitigate and manage the potential impacts on the environment.

### 6.1 Waste Management

In order to construct the proposed additional facilities and infrastructure, wastes will comprise excavated materials, demolition wastes where reuse is not possible, excess construction materials that cannot be reused and general litter. Soil excavation material (184,000m<sup>3</sup>) will be stockpiled on site and used for daily cover rather than being disposed of or transported off-site. With respect to the operational phase of the works, the additions to AWMF are proposed with the intention of providing more efficient waste transfer and management as part of LMCC's Waste Strategy which will allow further waste separation and diversion from landfill.

#### 6.1.1 Introduction

Both the construction and operation of the proposed additional landfill cells at the AWMF have the potential to alter existing waste management practices on site as well as produce additional waste, which will require appropriate disposal (i.e. soil, vegetation and construction waste). Following site inspections by Cardno personnel on 10 February 2011 and in consultation with AWMF site management personnel, this section details the existing and proposed future:

- Waste handling processes;
- Waste types and quantities received on site;
- Waste recovery methods; and
- Waste monitoring programs.

Potential environmental impacts due to changes in waste handling processes and quantity and type of waste received are also detailed in this section, with corresponding mitigation and management measures proposed where necessary.

## 6.1.2 Existing Environment

### 6.1.2.1 Waste Handling Processes

The AWMF is an OEH licensed solid waste landfill. The license permits waste defined by the NSW Government's EPA (1996) guidelines as Solid Waste Class 1 to be disposed at the site. A Solid Waste Class 1 landfill means that all solid waste including putrescible wastes and other wastes approved by the EPA are accepted at the landfill. (The only other classification for solid waste landfill's is Class 2, which means all solid waste with the exception of putrescible wastes and other wastes approved by the EPA are accepted at the landfill).

Waste arrives at the landfill from a variety of sources, including LMCC collection vehicles, waste collection contractors, and waste self-hauled by businesses and residents. Upon entering the AWMF, the waste is classified and charged in accordance with a number of categories, including mixed waste, construction and demolition (C&D) waste, green waste, household recyclables, special wastes (e.g. asbestos), clean fill, etc. (MRA, 2010).

The design for the expanded landfill by GHD has been based on average filling rates recorded at the AWMF between July 2006 and June 2009. Since this time LMCC has continued to monitor available airspace of the current landfill on a six monthly basis. More recent volumetric surveys undertaken in December 2010 indicate the following, which is consistent with assumptions made in the concept design:

- As of 30 June 2010, under current landfill design and operations, there was 857,925m<sup>3</sup> of available air space remaining as approved under DA82-1994; and
- Between July and December 2010 the landfill emplacement increased by 51,779m<sup>3</sup>, with the AWMF receiving an average of 281.4m<sup>3</sup> per day.

The area of the currently active tipping face is approximately 30m by 10m in the northwest section of the quarry cell. This tipping face (batter) is sprayed with OEH approved daily cover at the end of each day. The tipping floor and side batters are covered with traditional earth based cover material (intermediate cover of approximately 300mm depth). This tipping face is currently accessed by both private/commercial vehicles as well as LMCC waste vehicles as there is no waste transfer station present on the AWMF site.

The AWMF currently has an operational leachate management system. Under this system leachate spraying is the only form of leachate disposal, in accordance with License No. 5873. Leachate spraying is carried out at the site during appropriate weather conditions, such as dry weather (no rain) with appropriate wind directions. Leachate spraying is monitored to ensure that no leachate runoff occurs off site.

### 6.1.2.2 Waste Types and Quantities Received on Site

#### Waste Streams

LMCC currently collects information on the volumes of numerous different specific waste streams received at the AWMF, compiled on a monthly basis. These specific waste streams are then categorised into the following three primary waste streams:

- Municipal Solid Waste (MSW):
  - Household weekly bin collection;
  - Parks and gardens waste;
  - Bulk domestic waste kerbside collections;
  - Self-hauled residential waste;
- Commercial and Industrial (C&I) waste; and
- Construction and Demolition (C&D) waste.

LMCC provided raw monthly waste data collected and landfilled at the AWMF to assist the waste analysis. **Table 6.1** shows the total waste landfilled per annum, based on data provided by LMCC from the 2003/04 financial year to the 2010/11 financial year, both excluding and including the cover material used to cap the landfill. **Table 6.1** also indicates the percentage of the total waste landfilled that each of the three principal waste streams comprises.

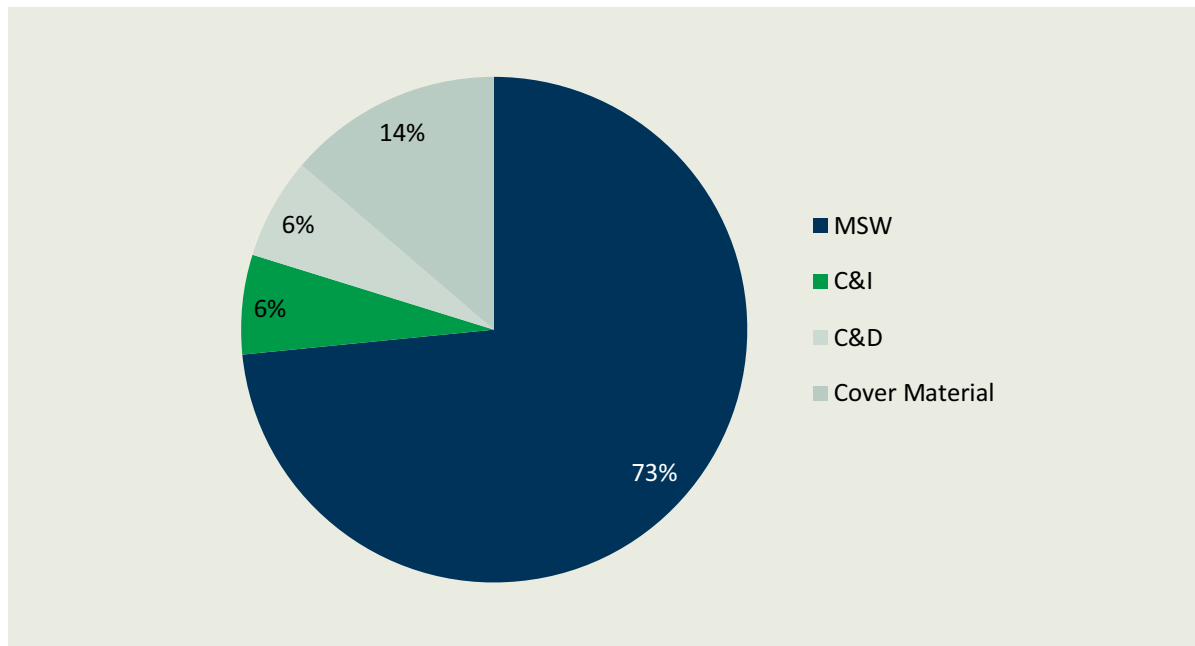
**Table 6.1: Waste Tonnages and Composition Landfilled at the AWMF (Data Provided by LMCC)**

Financial Year	Total Waste Landfilled						Total (T/yr) (ex. cover material)	Total (T/yr) (inc. cover material)
	MSW		C&I		C&D			
	(T/yr)	(% of Total)	(T/yr)	(% of Total)	(T/yr)	(% of Total)		
2003/04	74,246	45%	14,134	9%	75,490	46%	163,870	200,736
2004/05	77,940	66%	14,540	12%	25,436	22%	117,917	152,680
2005/06	79,625	67%	12,489	10%	27,145	23%	119,258	160,778
2006/07	81,579	73%	12,831	12%	16,740	15%	111,149	158,828
2007/08	90,203 <sup>^</sup>	76%	10,725	9%	17,262	15%	118,191	150,230
2008/09	82,311	82%	8,950	9%	9,276	9%	100,537	120,795
2009/10	80,198	85%	6,976	7%	7,034	7%	94,208	109,233
2010/11*	81,253	86%	6,366	7%	6,828	7%	94,447	-

\* Tonnes for April, May and June 2011 are predicted based on tonnes landfilled in the rest of 2010/11 financial year as this information was not available at the time of preparing this assessment

<sup>^</sup> Note this value is relatively high due to the significant storm event that occurred in June 2007 (the storm that ran the Pasha Bulker aground) which caused significant damage to property in the Lake Macquarie LGA.

Based on the data in **Table 6.1** the waste currently landfilled at the AWMF (based on the 2009/10 financial year data) is broken down into the three primary waste streams and the cover material as shown in the pie chart in **Figure 6.1**.



**Figure 6.1: Waste Composition Including Cover Material Landfilled at the AWMF in the 2009/10 Financial Year (Source: Raw Data Provided by LMCC)**

**Table 6.1** indicates that the total waste landfilled at the AWMF has been generally decreasing in recent years. Notably the tonnes of C&D waste landfilled have reduced markedly since 2003/04. This decrease in total waste landfilled and marked decreased in C&D waste landfilled at the AWMF is primarily due to two factors:

- LMCC is diverting more waste from landfill to recycling/reuse centres; and
- LMCC's current pricing policy is acting to discourage commercial waste being delivered to the AWMF.

Despite the majority of commercial waste currently being diverted away from the AWMF, the monthly data collected shows that household weekly bin collection tonnages are increasing. In 2001/02 the total garbage collected from the household weekly bin collection trucks was 52,852T, whereas in 2009/10 it had increased to 59,019T. **Table 6.1** indicates that the MSW tonnages have on average increased annually by approximately 1.45%. Hence it is reasonable for modelling purposes to predict an overall marginal increase in future total waste to be landfilled post 2010, as the increasing MSW stream will be the largest component of the total waste to be landfilled. Diversion of material from landfill remains a key goal of LMCC and if LMCC successfully implement their waste strategy then significant diversion rates will be achieved.

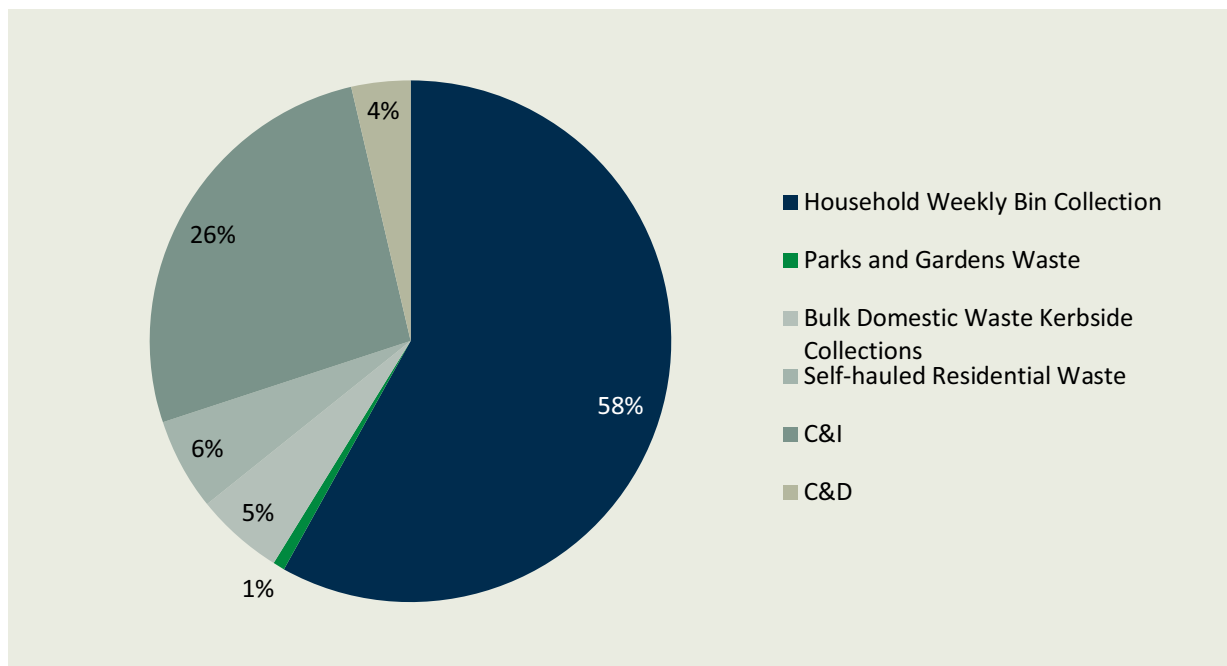
For the design of the proposed new cell areas, a conservative scenario has been adopted to predict future tonnes of waste that will be landfilled at the AWMF. In 2010 the AWMF was approximated to be receiving 103,034T of waste per year, which is conservatively expected to increase by approximately 1.2 to 1.3% per year (LMCC, 2010). Predicted tonnages for various

waste streams expected to be landfilled at the AWMF in the future, until 2014 are presented in **Table 6.2**.

**Table 6.2: Predicted Future Waste Tonnes and Composition Landfilled at the AWMF (LMCC, 2010)**

Year	MSW					C&I		C&D		Total (T/yr)
	Household Weekly Bin Collection (T/yr)	Parks and Gardens Waste (T/yr)	Bulk Domestic Waste Kerbside Collections (T/yr)	Self-hauled Residential Waste (T/yr)	(% of Total)	(T/yr)	(% Total)	(T/yr)	(% of Total)	
2010	59,817	765	5,633	5,857	70%	27,209	26%	3,753	4%	103,034
2011	60,714	770	5,793	5,901	70%	27,414	26%	3,781	4%	104,373
2012	61,625	776	5,958	5,946	70%	27,620	26%	3,810	4%	105,735
2013	62,550	782	6,128	5,990	70%	27,827	26%	3,838	4%	107,115
2014	63,489	788	6,303	6,035	71%	28,036	26%	3,867	4%	108,518

Based on the data in **Table 6.2**, the predicted future waste composition to be landfilled at the AWMF is broken down into the six waste streams as shown in the pie chart in **Figure 6.2**.



**Figure 6.2: Predicted Future Waste Composition Landfilled at the AWMF (Source: LMCC, 2010)**

### **Waste Stream Composition**

LMCC commissioned EC Sustainable Environment Consultants to conduct a LMCC wide residual waste stream audit of the domestic kerbside mobile garbage bins in July 2010 over a 12 day period, to analyse waste composition in the Household Weekly Bin Collection waste stream. Audit results from autumn 2008 were also provided for seasonal comparison.

The results of these audits are presented in **Table 6.3**. It should be noted that the audit was designed to only include the residual waste bins, not the separated kerbside recycling stream.

**Table 6.3: Waste Types and Composition in the Residual MSW Stream (EC Sustainable Environmental Consultants, 2010)**

Summary of the Overall Residual Household Weekly Bin Collection Waste by Weight				
Material Category		Proportion (% by Weight)		
		Autumn 2008	Winter 2010	Average Composition
Paper	Newspaper	2.07	2.09	2.08
	Magazines, Brochures	2.05	2.20	2.13
	Miscellaneous Packaging	0.27	0.02	0.15
	Corrugated Cardboard	1.07	0.98	1.03
	Package Board	1.60	1.70	1.65
	Liquid Paper Containers	0.46	0.19	0.33
	Disposable Paper Product	1.06	0.98	1.02
	Print / Writing / Office Paper	1.31	1.32	1.32
	Composite (Mostly Paper)	0.81	0.27	0.54
	Nappies Disposable	3.79	3.36	3.58
	Contaminated Soiled Paper	1.59	1.65	1.62
Organic	Food / Kitchen	25.08	28.07	26.58
	Garden / Vegetation	23.15	21.68	22.42
	Other Putrescible	2.28	3.86	3.07
	Wood / Timber	3.11	3.52	3.32
	Textile / Rags	2.59	5.37	3.98
	Leather	0.12	0.03	0.08
	Rubber	0.29	0.19	0.24
	Oils	0.14	0.14	0.14
Glass	Packaging Glass / Containers	1.43	0.71	1.07
	Packaging / Cullet White	0.39	1.20	0.80
	Packaging / Cullet Green	0.77	0.58	0.68
	Packaging / Cullet Brown	2.24	1.15	1.70
	Mixed Glass / Fines	0.34	0.08	0.21
	Miscellaneous / Other Glass	0.12	0.33	0.23
Plastic	PET (Plastic #1)	0.61	0.77	0.69
	HDPE (Plastic #2)	0.45	0.55	0.50
	PVC (Plastic #3)	0.26	0.17	0.22

Summary of the Overall Residual Household Weekly Bin Collection Waste by Weight				
Material Category		Proportion (% by Weight)		
		Autumn 2008	Winter 2010	Average Composition
	LDPE (Plastic #4)	0.09	0.04	0.07
	Polypropylene (Plastic #5)	0.50	0.53	0.52
	Polystyrene (Plastic #6)	0.83	0.83	0.83
	Other Plastic (Plastic #7)	0.80	0.33	0.57
	Foams	0.10	0.09	0.10
	Plastic Bags	1.18	0.92	1.05
	Film	1.74	1.45	1.60
	Composite (Mostly Plastic)	0.67	1.17	0.92
<b>Metal</b>	Steel Packaging Cans	1.04	1.05	1.05
	Steel Aerosols	0.42	0.19	0.31
	Steel Paint Cans	0.09	0.03	0.06
	Composite (Mostly Ferrous)	0.53	1.26	0.90
	Other [Ferrous]	0.01	0.45	0.23
	Aluminium (Cans and Foil)	0.41	0.32	0.37
	Composite (mostly non-ferrous)	0.02	0.24	0.13
	Other [Non-ferrous]	0.01	0.04	0.03
<b>Hazardous</b>	Paint	0.02	0.21	0.12
	Fluorescent Tubes	0.03	0.03	0.03
	Dry Cell Batteries	0.18	0.09	0.14
	Car Batteries	0.07	0.00	0.04
	Household Chemicals	0.14	0.58	0.36
	Asbestos / Building Materials	4.20	2.30	3.25
	Pathogenic Infectious (Medical)	0.03	0.16	0.10
	Gas Bottles	0.00	0.00	0.00
	Hazardous Other	0.06	0.04	0.05
<b>Earth Based</b>	Ceramics	1.10	0.87	0.99
	Dust / Dirt / Rock / Inert	4.10	1.51	2.81
	Ash / Earth Based	0.22	0.09	0.16
<b>Other</b>	Other Household Items	0.26	0.39	0.33
	Toner Cartridges	0.02	0.08	0.05
	Computer Parts	0.06	0.29	0.18
	Mobile Phones	0.03	0.01	0.02
	Electrical Items	0.89	1.19	1.04
	Other	0.70	0.06	0.38
<b>Total</b>		<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

A waste audit was undertaken by MRA in 2010 at the AWMF to obtain more detailed information in order to develop appropriate and effective diversion management practices and/or processing possibilities for different waste types currently present at the AWMF. The Waste Audit Report is contained in **Appendix E**.

As part of the audit MRA visually analysed waste types in all waste streams, except the Household Weekly Bin Collection stream (residual MSW), brought to the AWMF for disposal over a three day period in April 2010. **Table 6.4** provides an overall summary by weight of the percentages of waste types recorded within the audit period for all waste streams except residual MSW.

**Table 6.4: Summary of Received Waste Types and Composition in all Waste Streams Except Residual MSW at the AWMF (MRA, 2010)**

Summary of the Overall Landfill Waste by Weight	
Material	Average %
Vegetation / garden	13.0
Food / kitchen	11.4
Wood - furniture, painted wood	7.5
Rock / dirt / soil	7.3
Wood - untreated board	7.3
Plastic - other	5.7
Concrete / cement	4.6
Dry cardboard	4.2
Paper - all other	3.9
Carpet and underlay	3.5
Wood - chipboard, MDF	3.4
Cloth textiles	2.8
Wood - treated board	2.2
Other items	2.1
Electrical / electronic - televisions, etc.	2.1
Metals - ferrous (steel)	2.0
Bricks	1.9
Mattresses	1.6
Covered furniture	1.5
Wet cardboard	1.3
Plasterboard	1.3
Computers / office equipment	1.2
Plastic - film	1.1
Electrical / electronic - small	0.9
Wood - pallets	0.9
Paper - office	0.9
Glass - plate	0.9

Summary of the Overall Landfill Waste by Weight	
Material	Average %
Tiles	0.8
Glass - containers	0.5
Rubber other	0.4
Metals - non-ferrous	0.4
Electrical and electric whitegoods	0.4
Textiles / leather other	0.3
Hazardous / special	0.3
Plastic - containers recyclable	0.2
Plastic - polystyrene foam	0.2
Tyres, tubes	0.2
Toner cartridges	0.0
Waxed cardboard	0.0
Asphalt	0.0
<b>Total</b>	<b>100</b>

To further breakdown what key types of waste are received within each waste stream, **Table 6.5** provides a summary of the results of the top ten waste types by weight for each stream audited by MRA (2010).

**Table 6.5: Summary of Top Ten Waste Types Received in All Waste Streams Except Residual MSW at the AWMF (MRA, 2010)**

Waste Stream	Percentage of Material Type in the Waste Stream (%)																					
	Vegetation / garden	Food / kitchen	Wood — furniture, painted wood	Wood — untreated board	Wood - treated board	Wood — chipboard, MDF	Rock / dirt / soil	Paper - all other	Paper — office	Dry cardboard	Wet cardboard	Plastic - other	Metals — ferrous (steel)	Cloth textiles	Carpet and underlay	Textiles / leather other	Concrete / cement	Bricks	Plasterboard	Glass — plate	Electrical / electronic - televisions, etc.	Other items
Parks and Gardens Waste	25.02	21.54					16.97	6.34	1.79	2.07		4.78					2.05	2.18		2.04		
Bulk Domestic Waste Kerbside Collections	13.74		5.95	6.38		9.04	5.76			6.45		8.88	4.95			4.57						5.28
Self-hauled Residential Waste	20.73	5.27	6.98	3.96	5.15		4.22			6.36		5.67			3.74		6.02					
C&I	6.25	28.55					3.95	6.24		4.81	2.82	6.03		7.23			6.29					3.74
C&D		3.97	19.68	21.68		3.05	6.76					2.96			6.9		8.33	3.88	3.45			

For a further breakdown of types and percentages of waste within the waste streams in **Table 6.5**, refer to the Waste Audit Report in **Appendix E**.

The overall amount of waste delivered to the AWMF landfill during the audit period from the 272 loads audited by MRA (2010) was calculated to equal 209.39T. MRA (2010) calculated that the overall weight of Degradable Organic Carbon (DOC) material disposed of at the landfill is significant, making up a total of 62.38% of the weight or 130.62T of the total waste disposed of over the audit period. The overall component of packaging materials was 7.50% or 15.69T. These findings are quite significant as the majority of the DOC material can potentially be diverted for reuse and recycling, as the DOC component includes the following materials:

- Vegetation / garden;
- Food / kitchen;
- Wood – furniture, painted wood, untreated board, chipboard, MDF, treated board and pallets;
- Dry and wet cardboard;
- Paper – office and all other;
- Carpet and underlay;
- Cloth textiles; and
- Textiles / leather other.

#### *6.1.2.3 Waste Recovery Methods*

Capturing and flaring of landfill gases is currently undertaken at the AWMF. Electricity generated on site from captured landfill gas is fed back into the grid. The flare is only used as a fallback option when the generator is not operational.

There is currently a reuse centre at the AWMF, in the southern portion of the existing site. Batteries, oil and other recyclables can be dropped at the centre on site prior to proceeding to the main tip face. LMCC scavenge from the tip face and take material either for metal recycling or to the 'tip shop' for on selling.

Green waste is also currently tipped separately at the AWMF. Green waste processing is currently undertaken under contract on a campaign basis, being approximately every eight weeks, using an excavator to load a mobile shredder on site. Green waste processing at the AWMF currently involves shredding and stockpiling the green waste material then transferring it offsite for use and/or composting.

Street sweepings, dredging and seaweed, along with fill that is purchased by the AWMF site is also tipped separately and then used as cover material (MRA, 2010). It should also be noted that there is currently no separate tipping point for C&D or hazardous waste; it is all tipped at the main tip face.

#### 6.1.2.4 Waste Monitoring Programs

As discussed earlier, LMCC currently collects waste volume information for the AWMF, broken down into the six waste streams discussed earlier, which is compiled on a monthly basis (MRA, 2010).

LMCC also commissions periodic independent audits of the waste entering the AWMF and of the domestic kerbside mobile garbage bins in the Lake Macquarie LGA. This is done to record what types and volumes of waste materials are being brought to the AWMF in each waste stream and also highlight where efforts should be focused to divert certain waste types away from landfill and to increase sustainable practices at the AWMF.

LMS monitor the volume of landfill gas flared and captured for electricity generation on a monthly basis and report this to LMCC on a six monthly basis. The percentage of methane (CH<sub>4</sub>) in the landfill gas is also measured and reported for the reporting month.

### 6.1.3 Potential Impacts

#### 6.1.3.1 Construction Phase – AWMF Site

In order to construct the proposed cell Areas A and B approximately 92,000m<sup>3</sup> of soil material will need to be excavated from each area (184,000m<sup>3</sup> in total) over the lifetime of the expansion program. This will be the most significant volume of waste that will be produced by the works. However, this material will be excavated in seven stages in accordance with the staging plan (Areas A1-A3 and B1-B4 on **Figure 6.9**) over the course of the expansion program and will not be disposed of but rather will be stockpiled on site and reused as daily cover material for the AWMF landfill as required. Hence none of this material will require disposal or transport off site.

Vegetation within the total works footprint of approximately 8.55ha will need to be cleared in order to facilitate the excavation of proposed cell Areas A and B and the additional facilities at the AWMF site (7.2ha of which requires biodiversity offsetting). As with the excavation to create the new landfill cells, this clearing will also occur progressively over the lifetime of the expansion project. This vegetation will also not be disposed of but rather will be processed at the AWMF as green waste in the proposed green waste processing area (3,500m<sup>3</sup>), stockpiled on site and reused as mulch during the progressive revegetation of each cell area, wherever possible. Any excess green waste material will be transported off site and re-used as mulch elsewhere, in accordance with current operations.

In order to construct the additional facilities at the AWMF site (as shown on **Figure 1.2** and discussed in **Table 5.1**), including the proposed additional reuse centre with amenities, waste transfer station, gas and leachate capture infrastructure, package pumping station, wheel wash, weighbridges and access roads around the site the following wastes will likely be generated and will require disposal:

- Minor volumes of excavated soil material for earthworks, building foundations, boxing out of roads, etc.;
- Demolition wastes (the existing weighbridges may be reused if feasible);
- Any excess steel, concrete and/or other construction materials; and
- General litter by construction personnel.

The majority of this waste is expected to be able to be processed at the AWMF site and hence it is not anticipated that significant volumes of waste will require removal from the site.

Potentially contaminated soil material may be exposed during excavations, which would also require waste classification and appropriate disposal (potentially off site), if encountered.

#### *6.1.3.2 Construction Phase – Sewer Pipeline Site*

Approximately 1ha of vegetation (mainly comprising exotic groundcover) will need to be removed in order to facilitate the proposed sewer pipeline from the AWMF package pumping station to the Rathmines No. 6 WWPS. Up to 10 mature trees will require removal.

Soil material excavated during trenching works for the pipeline will be temporarily stockpiled on site along the route. Once the pipeline has been installed this overburden material will be used to back-fill the trench, with no excess overburden material anticipated to be generated (unless contaminated material is encountered that requires appropriate disposal off-site).

Other waste materials that will likely be generated by the sewer pipeline works and will require disposal include:

- Any excess concrete and/or other construction materials; and
- General litter by construction personnel.

#### *6.1.3.3 Operational Phase*

By extending the operational life of the facility, the expansion of the AWMF landfill will result in a greater total volume of waste being deposited at the landfill into the future and will extend the predicted life of the landfill from the end of 2014 to the end of 2032.

The proposed waste transfer station will provide an area where waste is transferred from domestic/commercial vehicles to the transfer station. Waste will then be transported to the tip face by LMCC vehicles. This will allow for more efficient waste management and reduces the number of vehicles at the active tipping face, which will minimise potential conflicts in the future between domestic/commercial and LMCC vehicles and increase safety at the AWMF site.

The waste audit data by MRA (2010) indicated there is great potential for further separation and diversion of waste at the AWMF, with a large quantity of the waste being DOC or recyclable materials. LMCC should ensure that these materials are captured in future waste diversion strategies.

The proposed additional reuse centre will expand the recycling and reuse capabilities of the AWMF and allow for a greater diversion of recyclable materials away from the landfill.

In terms of stray litter on site, there is the potential for waste brought to the AWMF to be blown off site during strong winds, which could affect the amenity of surrounding bushland areas.

## **6.1.4 Mitigation Measures**

### *6.1.4.1 Construction Phase*

Waste materials generated during the construction phase on both the AWMF site and along the sewer pipeline route should be recycled or reused wherever possible in the first instance. The majority of waste produced will be able to be processed on site at the AWMF and will be diverted to the reuse centre or offsite to third parties, where appropriate. During construction the site should be kept clear of unnecessary construction waste, which will also reduce potential occupational health and safety (OH&S) hazards due to excess waste materials lying around the site.

As discussed in **Section 6.1.3**, LMCC propose to stockpile and reuse the soil excavated for the new landfill cells at the AWMF (approximately 184,000m<sup>3</sup>) and use this soil as daily cover material for the landfill. Hence this waste will be effectively reused on site, in accordance with the principles of resource recovery in the WARR Act. The same applies to all vegetation that will be cleared across the AWMF site, which will be processed as green waste and used as mulch rather than be disposed of.

Along the sewer pipeline route Niche (2012b) has also specified that, where practical, any felled trees or tree limbs should be placed in nearby surrounding bushland and remain on site as potential habitat for fauna, which will also reduce the volume of green waste produced by the pipeline works.

### *6.1.4.2 Operational Phase*

To ultimately reduce the volume of waste to landfill LMCC will implement their Waste Management Strategy, as described in **Section 2.1.3**. The strategy aims to minimise waste sent to landfill and increase sustainable practices such as reuse and recycling within the LGA. LMCC determined that to reduce the volume of waste landfilled and meet NSW Waste Diversion targets they need to target domestic waste, as municipal solid waste currently comprises approximately 70% of all material presenting at the AWMF for landfilling.

LMCC will adopt a Phased Three Bin Source Separated Organics processing system as its preferred waste processing technology for targeting domestic waste. The new system will include three bins with different coloured lids for residents to sort their waste into general rubbish (red), recycling (yellow) and garden/food waste (green), as described in **Section 2.1.3**. The proposed relocated green waste processing area and additional reuse centre will be able to process these source separated wastes in the future at the AWMF.

MRA (2010) recommended that LMCC could make significant savings and increase their waste diversion rates considerably through the following actions:

- Investigate the way in which LMCC staff collect and deliver waste to the landfill. Efficiencies may be achieved by using fewer vehicles for the pick-up of LMCC works waste;
- Investigate the current capture and diversion programs and/or new or extra diversion strategies for those waste products demonstrated as being significant in waste audits;
- Consider reusing rocks, dirt and soil on other LMCC land to keep these materials out of landfill;
- Review the landfill pricing structure, which seems to be inconsistent across material types;
- Further review the landfill pricing structure relating to charity vehicles (as a lot of waste was brought in to the landfill in this category) and consider charging all charity vehicles a fee for tipping at the landfill; and
- Investigate the current recording methods at the landfill to try and develop a more robust form of data collection.

Gas extraction infrastructure will be extended into the proposed new landfill Areas A and B on a progressive basis in the future and eventually into Area C (over the existing landfill area). Hence the capacity for capturing of gas to generate energy and flaring at the site will be increased by the proposed works. The proposed layout for the additional gas capture manifolds and wells is provided in **Figure 5.4**.

Leachate generated by future landfilled waste will be managed using the proposed leachate management system described in **Section 6.4**. This will involve capping the existing landfill cells with a bridging layer and impervious liner such that the entire landfill, including the new cell areas is lined. Leachate will be drained from the leachate sumps within the landfill cells to the existing 6ML and proposed 8ML leachate dams and from there to the proposed on site AWMF package pumping station. Surplus leachate that requires removal from site will be pumped from the AWMF package pumping station to the Rathmines No. 6 WWPS, operated by HWC. This leachate waste will ultimately be processed at the Toronto WWTW. The proposed sewer pipeline from the AWMF to Rathmines No. 6 WWPS will facilitate this removal of surplus leachate such that, under normal operating circumstances, no tankering of surplus leachate waste from the AWMF site will be required.

The application of cover material over the tip face will suppress any litter from becoming airborne during strong winds and escaping into the surrounding environment. Litter patrols will also continue to be used to manage stray litter, which has proved to be an effective litter management technique. If these methods are found not to be sufficient a litter collecting fence could also be erected around the perimeter of the new landfill cells to catch any stray airborne litter.

## 6.2 Soils and Contamination

Key potential impacts relating to soils and contamination include soil erosion and slope instability, particularly in areas to be excavated. Rock substrate will be encountered during the excavation works for the landfill cells (in some areas of the site bedrock is as shallow as 0.3m below the ground surface). Contaminated material may be encountered during the excavation works, however excavation is not proposed for the existing landfilled areas, so this risk remains low. There is also some potential for accidental spills associated with construction machinery (particularly during refuelling) and migration of contaminants from the existing AWMF site to adjoining areas (e.g. from the existing landfill cells in stormwater runoff). Mitigation measures are discussed in Section 6.2.4.

### 6.2.1 Introduction

This section identifies the potential environmental impacts relating to soils and contamination associated with the construction and operation of the proposed additions to the AWMF and the installation of the sewer pipeline connecting to Rathmines No. 6 WWPS, discussed under the following subheadings:

- Topography;
- Geology;
- Mine subsidence;
- Soil contamination;
- Acid sulfate soils (ASS); and
- Salinity.

Geotechnique were commissioned to undertake geotechnical investigations at the AWMF site. Field investigations were undertaken on 27 and 28 January 2011 and included the drilling of four boreholes, two in Area A and two in Area B, and the excavation of 30 test pits uniformly distributed across Areas A and B. Representative soil samples from four test pits were tested in the laboratory to determine soil characteristics. For further details of geotechnical field work and methodologies refer to the report prepared by Geotechnique (2011) in **Appendix F**.

A Phase 1 (non-intrusive) Contamination Assessment was undertaken for the proposed AWMF extension works by Cardno. The potential for contamination to be present at the site was assessed by undertaking a review of available historical information and a site inspection where anecdotal evidence was also obtained during communications with staff on-site.

The excavation works for the proposed landfill cell Areas A and B, sediment/leachate basins and gas lines and wells, and the trenching works for the installation of the sewer pipeline are the key works discussed in the following sections, as the soils and geology that will be encountered during excavation is an important factor for these works.

Proposed ancillary facilities on the surface at the AWMF, including the waste transfer station, additional reuse centre, wheel wash facility and weighbridges will predominantly be constructed on the existing surface, and will generally be less affected by the soils and geology at the site.

## 6.2.2 Existing Environment

### 6.2.2.1 Topography

The proposed new landfill cells referred to as Areas A and B are located to the north eastern side and north western side of the existing landfill, respectively. Geotechnique (2011) and Cardno personnel have made the following observations during field work and site inspections regarding the topography of the AWMF site:

- The existing landfill and proposed new cells are located within forested rolling low hills;
- There is a perimeter road around the existing landfill;
- There is an unpaved track along the western boundary (ridgeline) of proposed Area B and a ditch and a fire trail (with some trees) along the western boundary of Area B;
- There are two leachate basins associated with the existing AWMF, one in the northern extent (which will be decommissioned) and the other at the southern extent of the existing landfill area;
- The ground surface within proposed Area A generally slopes toward the southwest at approximately 10 to 15 degrees, towards the existing landfill area, except in the south eastern boundary where the ground surface slopes towards the east, away from the existing landfill area;
- The ground surface within proposed Area B generally slopes toward the east at approximately 10 to 20 degrees, towards the existing landfill area, with localised steep slopes of approximately 60 to 70 degrees, except in the northern portion (around the existing northern leachate basin) where the ground surface slopes towards the south and south east at approximately five to 15 degrees, towards the existing landfill area;
- There is a creek that trends approximately northwest to southeast in direction immediately to the south of the existing landfill area; and
- Bedrock conglomerate and sandstone outcrop around the existing leachate basin near Area A.

The sewer connection pipeline from the AWMF to HWC's Rathmines No. 6 WWPS will be located entirely within the road reserve along Wilton, Wangi and Dorrington Roads and as such the pipeline site generally follows the topography of these roads.

The Soil Landscape Map of Gosford-Lake Macquarie (Scale 1:100,000) indicates that the landscapes across the AWMF site belong to the Awaba Group (aw), which is characterised by rolling low hills on predominantly coarse grained sediments of the Narrabeen group and Newcastle coal measures in the Awaba hills, local relief of 20m to 80m and slope gradient usually of 10% to 25% with some localised steep slopes up to 60% (Geotechnique, 2011).

General limitations in this landscape include steep slope (localised), mass movement (localised), very high erosion hazard, shallow and stony soils and strongly acidic soils with low fertility.

This Soil Landscape Map also indicates that the sewer pipeline site will traverse landscapes belonging to the Awaba (aw), Doyalson (do) and Wyong (wy) Groups. In addition to the characteristics described above for the Awaba Group, the Doyalson and Wyong Groups are characterised by the following:

- Doyalson: gently undulating rises on Munmorah Conglomerate, local relief to 30m and slope gradient usually of less than 10%, also consisting of predominately cleared eucalypt open-forest. General limitations in this landscape include high erosion hazard, foundation hazard (localised), high run-on (localised), mine subsidence district, seasonal waterlogging (localised) with hardsetting, stony soils and strongly acidic soils with low fertility; and
- Wyong: broad poorly drained deltaic floodplains and alluvial flats of Quaternary sediments on the Central Coast Lowlands, local relief to less than 10m and slope gradient usually less than 3%, also consisting of extensively cleared open-forest with swamps being common. General limitations in this landscape include flooding, seasonal waterlogging and localised permanent waterlogging, foundation hazard, stream bank erosion (localised), acid sulfate potential (localised) and strongly acidic, poorly drained, impermeable soils of very low fertility with saline subsoils.

#### 6.2.2.2 Geology

Based on the Geological Map of Sydney (Geological Series Sheets S1 56-5, Third Edition, 1966, Scale 1:250,000) bedrock at the AWMF site was anticipated to be Newcastle Coal Measures (Pn) comprising shale, sandstone, conglomerate, tuff, chert and coal seams (Geotechnique, 2011).

Information from the four boreholes and 30 test pits excavated by Geotechnique (2011) in the area of the two new landfill cells indicated that the sub-surface profiles across both Areas A and B comprised a sequence of topsoil/fill and residual soils underlain by bedrock. However, at some borehole and test pit locations fill appeared to have been placed directly on bedrock, generally at locations in closer proximity to the existing landfill cells at the site. Nine of the test pits (TP22 to TP30 as indicated on **Figure 6.3**) had very shallow (less than 0.3m) depths to bedrock.

Geotechnique (2011) generally describe the existing sub-surface materials encountered across new cell Areas A and B as follows:

- Topsoil/fill materials are predominantly sandy with some low to medium plasticity sandy silt and sandy silty clay. Thickness of topsoil/fill in the majority of boreholes and test pit locations was less than 0.5m;

- Residual soils are also predominantly sandy with bands of low to medium plasticity and stiff to hard silty clay and sandy clay, with cobbles at places; and
- Bedrock across the site varies from sandstone to conglomerate, with depth to bedrock in test locations within Areas A and B varying from approximately 0.2m to 1.5m from the existing ground surface. Bedrock was assessed to be extremely too distinctly weathered to borehole and test pit termination depths.

In summary, borehole and test pit logs by Geotechnique (2011) show that the combined thickness of topsoil/fill and residual soils across both proposed new cell Areas A and B varies from approximately 0.2m to 1.5m. The soils are predominantly sandy in nature with bands/layers of clayey soils. The creation of proposed new cell Areas A and B at the site will involve excavations to depths of approximately 2.7m and 3.2m, respectively, therefore bedrock will be encountered during excavations.



# Test Pit and Borehole Locations

## ADDITIONS TO AWABA WASTE MANAGEMENT FACILITY ENVIRONMENTAL ASSESSMENT

- Legend**
- Site Boundary
  - Test Pits <0.3m
  - Test Pits
  - Bore Holes
  - Proposed Excavation Contours Major
  - Proposed Excavation Contours Minor
  - Proposed Leachate Pond
  - Proposed Sediment Basin

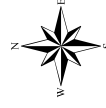
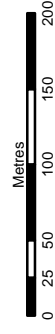


FIGURE 6.3  
1:5,000 Scale at A4



Data Source: Geotechnique (2011), GHD  
Map Produced by Cardno NSW/ACT Pty Ltd 2812  
Date: 2012-04-26  
Coordinate System: GDA 1984, MGA Zone 56  
Map: G6003\_TestPits&Boreholes.mxd 02  
Imagery supplied by LMCC and associated third party suppliers



Based on laboratory test results by Geotechnique (2011) on representative soil samples (provided in **Appendix F**), properties of soils encountered across the AWMF expansion site may generally be described as follows:

- Particle size distribution analysis showed that the proportion of clay and silt in the silty clay sample TP2 is significant (79%). However, the proportion of silt and clay in sandy soils (TP9, TP15 and TP20) was minor (17-44%);
- Plasticity characteristics of soil samples were assessed by determining liquid and plastic limits for finer fractions (0.425mm or smaller). Finer fractions in both clayey and sandy soils indicated that soils across the site are of medium to high plasticity;
- Susceptibility of soils to erosion was assessed by carrying out Emerson Class tests (physical tests), which grades soils into eight classes, with Class 1 being highly dispersive and Class 8 being non-dispersive. Clayey soils from TP2 were assessed to be highly susceptible to erosion. However, susceptibility of sandy soils from the site (TP9, TP15 and TP20) to erosion varied from low to high;
- Both clayey and sandy soils could be compacted to a reasonable maximum dry density of 1.7 to 1.9t/m<sup>3</sup> at optimum moisture content of 11.3 to 16.1%; and
- Permeability of clayey and sandy soils compacted to a dry density ratio of 95-100% standard at approximately optimum moisture content were in the order of 5x10<sup>-10</sup>m/s and 9x10<sup>-9</sup>m/s respectively. This means both clayey soils and sandy soils with clay at the site, when compacted, will have very low permeability.

For full details of the laboratory test results carried out on representative soil samples from the site refer to the report prepared by Geotechnique (2011) in **Appendix F**.

With regards to the geology of the sewer pipeline site, based on the Geological Map of Sydney (Geological Series Sheets S1 56-5, Third Edition, 1966, Scale 1:250,000) bedrock along the pipeline route is anticipated to be:

- Newcastle Coal Measures (Pn) comprising shale, sandstone, conglomerate, tuff, chert and coal seams; and
- Clifton Sub-group (Rnc) of the Narrabeen Group comprising claystone, sandstone and shale.

As explained in **Section 6.2.2.1**, the pipeline will be entirely contained within the road reserves of Wilton, Wangi and Dorrington Roads. Open trenching approximately 60cm wide is proposed for the majority of the pipeline route except for the Wangi Road trenchless crossing. Excavation depths within the trenches will vary from a minimum of approximately 800mm to a localised maximum of approximately 2.5m, possibly near culvert crossings. Along Wilton Road the sewer main is proposed on the edge of the road bitumen while along Wangi and Dorrington Roads the main will be centred approximately 1m from the edge of the road bitumen.

### 6.2.2.3 Mine Subsidence

The AWMF site and entire proposed sewer pipeline route are located within the West Lake Mine Subsidence District. The District Supervisor of NSW Mine Subsidence Board office at Newcastle advised that the proposed AWMF landfill cells are underlain by coal seams, which are likely to be mined sometime in the future by Centennial Coal Company Limited, who owns the mining lease (Geotechnique, 2011). It is understood that this mining lease (DA 73-11-98) extends from the AWMF site along Wilton Road to near the intersection between Wilton and Wangi Roads.

It is understood that Centennial Coal Company Limited will be mining an approximately 2.6m to 2.7m thick coal seam located at a depth of about 235m from the existing ground surface at the AWMF site, using the long wall mining method. This will involve stripping the coal seam between pillars spaced about 200m apart and letting the roof collapse in a controlled manner during/after coal extraction (Geotechnique, 2011). Approximate locations of pillars with regards to the AWMF site are indicated on a plan received from Centennial Coal Company Limited, which is included in **Appendix F**.

### 6.2.2.4 Soil Contamination

The existing landfill and proposed landfill extension works (the addition of cell Areas A and B) are wholly contained within Lot 372 DP 723259; 367 Wilton Road, Awaba. The majority of the area encompassing the proposed landfill extension works is currently undisturbed natural bushland, and as such, it was not anticipated that these areas of the site have significant potential to be contaminated.

The proposed sewer pipeline route connecting to the HWC's Rathmines No. 6 WWPS is wholly contained within the road reserves of Wilton, Wangi and Dorrington Roads, with excavation to an expected maximum depth of 2.5m. Hence encountering contaminated soils along the pipeline excavation route during trenching works is possible but unexpected due to the nature of the site.

Historical information obtained for the AWMF site (Lot 372 DP 723259) for the purpose of the Phase 1 Contamination Assessment included historical title deeds (for Lot 372 DP 723259 only), historical aerial photography and a search of contamination regulatory notices. To support the review of historical site information, a site inspection at the AWMF was also conducted on 10 February 2011 to identify potential contamination sources and/or visible evidence of contamination through detailed observations of the landfill expansion site. It should be noted that this site inspection did not include inspection along the proposed pipeline route.

The Phase 1 Contamination Assessment for the works site has been prepared in accordance with guidelines under Section 105 of the *Contaminated Land Management Act 1997*, including *Guidelines for Consultants Reporting on Contaminated Sites* (EPA, 2000), *National Environment Protection (Assessment of Site Contamination) Measure* (NEPC, 1999) and *Guidelines for the NSW Site Auditor Scheme (2nd edition)* (DEC, 2006b).

It should be noted that this assessment is not a detailed site investigation for environmental advice purposes but is a limited (Phase 1) desktop assessment only. No intrusive sampling which targeted contamination within Lot 372 (the AWMF site) or along the proposed sewer pipeline route has been conducted as part of this assessment.

Development consent for the existing AWMF was granted in October 1986, such that the site could operate as a landfill catering for household wastes, privately transported residential rubbish, construction and municipal wastes and some industrial wastes. Prior to commissioning of the AWMF in 1986 the entire area consisted of undisturbed natural bushland, as verified by 1984 aerial photography in **Figure 6.4**. The road reserves of Wilton, Wangi and Dorrington Roads and the access road to the Rathmines No. 6 WWPS were already established by 1984, also shown in **Figure 6.4**.

The results of the historic searches describing the present contamination risk across the AWMF expansion site and proposed pipeline route are summarised in **Table 6.6**.

**Table 6.6: Historic Use and Risk of Contamination at the Subject Site**

Search Component	Land Use	Likelihood of Existing Contamination
Historic and current title deeds	<p>A search of historic and current title deeds provided under the Land and Property Information (LPI) General Register of Deeds for the AWMF site indicates that prior to the site being approved for use as a landfill (record of deposited plan on 4/5/1987), the title was Crown Land.</p> <p>No historical title deeds searches were undertaken for the road reserves containing the proposed pipeline route.</p>	<p><b>Low:</b> There is no history of contaminating activities occurring at the AWMF site as the only prior title to the site being used as a landfill was Crown Land.</p> <p>Contamination likely has occurred at the AWMF site in general due to its current use as a landfill; however, any such contamination should be contained within the existing landfill cells and is not expected to be encountered in surrounding lands such as the proposed new cell Areas A and B.</p> <p>Contamination may be present in the road reserves along the sewer pipeline route. However, this is considered unlikely due to a general lack of historical contamination sources in the vicinity of the sewer pipeline route.</p>
Aerial photography	<p>Historical aerials of the AWMF landfill site were provided by the LPI for the years 1984 and 1990 (see <b>Figure 6.4</b>). More recent aerial images of the site from 2005 and 2010 were also obtained from Google Earth Pro (see <b>Figure 6.5</b>).</p> <p>The 1984 aerial shows the AWMF site to be completely vegetated with natural bushland prior to the development of the landfill. Wilton, Wangi and Dorrington Roads and the access road to the Rathmines No. 6 WWPS were already established by 1984, along with the Toronto Golf Course. The business park near the corner of Wangi and Dorrington Roads also appears to be partially developed by 1984 (see <b>Figure 6.4</b>).</p> <p>The 1990 aerial shows the landfill in its relatively early stages of development,</p>	<p>Low: No potentially contaminating site features or activities were identified from historical aerial photography in the proposed new cell Areas A and B prior to 1986 when the existing landfill was commissioned. Beyond 1986 leachate from the existing landfill could potentially have been transported into Areas A and B to be excavated to the north of the existing landfill site, although the leachate pond shown in the 2010 aerial (<b>Figure 6.5</b>) is lined and hence should be effectively containing leachate for the northern portion of the site.</p> <p>Contamination could be present in the road reserves along the sewer pipeline route; however, this is considered unlikely due to the general nature of the area surrounding the road reserves, with a significant amount of adjacent land still existing as untouched</p>

Search Component	Land Use	Likelihood of Existing Contamination
	<p>approaching the same footprint as current day (2011). The 1990 aerial also shows further development of the business park along Dorrington Road.</p> <p>The 2005 aerial shows the landfill nearing its current extent. The 2010 aerial shows the landfill at its current extent, with the existing leachate pond at the northernmost extent of the site, and natural bushland covering the landfill expansion area for Areas A and B.</p>	bushland.
OEH Contaminated Land Record	<p>A search of the OEH Contaminated Land Record on 17 October 2011 identified only seven sites of contaminated land with notices issued within the Lake Macquarie LGA (OEH, 2011a). Three of these sites are located on land to the east of Lake Macquarie water body and four are located to the west of Lake Macquarie; however, the closest site is approximately 8km from the AWMF and not in the vicinity of the proposed sewer pipeline route.</p>	<p><b>Low:</b> Given the contaminated sites with notices are well removed from the subject site it is highly unlikely that any of these contaminated sites have the potential to impact the proposed works. However, it should be noted that the Contaminated Land Record is not a comprehensive record of contaminated sites and hence there is still the potential for unrecorded contamination at the subject site.</p>
Groundwater bores	<p>A groundwater bore search of the NSW Water Information's Groundwater Database was conducted. No groundwater bores (with information) were located within 1km of the AWMF site on this Database.</p> <p>There are, however, five groundwater bores at the existing landfill site, which are currently monitored by LMCC in accordance with their EPA licence 5873. Groundwater quality data collected from these bores is presented in Annual Returns to OEH in accordance with the EPL. According to the Annual Returns from 2008 to 2010 there have been no instances of non-compliance regarding concentrations of contaminants at the AWMF site.</p>	<p><b>Low:</b> No instances of groundwater contamination have been recorded at the AWMF site, based on the Annual Returns from 2008 to 2010. Hence it is considered unlikely that groundwater at the landfill site is contaminated.</p> <p>It is considered unlikely that groundwater along the proposed sewer pipeline route would be contaminated due to a lack of potential contamination sources in the vicinity of the pipeline alignment.</p>



1984



1990

### Historical Aerial Photography 1984 and 1990

ADDITIONS TO AWABA WASTE MANAGEMENT FACILITY  
ENVIRONMENTAL ASSESSMENT



Map Produced by Cardno NSW/ACT Pty Ltd 2812  
Date: 2012-04-26  
Coordinate System: GDA 1994 MGA Zone 56  
Project: 600308  
Map: G6004\_HistoricalAerials.mxd 02  
Imagery supplied by LPI and associated third party suppliers

FIGURE 6.4



2005



2010



## Historical Aerial Photography 2005 and 2010

ADDITIONS TO AWABA WASTE MANAGEMENT FACILITY  
ENVIRONMENTAL ASSESSMENT

FIGURE 6.5



Map Produced by Cardno NSW/ACT Pty Ltd 2812  
Date: 2012-04-26  
Coordinate System: GDA 1994 MGA Zone 56  
Project: 600308  
Map: G6005\_HistoricalAerials2.mxd 02  
Imagery supplied by Google and associated third party suppliers

These historic database searches indicate the likelihood of existing contamination from historic sources being present at the AWMF site or along the route of the proposed pipeline is low, with the key potential contaminating factor for the proposed additions to the facility being leachate from the existing landfill site entering the groundwater system in the proposed new cell areas. However, due to the site topography in the new cell areas generally grading towards the existing landfill areas, this risk is considered to be minimal.

No potential areas of contamination or contaminating activities were identified visually in cell Areas A and B during the site inspection on 10 February 2011 or along the route of the proposed sewer pipeline during inspections. It should be noted that the AWMF is licensed to accept asbestos waste, although LMCC specifies that asbestos waste will only be accepted on site if it has been wet down and is completely encased in a heavy duty plastic and sealed so no asbestos particles can escape into the atmosphere.

The AWMF site inspection showed evidence of historic clearing in the area of the existing landfill and relatively little disturbance to the natural bushland areas surrounding the AWMF site in Areas A and B. Examination of the ground surface, where naturally visible, did not indicate any evidence of contamination, such as discoloration, staining or naturally bare soil patches. Similarly the condition of the vegetation comprising the bushland in Areas A and B did not suggest the presence of any sub-surface contamination as there were no visible signs of plant stress.

Given the known land-use of the existing AWMF site as a landfill, any existing contamination would likely come from material within the existing landfill, including leachate. Given the results of the historic database searches it is considered that the most likely contaminants that may be found at the landfill expansion site include:

- Contaminants in leachate; and
- Physical waste materials, potentially including asbestos, in the areas to be excavated in Areas A and B directly adjacent to the existing landfill area.

Based on the identified subject site history (the AWMF and road reserves) a Phase 2 (intrusive) Contamination Assessment is not considered necessary as part of the proposed works; however, excavation works immediately adjacent to the existing landfill boundary should be carefully monitored such that any buried waste materials in these areas are not disturbed. It is considered that the landfill expansion site at the AWMF is suitable for the proposed use as a landfill and that the road reserves of Wilton, Wangi and Dorrington Roads are suitable for the proposed installation of the sewer pipeline to convey leachate to the Rathmines No. 6 WWPS. Therefore a site auditor, accredited under the *Contaminated Land Management Act 1997*, is not considered to be required to issue a site audit statement to certify on the suitability of the current or proposed uses of the subject site.

#### 6.2.2.5 Acid Sulfate Soils

According to OEH's ASS risk mapping (**Figure 6.6**) the proposed expansion works and additions to the AWMF site are not located on land considered to be at risk of ASS. Land approximately 1.6km south-east of the AWMF site (near the Lake Macquarie estuary) has a high probability. The proposed installation works for the sewer pipeline will pass through two very small areas indicated as land considered being at risk of ASS, with a high probability of occurrence. One small area of potential ASS is part way along Wangi Road and the other is at the end of the access road to the Rathmines No. 6 WWPS, in closer proximity to the Lake Macquarie estuary.

According to Lake Macquarie's ASS Planning Map under the Lake Macquarie LEP 2004 the AWMF site is indicated as Class 5 land. However, the site is not located within 500m of land Classes 1 to 4. It is considered unlikely that any ASS will be encountered during excavation works at the AWMF site.

The two small areas of impacted land along the sewer pipeline route are indicated as Class 2 land on Lake Macquarie's ASS Planning Map. This would generally mean that any works below the natural ground surface and/or that are likely to lower the water table beyond 1m below the natural ground surface would require development consent from LMCC; however, the provisions of Part 3A overrule this requirement. It is possible that excavation works within these Class 2 areas may potentially encounter ASS.

#### 6.2.2.6 Salinity

Soil salinity is an accumulation of salt in land and water to a level that impacts on the natural built environment. Salinity occurs naturally in many landscapes in Australia but is often exacerbated by human activities that accelerate the mobilisation and accumulation of salt, such as changes in land use. In particular vegetation clearing can disturb natural ecosystems and change the hydrology of a landscape, mobilising salt into waterways and on land.

According to OEH's online Salinity Hazard mapping the proposed works are not located on land considered to be at risk of salinity. There is also no land in proximity to the works indicated as having either moderate, high or very high salinity hazard. Therefore it is considered unlikely that any saline soils will be encountered during excavation works at the AWMF site.

Although no salinity hazard is shown on OEH's online Salinity Hazard mapping for the works along the sewer pipeline route, it is considered that saline soils maybe be encountered during trenching works for the installation of the sewer pipeline, particularly in the areas in closest proximity to the Lake Macquarie estuary, such as at the end of the access road to the Rathmines No. 6 WWPS, due to the presence of nearby brackish waters in the Lake Macquarie estuary.



# Acid Sulphate Soils Risk

ADDITIONS TO AWABA WASTE MANAGEMENT FACILITY ENVIRONMENTAL ASSESSMENT

- Proposed Sewer Pipeline
- Site Boundary
- Cadastre
- Acid Sulphate Soils Risk
  - High probability of occurrence
  - Low probability of occurrence
  - No known occurrence

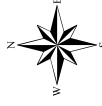
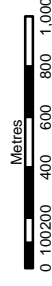
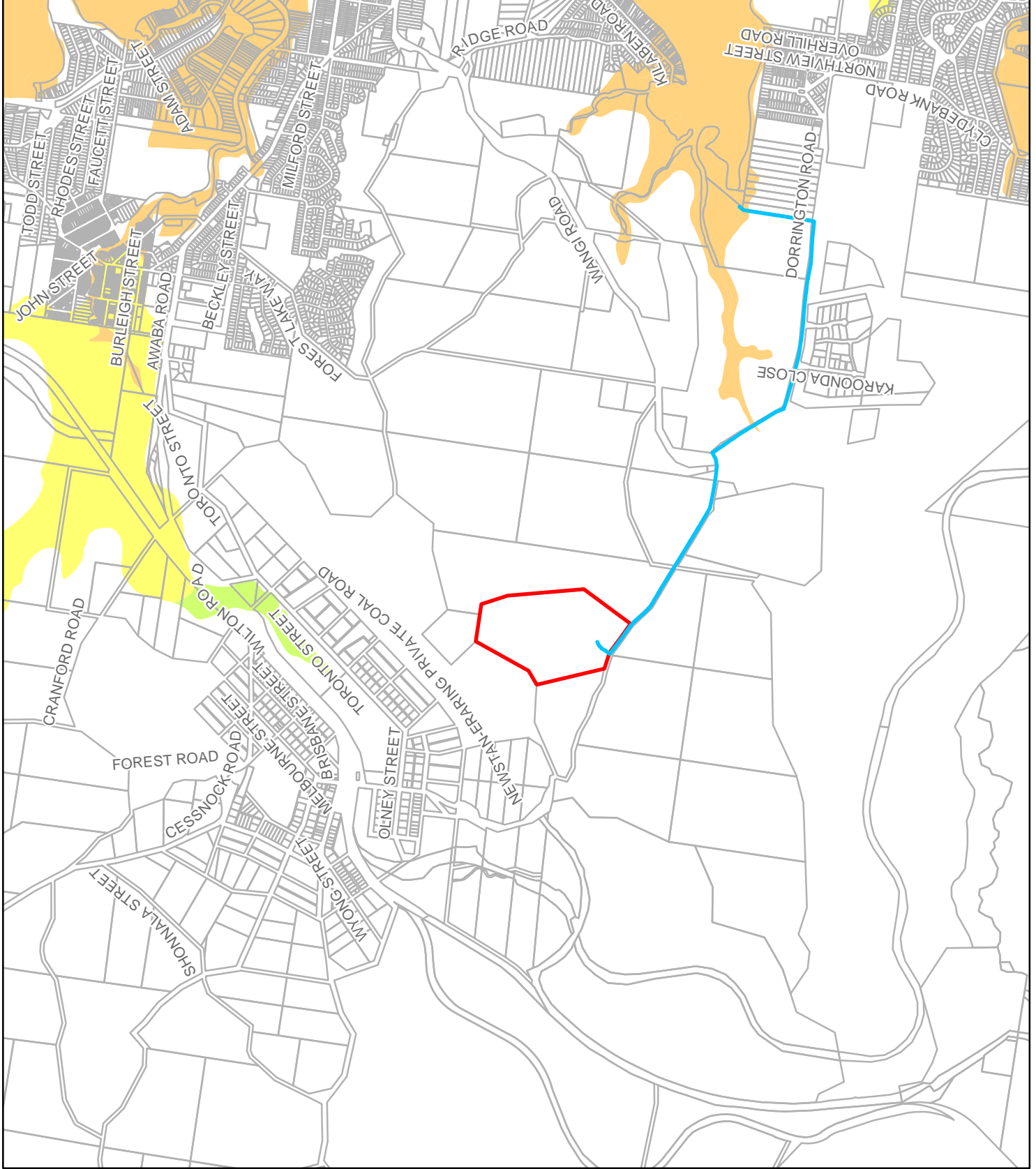


FIGURE 6.6

1:30,000 Scale at A4



Data Source: Geoscience Australia  
Map Produced by Cardno NSW/ACT Pty Ltd 2812  
Date: 2012-04-26  
Coordinate System: GDA 1994 MGA Zone 56  
Project: 600308  
Map: G6006\_AcidSS.mxd 02



## 6.2.3 Potential Impacts

### 6.2.3.1 Topography

The key potential impacts on topography are soil erosion and slope instability, particularly in areas to be excavated as part of the proposed works. There is the potential for erosion and sedimentation of soils during the construction phase, particularly during excavation works to prepare the proposed landfill cells and the proposed leachate basins and also during trenching works for the sewer pipeline.

Susceptibility of soils at the AWMF site to erosion was assessed by Geotechnique (2011). Tests indicated that some soils at the AWMF site are dispersive clays that are highly susceptible to erosion, while the majority are sands that vary in erosion potential from high to low. Exposed soils, particularly in clayey areas of the AWMF site and potentially within the trenched route of the sewer pipeline, would be highly susceptible to erosion during periods of heavy rainfall if not managed appropriately. Aeolian (wind) erosion could also occur from any unsecured stockpiles of spoil or exposed excavated areas both at the AWMF site and along the trenched route of the sewer pipeline and could be significant during periods of strong winds if not managed appropriately.

There is the potential for local subsidence, collapse or settling of the soil during excavation works, particularly if the slopes become destabilised due to vegetation clearance and the operation of machinery. Generally the maximum slope across the AWMF site is 15 to 20%; however, Geotechnique (2011) did note some localised steep slopes of approximately 60 to 70%. Hence there is the potential for slope instability and appropriate controls will be required to maintain slope stability.

Similar controls will also be put in place during trenching works for the sewer pipeline to ensure that in areas where trenching is required to deeper depths the side slopes remain stable at a suitable gradient.

Slope stability will also need to be managed in the operational phase of the new landfill cells, as waste is tipped, compacted and covered at the active tipping face, using soil material excavated during the construction phase as daily cover material for the tipping floor and side batters.

### 6.2.3.2 Geology

Rock substrate will be encountered during the excavation works for the landfill cells as in some areas of the site bedrock is as shallow as 0.3m below the ground surface (**Figure 6.3**). Therefore rock breaking machinery will be required during the construction phase for the new landfill cells and potentially for the construction of the new leachate basins at the south of the site. Bedrock could also potentially be encountered during trenching works for the sewer pipeline.

### 6.2.3.3 Mine Subsidence

Not all mining necessarily results in subsidence nor does all subsidence cause damage to the surface structures. However, based on modelling undertaken by Centennial Coal Company Limited, Geotechnique (2011) determined the subsidence parameters appropriate for the proposed AWMF landfill extension are as follows:

- Vertical subsidence/settlement = 400mm to 800mm;
- Tensile strain = 0.0mm/m to 2.0mm/m; and
- Tilt = 1.0mm/m to 6.0mm/m.

Variations in the above parameters across the AWMF site are shown on plans from Centennial Coal Company Limited which can be found in **Appendix F**.

The surface slopes on the existing landfill areas are approximately 60mm/m to 80mm/m. Therefore it can be assumed that a properly designed bridging layer over the existing waste should be able to accommodate the estimated mine subsidence.

The estimated differential settlement (tilt) is of more significance than the total settlement, as this could possibly lead to ponding occurring on the piggyback liner over the existing waste (see **Section 6.4** for piggy back liner details).

If mine subsidence did occur under the AWMF site due to the extraction of coal, there is the potential for damage to occur to site infrastructure at the AWMF during the operational phase, including structural damage to proposed new facilities such as the waste transfer station and additional reuse centre. If the land underlying the landfill became unstable, it could also damage the proposed gas collection system, as well as hinder the functioning of the leachate collection system.

If mine subsidence were to occur in the vicinity of the sewer pipeline during the operational phase there is the possibility that the pipeline could become damaged such that it leaks leachate into the surrounding environment during the transfer process to the WWPS.

It is noted that to further improve understanding of possible subsidence issues, LMCC is currently working in partnership with Centennial Coal (Newstan Colliery), the Mine Subsidence board, GSS Environmental (environmental consultants to Centennial Coal) GHD (Landfill designers), and MSEC (subsidence engineers) during preparation of a comprehensive mine subsidence risk assessment by Centennial Coal. Prior to construction, LMCC will consider the results of both this assessment and the existing Geotechnique Report (Appendix F) and undertake a design review to ensure that the final design considers the worst case mine subsidence parameters, and will accommodate the worst case ground movement identified in either document without suffering structural failure or compromising environmental protection.

#### 6.2.3.4 *Soil Contamination*

Based on the AWMF site history review and AWMF site inspection, the overall potential for the exposure of contaminated soils during construction is considered to be low, as concluded by the Phase 1 (non-intrusive) Contamination Assessment. However, given the known land-use of the existing AWMF site as a landfill, any existing contamination would likely come from material within the existing landfill, including leachate.

The risk of contamination occurring during construction is considered low, providing adequate mitigation measures are in place. Potential causes of contamination include:

- Accidental petrol or oil spills associated with construction machinery, particularly during refuelling; and
- Migration of contaminants from the existing AWMF site to adjoining areas (e.g. from the existing landfill cells in stormwater runoff).

Similarly, there is the potential for contaminated material to be uncovered during trenching works for the sewer pipeline; however, this risk is considered low based on the site history review of the pipeline route (contained within well-established road reserves).

If contaminated material is encountered during excavation works for the proposed landfill cells, the leachate basins or trenching works for the sewer pipeline, this contamination will need to be managed appropriately.

#### 6.2.3.5 *Acid Sulfate Soils*

It is considered highly unlikely that ASS will be encountered at the AWMF site, as they are typically associated with low-lying coastal areas. There is the potential for ASS to be encountered during trenching works for the sewer pipeline route, particularly along the lower lying sections of the route and in the vicinity of the WWPS.

In the event ASS are exposed, acid may be produced upon exposure of the soil to air. Any ASS soils encountered therefore need to be carefully managed during the construction phase, and in particular during works involving the excavation of soil material.

#### 6.2.3.6 *Salinity*

If saline soils are encountered at the AWMF site or along the sewer pipeline route either during construction or operation the principal effects may include damage to vegetation due to salt scalding on the land surface and/or damage to access road pavements, building foundations at the AWMF site and/or the sewer pipeline structure.

## 6.2.4 Mitigation Measures

### 6.2.4.1 Construction Phase

Prior to commencement of works, a *Construction Environmental Management Plan* (CEMP) would be prepared and would detail appropriate mitigation measures for soil erosion and sediment control, slope stability control and what actions to take in the event contaminated, saline and/or acid sulfate soils are encountered during the works (as a minimum).

Erosion and sedimentation issues will be addressed in an Erosion and Sediment Control Plan (ESCP). The Plan should be prepared and implemented in accordance with *Managing Urban Stormwater: Soils and Construction Volume 2* series (specifically volumes 2A: Installation of Services, 2B: Waste Landfills and 2C: Unsealed Roads) published by DECC (2008a, 2008b and 2008c, respectively) and will be developed by the Contractor and approved by LMCC prior to works commencing. The ESCP should include a range of measures in accordance with best practice, several of which are listed as follows:

- If possible, progressively clear vegetation from only those areas that will be excavated immediately for new landfill cell construction to minimise erosion potential at the AWMF site. This is of particular importance as the proposed new landfill cells would be a staged development over a number of years, to the end of 2032. If considered practical by the Contractor the same progressive removal of vegetation along the pipeline route in the road reserves could be undertaken during installation of the sewer pipeline to minimise exposed topsoil extents;
- Devices such as sediment fences and flow diversion structures will be implemented as required to minimise the movement of any disturbed sediments, particularly in runoff from the AWMF site and along the trenched sewer pipeline route during heavy rainfall;
- Exposed areas and overburden stockpiles will be regularly wet down or covered during construction to minimise aeolian transport of dust from the AWMF site and along the pipeline route. As all material to be excavated from the AWMF site to create the new landfill cells and leachate basins is proposed for use as future cover material, appropriate stockpiling and management of this material is vital. All material removed during trenching works for the sewer pipeline will be used as backfill once the pipeline has been installed;
- In the event of heavy rainfall occurring at the subject site, construction works will cease and all erosion and sediment control measures must be checked to ensure their integrity;
- All access points to the AWMF site will be stabilised and a temporary course base layer such as gravel should be laid down as soon as possible along access routes in order to minimise soil disturbance due to the movement of construction machinery and vehicles; and
- If considered necessary a rumble grid or similar could be implemented at the interface between the existing landfill site access roads and the construction area at the AWMF site to dislodge soil, mud and grass from the tyres of trucks and machinery as they leave the works area at the AWMF site.

- Immediately after the sewer pipeline has been installed the trench will be backfilled with material removed during trenching works and re-vegetated to help stabilise the soil in the road reserves.

With regards to potential mine subsidence, the design of the proposed landfill expansion works should ensure that the upper limits of settlement, strain and tilt indicated in **Section 6.2.3.3** (800mm, 2mm/m and 6mm/m, respectively) can be tolerated during the entire operational life of the expanded landfill. Providing these design parameters are accounted for in the design of the proposed works no damage should result to any infrastructure at the AWMF site, the landfill cells themselves or the sewer pipeline to the WWPS in the event of mine subsidence occurring in the future. Prior to construction, the landfill design will be reviewed to ensure that it is constructed to account for the worst case subsidence parameters which have been identified by either the existing Geotechnique Report (Appendix F), or the comprehensive mine subsidence risk assessment which is currently being prepared by Centennial Coal.

The CEMP will also include spill management measures. All construction staff should be made aware of their responsibilities and the procedures to be followed in case of a spill. In particular it is recommended that during construction:

- All refuelling is undertaken in appropriate designated areas;
- No fuel or oil should be stored within the construction zone and all fuels and oils must be stored within appropriately contained areas;
- Appropriate spill kits should be maintained at various locations within the works area; and
- Appropriate flow diversion measures will be used to contain runoff from the AWMF works site and ensure no runoff from the existing landfill cells enters the works site. Appropriate flow diversion measures will be used to manage runoff in the road reserves during trenching works for the sewer pipeline.

If any suspected or potential contamination is exposed during the works, works must cease immediately and LMCC and OEH must be notified. Any control measures needed to divert surface runoff away from contaminated areas and to capture and manage any surface runoff contaminated by exposure to contaminated areas should be implemented. OEH should be consulted to determine appropriate contamination investigations required and it may be necessary to prepare a *Contamination Management Plan*.

An ASS Management Plan must be prepared for the proposed works in accordance with the *Acid Sulfate Soils Manual* (Stone *et al.*, 1998). Similarly a Salinity Management Plan must be prepared for the proposed works. Both these Plans should be focused on the trenching works for the installation of the sewer pipeline, as these are the works that will be occurring in lower-lying areas closer to the Lake Macquarie estuary and hence are more likely to encounter acid sulfate or saline soils during the construction phase.

#### 6.2.4.2 Operational Phase

Erosion and sediment control and slope stability control measures will also be applied during the operational phase of the proposed new landfill cells, in accordance with current site practice at the existing AWMF.

A wheel wash facility is proposed for installation at the AWMF site egress point. This facility would prevent the tracking of mud or loose sediment from the AWMF off site. A new waste transfer station is also proposed to be constructed, which would reduce the number of vehicles leaving the paved road and entering the active tipping area.

Progressive re-vegetation of capped landfill areas will be undertaken at the AWMF to minimise disturbance of soils on capped cells.

The proposed new road around the AWMF will act to minimise surface and vegetation disturbance at the site during future operations.

## 6.3 Water Quality and Hydrology

The proposed expansion will steepen the slope of the capped surface (compared to the existing surface) and will generate higher peak runoff than under existing conditions, with some increase in flood levels. Groundwater extraction is not proposed as part of the works. In addition, impacts on stormwater and groundwater quality may occur due to the proposed works. Mitigation measures are discussed in the sections below.

### 6.3.1 Introduction

Rainfall that does not infiltrate the landfill but remains on the surface of the site produces surface runoff. Rainfall that infiltrates the landfill becomes leachate. Leachate generation by the AWMF is discussed separately in **Section 6.4**, while this section focuses on surface water runoff.

Note that within this EA, surface runoff that *comes into contact with* the landfilled surface is referred to as “stormwater”. Surface runoff at the site that is *diverted around* the landfilled areas is referred to as “surface water”. This distinction is shown in **Figure 5.5**.

As part of their geotechnical investigations at the AWMF site Geotechnique (2011) assessed groundwater conditions at the site, measuring depths to groundwater level or seepage in boreholes, where encountered. **Appendix F** contains the full report prepared by Geotechnique (2011).

Cardno undertook a stormwater quality and quantity assessment for the proposed works and prepared an assessment report (Cardno, 2011b) to summarise the findings (see **Appendix G**). This report comprises the assessment of stormwater management practices at the AWMF.

Cardno developed a catchment based water quality model (MUSIC model) to investigate stormwater runoff and its quality from the AWMF site. A qualitative assessment of flood impact due to the proposed extension of the AWMF site was undertaken using a hydrological model.

The site of the sewer pipeline route was not included in the modelling undertaken as the proposed pipeline is underground and its installation will not affect the hydrology and flood behaviour of the road reserve areas it passes through.

### 6.3.2 Existing Environment

The AWMF site is located in the vicinity of two un-named natural watercourses. One passes to the south of the proposed works area within Lot 372 (referred to as the on-site watercourse). The other passes to the south of Wilton Road and is directed through culverts underneath Wilton Road approximately 220m east from the exit of the AWMF site onto Wilton Road. Both watercourses discharge into Kilaben Bay of the Lake Macquarie estuary approximately 3km east of the AWMF site.