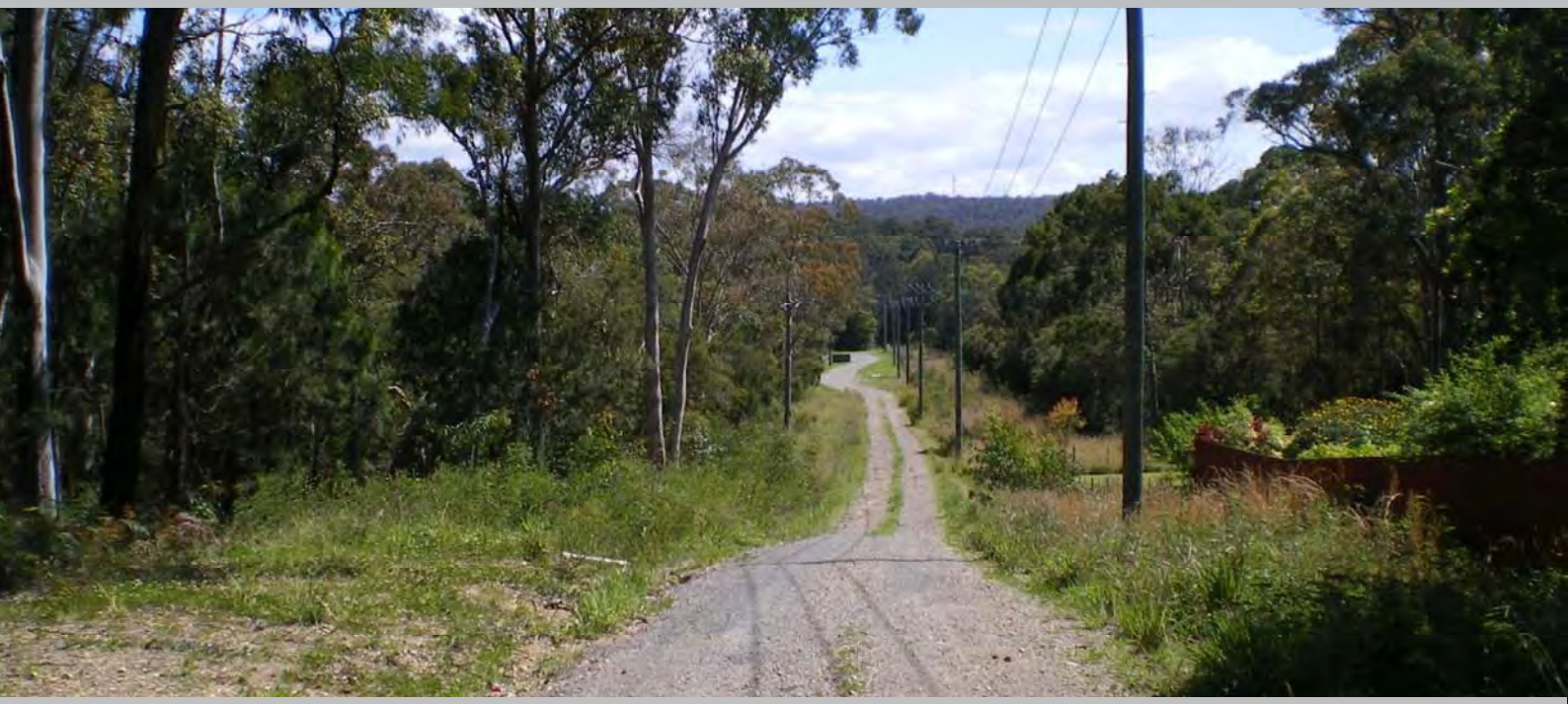
Additions to Awaba Waste Management Facility

Appendix N

Sewer Pipeline Aboriginal Heritage Report



ABORIGINAL CULTURAL HERITAGE ASSESSMENT

Awaba Waste Management Facility Proposed Pipeline, Awaba

December 2011

Local Government Area:	Lake Macquarie
Consultant Name:	Niche Environment and Heritage Pty Ltd
Authors:	Clare Anderson
Proponent:	Lake Macquarie City Council

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Summary

Cardno, on behalf of Lake Macquarie City Council, is preparing an Environmental Assessment of proposed works at the Awaba Waste Management Facility at Awaba, New South Wales. The proposed works will be assessed under Part 3A of the Environmental and Planning and Assessment Act NSW 1979 and Director General Requirements (DGRs) were issued for the project on 21 September 2010. Subsequently, an Aboriginal Cultural Heritage Assessment (ACHA) was prepared for the bulk of the proposed works at the Waste Management Facility (InSite Heritage 2011). A portion of the works, a proposed sewerage connection not originally within the InSite Heritage Study Area, has been identified as requiring assessment for Aboriginal archaeological and cultural heritage values. Niche Environment and Heritage has been commissioned by Cardno to provide additional information regarding the proposed sewerage connection to support the existing ACHA and Environmental Assessment.

The objective of this ACHA is to address these requirements; to identify the nature and extent of Aboriginal cultural heritage values associated with the Subject Area; and to provide an assessment of potential impacts to these values from the proposed sewerage connection. In addition this ACHA provides advice on the conservation of the heritage values, and recommendations for amelioration of potential impacts. For the purposes of this report Aboriginal cultural heritage includes archaeological objects (as defined by the *National Parks and Wildlife Act* 1974 NSW), cultural landscapes and contemporary Aboriginal cultural values.

The proposed works include approximately 3.5km of pipeline, a sewerage pump station and connection to the Rathmines Sewerage Pump Station.

A survey was completed over the impact footprint on 4 November 2011. The survey and consultation process identified cultural values within the impact footprint, two previously unregistered Aboriginal sites (AWMF Pipeline Isolated Find 1, AWMF Pipeline Midden 1) and areas of low visibility but potential archaeological sensitivity near creek lines.

A preliminary significance assessment of the two identified sites suggested low archaeological significance for AWMF Pipeline Isolated Find 1 and moderate archaeological significance for AWMF Pipeline Midden 1. Registered Aboriginal Parties have identified that any artefactual material holds cultural significances and have highlighted the importance of archaeological deposits near the creek lines.

As currently proposed, the pipeline will impact on all or a portion of areas identified as having archaeological or cultural values. Management and mitigation options have been discussed and the following recommendations have been made:

1. Additional subsurface testing be undertaken if impacts are to be made to any registered Aboriginal site or area of archaeological sensitivity.
2. Additional subsurface testing be undertaken in areas of archaeological sensitivity currently influenced by low visibility.
3. Detailed analysis should be made of any excavated materials so as to aid in the determination of the nature and significance of the site.
4. The methodology for any additional testing be included in the proposed Plan of Management for the Part 3A project.
    a. Any methodology should give consideration to the management recommendations made by the Registered Aboriginal Parties (see Appendix 1)
5. The registered Aboriginal stakeholders (Awabakal Local Aboriginal Land Council on behalf of Koompahtoo LALC, Awabakal Descendants Traditional Owners Aboriginal Corporation, Awabakal Traditional Owners Aboriginal Corporation and Cacatua Culture Consultants) continue to be consulted on all further archaeological work to be undertaken as part of this project.

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Introduction

Cardno, on behalf of Lake Macquarie City Council, is preparing an Environmental Assessment of proposed works at the Awaba Waste Management Facility at Awaba, New South Wales. The proposed works will be assessed under Part 3A of the Environmental and Planning and Assessment Act NSW 1979 and Director General Requirements (DGRs) were issued for the project on 21 September 2010. Subsequently, an Aboriginal Cultural Heritage Assessment (ACHA) was prepared for the bulk of the proposed works at the Waste Management Facility (InSite Heritage 2011). A portion of the works not originally within the InSite Heritage Study Area, a proposed sewerage connection, has been identified as requiring assessment for Aboriginal archaeological and cultural heritage values. Niche Environment and Heritage has been commissioned by Cardno to provide additional information regarding the proposed sewerage connection to support the existing ACHA and Environmental Assessment.

The objective of this ACHA is to address these requirements; to identify the nature and extent of Aboriginal cultural heritage values associated with the Subject Area; and to provide an assessment of potential impacts to these values from the proposed sewerage connection. In addition this ACHA provides advice on the conservation of the heritage values, and recommendations for amelioration of potential impacts. For the purposes of this report Aboriginal cultural heritage includes archaeological objects (as defined by the *National Parks and Wildlife Act* 1974 NSW), cultural landscapes and contemporary Aboriginal cultural values.

This ACHA has been prepared by Clare Anderson and Georgia Roberts of Niche Environment and Heritage.

Location

The Study Area is located between the suburbs of Awaba and Rathmines within the Lake Macquarie City Local Government Area (Figure 1). The proposed pipeline commences within Lot 372 DP723259 (367 Wilton Road, Awaba) and continues within the road reserve along the northern side of Wilton Road, Wangi Road and Dorrington Road. The pipeline then turns north onto a dirt access road which leads to Rathmines Sewerage Pump Station.

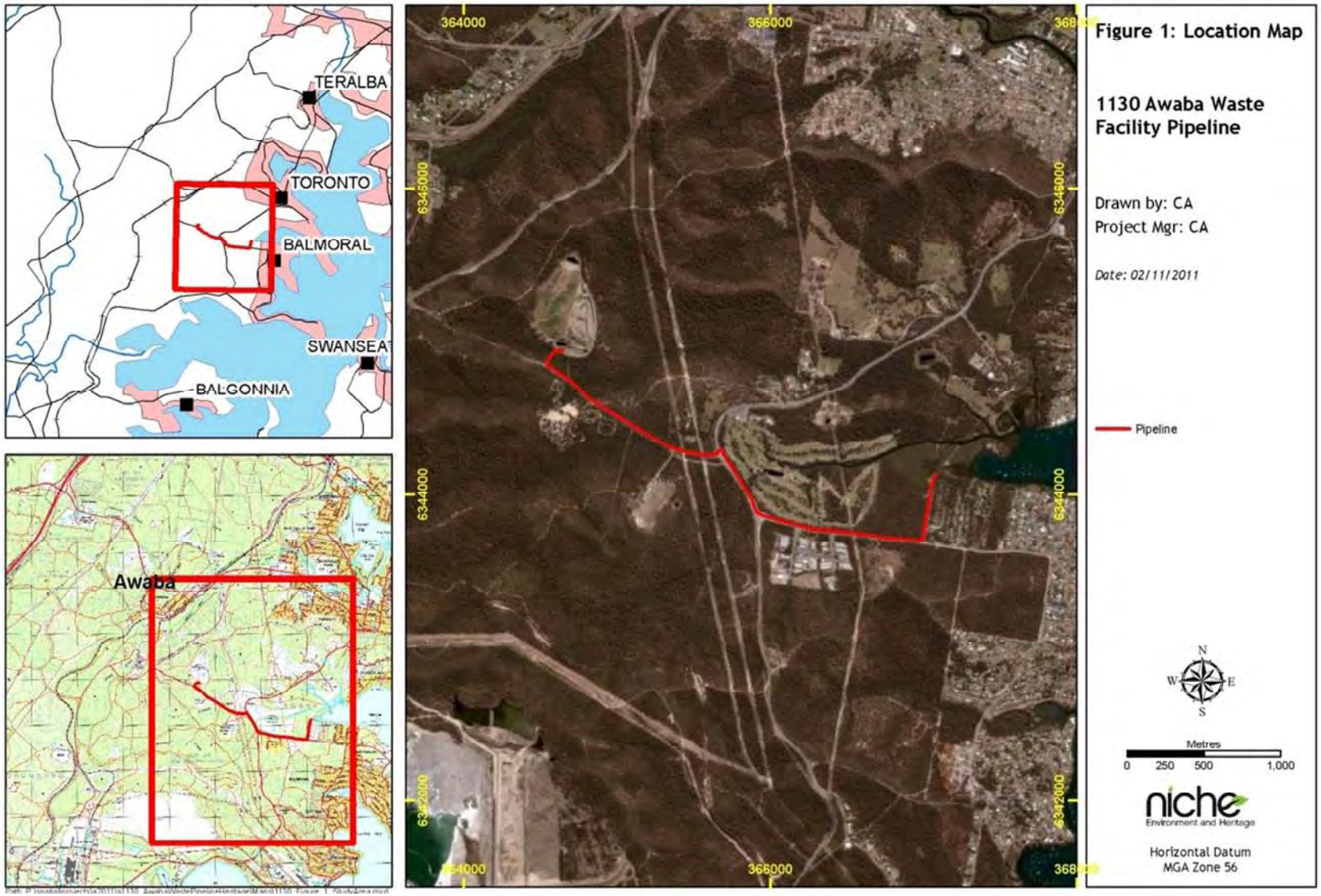


Figure 1: Location Map

Project Background

This ACHA has been undertaken due to the requirement of additional infrastructure for the proposed works at the Waste Management Facility, following the initial report by InSite Heritage (2011). A brief summary of the initial findings of the InSite Heritage (2011)report is presented below to contextualise the results of this study.

Insite Heritage Pty Ltd were commissioned by Cardno on behalf of the Lake Macquarie City Council to assist in preparing an Aboriginal Cultural Heritage Impact Assessment for the proposed expansion of the Awaba Waste Management Facility, Wilton Road, Awaba. The project is being assessed under Part 3A by the Department of Planning and Infrastructure (InSite Heritage 2011).

Aboriginal community consultation for the project was conducted in accordance with the DGRs (Department of Planning and Infrastructure) for the project, as per the 2005 consultation guidelines maintained by the OEH. A search of the AHIMS database found that no previously recorded archaeological sites occur within the Study Area.

The preliminary investigations involved a pedestrian surface survey of the proposed leachate basins. Survey visibility was hindered by thick vegetation and ground cover in some parts of the study area, with other areas disturbed by infrastructure development.

The survey identified three possible culturally modified trees located within the project area (AWTF_ST1, AWTF_ST2, AWTF_ST3) (Insite Heritage 2011). The preliminary subsurface testing excavated a total 1.75m^2. One broken silcrete flake was recovered from the least disturbed excavation in proximity to the permanent water course.

The following management recommendations were made in consultation with the registered Aboriginal parties for the project (Insite Heritage 2011: 37-38).

- *The identified possible culturally modified trees should remain in-situ. However, as AWTF_ST2 is dead it may be possible to relocate the tree into the conservation area adjacent to Wilton Road if project approval is granted, and if impacts are unavoidable.*

- *As AWTF_ST1 is located outside of the proposed boundary of the leachate basins, it should therefore not be impacted by the proposed development. To avoid unintentional impacts during construction it is recommended that a 5m perimeter / buffer zone be placed around the tree, surrounded by barrier tape or appropriate bunting/fencing. As AWTF_ST3 is located on the edge of the existing track / roadway*

that runs along the ridge line, it should not be impacted by the proposal. As with AWTF_ST1, a perimeter/buffer zone around the tree should be established to avoid unintentional impacts during construction. If impacts are unavoidable, then management of the affected trees should be discussed with the Aboriginal Stakeholders.

- *The preliminary testing narrowed down the area of archaeological sensitivity to a level bench area on the north side of the creek within the southernmost proposed leachate basin around Test Probe 7. Should the project receive approval it is recommended that additional excavation works be undertaken in this area prior to impact. This will initially comprise of 1m² probes spaced evenly over the area of impact along the creek line. These probes may be expanded if artefact densities warrant further investigation / salvage.*

- *Following completion of the archaeological subsurface excavation works in this area, it is recommended that a monitoring and collection programme is undertaken by the registered Aboriginal stakeholders during all proposed subsurface excavations works for the project within the margins of the creek/watercourse. This would involve a process in which the proponent engages the Aboriginal Stakeholders to monitor all sections of surface disturbance works to allow for collection of any artefacts that may be disturbed in this area.*

- *Artefacts collected during this observation and collection process along with any artefacts excavated from the subsurface excavations should then be relocated and reburied on site by the Aboriginal Stakeholders at a location that will not be subject to any impacts. This will ensure that any recovered artefacts will remain 'in country'. The artefacts and the location of their reburial would then be recorded and their details added to the Aboriginal Heritage Information Management System maintained by the Office of Environment and Heritage.*

- *It is recommended that a Cultural Heritage Management Plan (CHMP) be prepared for the project in consultation with the registered Aboriginal stakeholders, if approval is granted prior to any works commencing. The CHMP will outline the proposed additional excavation works in the area of impact within the southernmost leachate basin including methodologies for monitoring of surface disturbance works in this area and protocols for collection and reburial of artefacts by the registered Aboriginal stakeholders. The CHMP will also outline protocols for ongoing management of cultural heritage values including suggestions for the relocation of AWTF_ST2 and its ongoing conservation and management. It is recommended that the CHMP be developed in the early planning stages so that it can be effectively implemented.*

- ❒ *It is also recommended that should the project receive approval Cultural Heritage Awareness Training be implemented either through an oral and/or PowerPoint presentation for all contractors involved in the project.*

- ❒ *The registered Aboriginal stakeholders for the project have also requested that the proponent take all necessary steps to locate, protect and preserve Awabakal Cultural Heritage.*

Proposed Works

The proposed works and impact area for the works will be as follows:

- A Sewerage Pump Station (SPS) within the landfill site on Lot 372 will be located within a 10 x 10m footprint, located between the access road and the sediment basin to the north of the pipeline. The pump station will be around 3-4m deep

- The pipeline within Lot 372 will be open trenched within the actual road corridor to prevent any further disturbance (i.e. within the tarmac).

- Along Wilton Road the pipeline will be open trenched along the northern side of the road with a maximum impact area of 3m from the edge of the tarmac.

- A trenchless crossing will be used under Wangi Road, with the launch pit located in already disturbed area on the corner of Wilton/Wangi Road (assume 3x2m impact area for launch pit on either side of Wangi Road)

- Along Wangi Road and Dorrington Road the pipeline will be open trenched along the eastern/northern side of the road with a maximum impact area of 3m from the edge of the tarmac

- The pipeline will then turn off Dorrington Road and be open trenched within the bounds of the already disturbed dirt access road down to Rathmines SPS.

- ❒ Trench depths will vary, with the minimum depth will be 800mm with a localised maximum of around 2.5m possible near culvert crossings. The trench should only be 600mm wide.

The archaeological survey was restricted to these areas. If additional areas are to be disturbed, then further assessment would be required.

Director-General's Requirements

The Director-General's Requirements are outlined below:

The Environmental Assessment (EA) must include:

- ❒ an executive summary;
- ❒ a detailed description of the following:
  - historical operations/activities on the site;
  - existing and approved operations/facilities, including any statutory
  - approvals that apply to these operations and facilities; and
  - existing environmental management and monitoring regime.
- ❒ a detailed description of the project including the:
  - waste strategy that underpins the development of the project;
  - need for the project: having particular regard to the aims, objectives, and guidance in the NSW Waste Avoidance and Resource Recovery Strategy 2007;
  - a review of the project against Clause 123 of the State Environmental Planning Policy (Infrastructure) 2007;
  - alternatives considered, including a justification for the proposal on economic, social and environmental grounds;
  - details of any proposed building works, including engineering and/or architectural plans;
  - various components and stages of the project; and
  - the likely inter-relationship between the proposed operations and the existing operations on site including details of existing approvals, management systems and details of past environmental performance.
- ❒ a risk assessment of the potential environmental impacts of the project, identifying the key issues for further assessment;

- ❒ a detailed assessment of the key issues specified below, and any other significant issues identified in the risk assessment (see above), which includes:
    - a description of the existing environment, using sufficient baseline data;
    - an assessment of the potential impacts of all stages of the project taking into consideration any relevant guidelines, policies, plans and statutory provisions;
    - a description of the measures that would be implemented to avoid, minimise, mitigate, rehabilitate/remediate, monitor and/or offset the potential impacts of the project, including detailed contingency plans for managing any potentially significant risks to the environment.
- ❒ a conclusion justifying the project, taking into consideration: the suitability of the sites; the economic, social and environmental impacts of the project as a whole; and whether it is consistent with the objects of the Environmental Planning and Assessment Act 1979, and in particular the principles of ecologically sustainable development;
- ❒ a signed statement from the author of the environmental assessment certifying that the information contained in the report is neither false nor misleading.

Specific to the required Indigenous Heritage Assessment, the DGRs state that the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC, 2005) must be used.

Aims

This Aboriginal Cultural Heritage Assessment aims to:

- ❒ Identify the cultural and archaeological values that may be present within the impact footprint of the proposed pipeline;
- ❒ Determine the effect the proposal will have on the identified values; and,
- ❒ Propose measures to manage and mitigate potential impacts to the Aboriginal cultural heritage and heritage values identified, if any.

Methods

The broad methodology for this project is outlined below:

- Undertake a background review of relevant literature and conduct searches of relevant heritage databases, including the Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS);
- Continue consultation with Registered Aboriginal Parties identified by Insite Heritage (2011);
- Undertake a preliminary archaeological survey of the assessment area;
- Record any cultural and/or archaeological sites that occur in the assessment area;
- Assess the cultural heritage significance of the individual sites and the assessment area in accordance with the *Burra Charter* (Australia ICOMOS 1999) and OEH *Draft Guidelines for the Aboriginal Cultural Heritage Impact Assessment and Community Consultation 2005* (DECC 2005) and *Standards and Guidelines Kit* (NPWS 1997) where possible or identify the need for further study;
- Determine the potential impacts from the proposal to the cultural heritage value of individual sites, the cultural landscape as a whole, and contemporary cultural values;
- Provide recommendations to avoid impacts and conserve values, or to mitigate impacts where avoidance is not possible.

The site inspection involved walking over the subject area on foot, and inspecting areas of exposure for the presence of Aboriginal objects on the ground surface.

Detailed maps were used to record the area that was walked over, and the location of features and finds. A digital camera was used to photograph finds and features, and the general landscape setting.

Consultation with the Aboriginal Community

The consultation process for the Awaba Waste Management Facility project was initiated by Insite Heritage (2011) in accordance with the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC, 2005), as stated in the DGRs.

This process identified four Registered Aboriginal Parties:

- Awabakal Local Aboriginal Land Council on behalf of Koompahtoo LALC
- Awabakal Descendants Traditional Owners Aboriginal Corporation
- Awabakal Traditional Owners Aboriginal Corporation
- Cacatua Culture Consultants

Registered Aboriginal Parties were contacted and provided with project information and invited to provide comment and input into the project methodology and timeframes and to participate in a site inspection of the proposed works. Initial statements of cultural significance and suggestions regarding the project methodology were provided by the Registered Aboriginal Parties.

The information provided by the Registered Aboriginal Parties and survey determined that Aboriginal archaeological and cultural values exist within the proposed impact area. A draft Aboriginal cultural heritage and archaeological report, including a proposed methodology, was prepared and presented to the Registered Aboriginal Parties for comment.

Responses were received from Awabakal Descendants Traditional Owners Aboriginal Corporation, Awabakal Traditional Owners Aboriginal Corporation and Cacatua Culture Consutlants (see Appendix 1).

Landscape Context

The assessment area is situated within the Awaba Hills physiographic region of the Lake Macquarie area (Murphy, 1993).

Geology, Soils and Topography

The Awaba Hills physiographic region consist of low rolling hills on the Newcastle Coal Measures and Munmorah Conglomerate Formation (Murphy 1993: 2). The subgroups of this formation comprise shale, sandstone, chert, tuff, conglomerate and coal. Quaternary alluvium occurs along major watercourses and comprise unconsolidated sands, silts, clays and gravels.

Three soil landscapes occur within the assessment area. The Awaba Soil Landscape is mapped in Lot 372, within the Awaba Waste Management Facility. The Awaba soil landscape is an erosional landscape, consists of rolling low hills, closely spaced drainage lines with gradients of 10-25% and local relief of 20-80m. Rock outcropping is generally absent. Dominant soil types comprise of shallow Lithosols on steep slopes, shallow to moderately deep Soloths and Yellow Podzolic Soils on gentler slopes with Soloths in drainage lines (Murphy 1993).

The Awaba soil landscape merges into the Doyalson Soil Landscape at Wilton Road. The Doyalson Soil Landscape forms the majority of the assessment area. Like the Awaba soil landscape, Doyalson is an erosional landscape. It consists og undulating rises with local relief to 30m and slope gradients of <10%. Broad crests, ridges and long gently inclined slopes are common landform elements. Rock outcrops are usually absent. Dominant soil types comprise of moderately deep Yellow Earths, Yellow Podzolic Soils and Soloths occur on sandstones and comnglomerates; moderately deep Yellow Podzolic and Soloths occur on fine grained siltstone and claystones and moderately deep tot deep Yellow leached Earths, grey Eatrhs, Soloths and Geleyed Podzolic Soils occur along drainage lines (Murphy 1993: 29).

The Wyong soil landscape occurs across small portions of the assessment area in association with creek lines. The Wyong soil landscape is an alluvial landscape and consists of broad, poorly drained deltaic floodplains and alluvial flats of Quaternary sediments with slope gradients of <3% and local relief of <10m. Levees, meander scrolls, oxbows and swamps are common. Low lying, slightly elevated terraces are occasionally present (Murphy 1993: 81). Dominant soils comprise deep yellow podzolic Soils, Brown Podzolic Soils, Soloths with some Humus Podzols around lake edges (Murphy 1993: 81).

All three of these soil landscapes offer reasonable to good conditions for the preservation of Aboriginal Objects.

Ecology and cultural heritage

Existing vegetation mapping of the region (NPWS 2000, cited in Niche 2011) shows six vegetation communities occurring within or abutting the study area:

- Swamp Oak-Rushland Forest (40)
- Swamp Oak–Sedge Forest (41)
- Red Mahogany-Paperbark Thicket (114)
- Foreshore Redgum-Rough-barked Apple Forest (38)
- Narrabeen Alluvial Sedge Woodland (42)
- Coastal Plains Smooth-barked Apple Woodland (30)
- Coastal Plains Scribbly Gum Woodland (31)
- Freemans Peppermint-Apple-Bloodwood Forest (30f)
- Sugarloaf Lowland Bloodwood-Apple-Scribbly Gum Forest (30j)
- Exotic vegetation.

Many species within these vegetation communities are known to have been used by past Aboriginal people. Some old growth trees may occur within close proximity to the impact area. Where remnant native vegetation occurs, it is possible that the vegetation may have significance to contemporary Aboriginal people as an example or link between the landscape of today and that inhabited by their ancestors.

Lake Macquarie and associated watercourses such as Stockyard Creek are known to have provided a varied and rich range of resources; including shellfish, fish, bird, mammal, reptile and amphibians. It is anticipated that middens may be present within the assessment area and may provide evidence of exploitation of faunal resources.

Disturbance and Modification

In general, the local area has been subject to:

- Historical logging
- Light rural uses such as grazing
- Light rural residential use
- Industrial use including the industrial estate south of Dorrington Road and mining at the Awaba State Colliery

- ❒ Sport and recreational use including the Toronto Golf Course and the Newcastle Lake Macquarie Clay Target Club
- ❒ Construction of infrastructure such as roads, electricity easements and water drainage. Some landscaping has occurred in associations with these modifications.

Specific to the assessment area, a range of disturbances and past modifications have occurred along the length of the impact footprint.

The area proposed for the sewerage pump station within the landfill site on Lot 372., between the access road and the sediment basin to the north of the proposed pipeline, appears to have been cleared and subject to landscaping. Though the area is in close proximity to a creek line and would typically be associated with the potential for Aboriginal Objects to be present, the level of disturbance is likely to have reduced this potential.

The remainder of the impact footprint within Lot 372 is characterized by a tarmac road. The road has been subject to disturbances such as grading and earthworks.

Along Wilton Road, a maximum impact area of 3m from the edge of the tarmac is proposed. Disturbance along the impact footprint varies. Clearing from road and electricity easement construction is evident. Grading and landscaping works are also visible along sections of the road.

Along Wangi Road, the impact area is heavily disturbed by previous road construction & maintenance. It is unlikely that Aboriginal archaeological deposits exist in this area.

The Impact footprint along Dorrington Road is also characterised by disturbance from the road and the construction of a culvert where the road crosses a creek line. Spoil heaps are present from earthworks associated with the road.

The impact footprint along the access track leading to Rathmines Sewerage Pump Station was also characterised by disturbance from road construction and maintenance. Grading is evident.

Summary of Past Disturbance and Modification

A summary of relevant past ground disturbance works are provided below:

- ❒ Native vegetation has been cleared along large portions of the study area
- ❒ Roads
- ❒ Buried infrastructure: sewers, pipes and cables

The degree of disturbance and modification within the proposed impact footprint, as described above, indicates ground surface disturbance. The method for the construction of roads within the impact footprint is unknown but appears to have involved grading and the movement of sediments. The presence of spoil heaps suggests that not all sediment was removed during the process. It is estimated that the depth of disturbance ranges from 0.5m to 1m. It is possible that archaeological deposits still exist within the impact footprint, as topsoils in the local area may be moderately deep, however these deposits are likely to be highly disturbed.

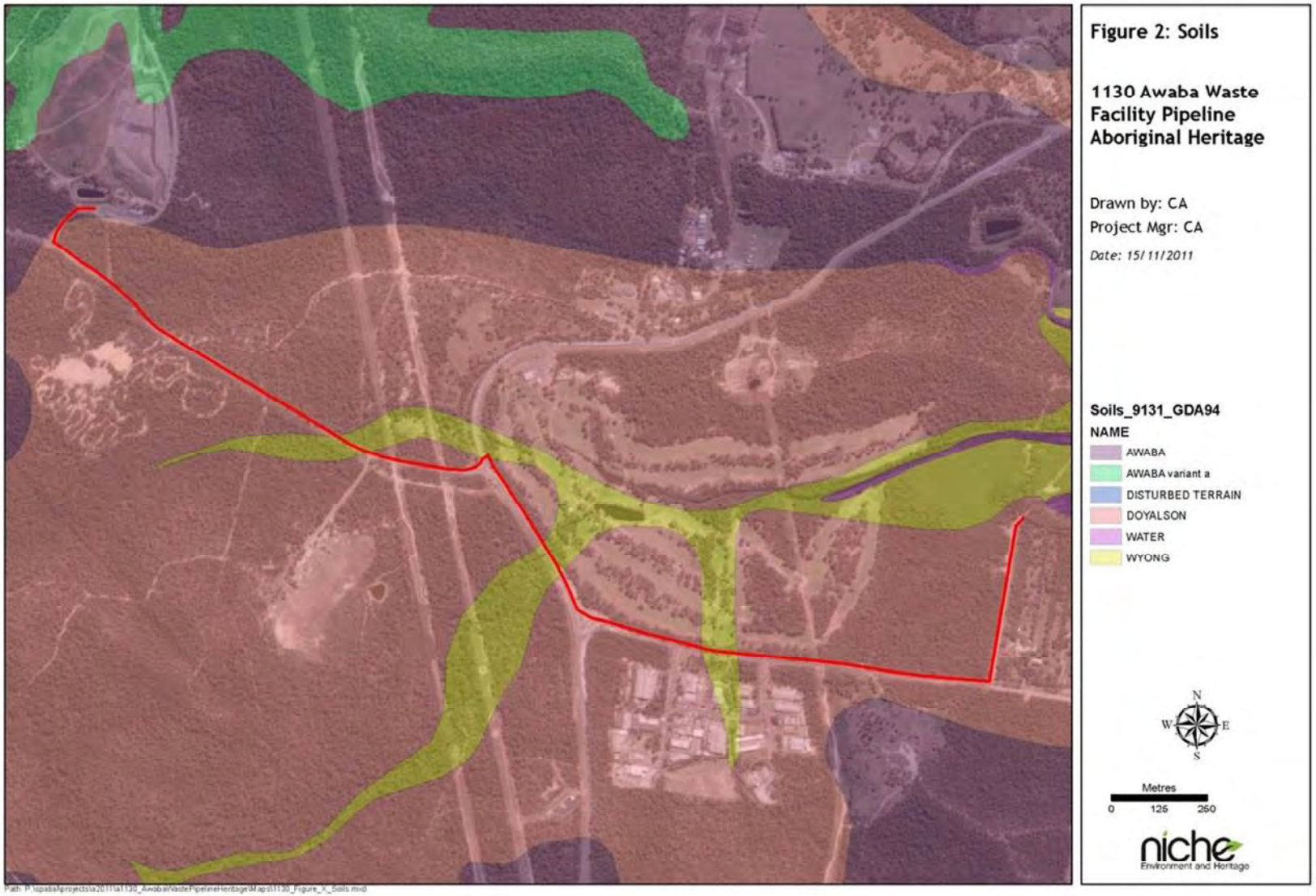


Figure 2: Soil Landscapes
Awaba Waste Management Facility Proposed Pipeline

Aboriginal History

A summary of local Aboriginal history is provided below. As a more detailed description is provided in the Insite Heritage (2011) report for this same project, it has not been repeated here.

The earliest archaeological evidence of Aboriginal occupation in NSW dates to the Pleistocene. Most of the earliest dates (c. 35,000 years ago) in the state were recovered within the Murray Darling Basin and Willandra Lakes system (Mulvaney & Kamminga 1999). A hearth at Glennies Creek in Singleton has been dated to 20,200 BP (Koettig 1986). Deposits from sand dunes at Moffats Swamp were dated to 17,000 BP.

The majority of evidence of Aboriginal occupation in NSW dates to the Holocene. Contested dates of 7,850 BP were recovered from a midden at Swansea on Lake Macquarie (Dallas et al 1993). During the Palais Royale excavation in Newcastle, Aboriginal objects were dated between 6,716 and 6,502 BP within a sand body (AHMS 2011).

The project area falls within traditional lands of the Awabakal. The Awabakal are documented as having occupied the area from Newcastle, the Hunter River and Maitland in the north to the south including Lake Macquarie and the Sugarloaf and Watagan Ranges in the west. Much of the documented history of the Awabakal is derived from L.E Threlkeld's missionary work on the eastern side of Lake Macquarie near Belmont in the early 1800 and subsequently the western side of Lake Macquarie in 1830. Observations made by Threlkeld provide detailed information regarding language, territories, resource use, kinship and mythology (In Site Heritage 2011).

Food resources referred to by Threkeld include fern root, marsupials such as kangaroos, ducks, geese, swans, pigeons, craw-fish, fish, oyster and grubs. The use of tools such as canoes, heat treated hardwood, quartz and flaked glass were also noted.

Register Searches

An Extensive Search of the OEH AHIMS database was conducted by Clare Anderson of Niche Environment and Heritage on 3 November 2011 (Search ID#55286 Datum: GDA, Easting: 360851 - 370851, Northing: 6339037 - 6349037). The search identified 79 Aboriginal sites (Table 1, Figure 3) currently recorded on the AHIMS register.

No previously identified sites occur within the impact footprint, however two midden sites (45-7-0246, 45-7-0247) occur 40m west of the proposed pipeline, off the access road to Rathmines Swamp.

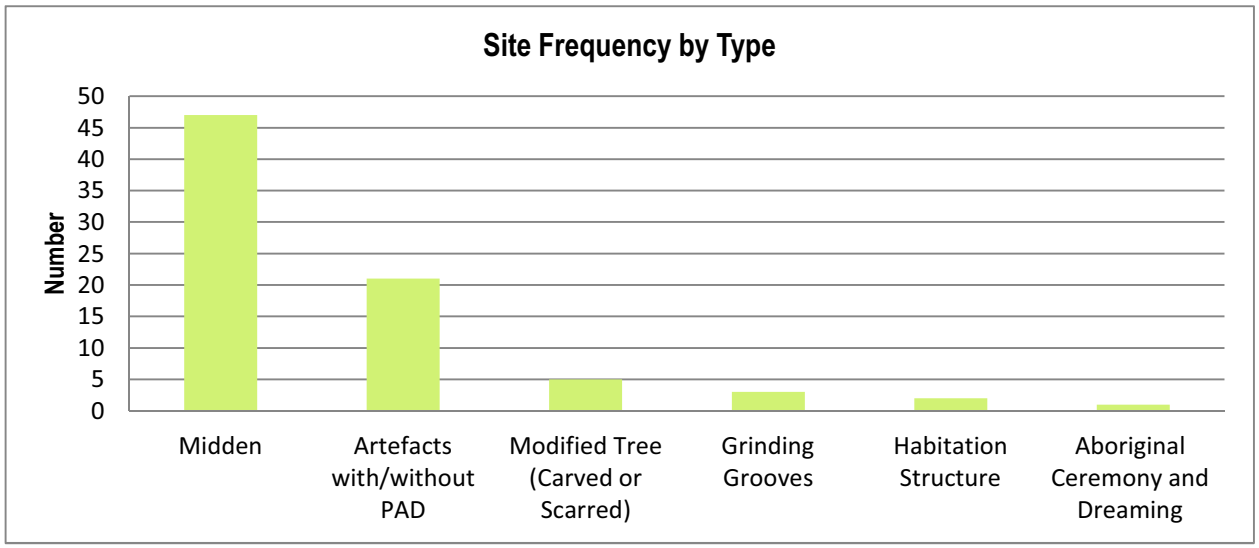
Midden sites are the most frequently recorded site type within the search, representing 59.5% (*n*=47) of sites. Artefacts with or without associated PAD are also prominent within the area, representing 26.6% (*n*= 21) of sites. Other site types include modified trees, habitation structures, grinding grooves and dreaming sites (Table 1).

Table 1: Summary of AHIMS Results

Site Features	Count	Percentage of Total
Aboriginal Ceremony and Dreaming	1	1.3%
Artefacts with/without PAD	21	26.6%
Grinding Groove	1	1.3%
Midden	47	59.5%
Grinding Groove with waterhole	1	1.3%
Grinding Groove without waterhole	1	1.3%
Habitation Structure	2	2.5%
Modified Tree (Carved or Scarred)	5	6.3%
Grand Total	**79**	**100.0%**

The frequencies of site types within the search area are consistent with the regional trends identified through previous studies (Insite Heritage 2011). The significant proportion of middens within the search area reflects the landscape significance of Lake Macquarie in Aboriginal prehistory. Open artefact sites are also frequently observed within the area, demonstrating the range of landscape types used by Aboriginal people.

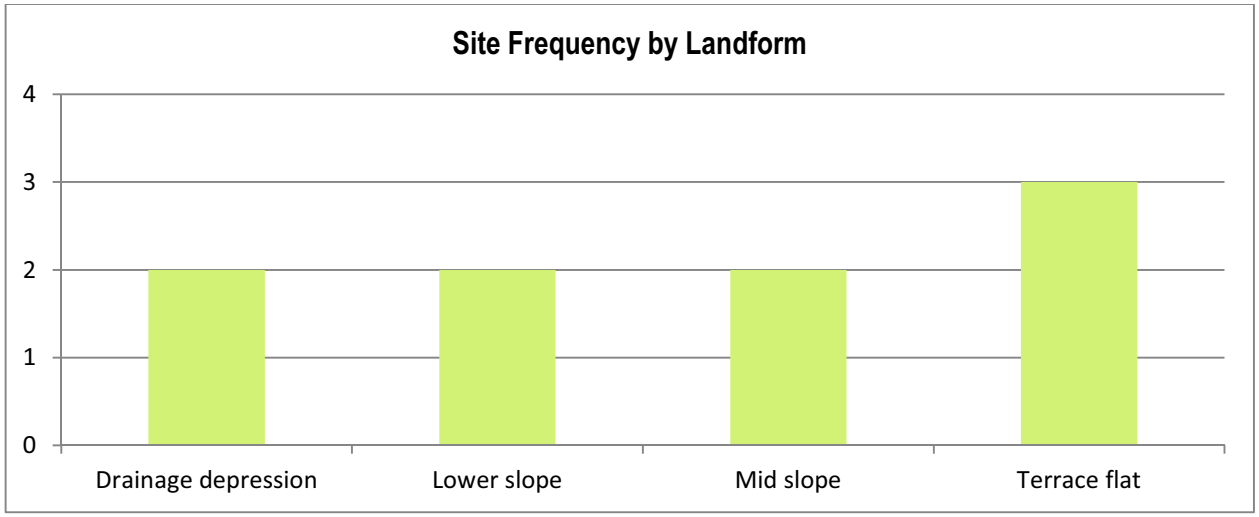
The significance of each site should be assessed on an individual basis.



Graph 1: Archaeological site frequencies by site type within the search area.

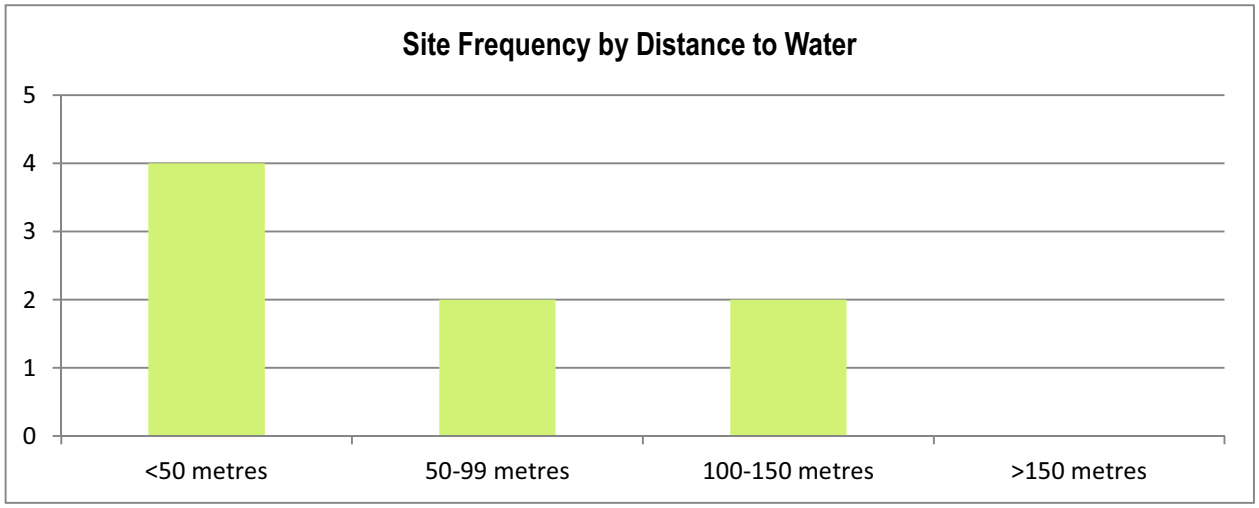
The frequencies of site types within the search area are consistent with the regional trends identified through previous studies (Insite Heritage 2011). The significant proportion of middens within the search area reflects the landscape significance of Lake Macquarie in Aboriginal prehistory. Open artefact sites are also common sites within the area, demonstrating the range of landscape types used by Aboriginal people.

Information on landform type was available for 100% (*n*= 9) of sites located within the AHIMS search area. Terrace flats (n= 3, 25%) were found to contain the greatest number of Aboriginal archaeological sites (Graph 2). Lower and midslopes, as well as drainage depressions were also found to contain sites.



Graph 2: Archaeological site frequencies by landform within the search area.

Sites were located at variable distances from permanent water sources throughout the search area, with a correlating trend of decreasing number and density associated with distance away from water (Graph 3).



Graph 3: Archaeological site frequencies by distance to water within the search area.

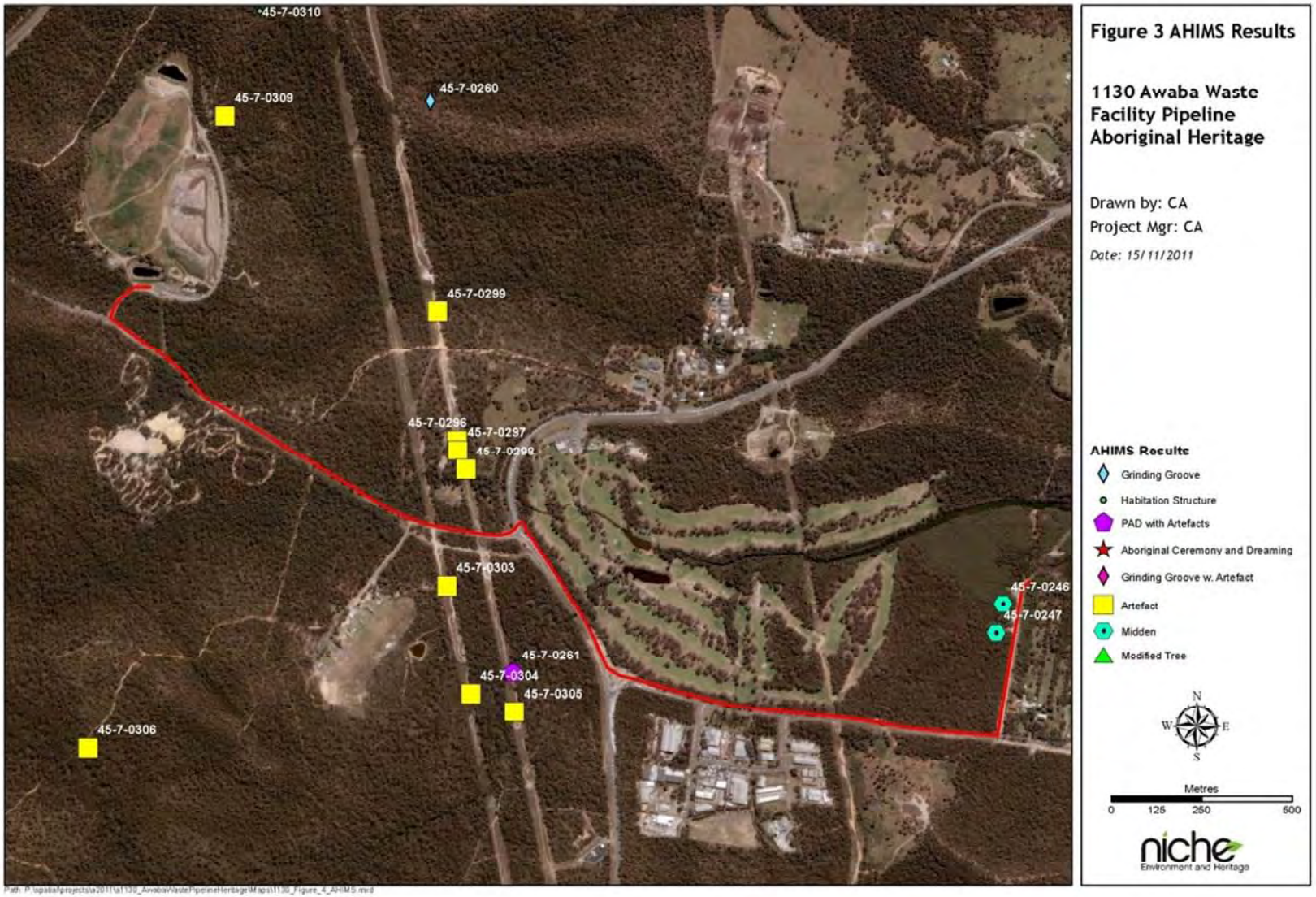


Figure 3: AHIMS Results

Previous Archaeological Work

The last three decades have seen increasing levels of archaeological investigation in the region surrounding the study area. Much of this work has been conducted as a direct response to numerous residential and infrastructure developments. The previous investigations with relevance to the current assessment area are reviewed below.

Overview of previous investigations

Koettig (1980) surveyed the Eraring to Kemps Creek Transmission Line, with the result that two isolated artefacts were located. The first was found south west of Mount Nellinda, while the second was located 1km northeast of Dora Creek. Mary Dallas (1990) surveyed approximately 116 ha between Wangi Wangi and Myuna Bay, locating an open midden within the foreshore reserve. Dallas (1992) undertook a survey along the Wangi Peninsula, identifying six shell middens. Dallas and Navin (1992) surveyed Fishing Point Peninsula, locating two Aboriginal shell middens.Dallas, Navin and McConchie (1993) conducted a survey of Morisset Peninsula during which twelve Aboriginal shell middens were found. Nelson and Ruig (1993) surveyed the site of the Henry Kendall Retirement Village at Bonnells Bay. The survey located an isolated artefact and an Aboriginal shell midden (on the foreshore of the lake).

Bonhomme Craib & Associates (1993) undertook a study of Central Coast shell middens for the National Parks and Wildlife Service of New South Wales in order to "*…better identify the archaeological record in this area, assess its significance, identify potential impacts to the remaining middens and establish appropriate management strategies for these resources*" (Bonhome et al 1993). The results of the study indicate that Aboriginal people used the coast extensively over much of the year. Aboriginal site types would have included a main camp, smaller field camps, locations were food was gathered, areas where ceremonies were held and places where tools are stored. An analysis of the evidence gathered suggests that most of the middens on the lakes and bays of the Central Coast area were probably locations where shellfish was gathered, prepared and eaten as there is little evidence to suggest that other activities were taking place. The report does however state that some of these midden sites (especially those located on headlands next to open beaches) may have in fact been main camps as these sites are larger than lake and bay sites and they contain a lot of shell. In addition they have stone tools and fireplaces (Insite Heritage 2011).

HLA Envirosciences (1995) augered the midden site Coal Point 1 in order to determine the nature and extent of the site, which was found not to be as extensive as previously thought when recorded by Dallas in 1995.

Navin Officer (1996) carried out test excavations at Mannering Bay, Lake Macquarie, establishing that the maximum dimensions of the site were 180m by 100m. The site yielded 137 artefacts. Ninety-five of the artefacts occurred on the surface and an additional 42 were found in eight test pits.

HLA Envirosciences (2007) surveyed a water pipeline route from Fennell Bay to Toronto to the north of the study area. Three locations were identified as sensitive, two areas of archaeological potential and one area of midden.

AHMS (2009) conducted subsurface testing at AHIMS Site 45-7-0261. The PAD area was located on a terrace of Stockyard Creek in the vicinity of Wangi Wangi and Wilton Roads, Rathmines. Radiocarbon dating returned an indicative date of 433 ± 55 C14 year B.P for the archaeological assemblage. A total of 16 1m^2 test probes were excavated over a low slope/ benched terrace on the northern side of Stockyard Creek covering an area of 80 x 30m. The excavation recovered 41 stone artefacts. The assemblage was also considered to be highly disturbed as artefacts occurred throughout the soil profile.

Insite Heritage Pty Ltd (2010) undertook staged salvage excavations for the Trinity Point Housing development, at Morisset Park, Lake Macquarie. To date, the excavations have salvaged subsurface sites including open camp sites, with peak artefact densities of 15.3 per m^2, including a large knapping floor.

AHMS Pty Ltd (2011) undertook subsurface archaeological investigations of a buried sand body adjacent to Hunter Street at the former Palais Hotel site in Newcastle located approximately 35km north east of the study area. A total of 48m^2 of open area excavations were undertaken with excavations depths of 1-2m below ground level. The excavation recovered 5,534 Aboriginal objects representing three occupation periods dating from 6,716-6,502 years BP. The site is of very high cultural and scientific significance.

Predictive Model

Based on an analysis of landforms, geomorphology, soil types and previous studies, the following predictive model has been formulated specific to the Study Area.

- Open lithic sites (artefact scatters and isolated artefacts) are the most likely site type to occur, being most common within water-related landforms and gentle slopes <100m from natural watercourses. Site sizes and densities may vary, increasing proportionally to the distance from natural watercourses. Raw materials will most likely comprise chert, silcrete and quartz.
- Scarred trees exhibit scars caused by the removal of bark or wood. The large areas on intact native woodland combined with the known location of several culturally modified trees within the Study Area suggest that additional scar trees are likely to occur.
- Due to the proximity of the Study Area to Lake Macquarie, shell middens may be present within the Study Area. Creek lines and unnamed tributaries of Stockyard Creek and Killaben Creek which flow into the western shore of Lake Macquarie, are possible locations for shell deposit.
- The geological characteristics of the Study Area are not consistent with those required for rock shelters. Limited potential for bedrock exposure consequently reduces the potential for sites such as axe grinding grooves or quarries.
- Aboriginal burials are unlikely to occur within the Study Area due to the erosional Awaba Soil Landscape documented to be present within the Study Area. Generally, burials are more commonly associated with deep, soft sediments, such as aeolian or alluvial deposits.
- No post-contact sites with shared significance by Aboriginal and European people are known to be located within the Study Area.
- Aboriginal places are places of cultural significance to Aboriginal people. No Aboriginal places have been declared within the Study Area (November 2011) or listed on AHIMS

(http://www.environment.nsw.gov.au/conservation/AboriginalPlacesNSW.htm).

Summary

Artefact scatters, isolated artefacts and scarred trees are the most likely Aboriginal archaeological sites to occur within the Study Area. Given the proximity of the site to Lake Macquarie and the two small creeks, midden sites may also be identified. Water-related landforms and gentle slopes <100m from natural watercourses are the landforms most likely to contain Aboriginal archaeological sites.

Archaeological Survey - Results

A field assessment was conducted on 4 November, 2011, in fine conditions. Participants in the survey were:

- Kerrie Brauer, Awabakal Traditional Owners Aboriginal Corporation
- Shane Frost, Awabakal Descendents Traditional Owners Aboriginal Corporation
- Adam Sampson, Cacatua Consultants;
- Amanda Atkinson, Niche Environment and Heritage.

Two previously unregistered Aboriginal sites were identified; an isolated silcrete stone artefact and a midden. Several areas of archaeological sensitivity were identified due to low visibility and their proximity to creek lines. Observations during fieldwork confirmed the levels of disturbance described within the Landscape Context.

AWMF Pipeline Isolated Find 1

Easting: 366291

Northing: 6343775

Visibility: High

Description: A medial tertiary broken silcrete flake, approximately 2cm in length, was located on a spoil heap on Dorrington Road.

Plate 1: Silcrete broken flake

Plate 2: General location of silcrete broken flake

AWMF Pipeline Midden 1

Easting: 364901

Northing: 6344577

Visibility: High

Description: A midden, consisting of approximately 50 fragments of shell, was identified on an exposed track immediately north of Wilton Road. The shells were primarily fresh water mussels and cockle. The visible area was recorded as 4.5m x 1m. The southern-most extent of the site was in the survey area and it extended north out of the survey area. Shell was eroding from the exposure suggesting subsurface deposit. There is a high probability that this site extends beyond these measurements and into areas of 0% surface visibility.

Plate 3: Midden site

Plate 4: General location of midden site

Other cultural heritage values

At the end of the survey, the Registered Aboriginal Parties who participated in the survey noted any unregistered sites or culturally sensitive areas they were aware of in close proximity to the assessment area. These areas were mapped and are presented in Figure 4. Registered Aboriginal Parties also noted that artefact scatters and middens were likely to occur anywhere where a creek line was present.

Discussion

The results of the survey are consistent with those anticipated by the predictive model outlined within this report. The low visibility of much of the survey area is likely to have resulted in an under-representation of sites within the Study Area. The location of both AWMF Isolated Find 1 (AHIMS # to be confirmed) and AWMF Pipeline Midden 1 (AHIMS # to be confirmed) demonstrate that the area has archaeological potential.

Further subsurface investigations should be undertaken if AWMF Pipeline Midden 1 is to be impacted by the proposed works. Subsurface testing should aim to determine the nature, extent and significance of the site. A proposed methodology for testing is outlined in the following section, Proposed Subsurface Testing Methodology (page 40).

As the archaeological potential/sensitivity of this area has been established by the presence of these two sites, additional testing should be undertaken along creek lines. This would minimise the effect of the limited surface visibility of the area. Three areas of archaeological sensitivity with low visibility have been identified and mapped.

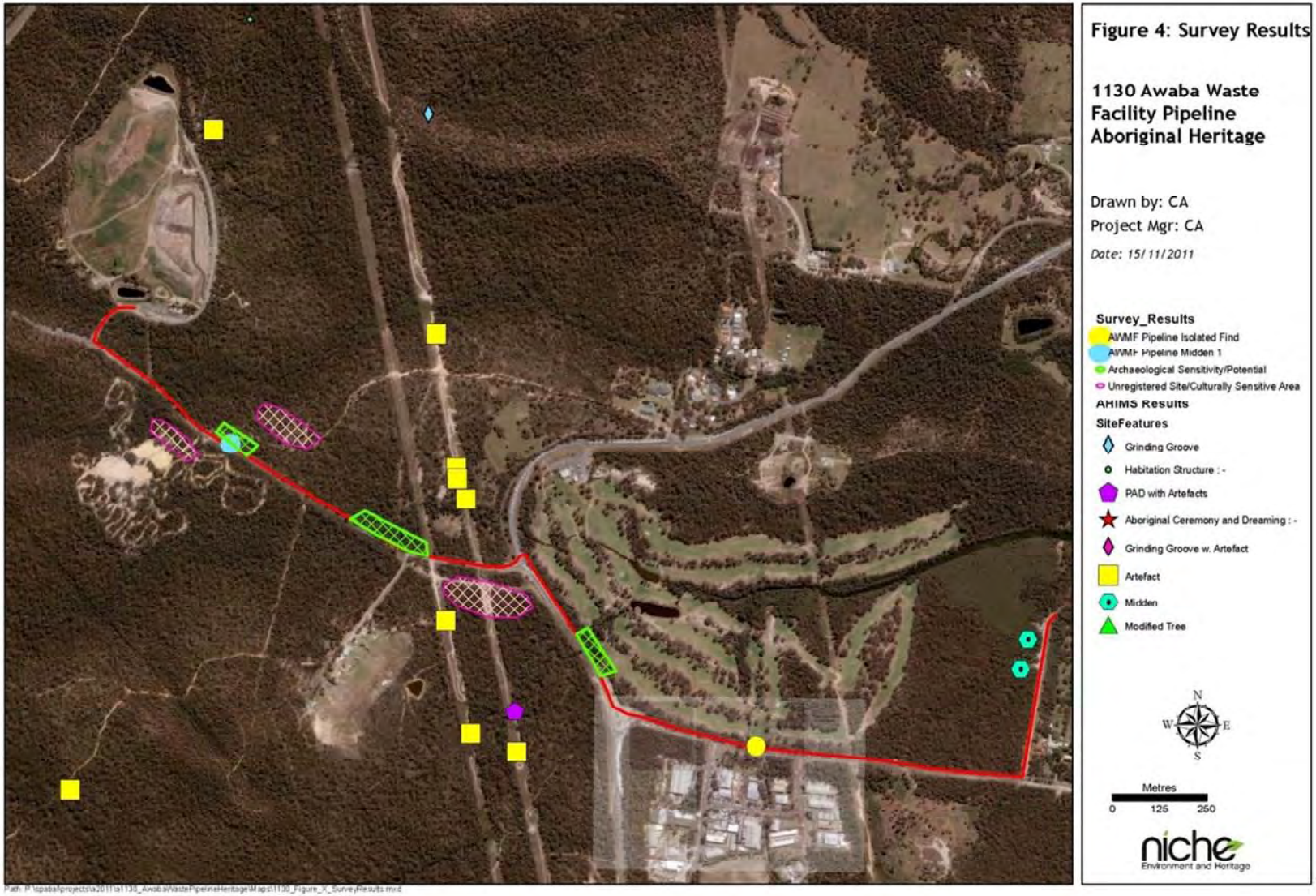


Figure 4: Survey Results

Aboriginal Cultural Heritage Significance

The Burra Charter (Australia ICOMOS 1999) defines the basic principles and procedures to be observed in the conservation of important places. It provides the primary framework within which decisions about the management of heritage sites in Australia should be made. The Burra Charter defines cultural significance as being derived from the following values:

Aesthetic value

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and material of the fabric; the smells and sounds associated with the place and its use.

Historic value

Historic value encompasses the history of aesthetics, science and society, and therefore to a large extent underlies all of the terms set out in this section.

A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment.

Scientific value

The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality or representativeness, and on the degree to which the place may contribute further substantial information.

Social value

Social value embraces the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiment to a majority or minority group.

Other approaches

The categorisation into aesthetic, historic, scientific and social values is one approach to understanding the concept of cultural significance. However, more precise categories may be developed as understanding of a particular place increases.

The NSW OEH guidelines for the significance assessment of Aboriginal archaeological sites are contained within the *Aboriginal Cultural Heritage Standards and Guidelines Kit (NPWS 1997)*. The Kit identifies with two main streams in the overall significance assessment process: the assessment of cultural/social significance to Aboriginal people and the assessment of scientific significance to archaeologists.

This approach encapsulates those aspects of the Burra Charter that are relevant to Aboriginal archaeological sites. The guidelines specify the following criteria for archaeological significance, as paraphrased below:

Research Potential

It is the potential to elucidate past behaviour which gives significance under this criterion rather than the potential to yield collections of artefacts. Matters considered under this criterion include – the intactness of a site, the potential for the site to build a chronology and the connectedness of the site to other sites in the archaeological landscape.

Representativeness

As a criterion, representativeness is only meaningful in relation to a conservation objective. Presumably all sites are representative of those in their class or they would not be in that class. What is at issue is the extent to which a class of sites is conserved and whether the particular site being assessed should be conserved in order to ensure that we retain a representative sample of the archaeological record as a whole. The conservation objective which underwrites the 'representativeness' criteria is that such a sample should be conserved.

Rarity

This criteria cannot easily be separated from that of representativeness. If a site is 'distinctive' then it will, by definition, be part of the variability which a representative sample would represent. The criteria might best be approached as one which exists within the criteria of representativeness, giving a particular weighting to certain classes of site. The main requirement for being able to assess rarity will be to know what is common and what is unusual in the site record but also the way that archaeology confers prestige on certain sites because of their ability to provide certain information.

The criterion of rarity may be assessed at a range of levels: local, regional, state, national, global.

Educational Potential

Heritage sites and areas should be conserved and managed in relation to their value to people. It is assumed that archaeologists have the ability to speak of the value of sites to members of their own profession. Where archaeologists or others carrying out assessments are speaking for the educational value of sites to the public the onus is on them to go to the public for an assessment of this value, or to reputable studies which have canvassed public demand for education. The danger, otherwise, is that archaeologists will be projecting their values onto a public which is itself given no voice on the matter.

Aesthetics

Archaeologists are not expected to include an assessment of aesthetic significance along with their assessment of scientific significance. In relation to heritage places, aesthetic significance is generally taken to mean the visual beauty of the place. Aesthetic value is not inherent in a place but arises in the sensory response people have to it.

Although the guidelines provide no expectation for archaeologists to consider *aesthetic values* it is often the case that a site's or a landscape's aesthetic is a significant contributory value to significance. Examples of archaeological sites that may have high aesthetic values would be rock art sites, or sites located in environments that evoke strong sensory responses – a local example would be the visually striking Illawarra Escarpment. For this reason we consider it appropriate to include aesthetic values as part of the significance assessment below.

The OEH Standards and Guidelines Kit (NPWS 1997) also provides advice on the assessment of Aboriginal cultural significance, based on the critical starting point that Aboriginal people are the primary determinants of the significance of their cultural heritage. OEH's Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC 2005b) provides advice on the heads of consideration for project assessments under Part 3A of the EP&A Act The Draft Guidelines focus on highlighting the multilayered and dynamic nature of Aboriginal cultural heritage and require that such considerations be included in heritage assessments. The Draft Guidelines also provide advice with regard to cultural landscapes:

> *…the significance of individual features is derived from their inter-relatedness within the cultural landscape. This means that features cannot be assessed in isolation, and that assessments need to consider the feature and its associations in a holistic manner. This may require a range of assessment methods with the close involvement and participation*

of Aboriginal people. Assessment will include lands, waterways, landscape features and native plants and animals that are culturally significant to Aboriginal people (DEC 2005b: 2).

Assessment of Archaeological Significance – Aboriginal Archaeological Sites

AWMF Pipeline Isolated Find

AWMF Pipeline Isolated Find is a single silcrete broken flake located within a spoil heap created from road construction. The presence of the Aboriginal Object indicates that other Aboriginal Objects may be present at low densities within the impact footprint but will be highly disturbed from road construction works. The artefact has limited ability to provide a chronology or help connect activities to other sites in the archaeological landscape. Silcrete artefacts are one of the most common Aboriginal Objects in the region and there are multiple examples of this class of Aboriginal Object being conserved in the region. On these grounds, AWMF Pipeline Isolated Find has been assessed to have low archaeological significance.

AWMF Pipeline Midden 1

AWMF Pipeline Midden 1 is a midden site which is visible over a 4.5m x 1m area. The southern visible extent of the site occurs within the impact footprint. The exact nature and extent of the site is unknown. The presence of shell eroding from the exposure indicates that other subsurface Aboriginal Objects may be present both within and beyond the impact footprint area and so the area surrounding the identified midden is considered Potential Archaeological Deposit. It is likely that the midden within the impact footprint has been disturbed by past road construction works, however outside this area the midden may be in reasonable condition. The site has research potential as it may provide information regarding exploitation of food resources in the area but is unlikely to provide chronological information in the impact footprint due to past disturbance from road construction. Middens are not uncommon in the region and there are several examples of this class of Aboriginal site being conserved in the region. Within the impact footprint, the site is considered to have moderate archaeological significance due to past disturbances however outside the impact footprint the site is considered to have high archaeological significance for its ability to provide potentially in-situ information regarding past resource use.

Assessment of Cultural Significance

Statements of cultural significance regarding the local area were provided by the Registered Aboriginal Parties.

Awabakal Traditional Owners Aboriginal Corporation

The Awabakal Traditional Owners Aboriginal Corporation members are descendants of the Awabakal People and accordingly have both a physical and spiritual connection and a primary association with our cultural boundary. Therefore, any artifacts and/or residual evidence of our people are held in high regard and are considered a cultural reminder that unites us with our land and sea country, our past and spirituality and provides us with a visual generational legacy.

With regard to providing cultural appropriate information, we would be pleased to share verbally any relevant cultural knowledge of the study area, but we do reserve the right and reluctance to share our cultural heritage with others in respect to aspects of the cultural significance that connects us to our country. It is believed by our people that those who shouldn't be privy to this cultural knowledge have no rights or entitlements to it.

The Awaba region is culturally significant to the Awabakal People who utilised and physically cared for the environment, and with the evidence already retrieved and documented from the region is a reasonable indication that this area was highly utilised by the Awabakal people prior to European settlement.

Awabakal Descendents Traditional Owners Aboriginal Corporation

Being the direct descendants of the Traditional Awabakal People of the Lake Macquarie/Newcastle area we take this opportunity in a few sentences to quickly formalise our position with you.

Our great great great Grandmother was one of the first Aboriginal People to be recorded in the Lake Macquarie and Newcastle area in 1828 when the Reverend L.E.Threlkeld made the first list of the Aboriginal People of the Lake Macquarie and Newcastle districts (which included the Hexham Swamp area) from his mission station at Belmont. At Warner's Bay our great great great Grandmother and her daughter, our great great Grandmother, were recorded by Jonathon Warner in 1833 and then again at Toronto in 1836 by L.E.Threlkeld at his mission there. We also have many well documented instances, as well as oral history of

our People which were recorded by the Rev. L.E. Threlkeld living in and around the Newcastle and Lake Macquarie areas. Therefore, our people still live and maintain our Cultural ties with our Traditional Country and are concerned with the overall welfare of our Cultural Heritage and desire to be involved in all the affairs that may affect that Cultural Heritage which is vital to our People in maintaining connectedness in respect of our Traditional Country.

Regarding the area referred to in the documentation received from you by our organisation proposing consultation and an Aboriginal archaeological assessment, most assuredly indicates that this project is located within the Traditional Tribal Country of our People, the Awabakal. This is why it is crucial for the correct People to be involved in this process and any information relevant to this area to be accurate and forthcoming at the outset of this project. This can only be accomplished by involving those who are the direct Descendants of the original People and that were born and raised in the Traditional Country of their Ancestors and as a result also hold that Traditional Cultural Knowledge of the proposed project area. Our Traditional Tribal area is significant to us because our people have lived around Newcastle and Lake Macquarie for many thousands of years, these resource rich areas were utilised on many occasions to hunt, fish and carry on Traditions that have now been passed down for centuries from one generation to another. Subsequently, there are many sites located within our Traditional Country which provide tangible evidence of the Cultural Heritage of our people and of which identification and information regarding the locations and significance of many of these is only held by the Awabakal People who hold this knowledge.

It must also be emphasised that this area is highly significant to our People, being close to Lake Macquarie, the source of many rich recourses of which our people have depended on for thousands of years. As a result, due to the occupation of this area by our People, many deposits now make up the Awabakal Cultural Heritage that is located within the perimeter of Lake Macquarie but also connects to the many other sites located within our Traditional Tribal Country.

As already explained, this area and every part of our Traditional Country are special to us, not just for the Physical aspect but also the Spiritual and Oral aspect which, when all combined, give us our complete Culture. Our Cultural Heritage and Traditional Tribal Country are two of the reasons why we take every opportunity to make ourselves available for consultation concerning the very important issues and decisions that need to be made in

regard to protecting what is Culturally ours, handed onto us as a legacy from our Ancestors and what also gives us the right through birth to be called Awabakal People.

ADTOAC further noted:

This area is important to our People due to its close proximity to Lake Macquarie, Stockyard Creek and Kilaben Creek and the mountainous country to the west of the study area. Therefore there needs to be consideration regarding the location of this proposal and the sites that are within this area.

Assessment of Significance – the Cultural Landscape

The local area has an abundance of landscape elements, such as remnant vegetation, undisturbed terrain, focal points, recorded Aboriginal Objects and resources that would have been suitable for exploitation by past Aboriginal people. Artefact sites and midden sites in the region provide important examples of resource use by past Aboriginal people. The impact footprint is limited to a 3.5km x 3m area which has previously been disturbed. The proposed works will impact on an Aboriginal Object and a portion of a midden and an Aboriginal Objects however these site types are well represented in the wider landscape. As highlighted by the Registered Aboriginal Parties responses to the draft assessment report, the local cultural landscape holds significance to the local Aboriginal community as do any cultural heritage items within the project area.

Impact Assessment

Sites and Areas of Archaeological Potential

The proposed works will impact on known Aboriginal objects; AWMF Pipeline Isolated Find and AWMF Pipeline Midden 1. The proposed works may also impact on areas of archaeological sensitivity along the creek lines.

The Cultural Landscape

The local area has an abundance of landscape elements, such as remnant vegetation, undisturbed terrain, focal points, recorded Aboriginal Objects and resources that would have been suitable for exploitation by past Aboriginal people. Artefact sites and midden sites in the region provide important examples of resource use by past Aboriginal people. The impact footprint is limited to a 3.5km x 3m area which has previously been disturbed. The proposed works will impact on a portion of a midden and an Aboriginal Object however these site types are well represented in the wider landscape. Overall, the proposed works will have limited impact on the wider cultural landscape of the region..

Other Cultural Values

The Registered Aboriginal Parties have identified that the proposed works will have an impact on cultural values. The following statement was provided by ADTOAC during the initial stages of the project regarding the potential for impact to archaeological and cultural values:

We understand that some areas have been modified by civil works but this does not discount the fact that there could be remnants of Cultural Heritage hidden or located beneath the said modifications. This should be considered especially in regard to the creek lines that will be impacted during the proposed project. Also we have located several locations just recently close to the road verge in which were found oyster cockle and whelk shells. These sites are considered by us to be vulnerable due to the proposal.

The above statement indicates that cultural values associated with midden sites and creek lines will be impacted by the proposed works, though these areas may have been assessed as having low archaeological significance.

Management and Mitigation Measures

There are several management and mitigation measures available to manage the Aboriginal cultural and archaeological values within the impact footprint.

Best archaeological practice, as outlined by the OEH (DECCW 2010) indicates that a test excavation sampling strategy should include:

- A framework for sampling all potential archaeological deposits (PAD) that are at risk of harm (within the subject area)
- A description of the differentiation of the PAD/ area of archaeological sensitivity to be test-excavated from the surrounding archaeological landscape (i.e. explain why the PAD is anticipated to be of higher significance than the continuous distribution of archaeological material in which it exists), and
    - test those areas of PAD that have no archaeological exposure or visibility, or
    - test the boundaries of known sites (where appropriate)
- A description of how the sampling area relates to the area that is proposed to be impacted by the proposed development.

Avoidance

- In the first instance, Lake Macquarie City Council should minimise or avoid all impact to all registered Aboriginal sites, PADs and areas of high archaeological sensitivity within the study area.
- To minimise or avoid impact to such sites, Lake Macquarie City Council should develop and adopt management and mitigation strategies to ensure that all sites, PADs and areas of archaeological sensitivity are not inadvertently impacted by future proposed developments.

Archaeological Testing

- A suitable testing methodology should be designed to test for potential subsurface archaeological deposit in areas of archaeological sensitivity along the creek lines.

- A suitable testing methodology should be designed so as to determine the nature, extent and significance of the midden site.

- Under Requirement 15c, at least 14 days before undertaking any test excavations the relevant OEH Environmental Protection and Regulation Division regional office must be notified, in writing, of the following:

    - The location of the proposed test excavation and the subject area.
    - The name and contact details of the legal entity with overall responsibility for the project.
    - The name and contact details of the person who will be carrying out the test excavations where this is different to the legal entity with overall responsibility for the project.
    - The proposed date of commencement and estimated date of completion of the test excavations.
    - The location of the temporary storage location for any Aboriginal objects uncovered during the test excavations.

A copy of the proposed methodology must also be provided to the appropriate OEH personnel.

Archaeological Salvage

If the site cannot be avoided, salvage excavations may be necessary. The results of subsurface testing will determine the extent to which the site will need to be excavated, and a more detailed plan should be developed once the subsurface testing has been undertaken.

Management and Mitigation Recommendations by Registered Aboriginal Parties

Additional management and mitigation measures have been recommended by the Registered Aboriginal Parties (ADTOAC, ATOAC) in response to reviewing the draft assessment and are summarised below:

- An Aboriginal Cultural Heritage Management Plan should be implemented in a timely manner prior to the commencement of site works. The Plan of Management should be composed by Lake Macquarie City Council in consultation with the Registered Aboriginal Parties.
- All Cultural Heritage that has been disturbed/collected/recovered from any development and excavations should be returned to as close as possible to their original location and reburied within an appropriate area that has been designated for

conservation and protection of these items where they will not be impacted on by future development. This process should be carried out by the Registered Aborigibnal Parties and recorded by an archaeologist and the co-ordinates submitted to the OEH AHIMS Database.

- A monitoring and observation program should be impletned along the entire pipeline route so that Registered Aboriginal Parties are allowed to collect any artefact that may be disturbed during the excavation stage of the pipeline.
- A methodology should be produced in consultation with the Registered Aboriginal Parties outlining the procedure for the test excavations and subsequent actions if artefacts are recovered. This methodology should be put in place prior to any works commencing or any AHIP being sought.
- There should also be compulsory Cultural Awareness Training included in the induction process for all contractors and workers on site, particularly those undertaking any excavations within the footprint of the proposed development area. Initially, this should be developed and delivered by the Awabakal People and an archaeological consultant to allow all workers and contractors some form of basic knowledge and recognition of our People and Cultural Heritage and also equip them in regard to the process of detection and identification of artefacts if uncovered during any of the proposed excavation/construction phase of the site works.

The full recommendations made by the Registered Aboriginal Parties can be viewed in Appendix 1.

Proposed Subsurface Testing Methodology

The details of the required Test Excavations Sampling Strategy are outlined in the Code (DECCW 2010) in some detail. The aim of the sampling strategy would be to build on the data already collected about the midden site and areas of archaeological potential through surface surveys.

A specific methodology should be used to test the midden site, involving the determination of the nature, extent and significance of any subsurface deposits. One such methodology would be to undertake a series of auger holes, which would allow the testing of nature and extent while limiting the impact to the site. Based on these results, a number of 50cm by 50cm test pits could be excavated within the site so as to determine the significance through careful

stratigraphic excavation of the deposit. The excavated materials would then be analysed after the excavation was completed. Specific analysis details are outlined below:

- Lithics – A number of attributes should be recorded for all lithic artefacts, including at the very least, descriptions of length, width, thickness, platforms, terminations and raw material type.
- Shell – Shell deposits should be analysed for the following attributes:
    - Species – the determination of species allows for the determination of resource area utilisation, Minimum Number of Individuals (MNI) and Number of Identified Specimens (NISP).
    - MNI – This count allows the determination of the minimum number of individual molluscs within the assemblage. When combined with species data, MNI allows the determination of resource usage.
    - NISP – NISP is another mechanism used to establish resource use and to identify changes through time.
- Faunal remains – species determination as well as MNI and NISP calculations can be used in a similar fashion to that of the shell assemblage.

A similar methodology could be employed to test areas of archaeological potential. A transect of auger holes could be dug in order to test the sensitive landform. Again, based on these results, a number of 50cm by 50cm test pits could be excavated at locations where archaeological deposit was found to occur.

Unanticipated Human Remains

Should any human remains be found, the following management plan must be followed

- All activity within 100m of the site should cease immediately. The remains must not be further disturbed and must be protected.
- The Coroners Office and the NSW Police must be notified immediately. Following this, a qualified archaeologist should be contacted to consult with the police as to whether the remains are within an archaeological context.
- If the remains are found to be non-Aboriginal and greater than 100 years old, they will be under the jurisdiction of the NSW Heritage Branch, under the Heritage Act, 1977.

- ❒ Once the context of the remains has been establishes, a suitable management method will be developed by the appropriate body (be that OEH, NSW Heritage Branch or the Police).

Recommendations

Based on the above Aboriginal Cultural Heritage Assessment the following recommendations are made:

1. Additional subsurface testing be undertaken if impacts are to be made to any registered Aboriginal site or area of archaeological sensitivity.
2. Additional subsurface testing be undertaken in areas of archaeological sensitivity currently influenced by low visibility.
3. Detailed analysis should be made of any excavated materials so as to aid in the determination of the nature and significance of the site.
4. The methodology for any additional testing be included in the proposed Plan of Management for the Part 3A project.
    a. Any methodology should give consideration to the management recommendations made by the Registered Aboriginal Parties (see Appendix 1)
5. The registered Aboriginal stakeholders (Awabakal Local Aboriginal Land Council on behalf of Koompahtoo LALC, Awabakal Descendants Traditional Owners Aboriginal Corporation, Awabakal Traditional Owners Aboriginal Corporation and Cacatua Culture Consultants) continue to be consulted on all further archaeological work to be undertaken as part of this project.

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Nelson L & Ruig J 1993 . *Report of an archaeological survey for a proposed retirement village Bonnells Bay, Lake Macquarie, NSW.* Report to Burgess and Associates Architects

Tindale, NB 1974, 'Tribal boundaries in Aboriginal Australia', Australian National University Press, Canberra.

Appendix 1 – Consultation Documentation

Provision Project Information

Clare Anderson

From: Clare Anderson
Sent: Thursday, 20 October 2011 4:59 PM
To: 'kerrie@awabakal.com.au'; 'awabakal_to@bigpond.com'; 'shanefrost@bigpond.com'; 'awabaka@bigpond.net.au'
Subject: Proposed Site Inspection Awaba Waste Disposal Proposed Pipeline
Attachments: Project Brief_Site Inspection_Awaba Waste Disposal Pipeline.docx; Pipeline_route.pdf

Hi all,

As discussed please find attached the project information for a proposed site inspection of a proposed sewerage connection at the Awaba Waste Disposal Facility. We are now looking at a inspection date of Monday 31 October 2011. If you have any questions or suggestions, please do not hesitate to contact me on 0488774105. I'll also try and give you a call sometime tomorrow to discuss the project timeframes.

Many thanks,
Clare

niche Environment and Heritage

Clare Anderson BA (Hons)
Archaeologist

PO Box 231 Concord, NSW 2137
canderson@niche-eh.com www.niche-eh.com
Mob: 0488774105 **Fax:** 02 4017 0071

From: Clare Anderson
Sent: Thursday, 20 October 2011 5:04 PM
To: 'cacatua@resetdsl.net.au'
Subject: Proposed Site Inspection Awaba Waste Disposal Pipeline
Attachments: Pipeline_route.pdf; Project Brief_Site Inspection_Awaba Waste Disposal Pipeline.docx

Hi Donna and George,

Please find attached project information and site inspection invitation for a proposed sewer pipeline for the Awaba Waste Disposal Facility. We are hoping to conduct the site inspection on 31 October. I will give you a call tomorrow to discuss.

Many thanks,
Clare

niche Environment and Heritage

Clare Anderson BA (Hons)
Archaeologist

PO Box 231 Concord, NSW 2137
canderson@niche-eh.com www.niche-eh.com
Mob: 0488774105 **Fax:** 02 4017 0071

Background

Due to current commitments of In Site Heritage, Niche Environment and Heritage have been commissioned by Cardno, on behalf of Lake Macquarie City Council, to conduct an assessment of a proposed sewer connection to the Awaba Waste Disposal Facility. The sewer pipeline is an addition to the works previously proposed and builds on the assessment undertaken by Liz Wyatt of In Site Heritage. The assessment will form an appendix to the Part 3A Environment Assessment report for the proposed landfill extension at the Awaba Waste Disposal Facility.

This document provides project information for the proposed sewer connection, provides a methodology for a proposed site inspection planned for the Friday 4 November and some general timeframes for the project.

For further information regarding the Awaba Waste Disposal Facility please see InSite Heritage (2011) *Aboriginal Cultural Heritage Impact Assessment Proposed Expansion Awaba Waste Treatment Facility Awaba, NSW*.

Awaba Waste Disposal Pipeline project details

The proposed assessment area is shown in Attachment 1.

The impact area for the works will be as follows:

- A Sewerage Pump Station (SPS) within the landfill site on Lot 372 will be located within a 10 x 10m footprint, located between the access road and the sediment basin to the north of the pipeline. The pump station will be around 3-4m deep
- The pipeline within Lot 372 will be open trenched within the actual road corridor to prevent any further disturbance (i.e. within the tarmac).
- Along Wilton Road the pipeline will be open trenched along the northern side of the road with a maximum impact area of 3m from the edge of the tarmac.
- A trenchless crossing will be used under Wangi Road, with the launch pit located in already disturbed area on the corner of Wilton/Wangi Road (assume 3x2m impact area for launch pit on either side of Wangi Road)
- Along Wangi Road and Dorrington Road the pipeline will be opend trenched along the eastern/northern side of the road with a maximum impact area of 3m from the edge of the tarmac
- The pipeline will then turn off Dorrington Road and be open trenched within the bounds of the already disturbed dirt access road down to Rathmines SPS.
- Trench depths will vary, minimum will be 800mm with a localised maximum of around 2.5m possible near culvert crossings. The trench should only be 600mm wide.

Proposed Site Inspection

A site inspection is proposed for Friday 4 November A representative of each of the Registered Aboriginal Parties is invited to attend.

Start Time: 10am

Meeting Place: Wilton Road at the entry to the Awaba Waste Disposal Facility

Required Equipment: Suitable PPE (high visibility clothing, sun/wet weather protection, safety boots, food, water etc)

Insurances:

Please ensure all field officers are covered by a suitable insurance policy and workers compensation policy for the period including the site inspection.

Safe Work Method Statement

A Safe Work Method Statement will be provided to the participants closer to the date of the site inspection.

Invoicing:

Invoices for the site inspection should be directed to:

Cardno

Awaba Waste Disposal Proposed Pipeline

c/o Chris Holloway

Christopher.Holloway@cardno.com.au

Proposed Site Inspection Methodology

A pedestrian foot survey will be conducted along the length of the proposed impact area. It is anticipated that survey coverage will be near to 100% given the narrow impact corridor.

A 12 megapixel camera will be used to record the survey. A Garmin handheld GPS will be used to take locational information.

Additional recording will be made where required to meet the Code of Practice for Archaeological Investigation.

Suggested Project Timeframes

The following project timeframes have been suggested to meet Lake Macquarie City Council's critical timeframes. It would be greatly appreciated if the stakeholders could review the timeframes and indicate whether they are possible or whether additional time at any stage of the project is required as per the Consultation Requirements

21-28 Oct – Registered Aboriginal Parties to review project information, provide feedback on project methodology and timeframe to Niche and organize site inspection for Friday 4 November Niche to begin drafting archaeological assessment.

31 Oct – Complete site inspection

1-4 Nov – Niche Environment and Heritage to complete draft assessment

7-8 Nov – Cardno review

9-23 Nov – Registered Aboriginal Parties to review draft assessment and provide any further comments, information and statements of significance.

25-27 Nov – Finalisation of Assessment Report

Please do not hesitate to contact Niche to discuss any aspect of the project.

The project contact at Niche is:

Clare Anderson BA (Hons)

Archaeologist

PO Box 231 Concord, NSW 2137

canderson@niche-eh.com www.niche-eh.com

Mob: 0488774105 **Fax:** 02 4017 0071

Registered Aboriginal Parties Response to Project Information

24 October 2011

Clare Anderson
Niche Environment and Heritage
PO Box 231 Concord, NSW 2137

Dear Clare

Re: Comments Regarding the Aboriginal Site Assessment Methodology for the Proposed Sewer Pipeline for the Awaba Waste Disposal

We have reviewed the Proposed Methodology for the Aboriginal Site Assessment for the Proposed Sewer Pipeline for the Awaba Waste Disposal, and recognise the evaluation by Niche Environmental and Heritage appears to be reasonably comprehensive.

We agree in principle with the proposed site assessment methodology and would like Niche to also consider the value of 'place' within the Heritage and Cultural weighting, as this consideration is to insure the protection and conservation of Place & Objects which impact significantly on the spirituality, cultural, historic and general legacy needs of Aboriginal people to address inequalities in social and community well being.

With regard to the suggested project timeframes, we believe that the proposed timeframes may not be in line with the Consultation Requirements for Proponents 2010, and therefore would like to indicate that we may request additional time to review and comment on the draft assessment if required.

We would like to take this opportunity to reiterate our family connection to the Awabakal People, as being direct descendants of the Traditional Awabakal People (the Lake Macquarie and its surrounding region). We as Awabakal descendants are connected with the Awabakal Culture and Heritage through our ancestral families.

The Aboriginal Heritage Assessment Process involves both a cultural values assessment and an archaeological assessment.

"The participation of Aboriginal communities and Aboriginal owners in archaeological field assessments is based on the principle of Aboriginal partnership in all facets of Aboriginal heritage management. Such participation should not be construed as 'consultation'. It is not a substitute for an assessment of Aboriginal cultural interests or values in a particular area of land or particular sites, such assessments being separate from archaeological assessments. A 'cultural assessment' should not be thought of as a mere component of an archaeological assessment or investigation" *(NPWS 1997, Aboriginal Heritage Standards and Guidelines Kit, Partnership with Aboriginal Communities section, p2).*

We believe that the Proposed Site Assessment Methodology may need to provide some further context to the discussion, for example:

- inclusion of the background environmental and archaeological information relating to the area within and surrounding the assessment site

1

- information on known sites should be provided, including map of site locations
- information relating to where the assessment area is in relation to other recorded sites
- how will the presence of any Aboriginal objects encountered to be managed
- concerns that no modifications have been included in the event that additional investigations may be necessary
- ***General comment:*** survey coverage should not be set by number of days, but should instead be set by the level (ha) of survey required to adequately understand the archaeological and cultural heritage values within the project area

We as Awabakal descendants believe that it is essential to be aware of all aspects relating to the proposed site assessment methodology, so that we are able to make informed decisions.

We believe that it is essential that Aboriginal Cultural and Heritage sites are located and recorded for the OEH AHIMS Database so that appropriate mitigation strategies and monitoring processes can be initiated to protect and manage Aboriginal sites for the future.

The Awabakal Traditional Owners Aboriginal Corporation members are descendants of the Awabakal People and accordingly have both a physical and spiritual connection and a primary association with our cultural boundary. Therefore, any artifacts and/or residual evidence of our people are held in high regard and are considered a cultural reminder that unites us with our land and sea country, our past and spirituality and provides us with a visual generational legacy.

With regard to providing cultural appropriate information, we would be pleased to share verbally any relevant cultural knowledge of the study area, but we do reserve the right and reluctance to share our cultural heritage with others in respect to aspects of the cultural significance that connects us to our country. It is believed by our people that those who shouldn't be privy to this cultural knowledge have no rights or entitlements to it.

The Awaba region is culturally significant to the Awabakal People who utilised and physically cared for the environment, and with the evidence already retrieved and documented from the region is a reasonable indication that this area was highly utilised by the Awabakal people prior to European settlement.

We would like to thank Niche Environment and Heritage for the opportunity to comment and request a copy finalised methodology demonstrating how you have addressed all the Aboriginal stakeholder comments provided as we would like a copy of this for our records prior to the field survey.

If you require any further information please do not hesitate in contacting me.

Yours sincerely,

Kerrie Brauer
Director | Administration

Awabakal Traditional Owners Aboriginal Corporation
ABN: 90 203 406 390 | ICN: 4411
PO Box 253 Jesmond NSW 2299 Australia
T: 61 2 49 58 81 70 | E: info@awabakal.com.au | www.awabakal.com.au

2

"From the Mountains to the Sea"
AWABAKAL
Descendants Traditional Owners
Aboriginal Corporation
ICN:4808 ABN:28402046601

PO BOX 86
CLARENCE TOWN
NSW 2321

Date: 26 October 2011

Attention: Clare Anderson
Niche Environmental and Heritage
PO Box 231 Concord
NSW 2137

Re: Proposed Awaba Waste Disposal Sewerage Pipeline Project Methodology

ALLA Clare,

In response to the correspondence we received from you requesting us to provide any comments and feedback regarding the **Proposed Awaba Waste Disposal Sewerage Pipeline Project Methodology** we would like to notify you that the ***Awabakal Descendants Traditional Owners Aboriginal Corporation*** has reviewed the methodology and we believe it addresses the majority of our concerns. There are a couple of extra comments/points we would like to see added.

First we would like to add that we are a registered Aboriginal Corporation under the Federal Governments **Aboriginal Corporations Act** to carry out business within Australia in regard to the representation of our people through this corporation known as the ***Awabakal Descendants Traditional Owners Aboriginal Corporation***.

Being the direct descendants of the Traditional Awabakal People of the Lake Macquarie/Newcastle area we take this opportunity in a few sentences to quickly formalise our position with you.

Our great great great Grandmother was one of the first Aboriginal People to be recorded in the Lake Macquarie and Newcastle area in 1828 when the Reverend L.E.Threlkeld made the first list of the Aboriginal People of the Lake Macquarie and Newcastle districts (which included the Hexham Swamp area) from his mission station at Belmont. At Warner's Bay our great great great Grandmother and her daughter, our great great Grandmother, were recorded by Jonathon Warner in 1833 and then again at Toronto in 1836 by L.E.Threlkeld at his mission there. We also have many well documented instances, as well as oral history of our People which were recorded by the Rev. L.E. Threlkeld living in and around the Newcastle and Lake Macquarie areas. Therefore, our people still live and maintain our Cultural ties with our Traditional Country and are concerned with the overall welfare of our Cultural Heritage and desire to be involved in all the affairs that may affect that Cultural Heritage which is vital to our People in maintaining connectedness in respect of our Traditional Country.

Regarding the area referred to in the documentation received from you by our organisation proposing consultation and an Aboriginal archaeological assessment, most assuredly indicates that this project is located within the Traditional Tribal Country of our People, the Awabakal. This is why it is crucial for the correct People to be involved in this process and any information relevant to this area to be accurate and forthcoming at the outset of this project. This can only be accomplished by involving those who are the direct Descendants of the original People and that were born and raised in the Traditional Country of their Ancestors and as a result also hold that Traditional Cultural Knowledge of the proposed project area. Our Traditional Tribal area is significant to us because our people have lived around Newcastle and Lake Macquarie for many thousands of years, these resource rich areas were utilised on many occasions to hunt, fish and carry on Traditions that have now been passed down for centuries from one generation to another. Subsequently, there are many sites located within our Traditional Country which provide tangible evidence of the Cultural Heritage of our people and of which identification and information regarding the locations and significance of many of these is only held by the Awabakal People who hold this knowledge.

It must also be emphasised that this area is highly significant to our People, being close to Lake Macquarie, the source of many rich recourses of which our people have depended on for thousands of years. As a result, due to the occupation of this area by our People, many deposits now make up the Awabakal Cultural Heritage that is located within the perimeter of Lake Macquarie but also connects to the many other sites located within our Traditional Tribal Country.

As already explained, this area and every part of our Traditional Country are special to us, not just for the Physical aspect but also the Spiritual and Oral aspect which, when all combined, give us our complete Culture. Our Cultural Heritage and Traditional Tribal Country are two of the reasons why we

take every opportunity to make ourselves available for consultation concerning the very important issues and decisions that need to be made in regard to protecting what is Culturally ours, handed onto us as a legacy from our Ancestors and what also gives us the right through birth to be called Awabakal People.

Below are some points that we believe may be relevant to the proposed project.

- We have taken part in several archaeological investigations over the last couple of years in and around this area in which have been found a variety of Aboriginal archaeological Cultural Heritage materials and sites present such as.

  a. Stone artefact Scatters
  b. Shell deposits
  c. And a rock shelter with deposit

  These have been located within relatively close proximity to the proposed project area and need to be taken into account even though the area to be disturbed is within the road verge. We understand that some areas have been modified by civil works but this does not discount the fact that there could be remnants of Cultural Heritage hidden or located beneath the said modifications. This should be considered especially in regard to the creek lines that will be impacted during the proposed project. Also we have located several locations just recently close to the road verge in which were found oyster cockle and whelk shells. These sites are considered by us to be vulnerable due to the proposal.

- We have also been a part of an archaeological excavation within close proximity to the study area close to a creek line in which stone artefacts were recovered.

  a. This is also a concern if as the methodology states that;

'The impact area for the works will be as follows:
- *A Sewerage Pump Station (SPS) within the landfill site on Lot 372 will be located within a 10 x 10m footprint, located between the access road and the sediment basin to the north of the pipeline. The pump station will be around 3-4m deep.'*

  b. It will be noted that the draft that was produced by Insite Heritage regarding the Awaba Waste Disposal Facility Extensions Cultural Heritage Impact Assessment shows that this particular area on the northern side of the creek line and to the south of the sediment basins contains Aboriginal artefacts and potential for more Cultural materials to be present. Therefore we would like more information regarding this proposal in regard to the above statement in the methodology!!

- This area is important to our People due to its close proximity to Lake Macquarie, Stockyard Creek and Killaben Creek and the mountainous country to the west of the study area. Therefore there needs to be consideration regarding the location of this proposal and the sites that are within this area.

- We would also like to see the AHIMS data from OEH database and a map of the recorded sites within a 10 kilometre radius of the proposed study area and added to the methodology.

- We would like to see the methodology address the intended process regarding discovery of artefacts or Cultural Heritage during and after the assessment??

- Also special attention to be given to high probability areas such as creek lines and closer to Lake Macquarie.

We hope this addresses any queries you may have Clare, if not and further information is required please don't hesitate to contact us ASAP. Our contact details are as follows.

NGI NOA
Shane Frost-Managing Director: Awabakal Descendants Traditional Owners Aboriginal Corporation
Email:shanefrost@bigpond.com Phone: 49964362 Fax: 49964325 Mobile: 0428320671

Provision of Draft Report

From: Renee Regal
Sent: Wednesday, 16 November 2011 4:32 PM
To: 'korskotegwp@gmail.com'; 'kerrie@awabakal.com.au'; 'awabaka@bigpond.net.au'; 'awabakal_to@bigpond.com'; 'cacatua@resetdsl.net.au'; 'shanefrost@bigpond.com'
Cc: Clare Anderson
Subject: Awaba Waste Disposal Aboriginal Heritage Assessment DRAFT report for comment
Attachments: 1130 Awaba Waste Disposal Aboriginal Heritage Assessment Draft 20111115.pdf

Good afternoon,

Please find attached the DRAFT Awaba Waste Disposal Aboriginal Heritage Assessment for you to read and comment on. It would be greatly appreciated if you could get any comments back to either myself or Clare Anderson at rregal@niche-eh.com , canderson@niche-eh.com or at the below postal address. If you wish to discuss anything in report or about the Awaba project please feel free to call me on the below number.

Kind regards,

Renée

Renée Regal BA (Hons)
Archaeologist
PO Box 12 Macarthur Square NSW 2560
rregal@niche-eh.com www.niche-eh.com
Mob: 0488 224 758 **Fax:** 02 4017 0071

2 December 2011

Clare Anderson
Niche Environment and Heritage
PO Box 231 Concord, NSW 2137

Dear Clare,

Re: Comments Regarding the Draft Report for the Awaba Waste Management Facility Proposed Sewer Pipeline Project.

With regard to the Draft Report Aboriginal Cultural Heritage and Archaeological Assessment for the Proposed Awaba Waste Facility Sewer Pipeline Project, we recognise the evaluation by Niche Environmental and Heritage appears to be reasonably comprehensive.

We believe that Niche Environmental and Heritage are committed and supportive in adequately addressing the many aspects related to the perspectives and diversity that is associated with Aboriginal Cultural Heritage.

We would like to highlight our appreciation of the informative process that the representative from Niche outlined during the survey and the due diligence in addressing any of our concerns.

We would like to take this opportunity to reiterate our family connection to the Awabakal People, as being direct descendants of the Traditional Awabakal People (the Newcastle and Lake Macquarie regions). We as Awabakal descendants are connected with the Awabakal Culture and Heritage through our ancestral families.

Our comments to the contents of the Draft Report are as follows:

We believe that it should be revealed within the **Draft Report** that the Proposed Sewer Pipeline Project was not part of the initial Awaba Waste Management Facility Project which was initiated by Insite Heritage in early 2011, as the text seems to reveal that they are the same project. Therefore we believe that the **Draft Report** should make a distinction between these projects.

Page 6, With regard to the reference made to the Koompahtoo LALC, we believe that it should read 'Koompahtoo LALC area', as it may seem to the reader that the Koompahtoo LALC is still operative.

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Page 9, second dot point, Typo reads '*AWTF_ST3 is located on the on the edge*', should read, '*AWTF_ST3 is located on the edge*'.

Page 10, We agree that the Cultural Heritage Management Plan (CHMP) should be developed in consultation with the Registered Aboriginal Stakeholders before any site works commence.

However, we would highly advocate that the CHMP should be developed and agreed upon between Lake Macquarie City Council and the Registered Aboriginal Stakeholders within a reasonable timeframe before any site works commence, so that the decision making process is not rushed, as past experiences demonstrates that CHMP development pertaining to Aboriginal Cultural Heritage is left mainly to the final stages.

Page 10, The Awabakal Traditional Owners prefer and recommend that all documented artefacts stay on country within an appropriate protected conservation area. Therefore we agree that all artefacts collected during the recommended observation and collection process along with any artefacts excavated from the subsurface excavations should be relocated and reburied on site that will not be subject to any impacts.

Page 11, With regard to the first dot point within this section of the **Draft Report**, we believe that consideration regarding the extent of the proposed works have not been taken into account, as it had been our experience that extensive impacts pertaining to the actual extent of the maximum impact area including machinery impact earthworks being proposed are continually being underestimated.

Therefore, we believe that this section may need further clarification with reference to the maximum impact area including the machinery impact earthworks of the proposed Sewage Pump Station and Sewage Pipeline works footprint.

Page 19, We consider that the "Cultural Heritage perspective" pertaining to the Aboriginal Cultural Heritage and Historical aspects of the Awabakal Peoples is excluded from the **Draft Report**, and believe that the writings of the Reverend Lancelot Threlkeld are an informative adjunct to the Awabakal Peoples lifestyle that would indeed broaden the context of the Report of the local area.

We also recommend the Cultural Collection Unit at the University of Newcastle, as they retain a plethora of resource material pertaining to Aboriginal occupation within the region. For example, the historical documented records of Lieutenant William Coke, R H Mathews and Jonathon Warner accounts of the Hunter Region are very informative.

The Awabakal people regard the Awaba area Culturally Significant, as Reverend Lancelot Threlkeld and the recorded documentation of our people the 'Awabakal' have now become part of the Historical Heritage of our people.

Page 20, With regard to the OEH AHIMS database, we had indicated to the Niche representative during the survey that the shell deposit should have shown up on the OEH AHIMS Database Sits Register as this site was recorded previously.

Therefore, we believe that the OEH AHIMS Database Sits Register may not necessarily have "up-to-date" or current information due to many unreported or unfinished site assessments pertaining to projects within close proximity to the Awaba project area.

Page 20, We are concerned that the reference to 'common site type' used within this section of the **Draft Report** may have the potential to undervalue the Aboriginal Cultural Heritage significance of Artefact and Shell Midden sites.

2

Our concerns are based on the statements within this and many other **Reports** that continually refer to Artefact and Shell Midden sites as "common features", as the meaning of 'common' has the potential to demean the value and rarity that each Artefact and Midden Site possess.

At this juncture it would be safe to say that Artefacts and Shell Midden sites within the region are still being recorded, therefore would this not be an opportunity to identify these sites as continual Aboriginal Occupation and propose that there may be a need to consider the value of 'place' within the Heritage and Cultural perspective.

Midden Sites around the foreshore of Lake Macquarie have more than halved since the colonisation of this area, as the destruction of these Shell Middens were used for lime, and will continue to be damaged and/or destroyed for the reason that they are repeatedly being referred to and regarded as 'common'. In addition, we believe that Aboriginal Midden Sites will continue to disappear from the Lakes foreshores areas caused by mining subsidence, development, infrastructure and public access.

Page 25, Typo reads 'Study Area due tot oh erosional' should read 'Study Area due to the erosional'.

In summary with regard to the Management and Mitigation Measures within the Draft Report, our Comments and Recommendations are that:

- We agree that additional subsurface testing be undertaken if impacts are to be made to any registered Aboriginal site or area of archaeological sensitivity.
- We agree that additional subsurface testing be undertaken in areas of archaeological sensitivity currently influenced by low visibility.
- We agree that a detailed analysis should be made of any excavated materials so as to aid in the determination of the nature and significance of the site.
- We highly recommended that the Cultural heritage management Plan (CHMP) should be developed and agreed upon between Lake Macquarie City Council and the Registered Aboriginal Stakeholders within a reasonable timeframe before any site works commence.
- We agree that the methodology for any additional testing be included in the proposed Plan of Management for the Part 3A project.
- We agree that the registered Aboriginal stakeholder groups continue to be consulted on all further archaeological work to be undertaken as part of this project.
- There are a number of statements within the Draft Report that may need further clarification.
- *All* artefacts collected during the subsurface testing should be reburied within an appropriate location that is designated for conservation by the Aboriginal Stakeholders.
- As there are several previously recorded sites within in the vicinity of the proposed project we suggest caution is needed as a number of our sites have previously been destroyed.

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- A Cultural Heritage Awareness Training perspective be implemented either through an Oral and/or PowerPoint presentation for staff and contractors involved in the project.
- All necessary steps should be taken to locate, protect and preserve our Awabakal Cultural Heritage.

The Awaba region is regarded as culturally significant to the Awabakal people, and in our view the region is part of the land that facilitates and completes the landscape that echoes the ethos of our cultural heritage.

This region is full of meaningful cultural reminders that speak to the present day through the Awabakal Creation Stories, Language and Art. The principles of traditional culture are there to keep intact the moral and spiritual fibre of Aboriginal People to survive in the land of their Ancestors.

The principle vision and aims of the Awabakal People is to protect the cultural heritage of our ancestors. Therefore, any artifacts and/or residual evidence of our people are held in high regard and are considered a cultural reminder that unites us with our land and sea country, our past and spirituality and provides us with a visual generational legacy.

We reserve the right and reluctance to share our cultural heritage with others in respect to aspects of the cultural significance that connects us to our country. It is believed by our people that those who shouldn't be privy to this cultural knowledge have no rights or entitlements to it.

We would like to thank Niche Environment and Heritage for the opportunity to comment and would ask for a copy of the *Finished Report* to be forwarded to us at your earliest convenience demonstrating how you have addressed all the Aboriginal stakeholder comments provided.

If you require any further information please do not hesitate in contacting me.

Yours sincerely,

Kerrie Brauer
Director | Administration

Awabakal Traditional Owners Aboriginal Corporation
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"From the Mountains to the Sea"
AWABAKAL
Descendants Traditional Owners
Aboriginal Corporation
ICN:4408 ABN:28403146681

PO BOX 86
CLARENCE TOWN
NSW 2321

Date: 2 December 2011

Attention: Clare Anderson
Niche Environmental and Heritage
PO Box 231 Concord
NSW 2137

Re: Draft Report-ABORIGINAL CULTURAL HERITAGE ASSESSMENT Awaba Waste Management Facility Proposed Pipeline, Awaba.

ALLA Clare,

In response to the correspondence we received from you requesting us to provide any comments and feedback regarding the **Draft Report-ABORIGINAL CULTURAL HERITAGE ASSESSMENT Awaba Waste Management Facility Proposed Pipeline, Awaba** we would like to notify you that the ***Awabakal Descendants Traditional Owners Aboriginal Corporation*** has reviewed the draft report and we believe it addresses the majority of our concerns. We would also like to complement you for the effort and thought that has gone into producing a document that considers the ramifications that such a proposal as this may have on our Cultural Heritage.

We would also like to raise the issue of a couple of extra comments/points we would like to see added to the final report.

Our comments are as follows;

- On page 20 and fourth paragraph of the draft report under heading Aboriginal History it states that *'The project area falls within traditional lands of the Awabakal. The Awabakal are documented as having occupied the area around the south of Lake Macquarie, the Sugarloaf ranges in the west and the Maitland area in the north.'*

  a. Our People (Awabakal) did not just inhabit the area south of Lake Macquarie but the area that encompasses Lake Macquarie north to Newcastle and the Hunter River. Threlkeld delineates the area that our People inhabited and he in no uncertain terms includes as the northern boundary, Newcastle and the Hunter River and then southwards past Lake Macquarie on both the east and west sides and then further to the west of Lake Macquarie to the mountains and beyond. The words highlighted in red should be corrected to say that ***'The Awabakal are documented having occupied the area from Newcastle and the Hunter River in the north and their Traditional Lands continued south and included Lake Macquarie, the Sugarloaf and Watagan Ranges in the west and the Maitland area in the north. These areas represent part of but not the full extent of what is the Traditional Land of the Awabakal'***

  b. It is important to provide the correct information to the readers of this document considering the consequences that misinformation or just a couple of wrongly placed words may have to our People and our Cultural Heritage in the future.

- Also on page 20 paragraph four it states that *'Much of the documented history of the Awabakal is derived from L.E Threlkeld's missionary work on the eastern side of Lake Macquarie near Belmont in the early 1800 and subsequently the western side of Lake Macquarie in 1824.'*

  a. Reverend L. E. Threlkeld did not start his mission on the western side of Lake Macquarie until 1830, not 1824 as stated in the draft. This needs to be rectified.

- On page 26 of the draft under heading Predictive Model dot point three it states that *'Due to the proximity of the Study Area to Lake Macquarie, shell middens may be present within the Study Area. The proximity of the unnamed tributary which flows eastwards into the western shore of Lake Macquarie, as well as Kilaben Creek (approximately 700m south of the Study Area) are possible locations for shell deposit.'*

niche
Environment and Heritage

  a. Kilaben Creek is not 700 Metres south of the study area when consideration is given to the proximity of the creek to the route that the pipeline is proposed to follow. For the majority of the route, Kilaben Creek is north of the proposed pipeline route and study area.

  b. Can you also clarify what is being determined as 'the unnamed tributary which flows eastwards into the western shore of Lake Macquarie'?? Do you mean Kilaben Creek or Stockyard Creek??

- An Aboriginal Cultural Heritage Management Plan should be implemented for this proposed project. This PoM should be composed by LMCC in consultation with the Awabakal People.

- What is proposed for the long term management and mitigation of any Aboriginal Cultural Heritage that is recovered from the proposed test excavations or that is left disturbed by any excavations if the proposed project is realised?

  a. We believe all of our Cultural Heritage that has been disturbed/collected/recovered from any development and excavations should be returned to as close as possible to their original location and reburied within an appropriate area that has been designated for conservation and protection of these items where they will not be impacted on by future development. This process should be carried out by the Aboriginal Stakeholders and recorded by an archaeologist and the co-ordinates submitted to the OEH AHIMS Database.

- We also believe that there should be the implementation of an observation/monitoring program of the entire pipeline route by which the Aboriginal Stakeholder groups are allowed to collect any artefacts that may be disturbed during the excavation stage of the pipeline.

- The production of a methodology outlining the procedure for the test excavations and subsequent actions if artefacts are recovered. These should be designed in consultation with the Aboriginal Stakeholders and an agreed mechanism put in place prior to excavations commencing or if necessary any AHIP Application being sought.

- There should also be compulsory Cultural Awareness Training included in the induction process for all contractors and workers on site, particularly those undertaking any excavations within the footprint of the proposed development area. Initially, this should be developed and delivered by the Awabakal People and an archaeological consultant to allow all workers and contractors some form of basic knowledge and recognition of our People and Cultural Heritage and also equip them in regard to the process of detection and identification of artefacts if uncovered during any of the proposed excavation/construction phase of the site works. **(Otherwise how do the construction workers know what an artefact looks like if they are not shown beforehand by those who know?)**

This proposed project area has already exhibited the fact that there are many Cultural Heritage sites that are within close proximity to it and that if explored, there is the likelihood that more Cultural Heritage sites that to date have remained undiscovered, will be found. It is vital that the Cultural Heritage that still exists within this area is located and not destroyed by this proposed project.

We would like to thank you for the opportunity to comment regarding this proposed project and would ask if a copy of the final report, which not just includes but addresses our comments, be forwarded to us at your earliest convenience.

We hope this addresses any queries you may have Clare, if not and further information is required please don't hesitate to contact us ASAP. Our contact details are as follows.

NGI NOA
Shane Frost-Managing Director: Awabakal Descendants Traditional Owners Aboriginal Corporation
Email:shanefrost@bigpond.com Phone: 49964362 Fax: 49964325 Mobile: 0428320671

Cultural Heritage Sites - Physical reminders of our Ancestors; once they are gone, they are gone forever and impossible to bring back!! THINK first and make WISE decisions last!!

Cacatua Culture Consultants

Entity of Carcatchua Pty Ltd

ABN: 87 145 082 480 ACN: 145 082 480

8 December 2011

Your Ref:

Clare Anderson

Emailed: *canderson@niche-eh.com*

RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT
Awaba Waste Management Facility Proposed Pipeline, Awaba

Clare,

Cacatua has read and we have also had a staff member present at a survey of the above with this in mind we have discussed the Aboriginal cultural Heritage Assessment report.

At this point in time we agree with the all the recommendations that were listed within the report.

However, It must be stated that if our support of any of these recommendations are in direct conflict with any recommendations or changes that the Awabakal Descendants Traditional Owners Aboriginal Corporation, Awabakal Traditional Owners Aboriginal Corporation would like to see changed then will support the changes they request as we believe that it is their voice that must be acknowledged.

Yours truly

Donna Sampson
Report Manager

Email: cacatua@resetdsl.net.au

UNIT 1b, 11 Glenwood Drive THORNTON NSW 2322 Ph: 02 4028 6942 Fax: 02 4028 6943

65 Jaeger Avenue, GUNNEDAH NSW 2380 Mob: 0403 765 019 Fax: 02 6742 1491

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Cardno
Shaping the Future

Additions to Awaba Waste Management Facility

Appendix O
Greenhouse Gas Model

Lake Macquarie City Council

Total Tonnes of Waste to Awaba Landfill

Year	MSW (T)	C&I (T)	C&D (T)	Total (T)	Growth
1985	-	-	-	-	
1986	49,051	9,338	49,873	108,262	1.3%
1987	49,697	9,461	50,530	109,688	1.3%
1988	50,352	9,585	51,195	111,132	1.3%
1989	51,015	9,711	51,870	112,596	1.3%
1990	51,687	9,839	52,553	114,079	1.3%
1991	52,368	9,969	53,245	115,582	1.3%
1992	53,058	10,100	53,946	117,104	1.3%
1993	53,756	10,233	54,657	118,646	1.3%
1994	54,464	10,368	55,377	120,209	1.3%
1995	55,182	10,505	56,106	121,792	1.3%
1996	55,909	10,643	56,845	123,397	1.3%
1997	56,645	10,783	57,594	125,022	1.3%
1998	57,391	10,925	58,352	126,669	1.3%
1999	53,537	10,191	54,433	118,161	-6.7%
2000	54,953	10,461	55,874	121,288	2.6%
2001	55,776	10,618	56,710	123,105	1.5%
2002	51,202	9,747	52,059	113,008	-8.2%
2003	58,647	11,164	59,629	129,441	14.5%
2004	74,246	14,134	75,490	163,870	26.6%
2005	77,940	14,540	25,436	117,917	-28.0%
2006	79,625	12,489	27,145	119,258	1.1%
2007	81,579	12,831	16,740	111,149	-6.8%
2008	90,203	10,725	17,262	118,191	6.3%
2009	82,311	8,950	9,276	100,537	-14.9%
2010	72,072	27,209	3,753	103,034	2.5%
2011	73,178	27,414	3,781	104,373	1.3%
2012	74,305	27,620	3,810	105,735	1.3%
2013	75,450	27,827	3,838	107,115	1.3%
2014	76,615	28,036	3,867	108,518	1.3%
2015	77,611	28,400	3,917	109,929	1.3%

Total

Scenario 1: Waste Landfilled - 2011 to end of 2014	425,741
Scenario 2: Waste Landfilled - 2011 to end of 2032	2,639,033

Average

Scenario 1: Waste Landfilled - 2011 to end of 2014	106,435
Scenario 2: Waste Landfilled - 2011 to end of 2032	119,956

Year	MSW (T)	C&I (T)	C&D (T)	Total (T)	Growth
2016	78,620	28,770	3,968	111,358	1.3%
2017	79,642	29,144	4,020	112,805	1.3%
2018	80,677	29,523	4,072	114,272	1.3%
2019	81,726	29,906	4,125	115,757	1.3%
2020	82,789	30,295	4,179	117,262	1.3%
2021	83,865	30,689	4,233	118,787	1.3%
2022	84,955	31,088	4,288	120,331	1.3%
2023	86,059	31,492	4,344	121,895	1.3%
2024	87,178	31,901	4,400	123,480	1.3%
2025	88,312	32,316	4,457	125,085	1.3%
2026	89,460	32,736	4,515	126,711	1.3%
2027	90,623	33,162	4,574	128,358	1.3%
2028	91,801	33,593	4,633	130,027	1.3%
2029	92,994	34,030	4,694	131,717	1.3%
2030	94,203	34,472	4,755	133,430	1.3%
2031	95,428	34,920	4,817	135,164	1.3%
2032	96,668	35,374	4,879	136,922	1.3%

CUMULATIVE TOTAL T: 5,602,169

Data Source Notes (2010 - 2014 data is from LMCC's Preliminary EA)

1986-1997

ASSUMED: Based on a 1.3% growth rate from 1986 to 1998

1998 - 2009

Sourced: Totals from the raw data and broken down into the three waste streams assuming breakdown was static as per 2003/04 breakdown of MSW = 45%, C&I = 9%, C&D = 46% until the 1997/98 year when the raw data ends

2010 - 2032

Source: Preliminary EA projections of 1.3% growth (conservative end of range)

Assumption: MSW is comprised of mixed domestic, bulk domestic, parks mixed waste and residential self hauled waste (as broken down in LMCC's Preliminary EA)

Assumption: Composition of Waste to Awaba Landfill remains constant at 70% 26% 4%

Awaba Waste Streams Breakdown

Waste Stream	Composition at Awaba
Municipal Solid Waste (MSW)	70%
Commercial and Industrial (C&I)	26%
Construction and Demolition (C&D)	4%
Total	**100%**

Source: Preliminary EA and Draft Strategy

Breakdown of Waste Type in Each Waste Stream

Waste Mix Type	MSW	C&I	C&D
Food	14%	29%	1%
Paper and Paper Board	12%	15%	3%
Garden and Park	21%	6%	4%
Wood and Wood Waste	12%	6%	49%
Textiles	8%	12%	8%
Sludge	0%	0%	0%
Nappies	1%	0%	0%
Rubber and Leather	1%	1%	0%
Inert Waste (including concrete, metal, plastic and glass)	32%	31%	35%
Total	**100%**	**100%**	**100%**

Source: Awaba Waste Audit (May 2010) values for C&I and C&D and a combination of Awaba Waste Audit (May 2010) values and LMCC Winter Audit values for MSW

Breakdown of Total Percentage of Waste Types in the Landfill

Waste Mix Type	MSW	C&I	C&D	Total
Food	10%	8%	0%	18%
Paper and Paper Board	8%	4%	0%	12%
Garden and Park	14%	2%	0%	16%
Wood and Wood Waste	9%	2%	2%	12%
Textiles	5%	3%	0%	9%
Sludge	0%	0%	0%	0%
Nappies	1%	0%	0%	1%
Rubber and Leather	0%	0%	0%	1%
Inert Waste (including concrete, metal, plastic and glass)	22%	8%	1%	32%
Total	**70%**	**26%**	**4%**	**100%**

Breakdown of Total Tonnes of Waste Types in the Landfill at Capacity

Waste Mix Type	MSW (T)	C&I (T)	C&D (T)	TOTAL T
Food	567,967	422,371	2,694	993,032
Paper and Paper Board	451,532	222,799	5,224	679,555
Garden and Park	803,922	92,463	8,101	904,486
Wood and Wood Waste	486,752	85,658	99,601	672,010
Textiles	305,855	178,861	16,406	501,121
Sludge	-	-	-	-
Nappies	35,023	-	-	35,023
Rubber and Leather	22,190	12,575	306	35,071
Inert Waste (including concrete, metal, plastic and glass)	1,245,853	464,978	71,686	1,782,517
Total	**3,919,093**	**1,479,705**	**204,017**	**5,602,815**

Waste Mix Type	DOC Value (Default)	k Value (Default)
Food	0.15	0.19
Paper and Paper Board	0.40	0.06
Garden and Park	0.20	0.10
Wood and Wood Waste	0.43	0.03
Textiles	0.24	0.06
Sludge	0.05	0.19
Nappies	0.24	0.06
Rubber and Leather	0.39	0.06
Inert Waste (including concrete, metal, plastic and glass)	0.00	0.00

Source: NGER (Measurement) Technical Guidelines (DCCEE, 2010)

Parameters	Default Values
DOCF	0.5
M	6
MCF	1
Y	0.01425
OF	0.1
F	0.50

Source: NGER (Measurement) Technical Guidelines (DCCEE, 2010)

Note: Values are sourced from the NGER Solid Waste Calculator spreadsheets

	WITH EXPANSION	WITHOUT EXPANSION
Year	Ej (T CO2-e) based on NGER Spreadsheet	Ej (T CO2-e) based on NGER Spreadsheet
1985	-	-
1986	-	-
1987	9,135	9,135
1988	17,472	17,472
1989	25,117	25,117
1990	32,162	32,162
1991	38,684	38,684
1992	44,749	44,749
1993	50,416	50,416
1994	55,732	55,732
1995	60,740	60,740
1996	65,476	65,476
1997	69,973	69,973
1998	74,258	74,258
1999	78,354	78,354
2000	81,426	81,426
2001	84,556	84,556
2002	87,626	87,626
2003	89,634	89,634
2004	92,923	92,923
2005	97,627	97,627
2006	62,393	62,393
2007	69,425	69,425
2008	65,369	65,369
2009	65,827	65,827
2010	65,905	65,905
2011	66,859	66,859
2012	67,091	67,091
2013	67,414	67,414
2014	67,815	67,815
2015	68,285	68,285
2016	68,816	62,883
2017	69,402	58,053
2018	70,035	53,722
2019	70,712	49,826
2020	71,427	46,309
2021	72,179	43,125
2022	72,963	40,234
2023	73,778	37,601
2024	74,621	35,197
2025	75,489	32,997
2026	76,383	30,977
2027	77,300	29,119
2028	78,239	27,406
2029	79,199	25,823

Year	Ej (T CO2-e) based on NGER Spreadsheet	Ej (T CO2-e) based on NGER Spreadsheet
2030	80,180	24,358
2031	81,181	22,999
2032	82,201	21,737
2033	83,240	20,562
2034	76,811	19,467
2035	71,054	18,444
2036	65,884	17,489
2037	61,225	16,595
2038	57,012	15,757
2039	53,192	14,971
2040	49,718	22,248
2041	46,548	21,164
2042	43,650	20,143
2043	40,991	19,182
2044	38,547	18,276
2045	36,295	17,421
2046	34,216	16,615
2047	32,291	15,853
2048	30,506	15,132
2049	28,848	14,451
2050	27,305	13,805
2051	25,867	13,194
2052	24,524	12,615
2053	23,269	12,066
2054	22,094	11,545
2055	20,993	11,050
2056	19,959	10,580
2057	18,988	10,134
2058	28,255	9,709
2059	26,911	9,305
2060	25,645	8,921
2061	24,451	8,555
2062	23,324	8,207
2063	22,260	7,875
2064	21,254	7,559
2065	20,302	7,257
2066	19,401	6,970
2067	18,547	6,695
2068	17,738	6,433
2069	16,971	6,183
2070	16,243	5,943
2071	15,552	5,715
2072	14,895	5,496
2073	14,271	5,287
2074	13,677	5,088
2075	13,113	4,896
2076	12,575	4,713
2077	12,063	4,538

Year	Ej (T CO2-e) based on NGER Spreadsheet	Ej (T CO2-e) based on NGER Spreadsheet
2078	11,576	4,370
2079	11,111	4,209
2080	10,668	4,055
2081	10,246	3,907
2082	9,843	3,766
2083	9,458	3,630
2084	9,090	3,499
2085	8,739	3,374
2086	8,403	3,254
2087	8,083	3,139
2088	7,776	3,028
2089	7,482	2,922
2090	7,202	2,819
2091	6,933	2,721
2092	6,675	2,627
2093	6,429	2,536
2094	6,193	2,449
2095	5,966	2,365
2096	5,749	2,284
2097	5,541	2,206
2098	5,342	2,131
2099	5,150	2,059
2100	4,966	1,990
SUM	**4,685,646**	**3,068,251**

PER ANNUM (T):	**35,563**	**17,592**
90 YEAR PERIOD (T):	**3,200,669**	**1,583,274**

Note: 'Per Annum' is average emissions from 2011 to 2100
Note: '90 Year Period' is the sum of emissions from 2011 to 2100

Fuel Combustion for Equipment on Site

Transport equipment type	Fuel combusted	Energy content factor (GJ/kL unless otherwise indicated)	Emission factor kg CO_2-e/GJ (relevant oxidation factors incorporated)		
			CO_2	CH_4	N_2O
General Transport	Diesel Oil	38.6	69.2	0.2	0.5
General Transport	Gasoline (other than for use as fuel in an aircraft) [Unleaded]	34.2	66.7	0.6	2.3

Source: NGA Factors (July 2010) (Table 4)

WITHOUT EXPANSION

Fuel combusted	kL Consumed per Year (Pre Expansion)	Annual CO2 Emissions (T CO2-e) (Pre Expansion)	Annual CH4 Emissions (T CO2-e) (Pre Expansion)	Annual N2O Emissions (T CO2-e) (Pre Expansion)	Total Annual GHG Emissions (T CO2-e) (Pre Expansion)	Total GHG Emissions for 90 Year Period (T CO2-e) [2011-2100]
Diesel Oil	144.3	385.4	1.1	2.8	389.3	1557.2
Unleaded	0.4	0.91	0.01	0.03	0.95	3.8

WITH EXPANSION

Fuel combusted	kL Consumed per Year (Post Expansion)	Annual CO2 Emissions (T CO2-e) (Post Expansion)	Annual CH4 Emissions (T CO2-e) (Post Expansion)	Annual N2O Emissions (T CO2-e) (Post Expansion)	Total Annual GHG Emissions (T CO2-e) (Post Expansion)	Total GHG Emissions for 90 Year Period (T CO2-e) [2011-2100]
Diesel Oil	148.3	396.1	1.1	2.9	400.1	8802.1
Unleaded	0.4	0.91	0.01	0.03	0.95	20.9

LMCC Data Provided:

Machine Code	Machine Type	Fuel Type	L Used	Period of Use	Days of Use	Annual Use (L)
2781.1	Traxcavator	Diesel	16,684.96	01/07/09 to 30/06/10	365	16,684.96
2781.2	Traxcavator	Diesel	13,549.40	13/01/11 to 18/05/11	126	39,250.25
2790.1	Traxcavator	Diesel	30,662.32	01/07/09 to 30/06/10	365	30,662.32
0601.2	Compactor	Diesel	50,964.03	01/07/09 to 30/06/10	365	50,964.03
1925.1	Water Cart	Diesel	3,468.15	05/07/10 to 18/05/11	318	3,980.74
1626.2	2T Tipper	Diesel	2,742.88	01/07/09 to 30/06/10	365	2,742.88
		TOTAL (approx.)	**118,071.74**			**144,285.17**

92004.2	Mower	Unleaded	-	
94521.1	-	Unleaded	-	
94522.1	Free Standing Pumps	Unleaded	-	
94523.1	-	Unleaded	-	
		TOTAL (approx.)	**400**	Assume per annum

Expansion Assumptions:

Assume one extra light to medium weight vehicle is required on site (in addition to above-listed machinery), as follows:

Additional Machine Type	Fuel Type	Predicted L Used / Year
Vehicle	Diesel	4,000.00
	TOTAL (approx.)	**4,000.00**

State, Territory or grid description	Emission factor kg CO2-e/kWh
NSW and ACT	0.9

Source: NGA Factors (July 2010)

WITHOUT EXPANSION

kWh of Electricity Purchased per Year	Total Annual GHG Emissions (T CO2-e)	Total GHG Emissions for 90 Year Period (T CO2-e) [2011-2100]
24341	22	88

Source: LMCC Data provided for the 2009/10 FY (see below)

NB: Assumes all electricity generation emissions stop after 2014 when landfill reaches capacity

WITH EXPANSION

kWh of Electricity Purchased per Year	Total Annual GHG Emissions (T CO2-e)	Total GHG Emissions for 90 Year Period (T CO2-e) [2011-2100]
48682	44	964

Source: LMCC Data provided for the 2009/10 FY (see below)

NB: Assumes all electricity generation emissions stop after 2032 when landfill reaches capacity

LMCC Data Provided:

KWH for 2009/2010		
AWABA WASTE DISPOSAL - CHECK IN STN	22035	(Assumed to be all electricity from the grid)
WASTE MANAGEMENT SITE	2306	(Assumed to be all electricity from the grid)

Expansion Assumptions:

KWH/year under expansion conditions	48682	(Assumed to be all electricity from the grid)

Assumed to be double existing requirements due to transfer station, reuse centre and package pumping station

AWABA LANDFILL GREENHOUSE GAS MODEL

OUTPUTS

Total Predicted GHG Emissions over the Future 90 Year Period [2011 - 2100]

Scenario			**1: Existing Landfill**			**2: Existing Landfill with Expansion**		
Remaining Operational Lifetime			**2011 - 2014**			**2011 - 2032**		
Emissions Source	**Quantity**	**Units**	**Total GHG Emissions (T CO2-e)**		**Total GHG Emissions (T CO2-e) for the 90 year period [2011 to 2100]**	**Total GHG Emissions (T CO2-e)**		**Total GHG Emissions (T CO2-e) for the 90 year period [2011 to 2100]**
			Scope 1	**Scope 2**		**Scope 1**	**Scope 2**	
Fuel Combustion for Equipment on Site								
Scenario 1: Diesel Oil	144	kL / yr	1,557		1,557			-
Scenario 2: Diesel Oil	148	kL / yr			-	8,802		8,802
Scenario 1 and 2: Unleaded Gasoline	0.4	kL / yr	4		4	21		21
Landfill Gases - Calculated using the NGER Solid Waste Calculator Version 6.1								
Scenario 1: Landfill Methane Emissions	425,741	Total T of waste predicted to be deposited from 2011 to end of 2014 [Total emissions to 2100]	1,583,274		1,583,274	-	-	-
Scenario 2: Landfill Methane Emissions	2,639,033	Total T of waste predicted to be deposited from 2011 to end of 2032 [Total emissions to 2100]	-	-	-	3,200,669		3,200,669
Electricity Generation								
Scenario 1: Electricity Used on Site	24,341	kWh / yr		88	88			-
Scenario 2: Electricity Used on Site	48,682	kWh / yr			-		964	964
TOTAL					**1,584,923**			**3,210,456**

Annual Predicted GHG Emissions for Future Operational Lifetime of Landfill

Scenario			1: Existing Landfill			2: Existing Landfill with Expansion		
Remaining Operational Lifetime			2011 - 2014			2011 - 2032		
Emissions Source	Quantity	Units	Annual GHG Emissions (T CO2-e)		Total Annual GHG Emissions (T CO2-e) over the 90 year period [2011 to 2100]	Annual GHG Emissions (T CO2-e)		Total Annual GHG Emissions (T CO2-e) over the 90 year period [2011 to 2100]
			Scope 1	Scope 2		Scope 1	Scope 2	
Fuel Combustion for Equipment on Site								
Scenario 1: Diesel Oil	144	kL / yr	389		389			-
Scenario 2: Diesel Oil	148	kL / yr			-	400		400
Scenario 1 and 2: Unleaded Gasoline	0.4	kL / yr	0.95		0.95	0.95		0.95
Landfill Gases - Calculated using the NGER Solid Waste Calculator Version 6.1								
Scenario 1: Landfill Methane Emissions	106,435	Average T / yr of waste predicted to be deposited from 2011 to end of 2014 [Average emissions to 2100]	17,592		17,592	-	-	-
Scenario 2: Landfill Methane Emissions	119,956	Average T / yr of waste predicted to be deposited from 2011 to end of 2032 [Average emissions to 2100]	-	-	-	35,563		35,563
Electricity Generation								
Scenario 1: Electricity Used on Site	24,341	kWh / yr		22	22			-
Scenario 2: Electricity Used on Site	48,682	kWh / yr			-		44	44
TOTAL					**18,004**			**36,008**

Sections of NGER (Measurement) Determ. 2008 amended, IPCC 2006 Guidelines Vol. 5	NGER Section 5.5	NGER Section 5.4			NGER Section 5.4/IPCC Equation 3.6	NGER Section 5.4		NGER Section 5.10			NGER Section 5.11							
NSW	**Select State/Territory, enter landfill opening year and enter Waste (kt), Q_{cap}, Q_{flared}, Q_{tr}**				**No input required in the fields below**			**Waste streams (proportions of total) Note: defaults can be overridden in accordance with NGER Determination**			**Waste mix types - Municipal Solid Waste (proportions Note: defaults can be overridden in accordance with NGER**							
Financial year ending - input landfill opening year in cell below	Waste received landfill (kt)	Q_{cap} (CH_4 only) (m^3)	Q_{flared} (CH_4 only) (m^3)	Q_{tr} (CH_4 only) (m^3)	CH_4 captured ($Q_{cap}+Q_{tr}+Q_{flared}$ in kt CO_2-e)	CH_4^* (kt CO_2-e)	CH_{4gen} (kt CO_2-e)	Emissions E_j (CO_2-e) (kt)	Municipal Solid Waste	Commercial and Industrial	Construction and Demolition (calculated by deduction)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies
1986	109.69	0	0	0	0.0000	0.0000	0.0000	0.000	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1987	111.13	0	0	0	0.0000	19.4285	19.4285	17.486	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1988	112.60	0	0	0	0.0000	37.5946	37.5946	33.835	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1989	114.08	0	0	0	0.0000	54.6188	54.6188	49.157	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1990	115.58	0	0	0	0.0000	70.6088	70.6088	63.548	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1991	117.10	0	0	0	0.0000	85.6609	85.6609	77.095	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1992	118.65	0	0	0	0.0000	99.8619	99.8619	89.876	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1993	120.21	0	0	0	0.0000	113.2897	113.2897	101.961	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1994	121.79	0	0	0	0.0000	126.0145	126.0145	113.413	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1995	123.40	0	0	0	0.0000	138.0998	138.0998	124.290	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1996	125.02	0	0	0	0.0000	149.6030	149.6030	134.643	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1997	126.67	0	0	0	0.0000	160.5761	160.5761	144.518	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1998	118.16	0	0	0	0.0000	171.0664	171.0664	153.960	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1999	121.29	0	0	0	0.0000	179.3145	179.3145	161.383	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2000	123.10	0	0	0	0.0000	187.5572	187.5572	168.801	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2001	113.01	0	0	0	0.0000	195.5616	195.5616	176.005	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2002	129.44	0	0	0	0.0000	201.2351	201.2351	181.112	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2003	163.87	0	0	0	0.0000	209.4579	209.4579	188.512	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2004	117.92	0	0	0	0.0000	223.2154	223.2154	200.894	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2005	119.26	0	97,673	0	1.3915	227.8369	227.8369	203.801	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2006	111.15	0	2,968,119	0	42.2850	232.4187	232.4187	171.120	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2007	118.19	2,325,690	220,646	0	36.2761	235.2857	235.2857	179.109	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2008	100.54	2,930,297	139	0	41.7482	239.2519	239.2519	177.753	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2009	103.03	3,007,477	1,245	0	42.8635	239.8525	239.8525	177.290	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2010	104.37	2,952,043	43,321	0	42.6732	240.9165	240.9165	178.419	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2011	105.74	2,773,680	163,024	0	41.8375	242.1967	242.1967	180.323	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2012	107.12	2,783,323	163,591	0	41.9829	243.6754	243.6754	181.523	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2013	108.52	2,796,697	164,377	0	42.1846	245.3362	245.3362	182.836	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2014	109.93	2,813,334	165,355	0	42.4356	247.1657	247.1657	184.257	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2015	0.00	2,832,849	166,502	0	42.7299	249.1492	249.1492	185.777	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2016	0.00	2,608,717	153,328	0	39.3492	231.5512	231.5512	172.982	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2017	0.00	2,408,374	141,553	0	36.3273	215.3711	215.3711	161.139	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2018	0.00	2,228,704	130,993	0	33.6172	200.4779	200.4779	150.175	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2019	0.00	2,067,051	121,492	0	31.1789	186.7544	186.7544	140.018	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2020	0.00	1,921,150	112,916	0	28.9781	174.0957	174.0957	130.606	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2021	0.00	1,789,060	105,153	0	26.9857	162.4077	162.4077	121.880	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2022	0.00	1,669,120	98,103	0	25.1766	151.6058	151.6058	113.786	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2023	0.00	1,559,902	91,684	0	23.5291	141.6140	141.6140	106.276	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2024	0.00	1,460,175	85,822	0	22.0249	132.3635	132.3635	99.305	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2025	0.00	1,368,877	80,456	0	20.6478	123.7923	123.7923	92.830	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2026	0.00	1,285,088	75,532	0	19.3839	115.8443	115.8443	86.814	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2027	0.00	1,208,009	71,001	0	18.2213	108.4686	108.4686	81.223	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2028	0.00	1,136,945	66,824	0	17.1494	101.6190	101.6190	76.023	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2029	0.00	1,071,288	62,965	0	16.1590	95.2535	95.2535	71.185	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2030	0.00	1,010,506	59,393	0	15.2422	89.3339	89.3339	66.683	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2031	0.00	954,133	56,080	0	14.3919	83.8254	83.8254	62.490	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2032	0.00	901,757	53,001	0	13.6019	78.6962	78.6962	58.585	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2033	0.00	853,014	50,136	0	12.8666	73.9172	73.9172	54.945	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2034	0.00	807,582	47,466	0	12.1813	69.4619	69.4619	51.553	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2035	0.00	765,174	44,973	0	11.5417	65.3060	65.3060	48.388	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2036	0.00	725,536	42,644	0	10.9438	61.4272	61.4272	45.435	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2037	0.00	688,439	40,463	0	10.3842	57.8051	57.8051	42.679	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2038	0.00	653,678	38,420	0	9.8599	54.4209	54.4209	40.105	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2039	0.00	621,070	36,504	0	9.3681	51.2572	51.2572	37.700	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2040	0.00	0	0	0	0.0000	48.2984	48.2984	43.469	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2041	0.00	0	0	0	0.0000	45.5296	45.5296	40.977	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2042	0.00	0	0	0	0.0000	42.9376	42.9376	38.644	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2043	0.00	0	0	0	0.0000	40.5098	40.5098	36.459	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2044	0.00	0	0	0	0.0000	38.2347	38.2347	34.411	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2045	0.00	0	0	0	0.0000	36.1019	36.1019	32.492	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2046	0.00	0	0	0	0.0000	34.1016	34.1016	30.691	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2047	0.00	0	0	0	0.0000	32.2246	32.2246	29.002	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2048	0.00	0	0	0	0.0000	30.4626	30.4626	27.416	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2049	0.00	0	0	0	0.0000	28.8080	28.8080	25.927	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2050	0.00	0	0	0	0.0000	27.2534	27.2534	24.528	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01

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Financial year ending - input landfill opening year in cell below	Waste received landfill (kt)	Q_{cap} (CH_4 only) (m^3)	Q_{flared} (CH_4 only) (m^3)	Q_{tr} (CH_4 only) (m^3)	CH_4 captured ($Q_{cap}+Q_{tr}+Q_{flared}$ in kt CO_2-e)	CH_4^* (kt CO_2-e)	CH_{4gen} (kt CO_2-e)	Emissions E_j (CO_2-e) (kt)	Municipal Solid Waste	Commercial and Industrial	Construction and Demolition (calculated by deduction)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies
2051	0.00	0	0	0	0.0000	25.7923	25.7923	23.213	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2052	0.00	0	0	0	0.0000	24.4185	24.4185	21.977	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2053	0.00	0	0	0	0.0000	23.1263	23.1263	20.814	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2054	0.00	0	0	0	0.0000	21.9103	21.9103	19.719	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2055	0.00	0	0	0	0.0000	20.7656	20.7656	18.689	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2056	0.00	0	0	0	0.0000	19.6876	19.6876	17.719	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2057	0.00	0	0	0	0.0000	18.6721	18.6721	16.805	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2058	0.00	0	0	0	0.0000	17.7151	17.7151	15.944	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2059	0.00	0	0	0	0.0000	16.8128	16.8128	15.132	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2060	0.00	0	0	0	0.0000	15.9619	15.9619	14.366	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2061	0.00	0	0	0	0.0000	15.1592	15.1592	13.643	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2062	0.00	0	0	0	0.0000	14.4016	14.4016	12.961	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2063	0.00	0	0	0	0.0000	13.6863	13.6863	12.318	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2064	0.00	0	0	0	0.0000	13.0108	13.0108	11.710	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2065	0.00	0	0	0	0.0000	12.3726	12.3726	11.135	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2066	0.00	0	0	0	0.0000	11.7695	11.7695	10.593	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2067	0.00	0	0	0	0.0000	11.1993	11.1993	10.079	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2068	0.00	0	0	0	0.0000	10.6601	10.6601	9.594	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2069	0.00	0	0	0	0.0000	10.1500	10.1500	9.135	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2070	0.00	0	0	0	0.0000	9.6674	9.6674	8.701	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2071	0.00	0	0	0	0.0000	9.2104	9.2104	8.289	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2072	0.00	0	0	0	0.0000	8.7778	8.7778	7.900	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2073	0.00	0	0	0	0.0000	8.3680	8.3680	7.531	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2074	0.00	0	0	0	0.0000	7.9797	7.9797	7.182	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2075	0.00	0	0	0	0.0000	7.6116	7.6116	6.850	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2076	0.00	0	0	0	0.0000	7.2627	7.2627	6.536	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2077	0.00	0	0	0	0.0000	6.9317	6.9317	6.239	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2078	0.00	0	0	0	0.0000	6.6178	6.6178	5.956	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2079	0.00	0	0	0	0.0000	6.3198	6.3198	5.688	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2080	0.00	0	0	0	0.0000	6.0370	6.0370	5.433	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2081	0.00	0	0	0	0.0000	5.7685	5.7685	5.192	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2082	0.00	0	0	0	0.0000	5.5134	5.5134	4.962	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2083	0.00	0	0	0	0.0000	5.2710	5.2710	4.744	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2084	0.00	0	0	0	0.0000	5.0407	5.0407	4.537	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2085	0.00	0	0	0	0.0000	4.8217	4.8217	4.340	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2086	0.00	0	0	0	0.0000	4.6135	4.6135	4.152	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2087	0.00	0	0	0	0.0000	4.4154	4.4154	3.974	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2088	0.00	0	0	0	0.0000	4.2270	4.2270	3.804	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2089	0.00	0	0	0	0.0000	4.0476	4.0476	3.643	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2090	0.00	0	0	0	0.0000	3.8768	3.8768	3.489	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2091	0.00	0	0	0	0.0000	3.7142	3.7142	3.343	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2092	0.00	0	0	0	0.0000	3.5593	3.5593	3.203	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2093	0.00	0	0	0	0.0000	3.4116	3.4116	3.070	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2094	0.00	0	0	0	0.0000	3.2709	3.2709	2.944	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2095	0.00	0	0	0	0.0000	3.1368	3.1368	2.823	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2096	0.00	0	0	0	0.0000	3.0089	3.0089	2.708	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2097	0.00	0	0	0	0.0000	2.8868	2.8868	2.598	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2098	0.00	0	0	0	0.0000	2.7704	2.7704	2.493	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2099	0.00	0	0	0	0.0000	2.6593	2.6593	2.393	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2100	0.00	0	0	0	0.0000	2.5532	2.5532	2.298	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01

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Sections of NGER (Measurement) Determ. 2008 amended, IPCC 2006 Guidelines Vol. 5			NGER Section 5.11									NGER Section 5.11											
NSW	**of total) Determination**		**Waste mix types - Commercial and Industry (proportions of total) Note: defaults can be overridden in accordance with NGER Determination**									**Waste mix types - Construction and Demolition (proportions of total) Note: defaults can be overridden in accordance with NGER Determination**									**Waste mix type prop Note: these**		
Financial year ending - input landfill opening year in cell below	Rubber and Leather	Inert (including concrete, metal, plastic, glass) (by deduction)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Inert (including concrete, metal, plastic, glass) (by deduction)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Inert (including concrete, metal, plastic, glass) (by deduction)	Food	Paper and paper board	Garden and park
1986	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1987	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1988	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1989	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1990	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1991	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1992	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1993	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1994	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1995	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1996	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1997	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1998	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1999	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2000	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2001	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2002	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2003	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2004	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2005	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2006	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2007	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2008	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2009	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2010	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2011	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2012	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2013	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2014	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2015	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2016	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2017	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2018	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2019	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2020	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2021	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2022	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2023	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2024	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2025	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2026	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2027	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2028	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2029	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2030	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2031	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2032	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2033	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2034	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2035	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2036	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2037	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2038	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2039	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2040	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2041	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2042	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2043	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2044	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2045	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2046	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2047	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2048	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2049	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2050	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52

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Financial year ending - input landfill opening year in cell below	Rubber and Leather	Inert (including concrete, metal, plastic, glass) (by deduction)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Inert (including concrete, metal, plastic, glass) (by deduction)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Inert (including concrete, metal, plastic, glass) (by deduction)	Food	Paper and paper board	Garden and park
2051	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2052	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2053	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2054	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2055	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2056	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2057	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2058	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2059	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2060	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2061	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2062	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2063	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2064	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2065	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2066	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2067	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2068	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2069	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2070	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2071	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2072	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2073	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2074	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2075	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2076	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2077	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2078	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2079	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2080	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2081	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2082	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2083	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2084	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2085	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2086	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2087	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2088	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2089	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2090	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2091	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2092	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2093	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2094	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2095	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2096	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2097	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2098	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2099	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2100	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52

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Sections of NGER (Measurement) Determ. 2008 amended, IPCC 2006 Guidelines Vol. 5	NGER Section 5.11						IPCC Sections 3.2.3, 3.7.2.2									IPCC Sections 3.2.3, 3.7.2.2	IPCC Sections 3.2.3, 3A1.3	IPCC Section 3.2.3
NSW	**portions (adjusted for licensing restrictions if necessary) e values are calculated and no input is required**						**Fraction of DOC that decomposes (DOCf) (default 0.5) Note: only override default with robust evidence in accordance with IPCC 2006 Guidelines Vol. 5**									**Note: only override default with robust evidence in accordance with IPCC 2006 Guidelines Vol. 5**		
Financial year ending - input landfill opening year in cell below	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Inert (including concrete, metal, plastic, glass)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Concrete, metal, plastic and glass	Methane Correction Factor (MCF)	Decomposition delay (months) (IPCC default is 6)	Fraction of CH_4 in landfill gas (F)
1986	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1987	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1988	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1989	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1990	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1991	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1992	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1993	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1994	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1995	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1996	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1997	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1998	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1999	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2000	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2001	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2002	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2003	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2004	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2005	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2006	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2007	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2008	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2009	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2010	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2011	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2012	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2013	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2014	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2015	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2016	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2017	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2018	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2019	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2020	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2021	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2022	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2023	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2024	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2025	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2026	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2027	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2028	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2029	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2030	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2031	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2032	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2033	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2034	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2035	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2036	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2037	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2038	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2039	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2040	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2041	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2042	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2043	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2044	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2045	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2046	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2047	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2048	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2049	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2050	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50

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Financial year ending - input landfill opening year in cell below	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Inert (including concrete, metal, plastic, glass)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Concrete, metal, plastic and glass	Methane Correction Factor (MCF)	Decomposition delay (months) (IPCC default is 6)	Fraction of CH_4 in landfill gas (F)
2051	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2052	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2053	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2054	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2055	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2056	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2057	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2058	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2059	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2060	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2061	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2062	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2063	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2064	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2065	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2066	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2067	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2068	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2069	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2070	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2071	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2072	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2073	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2074	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2075	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2076	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2077	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2078	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2079	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2080	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2081	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2082	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2083	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2084	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2085	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2086	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2087	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2088	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2089	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2090	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2091	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2092	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2093	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2094	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2095	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2096	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2097	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2098	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2099	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2100	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50

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Sections of NGER (Measurement) Determ. 2008 amended, IPCC 2006 Guidelines Vol. 5	NGER Section 5.5	NGER Section 5.4			NGER Section 5.4/IPCC Equation 3.6	NGER Section 5.4		NGER Section 5.10			NGER Section 5.11							
NSW	**Select State/Territory, enter landfill opening year and enter Waste (kt), Q_{cap}, Q_{flared}, Q_{tr}**				**No input required in the fields below**			**Waste streams (proportions of total) Note: defaults can be overridden in accordance with NGER Determination**			**Waste mix types - Municipal Solid Waste (proportions Note: defaults can be overridden in accordance with NGER**							
Financial year ending - input landfill opening year in cell below	Waste received landfill (kt)	Q_{cap} (CH_4 only) (m^3)	Q_{flared} (CH_4 only) (m^3)	Q_{tr} (CH_4 only) (m^3)	CH_4 captured ($Q_{cap}+Q_{tr}+Q_{flared}$ in kt CO_2-e)	CH_4^* (kt CO_2-e)	CH_{4gen} (kt CO_2-e)	Emissions E_j (CO_2-e) (kt)	Municipal Solid Waste	Commercial and Industrial	Construction and Demolition (calculated by deduction)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies
1986	109.69	0	0	0	0.0000	0.0000	0.0000	0.000	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1987	111.13	0	0	0	0.0000	19.4285	19.4285	17.486	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1988	112.60	0	0	0	0.0000	37.5946	37.5946	33.835	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1989	114.08	0	0	0	0.0000	54.6188	54.6188	49.157	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1990	115.58	0	0	0	0.0000	70.6088	70.6088	63.548	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1991	117.10	0	0	0	0.0000	85.6609	85.6609	77.095	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1992	118.65	0	0	0	0.0000	99.8619	99.8619	89.876	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1993	120.21	0	0	0	0.0000	113.2897	113.2897	101.961	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1994	121.79	0	0	0	0.0000	126.0145	126.0145	113.413	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1995	123.40	0	0	0	0.0000	138.0998	138.0998	124.290	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1996	125.02	0	0	0	0.0000	149.6030	149.6030	134.643	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1997	126.67	0	0	0	0.0000	160.5761	160.5761	144.518	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1998	118.16	0	0	0	0.0000	171.0664	171.0664	153.960	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
1999	121.29	0	0	0	0.0000	179.3145	179.3145	161.383	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2000	123.10	0	0	0	0.0000	187.5572	187.5572	168.801	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2001	113.01	0	0	0	0.0000	195.5616	195.5616	176.005	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2002	129.44	0	0	0	0.0000	201.2351	201.2351	181.112	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2003	163.87	0	0	0	0.0000	209.4579	209.4579	188.512	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2004	117.92	0	0	0	0.0000	223.2154	223.2154	200.894	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2005	119.26	0	97,673	0	1.3915	227.8369	227.8369	203.801	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2006	111.15	0	2,968,119	0	42.2850	232.4187	232.4187	171.120	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2007	118.19	2,325,690	220,646	0	36.2761	235.2857	235.2857	179.109	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2008	100.54	2,930,297	139	0	41.7482	239.2519	239.2519	177.753	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2009	103.03	3,007,477	1,245	0	42.8635	239.8525	239.8525	177.290	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2010	104.37	2,952,043	43,321	0	42.6732	240.9165	240.9165	178.419	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2011	105.74	2,773,680	163,024	0	41.8375	242.1967	242.1967	180.323	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2012	107.12	2,783,323	163,591	0	41.9829	243.6754	243.6754	181.523	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2013	108.52	2,796,697	164,377	0	42.1846	245.3362	245.3362	182.836	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2014	109.93	2,813,334	165,355	0	42.4356	247.1657	247.1657	184.257	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2015	111.36	2,832,849	166,502	0	42.7299	249.1492	249.1492	185.777	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2016	112.81	2,854,884	167,797	0	43.0623	251.2755	251.2755	187.392	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2017	114.27	2,879,158	169,224	0	43.4285	253.5349	253.5349	189.096	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2018	115.76	2,905,432	170,768	0	43.8248	255.9185	255.9185	190.884	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2019	117.26	2,933,504	172,418	0	44.2482	258.4188	258.4188	192.753	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2020	118.79	2,963,203	174,163	0	44.6962	261.0288	261.0288	194.699	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2021	120.33	2,994,383	175,996	0	45.1665	263.7427	263.7427	196.719	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2022	121.90	3,026,921	177,908	0	45.6573	266.5551	266.5551	198.808	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2023	123.48	3,060,713	179,895	0	46.1670	269.4613	269.4613	200.965	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2024	125.09	3,095,669	181,949	0	46.6943	272.4571	272.4571	203.187	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2025	126.71	3,131,714	184,068	0	47.2379	275.5389	275.5389	205.471	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2026	128.36	3,168,782	186,246	0	47.7971	278.7033	278.7033	207.816	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2027	130.03	3,206,821	188,482	0	48.3708	281.9477	281.9477	210.219	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2028	131.72	3,245,782	190,772	0	48.9585	285.2694	285.2694	212.680	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2029	133.43	3,285,627	193,114	0	49.5595	288.6662	288.6662	215.196	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2030	135.16	3,326,324	195,506	0	50.1734	292.1363	292.1363	217.767	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2031	136.92	3,367,843	197,946	0	50.7997	295.6780	295.6780	220.390	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2032	0.00	3,410,161	200,433	0	51.4380	299.2897	299.2897	223.067	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2033	0.00	3,453,260	202,967	0	52.0881	278.4027	278.4027	203.683	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2034	0.00	3,186,522	187,289	0	48.0647	259.1840	259.1840	190.007	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2035	0.00	2,947,727	173,254	0	44.4627	241.4802	241.4802	177.316	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2036	0.00	2,733,232	160,647	0	41.2274	225.1542	225.1542	165.534	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2037	0.00	2,539,933	149,285	0	38.3117	210.0833	210.0833	154.594	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2038	0.00	2,365,179	139,014	0	35.6757	196.1571	196.1571	144.433	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2039	0.00	2,206,704	129,700	0	33.2853	183.2768	183.2768	134.992	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2040	0.00	2,062,561	121,228	0	31.1111	171.3530	171.3530	126.218	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2041	0.00	1,931,081	113,500	0	29.1279	160.3052	160.3052	118.060	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2042	0.00	1,810,821	106,432	0	27.3140	150.0607	150.0607	110.472	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2043	0.00	1,700,538	99,950	0	25.6505	140.5535	140.5535	103.413	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2044	0.00	1,599,153	93,991	0	24.1212	131.7239	131.7239	96.842	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2045	0.00	1,505,729	88,500	0	22.7120	123.5177	123.5177	90.725	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2046	0.00	1,419,449	83,429	0	21.4106	115.8854	115.8854	85.027	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2047	0.00	1,339,602	78,736	0	20.2062	108.7822	108.7822	79.718	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2048	0.00	1,265,562	74,384	0	19.0894	102.1670	102.1670	74.770	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2049	0.00	1,196,780	70,341	0	18.0519	96.0024	96.0024	70.155	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2050	0.00	1,132,771	66,579	0	17.0864	90.2543	90.2543	65.851	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01

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Financial year ending - input landfill opening year in cell below	Waste received landfill (kt)	Q_{cap} (CH_4 only) (m^3)	Q_{flared} (CH_4 only) (m^3)	Q_{tr} (CH_4 only) (m^3)	CH_4 captured ($Q_{cap}+Q_{tr}+Q_{flared}$ in kt CO_2-e)	CH_4^* (kt CO_2-e)	CH_{4gen} (kt CO_2-e)	Emissions E_j (CO_2-e) (kt)	Municipal Solid Waste	Commercial and Industrial	Construction and Demolition (calculated by deduction)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies
2051	0.00	1,073,107	63,072	0	16.1865	84.8912	84.8912	61.834	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2052	0.00	1,017,408	59,799	0	15.3463	79.8846	79.8846	58.084	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2053	0.00	965,337	56,738	0	14.5609	75.2082	75.2082	54.583	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2054	0.00	916,592	53,873	0	13.8256	70.8377	70.8377	51.311	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2055	0.00	870,902	51,188	0	13.1365	66.7510	66.7510	48.253	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2056	0.00	828,027	48,668	0	12.4897	62.9277	62.9277	45.394	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2057	0.00	787,747	46,300	0	11.8822	59.3490	59.3490	42.720	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2058	0.00	0	0	0	0.0000	55.9976	55.9976	50.398	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2059	0.00	0	0	0	0.0000	52.8577	52.8577	47.572	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2060	0.00	0	0	0	0.0000	49.9143	49.9143	44.923	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2061	0.00	0	0	0	0.0000	47.1540	47.1540	42.439	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2062	0.00	0	0	0	0.0000	44.5642	44.5642	40.108	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2063	0.00	0	0	0	0.0000	42.1333	42.1333	37.920	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2064	0.00	0	0	0	0.0000	39.8506	39.8506	35.866	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2065	0.00	0	0	0	0.0000	37.7060	37.7060	33.935	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2066	0.00	0	0	0	0.0000	35.6904	35.6904	32.121	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2067	0.00	0	0	0	0.0000	33.7953	33.7953	30.416	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2068	0.00	0	0	0	0.0000	32.0127	32.0127	28.811	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2069	0.00	0	0	0	0.0000	30.3352	30.3352	27.302	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2070	0.00	0	0	0	0.0000	28.7561	28.7561	25.880	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2071	0.00	0	0	0	0.0000	27.2689	27.2689	24.542	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2072	0.00	0	0	0	0.0000	25.8679	25.8679	23.281	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2073	0.00	0	0	0	0.0000	24.5474	24.5474	22.093	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2074	0.00	0	0	0	0.0000	23.3025	23.3025	20.972	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2075	0.00	0	0	0	0.0000	22.1283	22.1283	19.915	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2076	0.00	0	0	0	0.0000	21.0204	21.0204	18.918	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2077	0.00	0	0	0	0.0000	19.9747	19.9747	17.977	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2078	0.00	0	0	0	0.0000	18.9874	18.9874	17.089	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2079	0.00	0	0	0	0.0000	18.0549	18.0549	16.249	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2080	0.00	0	0	0	0.0000	17.1737	17.1737	15.456	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2081	0.00	0	0	0	0.0000	16.3409	16.3409	14.707	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2082	0.00	0	0	0	0.0000	15.5535	15.5535	13.998	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2083	0.00	0	0	0	0.0000	14.8087	14.8087	13.328	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2084	0.00	0	0	0	0.0000	14.1040	14.1040	12.694	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2085	0.00	0	0	0	0.0000	13.4370	13.4370	12.093	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2086	0.00	0	0	0	0.0000	12.8055	12.8055	11.525	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2087	0.00	0	0	0	0.0000	12.2075	12.2075	10.987	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2088	0.00	0	0	0	0.0000	11.6409	11.6409	10.477	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2089	0.00	0	0	0	0.0000	11.1039	11.1039	9.994	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2090	0.00	0	0	0	0.0000	10.5949	10.5949	9.535	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2091	0.00	0	0	0	0.0000	10.1122	10.1122	9.101	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2092	0.00	0	0	0	0.0000	9.6543	9.6543	8.689	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2093	0.00	0	0	0	0.0000	9.2198	9.2198	8.298	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2094	0.00	0	0	0	0.0000	8.8073	8.8073	7.927	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2095	0.00	0	0	0	0.0000	8.4157	8.4157	7.574	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2096	0.00	0	0	0	0.0000	8.0438	8.0438	7.239	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2097	0.00	0	0	0	0.0000	7.6904	7.6904	6.921	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2098	0.00	0	0	0	0.0000	7.3546	7.3546	6.619	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2099	0.00	0	0	0	0.0000	7.0353	7.0353	6.332	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01
2100	0.00	0	0	0	0.0000	6.7318	6.7318	6.059	0.26	0.04	1.00	0.12	0.21	0.12	0.08	0.00	0.01	0.01

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Sections of NGER (Measurement) Determ. 2008 amended, IPCC 2006 Guidelines Vol. 5			NGER Section 5.11									NGER Section 5.11											
NSW	**of total) Determination**		**Waste mix types - Commercial and Industry (proportions of total) Note: defaults can be overridden in accordance with NGER Determination**									**Waste mix types - Construction and Demolition (proportions of total) Note: defaults can be overridden in accordance with NGER Determination**									**Waste mix type prop Note: these**		
Financial year ending - input landfill opening year in cell below	Rubber and Leather	Inert (including concrete, metal, plastic, glass) (by deduction)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Inert (including concrete, metal, plastic, glass) (by deduction)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Inert (including concrete, metal, plastic, glass) (by deduction)	Food	Paper and paper board	Garden and park
1986	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1987	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1988	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1989	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1990	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1991	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1992	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1993	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1994	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1995	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1996	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1997	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1998	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
1999	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2000	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2001	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2002	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2003	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2004	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2005	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2006	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2007	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2008	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2009	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2010	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2011	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2012	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2013	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2014	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2015	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2016	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2017	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2018	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2019	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2020	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2021	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2022	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2023	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2024	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2025	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2026	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2027	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2028	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2029	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2030	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2031	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2032	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2033	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2034	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2035	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2036	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2037	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2038	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2039	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2040	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2041	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2042	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2043	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2044	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2045	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2046	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2047	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2048	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2049	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2050	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52

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Financial year ending - input landfill opening year in cell below	Rubber and Leather	Inert (including concrete, metal, plastic, glass) (by deduction)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Inert (including concrete, metal, plastic, glass) (by deduction)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Inert (including concrete, metal, plastic, glass) (by deduction)	Food	Paper and paper board	Garden and park
2051	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2052	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2053	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2054	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2055	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2056	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2057	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2058	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2059	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2060	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2061	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2062	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2063	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2064	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2065	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2066	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2067	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2068	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2069	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2070	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2071	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2072	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2073	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2074	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2075	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2076	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2077	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2078	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2079	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2080	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2081	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2082	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2083	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2084	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2085	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2086	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2087	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2088	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2089	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2090	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2091	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2092	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2093	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2094	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2095	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2096	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2097	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2098	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2099	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52
2100	0.32	1.00	0.15	0.06	0.06	0.12	0.00	0.00	0.01	0.31	1.00	0.03	0.04	0.49	0.08	0.00	0.00	0.00	0.35	1.00	0.06	0.10	0.52

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Sections of NGER (Measurement) Determ. 2008 amended, IPCC 2006 Guidelines Vol. 5	NGER Section 5.11						IPCC Sections 3.2.3, 3.7.2.2									IPCC Sections 3.2.3, 3.7.2.2	IPCC Sections 3.2.3, 3A1.3	IPCC Section 3.2.3
NSW	**portions (adjusted for licensing restrictions if necessary) e values are calculated and no input is required**						**Fraction of DOC that decomposes (DOCf) (default 0.5) Note: only override default with robust evidence in accordance with IPCC 2006 Guidelines Vol. 5**									**Note: only override default with robust evidence in accordance with IPCC 2006 Guidelines Vol. 5**		
Financial year ending - input landfill opening year in cell below	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Inert (including concrete, metal, plastic, glass)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Concrete, metal, plastic and glass	Methane Correction Factor (MCF)	Decomposition delay (months) (IPCC default is 6)	Fraction of CH_4 in landfill gas (F)
1986	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1987	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1988	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1989	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1990	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1991	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1992	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1993	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1994	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1995	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1996	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1997	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1998	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
1999	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2000	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2001	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2002	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2003	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2004	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2005	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2006	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2007	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2008	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2009	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2010	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2011	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2012	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2013	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2014	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2015	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2016	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2017	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2018	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2019	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2020	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2021	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2022	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2023	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2024	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2025	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2026	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2027	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2028	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2029	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2030	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2031	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2032	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2033	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2034	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2035	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2036	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2037	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2038	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2039	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2040	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2041	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2042	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2043	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2044	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2045	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2046	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2047	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2048	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2049	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2050	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50

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Financial year ending - input landfill opening year in cell below	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Inert (including concrete, metal, plastic, glass)	Food	Paper and paper board	Garden and park	Wood and wood waste	Textiles	Sludge	Nappies	Rubber and Leather	Concrete, metal, plastic and glass	Methane Correction Factor (MCF)	Decomposition delay (months) (IPCC default is 6)	Fraction of CH_4 in landfill gas (F)
2051	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2052	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2053	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2054	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2055	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2056	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2057	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2058	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2059	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2060	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2061	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2062	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2063	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2064	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2065	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2066	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2067	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2068	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2069	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2070	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2071	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2072	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2073	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2074	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2075	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2076	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2077	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2078	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2079	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2080	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2081	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2082	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2083	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2084	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2085	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2086	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2087	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2088	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2089	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2090	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2091	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2092	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2093	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2094	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2095	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2096	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2097	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2098	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2099	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50
2100	0.11	0.00	0.00	0.00	0.45	1.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	6.00	0.50

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Cardno
Shaping the Future

Additions to Awaba Waste Management Facility

Appendix P
Traffic Report

Lake Macquarie City Council

Cardno
Shaping the Future

AWABA WASTE MANAGEMENT FACILITY TRAFFIC IMPACT ASSESSMENT

FINAL REPORT

Prepared for
Lake Macquarie City Council

transportation | traffic | engineering | planning

December 2012

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Awaba Waste Management Facility Traffic Impact Assessment					
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Final Draft	8th July 2011	Neill Miller	NM	Jason Scoufis	JS
Final	14th December 2011	Neill Miller	NM	John Gill	JG

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Appendix

1 INTRODUCTION

Cardno has been commissioned by Lake Macquarie City Council to prepare a Traffic Impact Assessment (TIA) for the expansion of the Awaba Waste Management Facility. This report assesses the traffic impacts on the surrounding road network both during the construction phase and operational phase.

1.1 PROJECT AND SITE DESCRIPTION

Awaba Waste Management Facility services the Lake Macquarie City Council area, which has a population of approximatetely 200,000 with a growth rate of 0.7% per annum. The lifespan of the waste management facility is currently very short, with only 4-6 years capacity remaining. The proposal includes excavation of additional areas to create new landfill aisrspace which will allow the site to operate until year 2034.

The location of the Awaba Waste Management Facility is to the southeast of Awaba and southwest of Toronto, as illustrated in **Figure 1** below. The landfill site is accessed via Wilton Road, which connects to Wangi Road to the east and Awaba Road to the north.

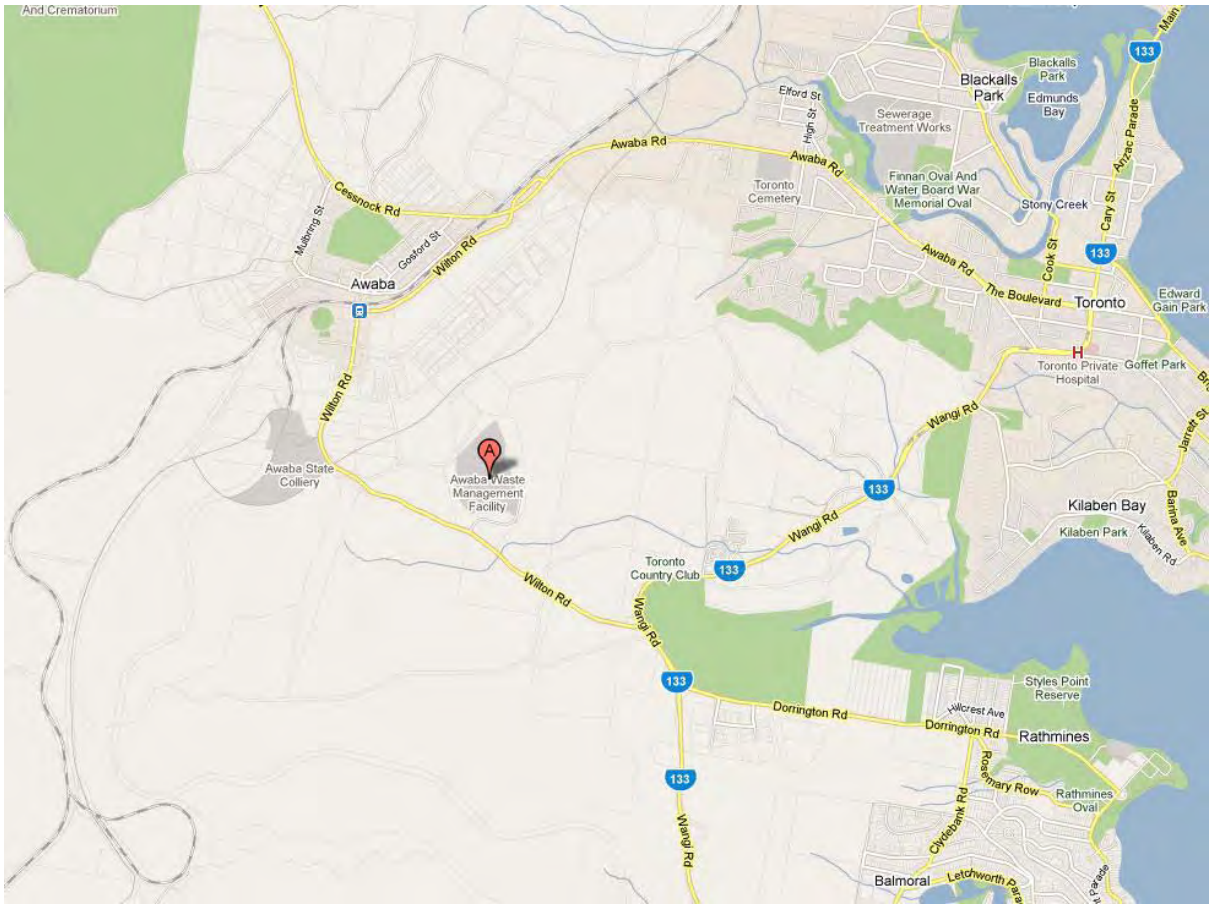

Figure 1 Site Location (Google Maps)

1.2 DIRECTOR-GENERAL REQUIREMENTS

The Director-General requirements relating to the assessment of traffic and transport issues were specified as follows:

- Details of traffic likely to be generated during construction and operation, and an assessment of the impact of this traffic of the safety and efficiency of the surrounding road network.
- Consideration of whether transport links to the landfill are optimised.

It is noted that the above requirements have been addressed in this study and are outlined in the following report.

1.3 RTA REQUIREMENTS

Through consultation the RTA advised that the study should include the following:

- Identify all relevant traffic routes and intersection for access to/from the subject area.
- Current traffic counts for all the above traffic routes and intersections.
- 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.
- Consideration of the traffic impacts on affected intersections and in particular the capacity of the intersections of Wilton Road/Wangi Road (MR 217) and Wilton Road/ Awaba Road (MR 220) to safely and efficiently cater for any additional vehicular traffic generated.
- Details of the anticipated route of trucks on the major arterial and local road network.

It is noted that the above requirements have been addressed in this study and are outlined in the following report.

1.4 SCOPE OF WORKS

The following scope of works was undertaken as part of this study and is subsequently outlined in this report:

- Assess existing operational impacts of the site on the surrounding road network.
- Determine traffic generation during construction and operational phases.
- Assess future operational impacts of the site on the surrounding road network.
- Determine optimal transport links to the landfill site.

1.5 REFERENCE DOCUMENTS

- AUSTROADS Guide to Traffic Management Part 3: Traffic Studies and Analysis.

2 EXISTING SITUATION

2.1 EXISTING ROAD NETWORK

2.1.1 Wilton Road

Wilton Road is a collector road with a posted speed limit of 80 km/hr linking Wangi Road and Awaba Road. The only significant developments that access Wilton Road are the Awaba Waste Management Facility and the Awaba State Colliery. Wilton Road is a single carriageway one travel lane in each direction, with occasional turning lanes for access into private roads.

2.1.2 Wangi Road

Wangi Road (MR217) is a state road with a posted speed limit of 80 km/hr. It is generally one lane each way with a painted median island separating the opposing traffic flows with additional turning lanes at intersections. Significant road upgrade works have been undertaken in recent years. It is a designated B-Double Route.

2.1.3 Awaba Road

Awaba Road (MR220) is a two lane road with a posted speed limit of 80 km/hr. Additional turn lanes are provided at intersections. Awaba Road provides access to the F3 Freeway via Palmers Road. It is a designated B-Double Route.

2.1.4 Awaba Landfill Private Road

The Awaba Landfill Private Road is the access to the Awaba Waste Management Facility. The road has a width of 10 metres and is divided by a median and has one lane in each direction at the approach to Wilton Road.

2.2 EXISTING KEY INTERSECTIONS

The following intersections located in the vicinity of the landfill site were assessed in this traffic study. The existing intersections used in the assessment are described below.

2.2.1 Wilton Road/Wangi Road

The intersection of Wilton Road/Wangi Road is priority controlled and includes the following characteristics:

- Two approach lanes on the northern leg, including a through lane and a right turn bay and one departure lane.
- Two approach lanes on the southern leg, including a through lane and a left slip lane and one departure lane.
- Two approach lanes on the western leg, including a right turn lane and a short left turn lane and one departure lane.

The intersection layout is illustrated in **Figure 2**.

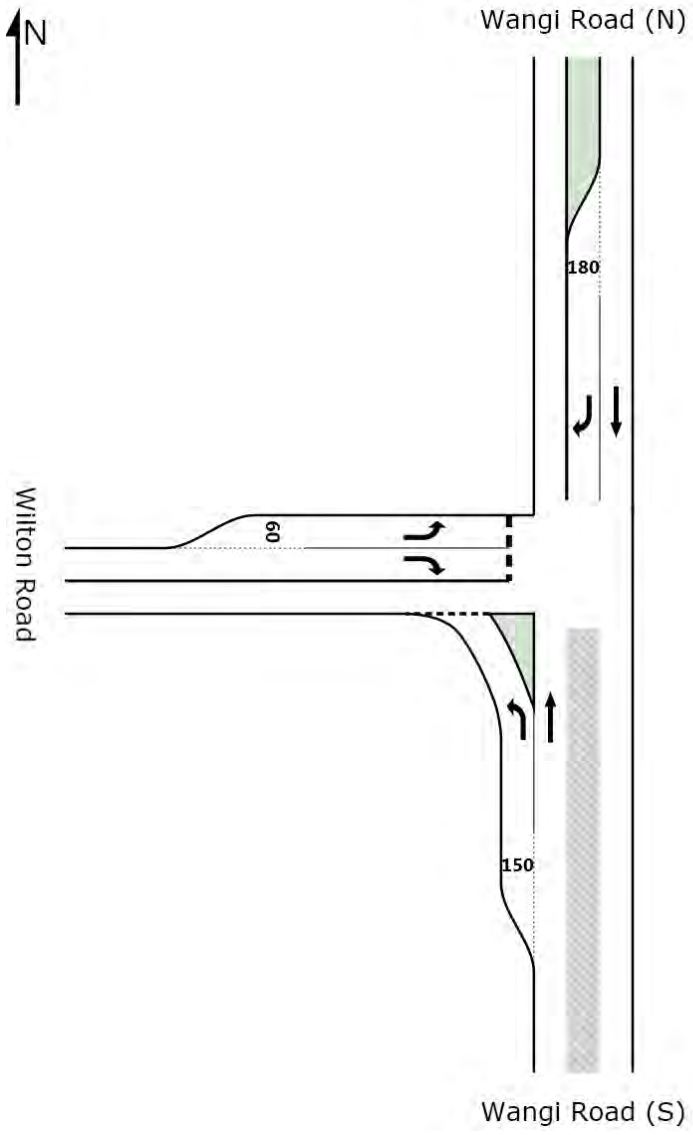

Figure 2 **Existing Intersection Layout Wilton Road/Wangi Road**

2.2.2 Wilton Road/Awaba Waste Management Facility Access Road

The intersection of Wilton Road/ Awaba Waste Facility Access Road is priority controlled and includes the following characteristics:

- Two approach lanes on the eastern leg, including a through lane and a right turn bay and one departure lane.
- One approach lane on the western leg and two departure lanes, including a short acceleration lane for vehicles departing the landfill site.
- One approach lane on landfill site access allowing left and right turn movements.

The intersection layout is illustrated in **Figure 3**.

Figure 3 Existing Intersection Layout Wilton Road/Awaba Waste Management Facility Access Road

2.2.3 Wilton Road/Awaba Road/Cessnock Road

The intersection of Wilton Road/ Awaba Road/Cessnock Road is priority controlled and includes the following characteristics:

- Two approach lanes on the north-eastern leg, including a through lane and a right turn bay and one departure lane.
- Two approach lanes on the south-western leg, including a through lane and a short left turn lane and one departure lane.
- One approach lane on the north-western leg and one departure lane.

The intersection layout is illustrated in **Figure 4**.

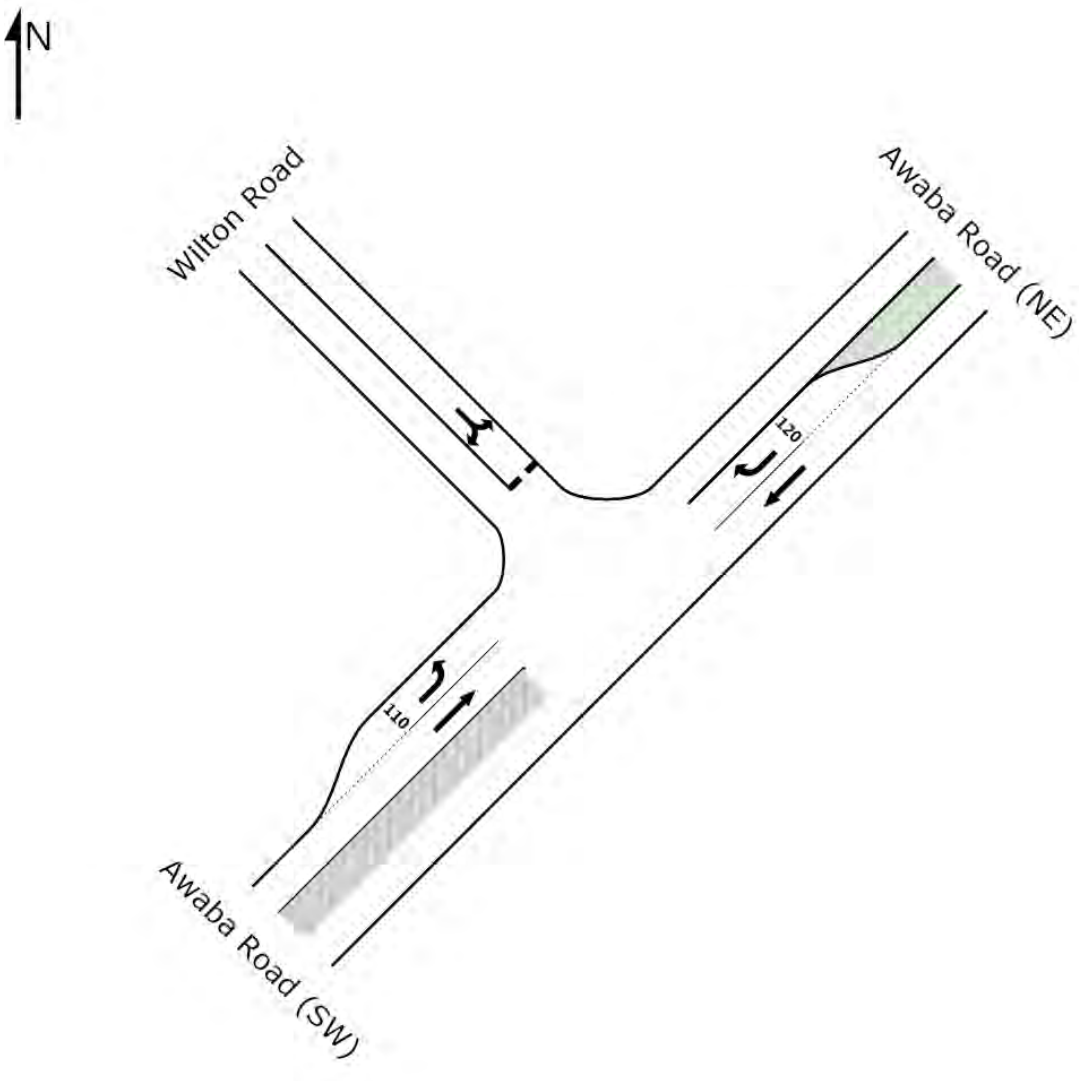

Figure 4 Existing Intersection Layout Wilton Road/Awaba Road/Cessnock Road

2.3 CURRENT WASTE DISPOSAL OPERATIONS

The site operates between 8:00am to 4:00pm seven days per week with the exception of Christmas Day and is available for the public to access under supervision by Council staff. All vehicles are permitted to access the tip face including the public. Data supplied by Council's Waste Sites Supervisor of traffic movements for the period 7nd February 2011 to 13th February 2011 indicates higher traffic generation at the site on weekdays than on weekends. Two machines work full time at the tip face and in total there is 7 staff on site. A car park, which has a capacity of 24 vehicles, is provided adjacent to the weighbridge.

2.4 SITE ACCESS

The existing site access is a priority controlled intersection providing direct access to Wilton Road. The access driveway is 10 metres wide with a concrete median along the centre to separate opposing traffic flows. Vehicles accessing the site from the east are provided with a 150 metre right turn bay on Wilton Road, and vehicles departing the site to the west are provided with a 50 metre acceleration lane on the western leg of Wilton Road.

2.5 EXISTING TRAFFIC MOVEMENTS

A full week of data of traffic movements was provided by Council in order to determine the traffic generation of the facility but also a profile of its usage throughout the day and on a weekend. **Table 2-1** below shows the 5 day and 7 day average existing site traffic generation profile. It is noted that the site traffic generation is generally even throughout the day, with a peak hour generation between 11:00 am and 12:00 pm.

Table 2-1 Existing Site Traffic Generation Profile

Time		5 Day Average Traffic Count	7 Day Average Traffic Count
From	To		
7:00	8:00	9	9
8:00	9:00	19	15
9:00	10:00	15	14
10:00	11:00	24	22
11:00	12:00	27	26
12:00	13:00	18	21
13:00	14:00	18	18
14:00	15:00	23	22
15:00	16:00	21	22
16:00	17:00	3	3
Total		**176**	**169**

2.6 MID-BLOCK PERFORMANCE

A midblock traffic assessment was undertaken for traffic volumes travelling east and west of the landfill site along Wilton Road. It is noted that the midblock flows are within capacity in all the peak periods operating at Levels of Service A.

Table 2-2 Mid-Block Level of Service

Location	AM Peak		Midday Peak		PM Peak	
	Traffic Volumes	Level of Service*	Traffic Volumes	Level of Service*	Traffic Volumes	Level of Service*
Wilton Road, east of waste management facility	199	A	127	A	206	A
Wilton Road, west of waste management facility	187	A	91	A	204	A

*Note: Levels of Service based on Figure 3.1 in AUSTROADS Guide to Traffic Management Part 3: Traffic Studies and Analysis

2.7 EXISTING INTERSECTION PERFORMANCE

The intersection count data has been used to determine the intersection performance on the existing road network. An assessment was undertaken for the weekday AM and PM peak and business peak. The weekday peak was assessed rather than the weekend as this coincides with the peak traffic generation period as shown in the data supplied by Council.

The intersection operating performance was assessed using the SIDRA 5.0 software package to determine the degree of saturation (DoS), average delay (AVD in seconds) and level of service (LoS) at each intersection. The SIDRA 5.0 program provides LoS criteria tables for various intersection types. The key indicator of intersection performance is LoS, where results are placed on a continuum from 'A' to 'F', as shown in **Table 2-3**.

Table 2-3 Intersection Level of Service

LoS	Traffic Signal / Roundabout	Give Way / Stop Sign / T-Junction control
A	Good operation	Good operation
B	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	Satisfactory	Satisfactory, but accident study required
D	Operating near capacity	Near capacity & accident study required
E	At capacity, at signals incidents will cause excessive delays.	At capacity, requires other control mode
F	Unsatisfactory and requires additional capacity, Roundabouts require other control mode	At capacity, requires other control mode

The AVD provides a measure of the operational performance of an intersection as indicated below, which relates AVD to LOS. The AVD's should be taken as a guide only as longer delays could be tolerated in some locations (i.e.

inner city conditions) and on some roads (i.e. minor side street intersecting with a major arterial route). For traffic signals, the average delay over all movements should be taken. For roundabouts and priority control intersections (sign control) the critical movement for LoS assessment should be that movement with the highest AVD.

Table 2-4 Intersection Average Delay (AVD)

LoS	AVD per Vehicles (seconds/vehicle)
A	Less than 14
B	15 to 28
C	29 to 42
D	43 to 56
E	57 to 70
F	>70

The DoS is another measure of the operational performance of individual intersections. For intersections controlled by traffic signals both queue length and delay increase rapidly as DoS approaches 1. It is common practice to attempt to keep DoS to less than 0.9. DoS up to 0.8 generally represent satisfactory intersection operation. When DoS exceed 0.9 queues can be anticipated.

The SIDRA results are summarised in **Table 2-5** to **Table 2-7** and are provided in more detail in **Appendix A**. The results show that the intersection of Wilton Road/Wangi Road operates at capacity in the AM and PM peak periods with Levels of Service E and F, respectively. The movement experiencing significant delays is the right turn out of Wilton Road onto Wangi Road.

The other key intersections assessed operate within capacity with minimal delays during all three peak periods.

Table 2-5 Existing AM Peak Intersection Performance

Intersection	Intersection Control	Existing AM Peak		
		DoS	Delay (s)	Level of Service
Wilton Road/Wangi Road	Priority Control	0.503	64.3	E
Wilton Road/Awaba Waste Management Facility Access Road	Priority Control	0.025	26.5	B
Wilton Road/Awaba Road/Cessnock Road	Priority Control	0.200	13.6	A

Table 2-6 Existing Midday Peak Intersection Performance

Intersection	Intersection Control	Existing Midday Peak		
		DoS	Delay (s)	Level of Service
Wilton Road/Wangi Road	Priority Control	0.133	24.7	B
Wilton Road/Awaba Waste Management Facility Access Road	Priority Control	0.026	23.0	B
Wilton Road/Awaba Road/Cessnock Road	Priority Control	0.010	11.7	A

Table 2-7 Existing PM Peak Intersection Performance

Intersection	Intersection Control	Existing PM Peak		
		DoS	Delay (s)	Level of Service
Wilton Road/Wangi Road	Priority Control	0.822	81.3	F
Wilton Road/Awaba Waste Management Facility Access Road	Priority Control	0.006	20.8	B
Wilton Road/Awaba Road/Cessnock Road	Priority Control	0.131	14.5	B

2.7.1 Recommended Upgrades

The following upgrades are suggested to cater for existing traffic volumes at the intersection of Wilton Road/Wangi Road to reduce average delays experienced at the intersection for vehicles turning right onto Wangi Road.

- Convert intersection to seagull form with the addition of a turn bay on departure of the southern leg to provide storage space for vehicles turning right from Wilton Road.

It is noted that the upgrade will provide safety benefits as well as the additional capacity at the intersection. The upgraded intersection layout is illustrated in **Figure 5**.

Upgrading the intersection by providing a 'seagull intersection' has been assessed to reduce the delays experienced by vehicles making this turn movement as it provides storage in Wangi Road and allows a staged crossing of Wangi Road. The seagull will provide a dedicated right turn lane for exiting from Wilton Road before merging with through traffic in Wangi Road. Further detail is provided below in relation to performance of the upgraded intersection.

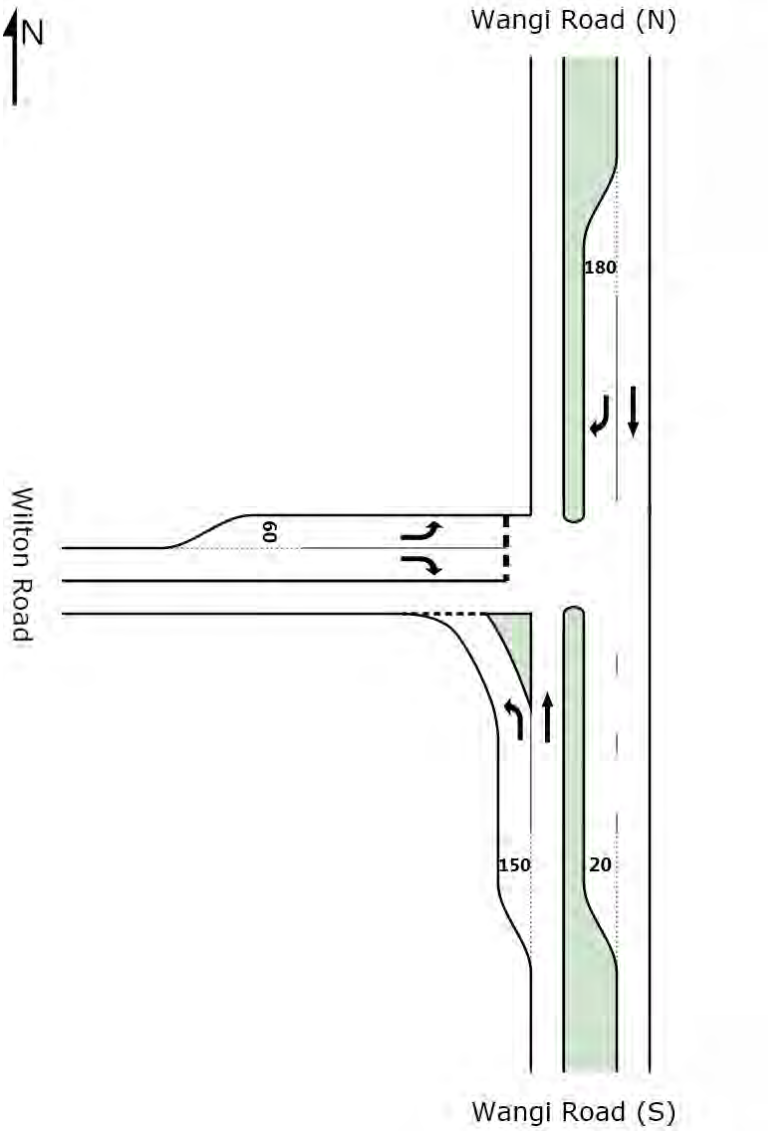

Figure 5 Upgraded Intersection Form of Wilton Road/Wangi Road

The results show that the seagull upgrade at the intersection of Wilton Road/Wangi Road will reduce average delays in all peak periods and improve the levels of service in the peak periods. The upgraded intersection form operates within capacity with minimal delays.

Table 2-8 Upgraded Wilton Road/Wangi Road (Seagull) Intersection Performance

Peak Period	DoS	Delay (s)	Level of Service
Existing AM Peak	0.111	30.3	C
Existing Midday Peak	0.052	17.6	B
Existing PM Peak	0.059	20.9	B

3 PROPOSED DEVELOPMENT

3.1 CONSTRUCTION TRAFFIC ASSESSMENT

In order to prolong the operations of the site, earthworks will be required at certain times to increase the site capacity. The intent is for the excavated material to stay on site resulting in minimal increases in traffic movements during these times. It is envisaged that when earthworks are required an additional 10 staff will access the site, as well as an additional three trucks. It is assumed that the additional traffic will enter the site in the AM peak and exit the site in the PM peak.

An assessment was undertaken of the future traffic flows at the key intersections in the vicinity of the site with the additional earthworks traffic. The assessment considered the existing intersection forms, as well as the recommended upgrade as discussed in Section 2.7.

The results of the impact assessment of the future traffic with additional construction traffic are shown in **Table 3-1** to **Table 3-3**. The results show that the additional earthworks traffic will have minimal impact on the surrounding road network with no change to the levels of service of the key intersections.

Table 3-1 Construction AM Peak Intersection Performance

Intersection	Intersection Control	Construction AM Peak		
		DoS	Delay (s)	Level of Service
Wilton Road/Wangi Road	Priority Control	1.000	>120	F
Wilton Road/Wangi Road (Seagull)	Priority Control	0.213	42.4	C
Wilton Road/Awaba Waste Management Facility Access Road	Priority Control	0.035	26.6	B
Wilton Road/Awaba Road/Cessnock Road	Priority Control	0.264	14.9	B

Table 3-2 Construction Midday Peak Intersection Performance

Intersection	Intersection Control	Construction Midday Peak		
		DoS	Delay (s)	Level of Service
Wilton Road/Wangi Road	Priority Control	0.228	31.5	C
Wilton Road/Wangi Road (Seagull)	Priority Control	0.082	19.1	B
Wilton Road/Awaba Waste Management Facility Access Road	Priority Control	0.034	23.0	B
Wilton Road/Awaba Road/Cessnock Road	Priority Control	0.074	12.0	A

Table 3-3 Construction PM Peak Intersection Performance

Intersection	Intersection Control	Construction PM Peak		
		DoS	Delay (s)	Level of Service
Wilton Road/Wangi Road	Priority Control	1.654	>120	F
Wilton Road/Wangi Road (Seagull)	Priority Control	0.101	24.8	B
Wilton Road/Awaba Waste Management Facility Access Road	Priority Control	0.007	20.9	B
Wilton Road/Awaba Road/Cessnock Road	Priority Control	0.185	16.1	B

3.2 OPERATIONAL TRAFFIC ASSESSMENT

An assessment was undertaken of the future traffic flows at the key intersections in the vicinity of the site. The assessment considered the existing intersection forms, as well as the suggested upgrade as discussed in Section 2.7.

The proposal will not result in any intensification of the site and will only result in the prolonging use of the site. There will be some additional trips generated as a result of the increase in population of the Lake Macquarie LGA, which is expected to be 0.7% per annum. This would result in an additional 7% trips in a 10 year horizon. A background growth assumption of 1.5% per annum has been adopted for the surrounding road network. It is expected that only 1-2 additional staff will be on site under the future operations.

The results of the future operational traffic impact assessment are shown in **Table 3-4** to **Table 3-6**. The results show that the intersection of Wilton Road/Wangi Road will operate at capacity in the AM and PM peak periods under its existing form, with significant delays to vehicles turning right from Wilton Road onto Wangi Road. The intersection will operate with minor delays during the Midday Peak Period.

The assessment of the proposed upgraded intersection form shows that the intersection will operate within capacity with reduced delays to vehicles approaching on Wilton Road. The Seagull form will provide additional capacity, as well as safety benefits to vehicles turning right onto Wangi Road. The intersection will operate at Levels of Service C in the AM peak and B in the Midday and PM peak periods.

The other key intersections assessed operate within capacity with minimal delays during all three peak periods.

Table 3-4 2021 Operation AM Peak Intersection Performance

Intersection	Intersection Control	Operational AM Peak		
		DoS	Delay (s)	Level of Service
Wilton Road/Wangi Road	Priority Control	1.000	>120	F
Wilton Road/Wangi Road (Seagull)	Priority Control	0.184	39.3	C
Wilton Road/Awaba Waste Management Facility Access Road	Priority Control	0.075	26.6	B
Wilton Road/Awaba Road/Cessnock Road	Priority Control	0.260	14.8	B

Table 3-5 2021 Operation Midday Peak Intersection Performance

Intersection	Intersection Control	Operational Midday Peak		
		DoS	Delay (s)	Level of Service
Wilton Road/Wangi Road	Priority Control	0.210	31.0	C
Wilton Road/Wangi Road (Seagull)	Priority Control	0.069	19.0	B
Wilton Road/Awaba Waste Management Facility Access Road	Priority Control	0.031	23.0	B
Wilton Road/Awaba Road/Cessnock Road	Priority Control	0.070	11.9	A

Table 3-6 2021 Operation PM Peak Intersection Performance

Intersection	Intersection Control	Operational PM Peak		
		DoS	Delay (s)	Level of Service
Wilton Road/Wangi Road	Priority Control	1.587	>120	F
Wilton Road/Wangi Road (Seagull)	Priority Control	0.093	24.7	B
Wilton Road/Awaba Waste Management Facility Access Road	Priority Control	0.007	20.9	B
Wilton Road/Awaba Road/Cessnock Road	Priority Control	0.183	16.0	B

4 OPTIMAL TRANSPORT LINKS

Traffic will either access the site via Wilton Road from Wangi Road to the north of south, Awaba Road or Cessnock Road depending on its origin. Given the minimal route choices to access the Waste Management Facility all links should continue to be utilised, however given the existing capacity constraints under existing traffic conditions, which will also be the case in the future at the Wilton Road/Wangi Road intersection for vehicles negotiating a right turn from Winton Road into Wangi Road, it is recommended that the Council waste service vehicles be provided with a 'recommended truck route map' which prevents this manoeuvre during peak hour conditions.

5 SUMMARY AND CONCLUSION

This traffic impact assessment has considered the impact of increasing the life span of the Awaba Waste Management Facility by providing additional landfill capacity to cater for demand until the year 2034 on the surrounding road network during both the future operational phase and the construction phase. The results indicate that the facility will have minimal impact on the surrounding road network under both these phases.

Currently the intersection of Wilton Road / Wangi Road operates at capacity in the AM and PM peak periods, with large delays to vehicles turning right from Wilton Road onto Wangi Road. This is an existing intersection capacity constraint and it is suggested that the intersection be upgraded to a 'seagull' intersection to increase its capacity and reduce delays for vehicles.

Transport links to the site were assessed and it was found that in order to optimise the performance of the road network Council waste service vehicle operators should be provided with a 'recommended truck route map', which minimises the number of vehicles making the right turn manoeuvre onto Wangi Road during peak hour conditions. Outside the peak hours vehicles can access the site from any direction with minimal impact on the road network.

APPENDICES

Appendix A
SIDRA OUTPUTS

MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road AM Peak

Wangi Road/Wilton Road AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	120	3.0	0.090	11.3	LOS A	0.5	3.2	0.12	0.64	45.1
2	T	827	8.0	0.446	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		947	7.4	0.446	1.4	LOS A	0.5	3.2	0.01	0.08	76.1
North: Wangi Road (N)											
8	T	678	8.0	0.366	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
9	R	24	58.0	0.108	30.4	LOS C	0.5	5.0	0.83	0.96	29.6
Approach		702	9.7	0.366	1.0	LOS C	0.5	5.0	0.03	0.03	77.6
West: Wilton Road											
10	L	21	38.0	0.111	30.3	LOS C	0.4	4.1	0.81	0.95	27.2
12	R	48	15.0	0.505	64.3	LOS E	2.1	16.5	0.95	1.04	25.9
Approach		69	22.0	0.503	54.0	LOS E	2.1	16.5	0.91	1.01	26.1
All Vehicles		1718	8.9	0.503	3.4	NA	2.1	16.5	0.06	0.10	71.9

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

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MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Landfill AM Peak

Wilton Road/Awaba Landfill AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Wilton Road (E)											
5	T	121	6.0	0.064	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
6	R	23	74.0	0.025	26.5	LOS B	0.1	1.2	0.19	0.75	42.1
Approach		144	16.9	0.064	4.2	LOS B	0.1	1.2	0.03	0.12	76.5
North: Awaba Waste Facility Access Road											
7	L	13	85.0	0.047	4.5	LOS A	0.2	2.0	0.22	0.32	23.0
9	R	12	83.0	0.047	5.2	LOS A	0.2	2.0	0.22	0.49	23.0
Approach		25	84.0	0.047	4.8	LOS A	0.2	2.0	0.22	0.40	23.0
West: Wilton Road (W)											
10	L	12	17.0	0.029	21.4	LOS B	0.0	0.0	0.00	0.84	61.5
11	T	42	5.0	0.029	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		54	7.7	0.029	4.7	LOS B	0.0	0.0	0.00	0.19	76.0
All Vehicles		223	22.2	0.064	4.4	NA	0.2	2.0	0.04	0.17	59.7

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

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MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Rd AM Peak

Wilton Road/Awaba Road AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
North East: Awaba Road (NE)											
25	T	232	6.0	0.124	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
26	R	19	11.0	0.015	11.7	LOS A	0.1	0.6	0.39	0.66	54.9
Approach		251	6.4	0.124	0.9	LOS A	0.1	0.6	0.03	0.05	77.6
North West: Wilton Road											
27	L	24	17.0	0.200	13.6	LOS A	1.0	7.4	0.52	0.74	47.3
29	R	102	12.0	0.201	13.4	LOS A	1.0	7.4	0.52	0.85	47.4
Approach		126	13.0	0.201	13.4	LOS A	1.0	7.4	0.52	0.83	47.4
South West: Awaba Road (SW)											
30	L	52	23.0	0.033	10.9	LOS A	0.0	0.0	0.00	0.71	57.1
31	T	253	4.0	0.133	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		305	7.2	0.133	1.9	LOS A	0.0	0.0	0.00	0.12	75.4
All Vehicles		682	8.0	0.201	3.6	NA	1.0	7.4	0.11	0.23	68.7

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

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MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road Midday Peak

Wangi Road/Wilton Road Midday Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	32	3.0	0.024	11.2	LOS A	0.1	0.8	0.08	0.65	45.4
2	T	460	8.0	0.248	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		492	7.7	0.248	0.7	LOS A	0.1	0.8	0.01	0.04	78.1
North: Wangi Road (N)											
8	T	561	8.0	0.303	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
9	R	21	19.0	0.023	14.2	LOS A	0.1	1.0	0.51	0.72	43.9
Approach		582	8.4	0.303	0.5	LOS A	0.1	1.0	0.02	0.03	78.8
West: Wilton Road											
10	L	24	33.0	0.052	17.6	LOS B	0.2	2.0	0.54	0.82	38.3
12	R	34	15.0	0.133	24.7	LOS B	0.5	4.3	0.79	0.95	44.9
Approach		58	22.4	0.133	21.7	LOS B	0.5	4.3	0.68	0.89	43.0
All Vehicles		1132	8.8	0.303	1.7	NA	0.5	4.3	0.05	0.08	75.9

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

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MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Landfill Midday Peak

Wilton Road/Awaba Landfill Midday Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Wilton Road (E)											
5	T	37	19.0	0.021	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
6	R	28	21.0	0.020	22.3	LOS B	0.1	0.7	0.15	0.77	42.6
Approach		65	19.9	0.021	9.6	LOS B	0.1	0.7	0.06	0.33	69.3
North: Awaba Landfill											
7	L	20	30.0	0.029	2.6	LOS A	0.1	0.9	0.15	0.32	23.3
9	R	7	0.0	0.029	2.5	LOS A	0.1	0.9	0.15	0.41	23.3
Approach		27	22.2	0.029	2.6	LOS A	0.1	0.9	0.15	0.35	23.3
West: Wilton Road (W)											
10	L	5	40.0	0.026	23.0	LOS B	0.0	0.0	0.00	0.84	61.5
11	T	42	10.0	0.026	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		47	13.2	0.026	2.4	LOS B	0.0	0.0	0.00	0.09	78.1
All Vehicles		139	18.1	0.029	5.8	NA	0.1	0.9	0.06	0.25	49.4

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

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MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Rd
Midday Peak

Wilton Road/Awaba Road Midday Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
North East: Awaba Road (NE)											
25	T	144	4.0	0.076	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
26	R	13	17.0	0.010	11.7	LOS A	0.1	0.4	0.33	0.65	55.2
Approach		157	5.0	0.076	0.9	LOS A	0.1	0.4	0.03	0.05	77.5
North West: Wilton Road											
27	L	14	15.0	0.055	11.6	LOS A	0.2	1.9	0.38	0.66	49.2
29	R	31	10.0	0.055	11.4	LOS A	0.2	1.9	0.38	0.72	49.2
Approach		44	11.5	0.055	11.4	LOS A	0.2	1.9	0.38	0.70	49.2
South West: Awaba Road (SW)											
30	L	40	8.0	0.023	10.4	LOS A	0.0	0.0	0.00	0.71	57.1
31	T	181	2.0	0.094	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		221	3.1	0.094	1.9	LOS A	0.0	0.0	0.00	0.13	75.1
All Vehicles		422	4.7	0.094	2.5	NA	0.2	1.9	0.05	0.16	72.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

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MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road
PM Peak

Wangi Road/Wilton Road PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	72	4.0	0.054	11.2	LOS A	0.3	1.9	0.04	0.67	45.8
2	T	867	8.0	0.468	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		939	7.7	0.468	0.9	LOS A	0.3	1.9	0.00	0.05	77.8
North: Wangi Road (N)											
8	T	710	8.0	0.383	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
9	R	6	0.0	0.010	15.9	LOS B	0.0	0.3	0.67	0.80	40.2
Approach		716	7.9	0.383	0.1	LOS B	0.0	0.3	0.01	0.01	79.7
West: Wilton Road											
10	L	19	11.0	0.059	20.9	LOS B	0.2	1.8	0.73	0.93	33.5
12	R	106	2.0	0.822	81.3	LOS F	4.9	35.1	0.98	1.22	21.8
Approach		125	3.4	0.824	72.1	LOS F	4.9	35.1	0.94	1.17	22.4
All Vehicles		1780	7.5	0.824	5.6	NA	4.9	35.1	0.07	0.11	67.6

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

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MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Landfill PM Peak

Wilton Road/Awaba Landfill PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Wilton Road (E)											
5	T	83	20.0	0.048	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
6	R	10	0.0	0.006	20.8	LOS B	0.0	0.2	0.22	0.74	41.9
Approach		93	17.8	0.048	2.2	LOS B	0.0	0.2	0.02	0.08	77.7
North: Awaba Landfill											
7	L	16	0.0	0.017	2.7	LOS A	0.1	0.4	0.22	0.36	23.2
9	R	2	0.0	0.017	2.7	LOS A	0.1	0.4	0.22	0.43	23.2
Approach		18	0.0	0.017	2.7	LOS A	0.1	0.4	0.22	0.37	23.2
West: Wilton Road (W)											
10	L	2	0.0	0.062	20.1	LOS B	0.0	0.0	0.00	0.85	61.5
11	T	117	2.0	0.062	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		119	2.0	0.062	0.3	LOS B	0.0	0.0	0.00	0.01	79.7
All Vehicles		230	8.2	0.062	1.3	NA	0.1	0.4	0.03	0.07	66.3

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Existing.sip
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MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Rd PM Peak

Wilton Road/Awaba Road PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
North East: Awaba Road (NE)											
25	T	225	1.0	0.116	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
26	R	17	0.0	0.016	12.2	LOS A	0.1	0.6	0.51	0.70	54.1
Approach		242	0.9	0.116	0.9	LOS A	0.1	0.6	0.04	0.05	77.7
North West: Wilton Road											
27	L	12	1.0	0.130	14.3	LOS A	0.6	4.2	0.59	0.83	46.0
29	R	57	5.0	0.131	14.5	LOS B	0.6	4.2	0.59	0.88	46.1
Approach		69	4.3	0.131	14.5	LOS B	0.6	4.2	0.59	0.87	46.1
South West: Awaba Road (SW)											
30	L	101	3.0	0.056	10.2	LOS A	0.0	0.0	0.00	0.71	57.1
31	T	443	13.0	0.246	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		544	11.1	0.246	1.9	LOS A	0.0	0.0	0.00	0.13	75.0
All Vehicles		855	7.7	0.246	2.6	NA	0.6	4.2	0.06	0.17	72.1

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

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MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road (Seagull) AM Peak

Wangi Road/Wilton Road (Seagull) AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	120	3.0	0.090	11.3	LOS A	0.4	2.6	0.12	0.64	45.1
2	T	827	8.0	0.446	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		947	7.4	0.446	1.4	LOS A	0.4	2.6	0.01	0.08	76.1
North: Wangi Road (N)											
8	T	678	8.0	0.366	0.1	NA [9]	NA [9]	NA [9]	NA [9]	0.00	79.8
9	R	24	58.0	0.108	30.3	LOS C	0.4	3.9	0.83	0.95	29.5
Approach		702	9.7	0.366	1.1	LOS C	0.4	3.9	0.03	0.03	77.5
West: Wilton Road											
10	L	21	38.0	0.111	30.3	LOS C	0.3	3.2	0.81	0.95	27.2
12	R	48	15.0	0.150	21.7	LOS B	0.5	4.0	0.74	0.93	47.4
Approach		69	22.0	0.150	24.3	LOS C	0.5	4.0	0.76	0.94	42.0
All Vehicles		1718	8.9	0.446	2.2	NA	0.5	4.0	0.05	0.10	74.6

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

9 Continuous movement

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Existing.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road (Seagull) Midday Peak

Wangi Road/Wilton Road (Seagull) Midday Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	32	3.0	0.024	11.2	LOS A	0.1	0.6	0.08	0.65	45.4
2	T	460	8.0	0.248	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		492	7.7	0.248	0.7	LOS A	0.1	0.6	0.01	0.04	78.1
North: Wangi Road (N)											
8	T	561	8.0	0.303	0.1	NA [9]	NA [9]	NA [9]	NA [9]	0.00	79.9
9	R	21	19.0	0.023	14.2	LOS A	0.1	0.8	0.51	0.72	43.9
Approach		582	8.4	0.303	0.6	LOS A	0.1	0.8	0.02	0.03	78.6
West: Wilton Road											
10	L	24	33.0	0.052	17.6	LOS B	0.2	1.6	0.54	0.82	38.3
12	R	34	15.0	0.057	15.3	LOS B	0.2	1.6	0.51	0.80	54.1
Approach		58	22.4	0.057	16.3	LOS B	0.2	1.6	0.52	0.80	49.0
All Vehicles		1132	8.8	0.303	1.4	NA	0.2	1.6	0.04	0.07	76.5

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

9 Continuous movement

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Existing.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road (Seagull) PM Peak

Wangi Road/Wilton Road (Seagull) PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	72	4.0	0.054	11.2	LOS A	0.2	1.5	0.04	0.67	45.8
2	T	867	8.0	0.468	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		939	7.7	0.468	0.9	LOS A	0.2	1.5	0.00	0.05	77.8
North: Wangi Road (N)											
8	T	710	8.0	0.383	0.1	NA [9]	NA [9]	NA [9]	NA [9]	0.00	79.8
9	R	6	0.0	0.010	15.9	LOS B	0.0	0.3	0.67	0.79	40.1
Approach		716	7.9	0.383	0.2	LOS B	0.0	0.3	0.01	0.01	79.5
West: Wilton Road											
10	L	19	11.0	0.059	20.9	LOS B	0.2	1.5	0.73	0.93	33.5
12	R	106	2.0	0.263	19.7	LOS B	1.0	7.1	0.73	0.95	48.7
Approach		125	3.4	0.263	19.9	LOS B	1.0	7.1	0.73	0.94	47.0
All Vehicles		1780	7.5	0.468	1.9	NA	1.0	7.1	0.05	0.10	75.2

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

9 Continuous movement

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Existing.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road
AM Peak

Wangi Road/Wilton Road 2021 Construction AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	145	3.0	0.108	11.3	LOS A	0.6	4.0	0.13	0.64	45.0
2	T	960	8.0	0.518	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		1105	7.3	0.518	1.5	LOS A	0.6	4.0	0.02	0.08	76.0
North: Wangi Road (N)											
8	T	787	8.0	0.424	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
9	R	30	58.0	0.213	42.5	LOS C	0.9	9.4	0.90	0.99	23.1
Approach		817	9.8	0.425	1.6	LOS C	0.9	9.4	0.03	0.04	76.4
West: Wilton Road											
10	L	25	38.0	0.185	39.5	LOS C	0.7	6.7	0.87	0.97	22.4
12	R	56	15.0	1.000[4]	287.9	LOS F	8.1	63.7	1.00	1.43	7.7
Approach		81	22.1	1.000	211.2	LOS F	8.1	63.7	0.96	1.29	8.7
All Vehicles		2003	9.0	1.000	10.0	NA	8.1	63.7	0.06	0.11	59.9

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

4 x = 1.00 due to minimum capacity

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Earthworks.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Landfill AM Peak

Wilton Road/Awaba Landfill 2021 Construction AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Wilton Road (E)											
5	T	141	6.0	0.075	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
6	R	32	74.0	0.035	26.6	LOS B	0.2	2.2	0.22	0.75	41.9
Approach		173	18.6	0.075	4.9	LOS B	0.2	2.2	0.04	0.14	75.9
North: Awaba Landfill											
7	L	14	85.0	0.054	5.0	LOS A	0.2	3.0	0.26	0.34	22.9
9	R	13	83.0	0.054	5.7	LOS A	0.2	3.0	0.26	0.51	22.8
Approach		27	84.0	0.054	5.4	LOS A	0.2	3.0	0.26	0.42	22.8
West: Wilton Road (W)											
10	L	19	17.0	0.037	21.4	LOS B	0.0	0.0	0.00	0.84	61.5
11	T	49	5.0	0.037	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		68	8.4	0.037	6.0	LOS B	0.0	0.0	0.00	0.24	75.0
All Vehicles		268	22.6	0.075	5.2	NA	0.2	3.0	0.05	0.19	60.3

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Earthworks.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Rd AM Peak

Wilton Road/Awaba Road 2021 Construction AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
North East: Awaba Road (NE)											
25	T	274	6.0	0.146	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
26	R	23	11.0	0.019	12.0	LOS A	0.1	0.8	0.42	0.68	54.7
Approach		297	6.4	0.146	0.9	LOS A	0.1	0.8	0.03	0.05	77.6
North West: Wilton Road											
27	L	28	17.0	0.264	14.9	LOS B	1.4	10.5	0.57	0.81	46.1
29	R	121	12.0	0.265	14.8	LOS B	1.4	10.5	0.57	0.89	46.2
Approach		149	12.9	0.265	14.8	LOS B	1.4	10.5	0.57	0.88	46.2
South West: Awaba Road (SW)											
30	L	60	23.0	0.038	10.9	LOS A	0.0	0.0	0.00	0.71	57.1
31	T	294	4.0	0.155	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		354	7.2	0.155	1.8	LOS A	0.0	0.0	0.00	0.12	75.4
All Vehicles		800	8.0	0.265	3.9	NA	1.4	10.5	0.12	0.24	68.1

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Earthworks.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road
Midday Peak

Wangi Road/Wilton Road 2021 Construction Midday Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	41	3.0	0.031	11.3	LOS A	0.1	1.0	0.10	0.64	45.3
2	T	534	8.0	0.288	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		575	7.6	0.288	0.8	LOS A	0.1	1.0	0.01	0.05	77.9
North: Wangi Road (N)											
8	T	652	8.0	0.352	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
9	R	27	19.0	0.033	14.8	LOS B	0.2	1.4	0.55	0.76	43.0
Approach		679	8.4	0.352	0.6	LOS B	0.2	1.4	0.02	0.03	78.6
West: Wilton Road											
10	L	30	33.0	0.074	19.1	LOS B	0.3	2.9	0.59	0.87	36.6
12	R	43	15.0	0.228	31.5	LOS C	0.9	7.4	0.86	0.98	39.8
Approach		73	22.4	0.227	26.4	LOS C	0.9	7.4	0.75	0.94	38.9
All Vehicles		1327	8.9	0.352	2.1	NA	0.9	7.4	0.06	0.09	74.9

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Earthworks.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Landfill Midday Peak

Wilton Road/Awaba Landfill 2021 Construction Midday Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Wilton Road (E)											
5	T	43	19.0	0.025	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
6	R	36	21.0	0.026	22.3	LOS B	0.1	1.2	0.17	0.76	42.3
Approach		79	19.9	0.026	10.2	LOS B	0.1	1.2	0.08	0.35	68.4
North: Awaba Landfill											
7	L	27	30.0	0.043	2.7	LOS A	0.2	1.6	0.18	0.33	23.3
9	R	13	0.0	0.043	2.7	LOS A	0.2	1.6	0.18	0.42	23.3
Approach		40	20.3	0.043	2.7	LOS A	0.2	1.6	0.18	0.36	23.3
West: Wilton Road (W)											
10	L	11	40.0	0.034	23.0	LOS B	0.0	0.0	0.00	0.84	61.5
11	T	49	10.0	0.034	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		60	15.5	0.034	4.2	LOS B	0.0	0.0	0.00	0.15	76.7
All Vehicles		179	18.5	0.043	6.5	NA	0.2	1.6	0.07	0.28	46.7

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Earthworks.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Rd
Midday Peak

Wilton Road/Awaba Road 2021 Construction Midday Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
North East: Awaba Road (NE)											
25	T	171	4.0	0.090	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
26	R	15	17.0	0.012	11.9	LOS A	0.1	0.5	0.37	0.66	55.0
Approach		185	5.0	0.090	0.9	LOS A	0.1	0.5	0.03	0.05	77.5
North West: Wilton Road											
27	L	17	15.0	0.074	12.0	LOS A	0.3	2.6	0.42	0.68	48.7
29	R	38	10.0	0.073	11.9	LOS A	0.3	2.6	0.42	0.75	48.8
Approach		55	11.5	0.073	11.9	LOS A	0.3	2.6	0.42	0.73	48.8
South West: Awaba Road (SW)											
30	L	49	8.0	0.028	10.4	LOS A	0.0	0.0	0.00	0.71	57.1
31	T	214	2.0	0.111	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		263	3.1	0.111	1.9	LOS A	0.0	0.0	0.00	0.13	74.9
All Vehicles		503	4.7	0.111	2.7	NA	0.3	2.6	0.06	0.17	71.7

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Earthworks.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road
PM Peak

Wangi Road/Wilton Road 2021 Construction PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	84	4.0	0.063	11.2	LOS A	0.3	2.2	0.04	0.66	45.8
2	T	1007	8.0	0.543	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		1091	7.7	0.543	0.9	LOS A	0.3	2.2	0.00	0.05	77.7
North: Wangi Road (N)											
8	T	824	8.0	0.444	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
9	R	7	0.0	0.016	18.3	LOS B	0.1	0.5	0.76	0.88	37.4
Approach		831	7.9	0.445	0.2	LOS B	0.1	0.5	0.01	0.01	79.6
West: Wilton Road											
10	L	25	11.0	0.101	24.8	LOS B	0.4	3.1	0.80	0.95	30.2
12	R	129	2.0	1.654	1266.6	LOS F	69.7	496.1	1.00	3.92	1.9
Approach		154	3.5	1.651	1065.0	LOS F	69.7	496.1	0.97	3.43	2.0
All Vehicles		2076	7.5	1.651	79.5	NA	69.7	496.1	0.08	0.28	22.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Earthworks.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Landfill PM Peak

Wilton Road/Awaba Landfill 2021 Construction PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Wilton Road (E)											
5	T	97	20.0	0.056	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
6	R	11	0.0	0.007	20.9	LOS B	0.0	0.3	0.24	0.73	41.7
Approach		108	18.0	0.056	2.1	LOS B	0.0	0.3	0.02	0.07	77.8
North: Awaba Landfill											
7	L	25	0.0	0.034	2.9	LOS A	0.2	1.1	0.26	0.37	23.2
9	R	9	5.0	0.034	3.0	LOS A	0.2	1.1	0.26	0.46	23.2
Approach		34	1.3	0.034	2.9	LOS A	0.2	1.1	0.26	0.40	23.2
West: Wilton Road (W)											
10	L	3	0.0	0.071	20.1	LOS B	0.0	0.0	0.00	0.85	61.5
11	T	136	2.0	0.072	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		139	2.0	0.072	0.4	LOS B	0.0	0.0	0.00	0.02	79.6
All Vehicles		281	8.0	0.072	1.4	NA	0.2	1.1	0.04	0.09	60.9

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Earthworks.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Rd PM Peak

Wilton Road/Awaba Road 2021 Construction PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
North East: Awaba Road (NE)											
25	T	262	1.0	0.135	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
26	R	20	0.0	0.021	12.7	LOS A	0.1	0.8	0.55	0.73	53.4
Approach		282	0.9	0.135	0.9	LOS A	0.1	0.8	0.04	0.05	77.6
North West: Wilton Road											
27	L	16	1.0	0.184	15.9	LOS B	0.8	5.9	0.67	0.89	44.7
29	R	67	5.0	0.185	16.1	LOS B	0.8	5.9	0.67	0.90	44.8
Approach		83	4.2	0.185	16.1	LOS B	0.8	5.9	0.67	0.90	44.8
South West: Awaba Road (SW)											
30	L	120	3.0	0.066	10.2	LOS A	0.0	0.0	0.00	0.71	57.1
31	T	519	13.0	0.289	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		639	11.1	0.289	1.9	LOS A	0.0	0.0	0.00	0.13	74.9
All Vehicles		1004	7.7	0.289	2.8	NA	0.8	5.9	0.07	0.17	71.7

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Earthworks.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road (Seagull) AM Peak

Wangi Road/Wilton Road (Seagull) Construction AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	145	3.0	0.108	11.3	LOS A	0.6	4.0	0.13	0.64	45.0
2	T	960	8.0	0.518	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		1105	7.3	0.518	1.5	LOS A	0.6	4.0	0.02	0.08	76.0
North: Wangi Road (N)											
8	T	787	8.0	0.424	0.1	NA [9]	NA [9]	NA [9]	NA [9]	0.00	79.8
9	R	30	58.0	0.213	42.4	LOS C	0.9	9.4	0.90	0.99	23.1
Approach		817	9.8	0.425	1.6	LOS C	0.9	9.4	0.03	0.04	76.2
West: Wilton Road											
10	L	25	38.0	0.185	39.5	LOS C	0.7	6.7	0.87	0.97	22.4
12	R	56	15.0	0.224	26.2	LOS B	1.0	7.6	0.81	0.96	43.6
Approach		81	22.1	0.224	30.3	LOS C	1.0	7.6	0.83	0.97	37.3
All Vehicles		2003	9.0	0.518	2.7	NA	1.0	9.4	0.06	0.10	73.4

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

9 Continuous movement

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Earthworks.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road (Seagull) Midday Peak

Wangi Road/Wilton Road (Seagull) Construction Midday Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	41	3.0	0.031	11.3	LOS A	0.1	1.0	0.10	0.64	45.3
2	T	534	8.0	0.288	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		575	7.6	0.288	0.8	LOS A	0.1	1.0	0.01	0.05	77.9
North: Wangi Road (N)											
8	T	652	8.0	0.352	0.1	NA [9]	NA [9]	NA [9]	NA [9]	0.00	79.8
9	R	27	19.0	0.033	14.8	LOS B	0.2	1.4	0.55	0.76	42.9
Approach		679	8.4	0.352	0.7	LOS B	0.2	1.4	0.02	0.03	78.4
West: Wilton Road											
10	L	33	33.0	0.082	19.1	LOS B	0.4	3.2	0.59	0.88	36.5
12	R	43	15.0	0.082	16.3	LOS B	0.4	2.8	0.55	0.85	53.0
Approach		76	22.8	0.082	17.5	LOS B	0.4	3.2	0.57	0.86	47.2
All Vehicles		1330	8.9	0.352	1.7	NA	0.4	3.2	0.05	0.08	75.9

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

9 Continuous movement

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Earthworks.sip
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MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road (Seagull) PM Peak

Wangi Road/Wilton Road (Seagull) Construction PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	84	4.0	0.063	11.2	LOS A	0.3	2.2	0.04	0.66	45.8
2	T	1007	8.0	0.543	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		1091	7.7	0.543	0.9	LOS A	0.3	2.2	0.00	0.05	77.7
North: Wangi Road (N)											
8	T	824	8.0	0.444	0.1	NA [9]	NA [9]	NA [9]	NA [9]	0.00	79.8
9	R	7	0.0	0.016	18.3	LOS B	0.1	0.5	0.76	0.88	37.4
Approach		831	7.9	0.445	0.2	LOS B	0.1	0.5	0.01	0.01	79.4
West: Wilton Road											
10	L	25	11.0	0.101	24.8	LOS B	0.4	3.1	0.80	0.95	30.2
12	R	129	2.0	0.396	24.2	LOS B	2.0	14.4	0.82	1.01	44.7
Approach		154	3.5	0.396	24.3	LOS B	2.0	14.4	0.81	1.00	42.9
All Vehicles		2076	7.5	0.543	2.4	NA	2.0	14.4	0.06	0.10	74.2

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

9 Continuous movement

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MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road
AM Peak

Wangi Road/Wilton Road 2021 Operational AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	140	3.0	0.105	11.3	LOS A	0.4	3.1	0.13	0.64	45.0
2	T	960	8.0	0.518	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		1100	7.4	0.518	1.4	LOS A	0.4	3.1	0.02	0.08	76.1
North: Wangi Road (N)											
8	T	787	8.0	0.425	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
9	R	28	58.0	0.198	42.0	LOS C	0.7	7.0	0.90	0.98	23.3
Approach		815	9.7	0.425	1.4	LOS C	0.7	7.0	0.03	0.03	76.7
West: Wilton Road											
10	L	25	38.0	0.184	39.3	LOS C	0.6	5.3	0.87	0.97	22.5
12	R	56	15.0	1.000[4]	284.2	LOS F	6.7	53.1	1.00	1.43	7.8
Approach		81	22.1	1.000	208.6	LOS F	6.7	53.1	0.96	1.29	8.8
All Vehicles		1996	8.9	1.000	9.8	NA	6.7	53.1	0.06	0.11	60.1

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

4 x = 1.00 due to minimum capacity

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Future Operational.sip
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MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Landfill AM Peak

Wilton Road/Awaba Landfill 2021 Operational AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Wilton Road (E)											
5	T	141	6.0	0.075	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
6	R	25	74.0	0.027	26.6	LOS B	0.1	1.3	0.21	0.75	42.0
Approach		166	16.2	0.075	4.0	LOS B	0.1	1.3	0.03	0.11	76.7
North: Awaba Landfill											
7	L	14	85.0	0.053	4.9	LOS A	0.2	2.3	0.25	0.33	22.9
9	R	13	83.0	0.053	5.5	LOS A	0.2	2.3	0.25	0.51	22.9
Approach		27	84.0	0.053	5.2	LOS A	0.2	2.3	0.25	0.42	22.9
West: Wilton Road (W)											
10	L	13	17.0	0.034	21.4	LOS B	0.0	0.0	0.00	0.84	61.5
11	T	49	5.0	0.034	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		62	7.5	0.034	4.5	LOS B	0.0	0.0	0.00	0.18	76.2
All Vehicles		255	21.3	0.075	4.2	NA	0.2	2.3	0.05	0.16	60.5

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Future Operational.sip
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MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Rd AM Peak

Wilton Road/Awaba Road 2021 Operational AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
North East: Awaba Road (NE)											
25	T	270	6.0	0.144	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
26	R	23	11.0	0.019	12.0	LOS A	0.1	0.8	0.42	0.68	54.7
Approach		293	6.4	0.144	0.9	LOS A	0.1	0.8	0.03	0.05	77.5
North West: Wilton Road											
27	L	28	17.0	0.259	14.8	LOS B	1.3	10.2	0.57	0.81	46.2
29	R	119	12.0	0.260	14.7	LOS B	1.3	10.2	0.57	0.89	46.3
Approach		147	13.0	0.260	14.7	LOS B	1.3	10.2	0.57	0.87	46.2
South West: Awaba Road (SW)											
30	L	60	23.0	0.038	10.9	LOS A	0.0	0.0	0.00	0.71	57.1
31	T	294	4.0	0.155	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		354	7.2	0.155	1.8	LOS A	0.0	0.0	0.00	0.12	75.4
All Vehicles		794	8.0	0.260	3.9	NA	1.3	10.2	0.12	0.23	68.2

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Future Operational.sip
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MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road
Midday Peak

Wangi Road/Wilton Road 2021 Operational Midday Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	38	3.0	0.028	11.2	LOS A	0.1	0.8	0.09	0.65	45.3
2	T	534	8.0	0.288	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		572	7.7	0.288	0.7	LOS A	0.1	0.8	0.01	0.04	78.0
North: Wangi Road (N)											
8	T	652	8.0	0.352	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
9	R	25	19.0	0.031	14.8	LOS B	0.1	1.0	0.55	0.76	43.0
Approach		677	8.4	0.352	0.5	LOS B	0.1	1.0	0.02	0.03	78.7
West: Wilton Road											
10	L	28	33.0	0.069	19.0	LOS B	0.2	2.1	0.59	0.87	36.6
12	R	40	15.0	0.210	31.0	LOS C	0.7	5.4	0.86	0.97	40.2
Approach		68	22.4	0.210	26.1	LOS C	0.7	5.4	0.75	0.93	39.2
All Vehicles		1317	8.8	0.352	2.0	NA	0.7	5.4	0.05	0.08	75.3

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Future Operational.sip
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MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Landfill Midday Peak

Wilton Road/Awaba Landfill 2021 Operational Midday Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Wilton Road (E)											
5	T	43	19.0	0.025	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
6	R	31	21.0	0.022	22.3	LOS B	0.1	0.8	0.16	0.76	42.4
Approach		74	19.8	0.025	9.3	LOS B	0.1	0.8	0.07	0.32	69.6
North: Awaba Landfill											
7	L	22	30.0	0.032	2.7	LOS A	0.1	1.0	0.17	0.33	23.3
9	R	8	0.0	0.032	2.6	LOS A	0.1	1.0	0.17	0.41	23.3
Approach		30	22.0	0.032	2.7	LOS A	0.1	1.0	0.17	0.35	23.3
West: Wilton Road (W)											
10	L	6	40.0	0.031	23.0	LOS B	0.0	0.0	0.00	0.84	61.5
11	T	49	10.0	0.031	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		55	13.3	0.031	2.5	LOS B	0.0	0.0	0.00	0.09	78.0
All Vehicles		159	18.0	0.032	5.7	NA	0.1	1.0	0.06	0.25	50.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

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8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Rd
Midday Peak

Wilton Road/Awaba Road 2021 Operational Midday Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
North East: Awaba Road (NE)											
25	T	167	4.0	0.088	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
26	R	15	17.0	0.012	11.9	LOS A	0.1	0.5	0.36	0.65	55.0
Approach		182	5.1	0.088	1.0	LOS A	0.1	0.5	0.03	0.05	77.5
North West: Wilton Road											
27	L	17	15.0	0.070	11.9	LOS A	0.3	2.4	0.41	0.68	48.8
29	R	36	10.0	0.070	11.8	LOS A	0.3	2.4	0.41	0.75	48.9
Approach		53	11.6	0.070	11.8	LOS A	0.3	2.4	0.41	0.72	48.8
South West: Awaba Road (SW)											
30	L	47	8.0	0.027	10.4	LOS A	0.0	0.0	0.00	0.71	57.1
31	T	211	2.0	0.109	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		258	3.1	0.109	1.9	LOS A	0.0	0.0	0.00	0.13	75.1
All Vehicles		493	4.7	0.109	2.6	NA	0.3	2.4	0.05	0.17	71.8

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Future Operational.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road
PM Peak

Wangi Road/Wilton Road 2021 Operational PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	84	4.0	0.063	11.2	LOS A	0.2	1.7	0.04	0.66	45.8
2	T	1007	8.0	0.543	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		1091	7.7	0.543	0.9	LOS A	0.2	1.7	0.00	0.05	77.7
North: Wangi Road (N)											
8	T	824	8.0	0.445	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
9	R	7	0.0	0.016	18.3	LOS B	0.1	0.4	0.76	0.88	37.4
Approach		831	7.9	0.445	0.2	LOS B	0.1	0.4	0.01	0.01	79.6
West: Wilton Road											
10	L	23	11.0	0.093	24.7	LOS B	0.3	2.2	0.80	0.95	30.2
12	R	124	2.0	1.587	1153.9	LOS F	62.5	445.0	1.00	3.75	2.1
Approach		147	3.4	1.587	977.3	LOS F	62.5	445.0	0.97	3.31	2.2
All Vehicles		2069	7.5	1.587	70.0	NA	62.5	445.0	0.07	0.27	24.1

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Future Operational.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Landfill PM Peak

Wilton Road/Awaba Landfill 2021 Operational PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Wilton Road (E)											
5	T	97	20.0	0.056	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
6	R	11	0.0	0.007	20.9	LOS B	0.0	0.2	0.24	0.73	41.7
Approach		108	18.0	0.056	2.1	LOS B	0.0	0.2	0.02	0.07	77.8
North: Awaba Landfill											
7	L	18	0.0	0.021	2.8	LOS A	0.1	0.5	0.25	0.37	23.2
9	R	3	0.0	0.021	2.9	LOS A	0.1	0.5	0.25	0.45	23.2
Approach		21	0.0	0.021	2.8	LOS A	0.1	0.5	0.25	0.38	23.2
West: Wilton Road (W)											
10	L	3	0.0	0.072	20.1	LOS B	0.0	0.0	0.00	0.85	61.5
11	T	136	2.0	0.072	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		139	2.0	0.072	0.4	LOS B	0.0	0.0	0.00	0.02	79.6
All Vehicles		268	8.3	0.072	1.3	NA	0.1	0.5	0.03	0.07	66.2

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Future Operational.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wilton Rd/Awaba Rd PM Peak

Wilton Road/Awaba Road 2021 Operational PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
North East: Awaba Road (NE)											
25	T	262	1.0	0.135	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
26	R	20	0.0	0.021	12.6	LOS A	0.1	0.8	0.55	0.73	53.4
Approach		282	0.9	0.135	0.9	LOS A	0.1	0.8	0.04	0.05	77.6
North West: Wilton Road											
27	L	16	1.0	0.184	15.8	LOS B	0.8	5.8	0.66	0.89	44.8
29	R	67	5.0	0.183	16.0	LOS B	0.8	5.8	0.66	0.90	44.8
Approach		83	4.2	0.183	16.0	LOS B	0.8	5.8	0.66	0.90	44.8
South West: Awaba Road (SW)											
30	L	118	3.0	0.065	10.2	LOS A	0.0	0.0	0.00	0.71	57.1
31	T	515	13.0	0.286	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		633	11.1	0.286	1.9	LOS A	0.0	0.0	0.00	0.13	75.0
All Vehicles		998	7.7	0.286	2.8	NA	0.8	5.8	0.07	0.17	71.7

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Future Operational.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road (Seagull) AM Peak

Wangi Road/Wilton Road (Seagull) Operational AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	140	3.0	0.105	11.3	LOS A	0.4	3.1	0.13	0.64	45.0
2	T	960	8.0	0.518	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		1100	7.4	0.518	1.4	LOS A	0.4	3.1	0.02	0.08	76.1
North: Wangi Road (N)											
8	T	787	8.0	0.425	0.1	NA [9]	NA [9]	NA [9]	NA [9]	0.00	79.8
9	R	28	58.0	0.198	41.9	LOS C	0.7	7.0	0.90	0.98	23.3
Approach		815	9.7	0.425	1.5	LOS C	0.7	7.0	0.03	0.03	76.4
West: Wilton Road											
10	L	25	38.0	0.184	39.3	LOS C	0.6	5.3	0.87	0.97	22.5
12	R	56	15.0	0.222	26.0	LOS B	0.8	6.0	0.81	0.96	43.7
Approach		81	22.1	0.222	30.1	LOS C	0.8	6.0	0.83	0.97	37.5
All Vehicles		1996	8.9	0.518	2.6	NA	0.8	7.0	0.06	0.10	73.6

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

9 Continuous movement

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Future Operational.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road (Seagull) Midday Peak

Wangi Road/Wilton Road (Seagull) Operational Midday Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	38	3.0	0.028	11.2	LOS A	0.1	0.8	0.09	0.65	45.3
2	T	534	8.0	0.288	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		572	7.7	0.288	0.7	LOS A	0.1	0.8	0.01	0.04	78.0
North: Wangi Road (N)											
8	T	652	8.0	0.352	0.1	NA [9]	NA [9]	NA [9]	NA [9]	0.00	79.8
9	R	25	19.0	0.031	14.8	LOS B	0.1	1.0	0.55	0.76	43.0
Approach		677	8.4	0.352	0.6	LOS B	0.1	1.0	0.02	0.03	78.5
West: Wilton Road											
10	L	28	33.0	0.069	19.0	LOS B	0.2	2.1	0.59	0.87	36.6
12	R	40	15.0	0.075	16.2	LOS B	0.3	2.1	0.55	0.84	53.0
Approach		68	22.4	0.075	17.4	LOS B	0.3	2.1	0.56	0.85	47.6
All Vehicles		1317	8.8	0.352	1.5	NA	0.3	2.1	0.04	0.08	76.3

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

9 Continuous movement

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Future Operational.sip
8000955, CARDNO, ENTERPRISE

MOVEMENT SUMMARY

Site: Wangi Rd/Wilton Road (Seagull) PM Peak

Wangi Road/Wilton Road (Seagull) Operational PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wangi Road (S)											
1	L	84	4.0	0.063	11.2	LOS A	0.2	1.7	0.04	0.66	45.8
2	T	1007	8.0	0.543	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		1091	7.7	0.543	0.9	LOS A	0.2	1.7	0.00	0.05	77.7
North: Wangi Road (N)											
8	T	824	8.0	0.445	0.1	NA[9]	NA[9]	NA[9]	NA[9]	0.00	79.8
9	R	7	0.0	0.016	18.3	LOS B	0.1	0.4	0.76	0.88	37.4
Approach		831	7.9	0.445	0.2	LOS B	0.1	0.4	0.01	0.01	79.4
West: Wilton Road											
10	L	23	11.0	0.093	24.7	LOS B	0.3	2.2	0.80	0.95	30.2
12	R	124	2.0	0.380	24.0	LOS B	1.5	11.0	0.81	1.00	44.8
Approach		147	3.4	0.380	24.1	LOS B	1.5	11.0	0.81	0.99	43.1
All Vehicles		2069	7.5	0.543	2.3	NA	1.5	11.0	0.06	0.10	74.4

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

9 Continuous movement

Project: N:\Traffic\PROJECTS\Current\600308 Awaba Waste Disposal Facility TIA\SIDRA\600308 AWABA Landfill Future Operational.sip
8000955, CARDNO, ENTERPRISE

Additions to Awaba Waste Management Facility

Appendix Q

Landfill Gas Management

CLIENTS | PEOPLE | PERFORMANCE

27 June 2012

David Lovell
Lake Macquarie City Council
126-138 Main Road
Speers Point NSW 2284

Our ref: 22/16177/1291
Your ref:

Dear David,

Awaba Waste Disposal Facility Environmental Assessment
Further Details on Landfill Gas Management

1 Introduction

Lake Macquarie City Council (LMCC) recently retained GHD Pty Ltd (GHD) to provide further information in relation to landfill gas (LFG) management at the Awaba Waste Disposal Facility (the Site), located at Wilton Road, Awaba, NSW. The following sections provide the requested information.

2 Overview of Existing LFG Collection and Treatment System

LFG generated at the Site is currently managed by an active LFG collection and treatment system that is designed, installed and operated by a specialist LFG management contactor (LMS Pty Ltd). The term "active" indicates that LFG is extracted from the waste mass using a fan (or blower), which directs the extracted gas to the treatment plant (flare or engine). In simple terms, the LFG is sucked out of the waste mass and the combustible components (predominantly methane) are ultimately burnt.

LFG treatment at the Site is predominately via combustion in a LFG fuelled reciprocating engine (Engine) that drives a generator to create renewable electricity (which is ultimately exported to the electricity grid). GHD understands that during periods of Engine downtime, or when otherwise required, LFG can be directed to a LFG flare (Flare) located at the Site. GHD further understands that the capacity of the LFG treatment technologies at the Site can / will be expanded as required so that collection and treatment of LFG at the Site is optimised (i.e. additional Engines and / or Flares will be installed as required to ensure optimal LFG control).

LFG collected from the Site is drawn through a main pipe (Main) that is constructed from Medium Density Polyethylene (MDPE) and is typically between 160 mm and 300 mm (outer diameter) in size. The Main is sized with consideration to a number of factors including:

- The quantity of LFG to be collected from the waste mass (now and in the future);
- Minimising suction losses through the LFG collection system; and
- LFG condensate (Condensate) management (see details provided below).

As the Main advances across the waste mass, it branches off into a series of smaller diameter header pipes (Headers), which are also constructed from MDPE pipework and typically between 120 mm and 200 mm (outer diameter) in size.

The Headers are connected to a series of local LFG collection points (Well Stations) across the Site. Well Stations are also constructed from MDPE pipework and contain monitoring points, orifice plates and control valves for individual LFG Wells (and the Well Station itself). Well Stations typically have between 5 and 10 LFG Wells connected to them by small diameter (typically 63 mm to 90 mm outer diameter) MDPE pipework (Flowlines). The use of Well Stations within a LFG collection and Treatment system allows for control / adjustment on a local level of the composition, applied suction pressure and flow rate of LFG collected from the individual LFG Wells in an area of the Site (and the overall mixture of LFG collected from the Well Station itself).

LFG Wells are typically constructed from Medium Density Polyethylene (MDPE) pipework (typically 90 mm to 160 mm outer diameter in size) that is surrounded by LFG permeable material (typically crushed rock / aggregate in the 20 mm to 100 mm diameter range). LFG Wells can be either vertical and / or horizontal and are either drilled or excavated into the waste mass as appropriate. LFG Well designs are often specific to the requirements of their individual location on the Site (e.g. varying drill depths due to differing waste depths etc.).

The LFG Collection and treatment system at the Site has been designed to ensure adequate management of any Condensate formed within the system. LFG is a “wet” gas and Condensate is the term used for water vapour that was originally entrained within the LFG and subsequently condenses out from the LFG as it cools within the collection pipework. If inadequately managed, Condensate can block collection pipework (by settling in low spots within the pipework) and / or cause damage to treatment technologies and / or ancillary equipment. Condensate formed within the collection pipework at the Site is managed via a combination of pipework grading and a series of Condensate drainage / collection points (constructed from MDPE). The Condensate which is formed within the pipework at the Site ultimately drains back into the waste mass.

The majority of the LFG collection and treatment system at the Site is buried below ground level (with the exception of the Engine, the Flare, some of the Condensate collection / drainage points and the Well Stations). None of the existing LFG Collection pipework is currently within the proposed footprint of the Piggy Back Liner (PBL).

3 Overview of Piggy Back Liner (PBL) Approach

Part of LMCC’s approach to the proposed landfill extension is to landfill over areas of historical waste. In order to do this, it is proposed that a PBL will be installed across a large part of the Site (generally the existing northeastern, northern and northwestern sloping batters of the Site). The proposed footprint of the PBL will not extend across the entire historical waste footprint or the entire proposed landfill extension area.

The PBL approach presents a challenge in relation to LFG management (particularly that which is generated by the historical waste located beneath PBL). The following sections provide additional information on how LFG will / could be appropriately managed in areas of landfilled waste outside the

proposed footprint of the PBL, above the PBL and below the PBL. The attached Site plan and cross-section shows the approximate locations of these three areas.

All LFG ultimately collected from the waste (whether outside the PBL footprint, above the PBL footprint or below the PBL footprint) will ultimately be directed to an appropriate LFG treatment technology (i.e. an Engine and / or Flare).

3.1 LFG Management in Waste Landfilled outside the PBL Footprint

LFG generated outside the footprint of the PBL will be managed in accordance with the existing approach detailed in Section 2 above (in both areas that will be landfilled and areas that will not be landfilled). That being a system of vertical and / or horizontal LFG Wells are / will be installed across these areas of waste as the waste achieves a sufficient thickness to allow LFG collection to occur. The collected LFG will be directed to the existing Engine (or other treatment technology as required i.e. additional LFG Engine(s) and / or Flare(s)) for treatment.

Existing vertical LFG Wells already installed may be extended and / or re-drilled if additional waste is placed in areas where they are present.

3.2 LFG Management in Waste Landfilled above the PBL

LFG generated by waste landfilled above the PBL will be managed in accordance with the existing approach detailed in Section 2 above. That being a system of vertical and / or horizontal LFG Wells will be installed across these new areas of waste as the waste achieves a sufficient thickness to allow LFG collection to occur. The collected LFG will be directed to the existing Engine (or other treatment technology as required i.e. additional LFG Engine(s) and / or Flare(s)) for treatment.

In order to prevent damage to the PBL due to over-drilling of vertical LFG Wells and / or over-excavation of horizontal LFG Wells, LMCC will:

- Survey the surface and edges of the PBL footprint at regular intervals (as a minimum - prior to waste deposition above it); and
- Agree an appropriate “stand-off” drill depth with drilling contractors (whether retained by LMCC or other parties) to prevent damage to the PBL.

3.3 LFG Management in waste landfilled below the PBL

3.3.1 Overview of Technical Challenge

Control of LFG generated below the PBL presents more of a technical challenge than control of LFG generated above or outside the footprint of the PBL. There are a number of important factors that require consideration in relation to how best to control LFG generated beneath a PBL, including:

- Installation of the PBL will cut off the existing LFG emission pathway though the waste’s surface across the PBL footprint. This means that any LFG generated below the PBL currently emitted via this pathway will have to find another way out;

- Installation of the PBL may increase the likelihood of lateral sub-surface emissions of LFG (i.e. towards the perimeter of the landfilled waste);
- LFG collection systems cannot be installed beneath a PBL once it is installed without compromising the PBL;
- LFG collection systems installed beneath a PBL generally cannot be investigated, maintained or repaired without compromising the PBL;
- Placing significant depths / weights of waste above vertical and / or horizontal LFG Wells and collection pipework can cause them to block with Condensate (due to low spots in pipework developing) and / or physically damage them (i.e. crush them) unless they have been appropriately designed for such loads;
- Placing significant depths / weights of waste above historical waste can significantly compress the underlying waste resulting in temporary increases in LFG generation rates (due to biological re-activation);
- Placing significant depths / weights of waste above historical waste may increase the capture efficiency of the existing LFG collection system by reducing the existing vertical emission pathway;
- If LFG generated beneath a PBL is not adequately collected, physical damage to the PBL may occur (e.g. due to lifting / deformation / bubbling). The most likely time for this risk to eventuate is during the construction / early filling phase rather than once an area has been landfilled;
- If LFG generated beneath a PBL is not adequately collected, loss of geotechnical stability of the PBL may occur (i.e. slippage). The most likely time for this risk to eventuate is during the construction / early filling phase rather than once an area has been landfilled and
- Vertical riser / LFG Well systems installed beneath a PBL may pose a future penetration risk to the PBL (i.e. puncture) unless they have been appropriately designed.

3.3.2 Possible Approaches to LFG Management beneath the PBL

There are a number of possible approaches to collecting LFG generated beneath the PBL whilst ensuring the integrity of the PBL is not compromised. These include;

- Specifically designing vertical and / or horizontal LFG Wells and associated interconnecting pipework with consideration to the issues identified in Section 3.3.1 above. Then install the system beneath the PBL. Such a system would need to be installed prior to placement of the PBL and may require an element of contingency (e.g. oversized / thicker pipework, closer spacing of LFG Wells than the existing system etc.);
- Installing vertical LFG Wells through the PBL as the PBL is constructed and fit sliding “boots” around these penetrations that can move up / down around the LFG Wells as the waste mass settles / moves. Such a system would likely need the vertical LFG Wells to be extended on a regular basis in line with landfilling operations;
- Increase the number / spacing of LFG Wells located immediately adjacent to the PBL footprint where this is possible (most likely the southern boundary of the PBL footprint). This may not be a solution on its own;

- Design and install the PBL with engineered passive “Gas Flaps” which would allow LFG to move vertically from beneath the PBL to above the PBL (this is unlikely to be a solution on its own);
- Design and install a LFG drainage layer (i.e. a gravel / aggregate layer) immediately beneath the PBL with appropriate vertical connection risers (likely to be quite expensive); and
- A combination of some or all of the above.

The adequate control of LFG generated beneath a PBL is a technically complex issue and all of the possible approaches identified above come with their own advantages and disadvantages. GHD consider that with appropriate design, installation and operation, one or a combination of the possible approaches identified above are likely to enable LFG generated beneath the PBL to be adequately collected and subsequently directed to an appropriate LFG treatment technology (i.e. an Engine and / or Flare).

GHD notes that the LFG generation rate from a single tonne of waste deposited in a landfill site typically peaks within approximately 1 to 3 years of its deposition. From that point onwards, the rate of LFG generation declines slowly. This means that over time the rate of LFG generation beneath the PBL will decrease and will present a lower risk / require lower level control measures. As such, although any system deigned should allow contingency for failures of the system / LFG wells etc., it is noted that the number of wells etc. required over time to physically control the LFG generated beneath the PBL is likely to decrease.

4 Conclusions

Following GHD’s review, the following conclusions are made:

- LFG above the PBL and beyond the PBL footprint will be managed in the same way and using a similar collection system as the LFG which is currently managed at the Site. Careful management of drill depths and drillers will be required in areas above the PBL to ensure that the PBL is not compromised;
- There are a number of technical issues likely to be associated with adequately managing LFG generated beneath the PBL;
- There are several possible approaches to managing LFG generated below the PBL. Assuming appropriate design, installation and operation, one or a combination of the possible approaches identified within this letter are likely to enable LFG generated beneath the PBL to be adequately managed; and
- All LFG ultimately collected at the Site will be directed to a suitable treatment technology (i.e. an engine and / or flare).

5 Recommendations

Following GHD’s review, the following recommendations are made:

- The possible approaches to managing LFG beneath the PBL should be reviewed by LMCC and LMS as to which (or which combination) is considered most likely to achieve the aim of long term LFG

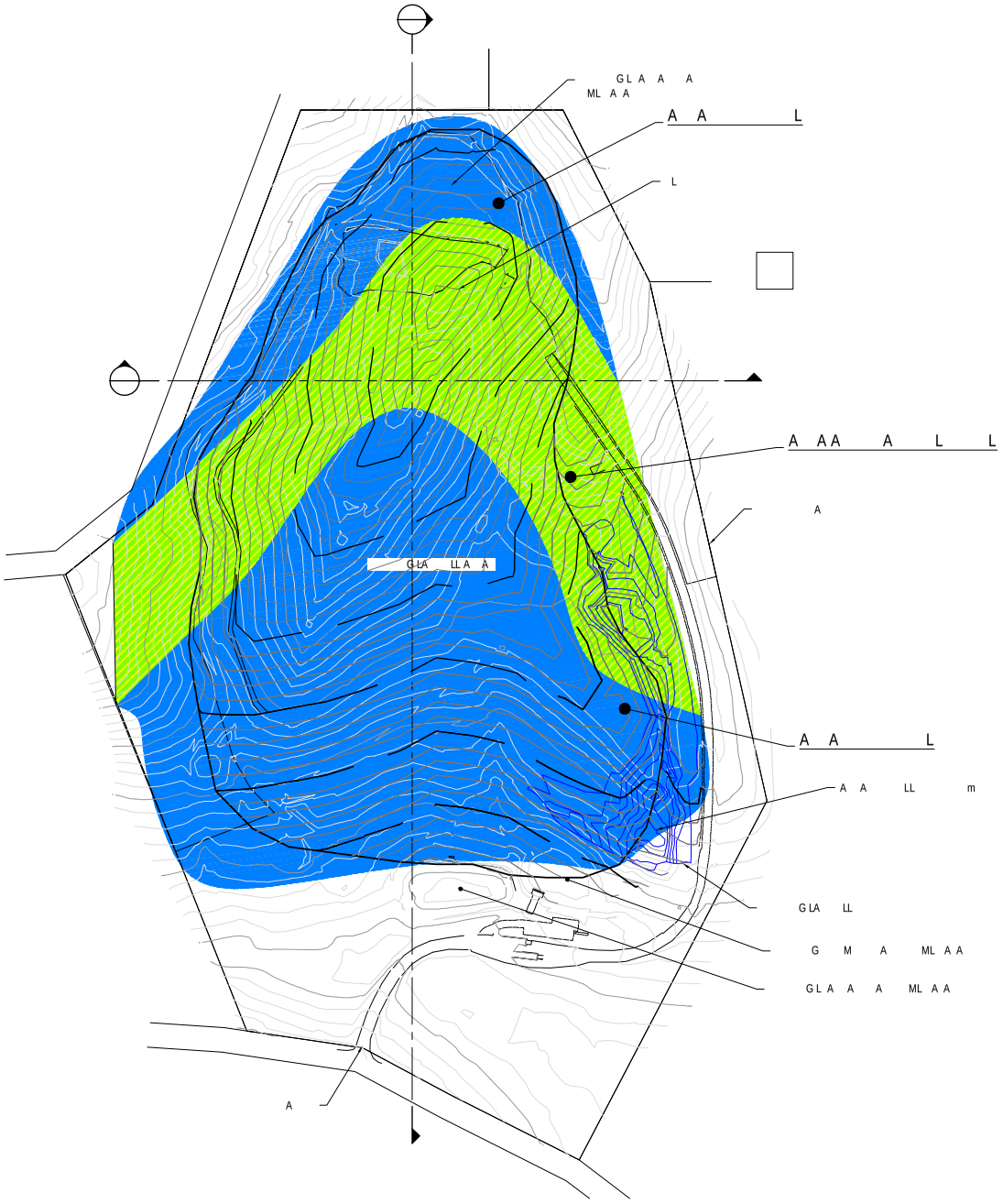
management beneath the PBL. The preferred approach should then be progressively installed / constructed. If it is found following installation / construction that the preferred approach is not adequate / sufficient, LMCC and LMS should review their continuing use of the preferred approach;

- Undertaking the following works is likely to assist LMCC and LMS in relation to the selection of an appropriate long term LFG management approach beneath the PBL:
  - Identifying the age, quantity and types of waste likely to ultimately be beneath the PBL (and to be unaffected by the existing LFG collection system). Once the waste's characteristics have been more fully defined, modelling of the likely rate and change of rate over time of LFG generation within this waste should be undertaken. This will provide useful input data for the design of any LFG management system installed beneath the PBL; and
  - Reviewing LFG surface emissions monitoring data for the area within the PBL footprint (or if such data is unavailable, undertaking LFG surface emissions monitoring in this area). This data would assist LMCC to understand whether significant quantities of LFG are currently being emitted through the surface of the waste in the PBL footprint area.

I trust the information provided above is adequate to achieve the Department's requirements. If you have any queries please do not hesitate to contact me on the telephone number below.

Yours sincerely
GHD Pty Ltd

Matt Welsh
Senior Landfill Gas Specialist
02 92397359



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L A

G A LA LL

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LL

G G A M G LL

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PRELIMINARY

rev	description	app'd	date
B	REVISED		20.04.10
A	INITIAL ISSUE		24.03.10

LAKE MACQUARIE CITY COUNCIL
AWABA LANDFILL

EXISTING FINAL CONTOURS LMCC - PER 1993 REF

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T 61 7 3316 3000 **F** 61 7 3316 3333
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scale 1:2000 for A1 job no. 21-19318
date APR 2010 rev no. B

approved (PD) SK015

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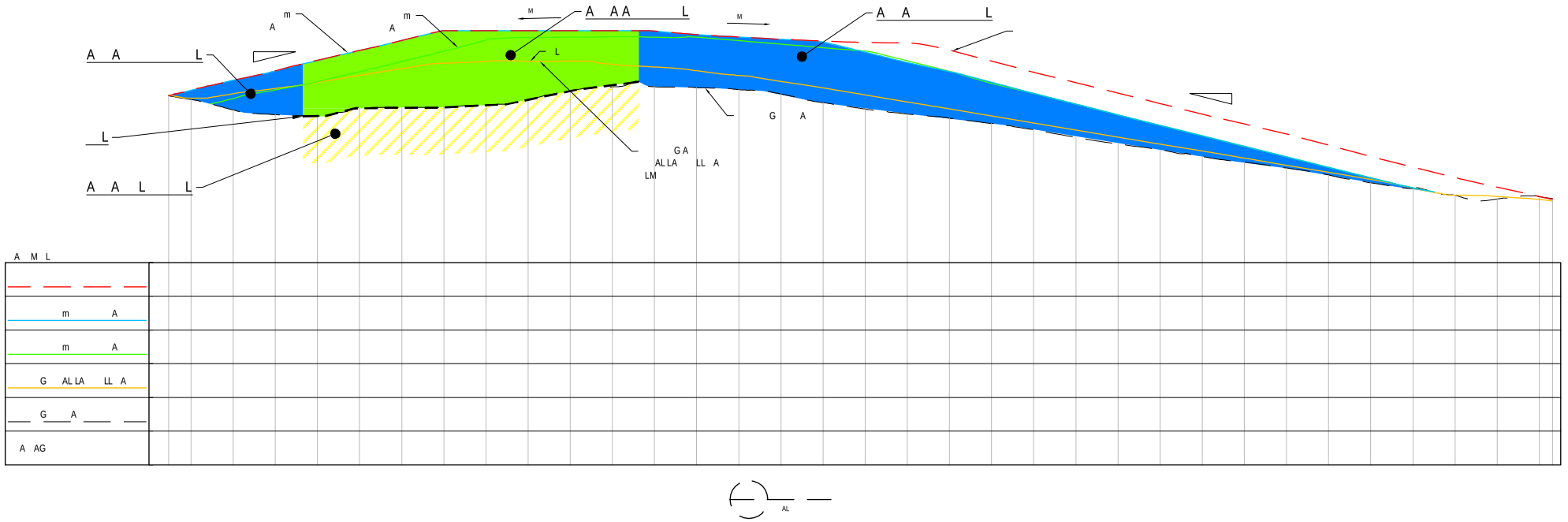

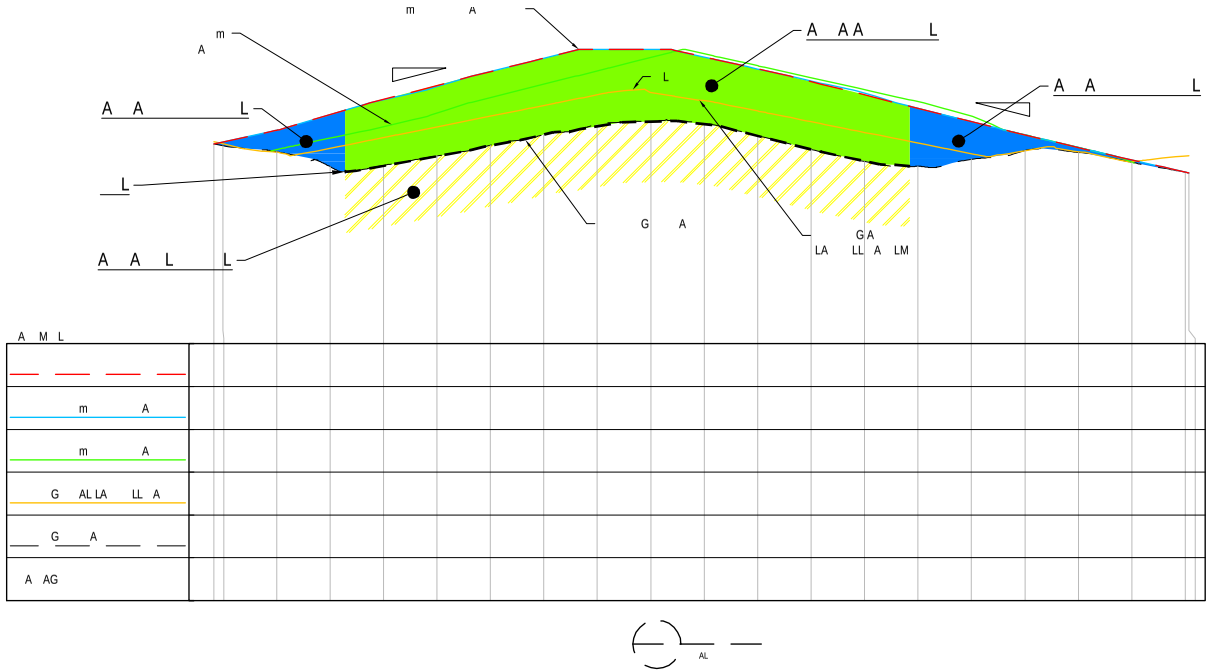

PRELIMINARY

rev	description	app'd	date
B	REVISED		20.04.10
A	INITIAL ISSUE		24.03.10

LAKE MACQUARIE CITY COUNCIL
AWABA LANDFILL

PROPOSED FINAL LANDFORM LONGITUDINAL SECTIONS

Level 4, 201 Charlotte St Brisbane QLD 4000 Australia
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