# Genesis Waste Management Facility, Eastern Creek, Modification 6

## Response to Submissions

**Prepared for Dial-A-Dump (EC) Pty Ltd**
**May 2019**


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# Genesis Waste Management Facility, Eastern Creek, Modification 6

Response to Submissions

**Report Number**

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**Client**

Dial-A-Dump (EC) Pty Ltd

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**Prepared by**

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28 May 2019

**Approved by**

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28 May 2019

# Executive Summary

## ES1 The proposed modification

Dial a Dump (EC) Pty Ltd (the Applicant) - acquired by Bingo Industries in February 2019 - owns and operates the Genesis Xero Waste Facility (the facility) at Eastern Creek in Sydney's west.

The original project approval for the site was granted by the Minister for Planning in 2009 (MP 06_0139).

The facility is approved to accept up to 2 million tonnes per annum (tpa) of construction, demolition, commercial and industrial, special waste and green waste. It also operates subject to two Environmental Protection Licences issued by the NSW Environment Protection Authority.

The facility undertakes a range of waste management services, including sorting, processing and recycling materials for reuse, and landfilling materials which cannot be recycled or reused.

It is proposed to modify the terms of approval for the facility by:

- increasing the annual landfill limit from 700,000 tpa to 1,000,000 tpa (exclusive of waste generated by recycling processes within the Materials Processing Centre (MPC) and the Pre-Sort Enclosure (PSE) which are the two stages of sorting materials in the co-mingled waste recycling stream);
- revising the noise impact assessment criteria; and
- extending the operating hours for the facility.

## ES2 Important clarifications

There is also a need to be clear on what is not proposed and will not change as part of this modification:

- the facility is approved to receive up to 2 million tonnes per annum and this will not be increased as part of the modification;
- the types of waste accepted at the facility will not be altered as part of the modification; and
- the facility will continue to collect and treat leachate.

## ES3 Why the modification is needed

### ES3.1 The waste management marketplace is changing

The facility operates within the context of the Greater Sydney basin, which is facing growing pressure as non-putrescible waste generation continues to grow in line with construction activity and major infrastructure investment. Research suggests that both the number of landfills and their collective approved capacity are in decline.

Increasing the approved capacity at Eastern Creek – in terms of operating hours and the volume allowed to be sent to landfill - seeks to optimise the capacity of the site as other landfill facilities come offline. Enhancing the level of disposal capacity within the Sydney basin also reduces the overall impact of waste management, such as the avoidance of the long-haul transport for waste which generates additional environmental and amenity impacts for communities.

Given the significantly declining landfill capacity and increasing waste generation from an infrastructure boom within the Sydney region, combined with the introduction of the Queensland waste levy, there is a strong need to increased capacity for direct-to-landfill disposal at the facility.

### ES3.2 The landfilling limit may cause recycling to cease at the facility

The consent does not currently distinguish between 'direct-to-landfill' waste and waste which is an unavoidable by-product to recycling processes and which also needs to be sent to landfill.

If landfilling quantities reach the 700,000 tpa limit, then neither 'direct-to-landfill' waste nor waste from recycling can be disposed to landfill. Recycling of co-mingled recyclable waste via the Pre-Sort Enclosure and the Materials Processing Centre cannot occur if there is not capacity to dispose of the by-products to the landfill void. Disposal of this by-product waste is also a requirement of the EPL for the facility.

### ES3.3 The landfilling limit may displace disposal elsewhere

If the landfilling limit is reached, the need for landfilling of 'direct-to-landfill' waste – such as soil contaminated by asbestos – is simply forced to licensed facilities further afield, bring additional impacts to communities through haul routes across greater distances or potentially incentivising illegal dumping.

### ES3.4 The current noise criteria are a poor indicator of noise impacts

The noise criteria set via the development consent need recalibration to reflect contemporary background (ambient) levels. The impact of a noise level which is below background noise levels will not be discerned by the local community. For the purpose of regulating noise from the facility, a more meaningful set of noise criteria are required.

### ES3.5 The current hours of operation are sub-optimal

There is scope for hours to be extended, and tailored to selected activities, while maintaining impacts within acceptable limits. If current hours are unchanged, then the growth in demand for recycling and landfill services will need to be accommodated within existing times. This results in a concentration of activity, including truck movements, which can bring additional impacts such as congestion. Spreading the hours of operation can allow demand to be accommodated provides a better balance.

## ES4 Details about the modifications

Full details of the existing consent conditions and the proposed changes to those conditions are illustrated at Section 7.2 of this report. Summaries of the proposed changes are described below.

### ES4.1 Volumes

The facility is currently approved to accept up to 2 million tonnes per annum (M tpa) of construction, demolition, commercial and industrial, green waste and asbestos waste in the landfill. The facility currently operates below the approved 2M tpa limit. It is not proposed to vary that overall limit nor is it proposed to vary the types of waste approved for processing at the facility

The overall limit of 2M tpa is currently subject to a secondary constraint being that, of that 2M tpa, a maximum of 700,000 tpa can be disposed to landfill. It is this secondary 'landfill limit' that is the focus of the modification.

The proposed modification is to increase the annual landfill limit to 1M tpa and to clarify that this landfill limit applies only to 'direct-to-landfill' waste. The 1M tpa would not apply to waste sent to landfill as a by-product of the

recycling and sorting processes which occur in the Materials Processing Centre (MPC) and the Pre-Sort Enclosure (PSE). Without exclusion of the MPC and PSE by-product waste from the landfill limit, the beneficial recycling processes which rely on some disposal of by-product to landfill may need to cease or be constrained. Waste generated through the recycling process must be disposed to the landfill in accordance with the EPL 13426, Condition L3.4.

The lifespan of the landfill will be shortened by the proposed modification, which provides benefits in terms of bringing forward the closure and rehabilitation of the landfill, and cessation of operational impacts associated with landfilling activities.

## ES4.2 Hours

The proposed modification also seeks to extend the hours of operation for the facility for selected activities. A general broadening of those time periods is proposed, and also a greater distinction between different parts of those activities.

The existing and proposed hours for each activity are detailed in Table ES1 below.

**Table ES1 Existing and proposed hours**

| Activity | Days | Existing times | Proposed times |
|---|---|---|---|
| Construction | Monday – Friday | 7:00 am to 6:00 pm | No change |
| | Saturday | 8:00 am to 4:00 pm | No change |
| | Public holidays | Nil | No change |
| MPC Operations (waste delivers and chute use) | Monday – Friday | 7:00 am to 6:00 pm | 24 hours |
| | Saturday, Sunday and Public holidays | 8:00 am to 4:00 pm | 24 hours |
| Crushing and screening | Monday – Friday | 7:00 am to 6:00 pm | 6:00 am to 6:00 pm |
| Receipt of segregated materials at the SMA site (excluding crushing and screening) | Monday – Friday | 7:00 am to 6:00 pm | 24 hours |
| MPC (including maintenance) | Monday – Friday | 6:00 am to 10:00pm | 24 hours |
| | Saturday, Sunday and Public holidays | 6:00 am to 4:00 pm | 24 hours |
| Landfill deliveries (by truck only) | Monday – Sunday | 7:00 am to 6:00 pm | 5:00 am to 9:00 pm |

## ES4.3 Noise criteria

There will be no impact on local residents from the proposed change in noise criteria.

The ambient noise levels at residential locations in Minchinbury and Erskine Park are respectively recorded as being (in $L_{Aeq,\ period}$ noise level[3], dB) 55 and 53 for daytime; 54 and 57 for evenings; and 51 and 46 at night time.

Ambient noise levels at the nearest receivers are more than 10 dB higher than the noise limits set in the project approval and relevant Environment Protection Licences (EPL), which are:

- Day – 36 dB(A) ($LA_{eq(15\ minutes)}$);
- Evening – 35 dB(A) ($LA_{eq(15\ minutes)}$); and

- Morning shoulder – 35 dB(A) ($LA_{eq(15\ minutes)}$).

This creates a situation where there can be a technical exceedance of the noise limits specified in the development consent and the EPL of up to 10dB, and yet that exceedance would not be able to be heard above the background noise levels. The existing noise criteria are therefore a poor predicter of actual noise impact. If a sound emanating from the facility is not able to be heard above other background noise levels (such as traffic from the M4 Western Motorway) then it has no adverse impact on the receiver.

It is recommended that the existing noise criteria be re-calibrated to a more meaningful level so that both the facility operator, environmental regulator and the local communities have a meaningful measure by which to manage potential impacts. The proposed new noise impact thresholds are shown in Table ES2 below.

**Table ES2 Proposed new noise impact thresholds**

| Location | Day | Evening | Night | Morning shoulder |
|---|---|---|---|---|
| | $LA_{eq(15\ minute)}$ dB(A) | $LA_{eq(15\ minute)}$ dB(A) | $LA_{eq(15\ minute)}$ dB(A) | $LA_{eq(15\ minute)}$ dB(A) |
| Minchinbury residential receivers | 48 | 47 | 44 | 47 |
| Erskine Park residential receivers | 39 | 40 | 37 | 40 |

## ES5 The environmental management system for the facility

The facility operates subject to a number of operational plans which form part of the Environmental Management System for the site. These are required as conditions to the development consent for the facility.

These plans and strategies remain relevant to the operation of the facility and the proposed changes within this modification do not radically alter the fundamental aspects of the facility which are addressed by the management plans. The plans will be updated to reflect the changes arising from this proposed modification.

## ES6 The exhibition of the environmental assessment

An environmental assessment report was prepared for the Applicant by EMM Consulting Pty Ltd (EMM) in August 2018.

The report was placed on public exhibition, in accordance with Division 6 of Part 6 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), between 3 October 2018 and 17 October 2018.

Copies of the environmental assessment report were made available via Blacktown City Council offices as well as via the Department of Planning and Environment (DPE) website.

During the exhibition period, submissions were invited from all stakeholders, including members of the community and government authorities.

A total of 66 submissions were received from community members.

A total of 10 submissions were received from public authorities, including State and local government.

## ES7 The matters raised by respondents

Most of the community responses were from residents in Minchinbury and Erskine Park. The issues most frequently raised by the respondents were:

- noise;
- air quality (including 'pollution');
- traffic;
- odour;
- asbestos;
- health impacts; and
- impacts on local amenity and residential land use.

Public authorities were also invited to prepare submissions regarding the proposed modifications. The public authorities included local councils and also State agencies such as the Environment Protection Authority, Transport for NSW, Department of Industry and Office of Environment and Heritage.

The issues raised by public authorities included:

- the lifespan of the landfill;
- traffic;
- noise;
- air quality;
- leachate;
- lighting; and
- facility design considerations.

## ES8 Addressing the matters raised

All of the main issues, as well as those issues registering fewer comments, were able to be addressed through the provision of additional information or further explanatory text.

A few matters were raised which were considered out of scope. Notably there were some community references to the previously proposed 'waste to energy' facility which is not within the subject site or the subject of this modification, is unrelated to the operation of the subject facility, and was the focus of a separate development proposal. It should also be clarified that the proposal does not seek to vary the 2M tpa gate limit, which is already a condition of the existing approval.

Other than the replacement of Appendix B to the Environmental Assessment - Noise Impact Assessment Report - with the correct version of the Noise Impact Assessment Report, the Environmental Assessment remains unchanged.

All of the issues raised by respondents are addressed in the Response to Submissions Report.

The responses to submissions are often quite lengthy because many of the submissions required background material to be provided or for complex issues to be explained in detail.

## ES9 The future of the facility

The facility at Eastern Creek is part of a broader network of waste management facilities across Sydney. This facility, and others, fulfil an important role in the way that the city functions.

While waste generation can be reduced, the population growth, urban development and infrastructure programs which inevitably create waste materials will continue for the foreseeable future.

The facility at Eastern Creek provides two important services to the community. It enables more efficient and effective use of resources by providing facilities to sort, screen and process recyclable waste materials and then adding value by providing the recycled materials to the market for application in a wide range of developments. The facility also provides an essential means to dispose of waste to landfill where landfilling is the only safe and economic solution for certain waste streams.

The facility is also appropriately licensed to undertake this activity and has the benefit of an existing development consent to receive up to 2M tonnes of waste each year.

This modification seeks to change some of the conditions of the existing development consent which are, or are likely to, create adverse - and perhaps unforeseen - outcomes. For example, the current limit on landfilling will potentially cause the facility to cease recycling as well as curtailing recept of any 'direct-to-landfill' waste because the process of recycling produces non-recyclable by-products which also need to be disposed to landfill.

While there are no simple solutions, a waste management facility needs to deal in waste, and there are impacts associated with that activity. The proposed modification has carefully considered how changes can be made to the conditions relating to volumes, hours and noise criteria while achieving impact levels within objective government guidelines and taking into account both the concerns of the local community and the needs of the broader urban areas of Sydney in terms of demand for waste management.

It is important to note that this proposed modification does not alter the approved 2M tpa 'gate limit' for the facility nor the types of waste which are authorised to be received on site. It does not seek to enlarge to operational area of the facility nor the general arrangement of plant and equipment on site.

The modification was proposed so that the operator of the facility can meet the policy objectives of the NSW Government for recycling, accommodate the increasing demands of Sydney's development activities, and to recalibrate noise measures so that they are meaningful and reliable as indicators of adverse impacts.

# Table of Contents

## Appendices



## Tables

## Figures

# 1 Introduction

## 1.1 The existing facility

Dial a Dump (EC) Pty Ltd (the Applicant) owns and operates the Genesis Xero Waste Facility (the facility) at Eastern Creek in Sydney's west. The facility is located at 1 Kangaroo Avenue and comprises a resource recovery facility and a general solid waste (non-putrescible) landfill. The landfill is a former quarry site and the resource recovery operations involve a Materials Processing Centre (MPC), a Pre-Sort Enclosure (PSE), a Segregated Material Area (SMA), and a Waste Transfer Station.

The landfill void (former quarry) comprises approximately 75% of the site area. The MPC, PSE, timber waste, green waste, sales yard, SMA (ie crushing and screening area) and workshop area are situated in the west and north-west sectors of the site. The operational areas of the site are surrounded to the east, west and north by an environmental bund constructed of overburden from the former quarry which shields receptors from views of, and light and noise generated from, the facility.

The facility is approved to accept up to 2 million tonnes per annum (2M tpa) of construction, demolition, commercial and industrial and green waste. It is also licensed to accept special waste, such as asbestos. There are two main processing streams at the facility depending on the characteristics of the waste being delivered to the site:

- direct-to-landfill; and
- materials recovery and recycling.

Direct-to-landfill is necessary for contaminated waste such as soil containing asbestos fragments. Much of the recent growth in landfill inputs at the facility is asbestos contaminated soils and asbestos containing materials which accounted for more than 60% of landfill inputs in FY2017-18. This type of waste cannot be recycled and disposal to a licensed landfill facility is the method required by regulation. This stream is expected to continue growing as the NSW construction and redevelopment boom continues and the number of alternative disposal sites reduces.

The materials recovery and recycling represent the processing stream for the majority of the waste received. This waste is directed to the resource recovery facilities (such as PSE, MPC and SMA) for sorting, processing and resale as products suitable for application to land such as road base. The facility recycles an estimated 65-80% of all incoming waste. Material which is unsuitable or uneconomical for recovery or recycling is subsequently disposed to landfill. This is estimated to be approximately 30% of waste processed through the PSE and MPC.

The facility currently landfills at a rate of approximately 629,000 tpa (from both direct-to-landfill sources and residual wastes from the PSE and MPC).

## 1.2 Notes

Please note that Dial a Dump (EC) Pty Ltd was acquired by Bingo Industries in February 2019. Dial a Dump (EC) Pty Ltd nevertheless remains the Applicant for this modification.

Please also note that there is another Application to Modify the Consent for this facility – referred to as Modification 7 – which has also been lodged with the Department of Planning and Environment. Modification 7 seeks to reconfigure some of the roads, plant and buildings on site, and to install new weighbridges, an amenity wall and related infrastructure. Modification 7 is noted where relevant in this report but the determination of Modification 7 is a separate matter subject to a separate environmental assessment.

The Applicant engaged Arcadis Australia Pacific to undertake an independent peer review of the report prepared by EMM. This quality assurance measure will provide greater confidence to agency and community respondents that issues were adequately addressed.

## 1.3 The proposed modification

It is proposed to modify the terms of approval for the facility by:

- increasing the annual landfill limit from 700,000 tpa to 1,000,000 tpa (excluding waste generated by recycling processes within the Materials Processing Centre (MPC) and the Pre-Sort Enclosure (PSE) which are the two stages of sorting materials in the co-mingled waste recycling stream);
- revising the noise impact assessment criteria; and
- extending the operating hours for the facility.

## 1.4 Statutory context

The original project approval for the site was granted by the Minister for Planning in 2009 (MP 06_0139) under Section 75J of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The operations commenced in 2012 and the project approval has been modified five times, most recently in March 2016. The facility also operates subject to two Environment Protection Licences (EPL) issued by the NSW Environment Protection Authority (EPA).

The application to modify the existing planning approval was made under section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Applicant applied for Secretary's environmental assessment requirements (SEARs) for the proposed modification on 1 March 2017. SEARs, including requirements from other government agencies, were received from the DPE on 3 April 2017.

## 1.5 Environmental assessment

An environmental assessment report was prepared for the Applicant by EMM Consulting Pty Ltd (EMM) in August 2018. The report was placed on public exhibition, in accordance with Division 6 of Part 6 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), between 3 October 2018 and 17 October 2018. Copies of the environmental assessment report were made available via Blacktown City Council offices as well as via the Department of Planning and Environment (DPE) website. During the exhibition period, submissions were invited from all stakeholders, including members of the community and government authorities.

A total of 66 submissions were received from community members.

A total of 10 submissions were received from public authorities, including State and local government.

The submissions received during the public exhibition period are the focus of this report, known as a Response to Submissions (RTS). The RTS tabulates the submissions, identifies and analyses the issues raised, and proposes a means by which those issues can be addressed.

## 1.6 Additional strategic justification for the proposal

The strategic justification is explained in detail in Section 4.2 of the Modification 6 Environmental Assessment.

Following the lodgement of the modification application in September 2018 and the introduction of the Queensland waste levy in March 2019 additional analysis, summarised below, has been undertaken on the compelling strategic need for this proposal.

The Genesis Waste Management Facility at Eastern Creek operates within the context of the Greater Sydney basin, which is facing growing pressure as non-putrescible waste generation continues to grow in line with construction activity and major infrastructure investment.

Previous analysis completed by MRA (2018) presented below (Figure 1.1) for Bingo Industries has identified a number of existing non-putrescible waste landfills and one planned landfill within the metropolitan region. However, both the number of landfills and their collective approved capacity are in decline. Major sites have closed, including Spring Farm Landfill in 2016, and others set to close in the next 1-2 years include the significant Erskine Park and Horsley Park landfills (Figure 1.2).

| No. | Dry Landfill | CALCULATING TOTAL VOID SPACE | | | | Licence limit (tpa) | CALCULATING RECEIVAL RATE T/YR | | | Expected closure year (est. see caveat) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Estimated existing min void space (t) | Stated Cap volume (t)[3] | Estimated Cap volume (t)[4] | Total void space including cap volume (t) | | T received Landfilled in Sydney/yr (A) | T received Transported to QLD /yr (B) | Capacity to absorb (tpa) A+B+New Patons lane receipts | | |
| 1 | Dial-a-Dump Genesis | 9,600,000 | - | - | 9,600,000 | 700,000 | 690,000 | - | 690,000 | 2033 | - |
| 2 | SUEZ Kemps Creek | 7,000,000 | 8,400,000 | - | 15,400,000 | unlimited | 1,400,000 | - | 1,400,000 | 2030 | SUEZ application for extension likely to be approved |
| 3 | Veolia Horsley Park | 430,000 | - | - | 430,000 | 430,000 | 430,000 | - | 430,000 | 2019 | Veolia have stated they will transport to Woodlawn once full |
| 4 | Brandown | 3,200,000 | - | 1,869,610 | 5,069,610 | unlimited | - | 250,000 | 250,000 | 2040 | MRA estimated additional cap |
| 5 | Kurnell Landfill | 2,000,000 | - | - | 2,000,000 | unlimited | 200,000 | - | 200,000 | 2029 | No cap increase assumed |
| 6 | Glenfield Waste Services | 1,800,000 | - | 1,007,230 | 2,807,230 | unlimited | 75,000 | - | 75,000 | 2040 | MRA estimated additional cap |
| 7 | Blacktown Waste Services | 600,000 | - | 619,540 | 1,219,540 | 360,000 | 100,000 | - | 100,000 | 2032 | MRA estimated additional cap |
| 8 | Kelso Landfill | 11,366 | - | - | 11,366 | unlimited | 25,000 | - | 25,000 | 2020 | No cap increase assumed |
| 9 | Kimbriki Environmental Enterprises | 2,968,778 | - | - | 2,968,778 | unlimited | 60,000 | - | 60,000 | 2040 | No cap increase assumed |
| 10 | Greenwood Landfill | 18,736 | - | - | 18,736 | 15,000 | 1,000 | - | 1,000 | 2038 | No cap increase assumed |
| 11 | Sydney Recycling Park | 650,000 | 150,000 | - | 800,000 | unlimited | - | 150,000 | 150,000 | 2025 | Sending sig volumes to QLD |
| 12 | Patons Lane | 4,300,000 | - | - | 4,300,000 | 205,000 | - | - | 205,000[5] | 2040 | - |
| 13 | Cleanaway Erskine Park | 360,000 | - | - | 360,000 | 1,000,000 | - | 120,000 | 120,000 | 2022 | Sending sig volumes to QLD |
| | **Total** | | | | **45 Mt[6]** | | **2.9 Mt** | | **3.7 Mt** | | |

**Figure 1.1 Sydney landfill throughput capacity**

At the same time, only one new landfill has been approved in the Sydney basin this century, Bingo's own Paton's Lane facility, and no new landfills are likely to be approved due to community sensitivity and the rising cost of land.

Increasing the approved capacity at Eastern Creek to 1 million tonnes per annum (Mtpa) seeks to optimise the capacity of the site as other facilities come offline. Securing disposal capacity within the Sydney basin also reduces the long-haul transport of waste, supporting NSW Government objectives to avoid the environmental and amenity impacts of this practice.

Further, the final version of the standards no longer includes mandatory minimum recovery rates for B&D facilities, initially proposed at 75% for any facility receiving more than 30,000 tonnes per annum and 50% for smaller facilities.[1] The stipulated floor in recovery rates was intended to increase the diversion of B&D waste from landfill to productive uses in the economy. Its removal will almost certainly increase the landfilling of B&D waste compared to expectations, while simultaneously waste to Queensland is likely to decline from July 1, 2019 when the Queensland landfill levy is introduced.

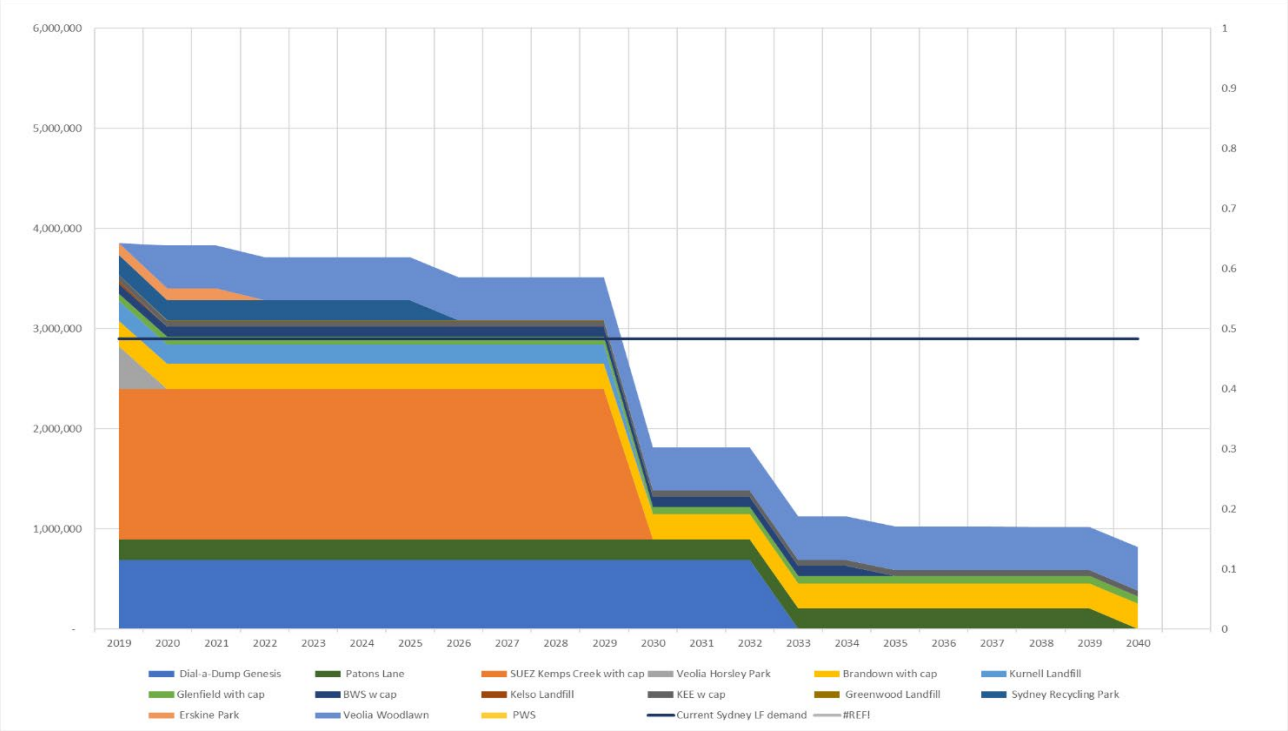



**Figure 1.2 Forecast non-putrescible landfill capacity and closure in the Sydney basin (MRA, 2018)**

Given the significantly declining landfill capacity and increasing waste generation from an infrastructure boom within the Sydney region, combined with the introduction of the Queensland levy, there is a strong need to increased capacity for direct-to-landfill disposal at the Genesis Waste Management Facility.

[1] https://www.epa.nsw.gov.au/~/media/EPA/Corporate%20Site/resources/wasteregulation/nsw-managing-construction-demolition-waste-minimum-standards-160545.ashx

# 2 Overview of the exhibited project

There are three key elements to the proposed modification. It is proposed to:

- increase the annual landfill volume limit;
- extend the hours of operation; and
- re-set the existing noise criteria to a meaningful level.

## 2.1 Volumes

The facility is currently approved to accept up to 2 million tonnes per annum (M tpa) of construction, demolition, commercial and industrial, special waste (asbestos) and green waste. The facility currently operates at well below that approved 2M tpa limit. It is not proposed to vary that overall limit nor is it proposed to vary the types of waste approved for processing at the facility.

The overall limit of 2M tpa is currently subject to a secondary constraint being that, of that 2M tpa, a maximum of 700,000 tpa can be disposed to landfill. It is this secondary 'landfill limit' that is the focus of the modification.

The proposed modification is to increase the annual landfill limit to 1M tpa and to clarify that this landfill limit applies only to 'direct-to-landfill' waste. The 1M tpa would not apply to waste sent to landfill as a by-product of the recycling and sorting processes which occur in the Materials Processing Centre (MPC) and the Pre-Sort Enclosure (PSE). Without exclusion of the MPC and PSE by-product waste from the landfill limit, the beneficial recycling processes which rely on some disposal of by-product to landfill may need to cease or be constrained. Waste generated through the recycling process must be disposed to the landfill in accordance with the EPL 13426, Condition L3.4.

The proposed increase in the landfill limit also acknowledges the growing demand for appropriate facilities to where direct-to-landfill waste can be accommodated.

The lifespan of the landfill will be shortened by the proposed modification, which provides benefits in terms of bringing forward the closure and rehabilitation of the landfill, and cessation of operational impacts associated with landfilling activities.

The landfill lifespan is a function of a number of variables, the key ones being:

- the remaining landfill void (airspace) which is fixed and not proposed to change under this modification;
- the rate of annual waste inputs to the landfill (in tonnes per annum) which is proposed to increase under this modification; and
- the average density of the waste in the landfill (after compaction), which determines how much volume each tonne of waste consumes.

The current direct-to-landfill waste is predominantly heavy streams such as asbestos soils and general non-putrescible waste. There are light (low density) streams such as shredder flock and residuals from the PSE and MPC which are also low density. It is difficult to predict the future waste mix as this will be driven by market demand, but if there is an increase in the proportion of light materials and a reduction in the overall average density of waste to landfill, then landfill airspace will be consumed more quickly for a given input tonnage.

By way of example, two scenarios are presented:

- Business-as-usual under the current approval with total waste to landfill (including PSE and MPC residuals) limited to 700,000 tonnes per annum. Based on the most recent landfill survey data, the remaining void (as of July 2018) was 9.6 million cubic metres and the average airspace utilisation rate was 1.24 tonnes per cubic metre. Assuming no significant change in the waste mix, the landfill would be full around 2035.

- Under an alternative scenario where the direct-to-landfill annual rate is increased to 1 million tonnes per annum with the same waste mix, and the PSE/MPC throughput is increased (due to 24 hour running) to a nominal 350,000 tonnes per annum (leaving up to 650,000 tonnes per annum to go through the SMA) and PSE/MPC residuals are addition to the direct-to-landfill stream; the landfill lifespan would be reduced by an estimated 7 years to around 2028[2].

This alternate scenario is for demonstration purposes only and there a numerous permutations that could be considered of different waste mixes and throughputs to the PSE/MPC.

## 2.2 Hours

The proposed modification also seeks to extend the hours of operation for the facility for selected activities. The current consent allows for a varying set of hours for each major element of operation. For example, MPC operation and maintenance can currently occur between 6:00 am and 10:00 pm Monday to Friday, and crushing or screening can occur over a lesser period of 7:00 am to 6:00 pm Monday to Friday. Times are also different on weekends. The principle of setting different time periods for different activities will be maintained. What is proposed in this modification is a general broadening of those time periods, and also a greater distinction between different parts of those activities. For example, there is no change proposed for construction hours; crushing and screening is extended by one hour; and the operation of the MPC (an enclosed building) is proposed to be available 24 hrs.

Overall, the proposed modification is seeking a balanced and responsible arrangement for the operation of the facility so that it can accommodate the growing demand for waste management in Sydney, while addressing the legitimate concerns of the community.

Note that a reference to the proposed hours for an activity means the suite of activities associated with normal functioning of those areas of the facility, and not to a specific building. Hence, the activity of “MPC” includes pre-sorting within the Pre-Sort Enclosure (PSE) which is adjacent to the building called the Materials Processing Centre (MPC). The PSE and the MPC buildings are both components of materials processing and are generically referred to as the “MPC activity”.

The existing and proposed hours for each activity are detailed in Table 2.1 below.

[2] Based on an assumed 25% residuals from the MPC process with a compacted density of 0.5t/m$^3$.

**Table 2.1 Existing and proposed hours**

| Activity | Days | Existing times | Proposed times |
|---|---|---|---|
| Construction | Monday – Friday | 7:00 am to 6:00 pm | No change |
| | Saturday | 8:00 am to 4:00 pm | No change |
| | Public holidays | Nil | No change |
| MPC Operations (waste delivers and chute use) | Monday – Friday | 7:00 am to 6:00 pm | 24 hours |
| | Saturday, Sunday and Public holidays | 8:00 am to 4:00 pm | 24 hours |
| Crushing and screening | Monday – Friday | 7:00 am to 6:00 pm | 6:00 am to 6:00 pm |
| Receipt of segregated materials at the SMA site (excluding crushing and screening) | Monday – Friday | 7:00 am to 6:00 pm | 24 hours |
| MPC | Monday – Friday | 6:00 am to 10:00pm | 24 hours |
| (including maintenance) | Saturday, Sunday and Public holidays | 6:00 am to 4:00 pm | 24 hours |
| Landfill deliveries (by truck only) | Monday – Sunday | 7:00 am to 6:00 pm | 5:00 am to 9:00 pm |

## 2.3 Noise criteria

The proposed changes to the noise criteria have no impact on local residents.

The ambient noise levels at residential ('sensitive receptor') locations in Minchinbury and Erskine Park are respectively recorded as being (in $L_{Aeq,\ period}$ noise level[3], dB) 55 and 53 for daytime; 54 and 57 for evenings; and 51 and 46 at night time.

Ambient noise levels at the nearest receivers are more than 10 dB higher than the noise limits set in the project approval and relevant Environment Protection Licences (EPL), which are:

- Day – 36 dB(A) ($LA_{eq(15\ minutes)}$);
- Evening – 35 dB(A) ($LA_{eq(15\ minutes)}$); and
- Morning shoulder – 35 dB(A) ($LA_{eq(15\ minutes)}$).

This creates a situation where there can be a technical exceedance of the noise limits specified in the development consent and the EPL of up to 10dB, and yet that exceedance would not be able to be heard above the background noise levels. The existing noise criteria are therefore a poor predicter of actual noise impact. If a sound emanating from the facility is not able to be heard above other background noise levels (such as traffic from the M4 Western Motorway) then it has no adverse impact on the receiver.

It is recommended that the existing noise criteria be re-calibrated to a more meaningful level so that both the facility operator, environmental regulator and the local communities have a meaningful measure by which to manage potential impacts. These changes will have no impact on local residents.

The proposed new noise impact thresholds are:

**Table 2.2 Proposed new noise impact thresholds**

| Location | Day | Evening | Night | Morning shoulder |
|---|---|---|---|---|
| | $LA_{eq(15\ minute)}$ dB(A) | $LA_{eq(15\ minute)}$ dB(A) | $LA_{eq(15\ minute)}$ dB(A) | $LA_{eq(15\ minute)}$ dB(A) |
| Minchinbury residential receivers | 48 | 47 | 44 | 47 |
| Erskine Park residential receivers | 39 | 40 | 37 | 40 |

## 2.4 Revisions to the proposal

The matters raised in the submissions from authorities and the community generally required a response in the form of clarification or additional information. That information is recorded in Section 4 and 5 of this report (being the responses to public authority submissions and the responses to community submissions respectively), forms part of the overall assessment of the proposed modification and should be read in conjunction with the Environmental Assessment (EMM 2018).

One of the matters noted in submissions was that the noise impact assessment report (Appendix B to the Environmental Assessment) was not the most current version and not the version referenced in the Environmental Assessment. The original proposal is therefore revised to the extent that the appropriate Appendix B is now provided. Please refer to the Addenda section of the report where the appropriate version is provided.

Broadly, the proposed modification remains as originally described, and the remainder of the Environmental Assessment and Appendices are also as originally submitted. No additional mitigation works are proposed.

## 2.5 The purpose of this report

The purpose of this RTS is to analyse and respond to matters raised in submissions from stakeholders during the exhibition period.

Section 4.39(e) of the EP&A Act provides for the Regulations to require applicants to prepare a response to submissions relating to State significant development. Clause 85A of the EP&A Regulation further requires the Secretary of DPE to provide the submissions (or a summary of the submissions) to the applicant and may also require the applicant to prepare a written response to issues raised in those submissions.

A request to prepare a RTS was issued by DPE on 1 November 2018.

The request for a RTS requires the applicant to:

- provide a written response to each of the issues raised; and
- provide a response to specific matters raised by DPE in an attachment to the letter.

A copy of the letter, including the attachment, is provided at Appendix D.

The issues identified by DPE in the letter dated 1 November 2018 were:

- general matters (such as life expectancy of the landfill);
- traffic and parking;
- air quality and odour; and

- noise.

All of these issues are addressed in this report.

The responses provided via this Response to Submissions Report form part of the assessment documentation related to the proposed modification.

# 3 Exhibition and consultation

## 3.1 Consultation prior to public exhibition

During the preparation of the environmental assessment and the development of the proposed modification, the Applicant undertook consultation with, or received advice from:

- Department of Planning and Environment (DPE);
- NSW Environment Protection Authority (EPA); and
- Blacktown City Council.

The consultation was conducted face to face, by telephone and by email.

## 3.2 Consultation during the public exhibition

The Applicant met with Blacktown City Council during the exhibition period (2 October 2018). The Applicant provided an email response direct to Blacktown City Council (15 October 2018) in response to the matters raised by Council at that meeting.

As noted in Section 3 of this report, several public authorities made submissions during the exhibition period. Details of the issues raised by public authorities, and responses to those matters, are provided in Section 4

Community submissions and the responses to matters raised by the community are detailed in Section 5.

## 3.3 Consultation after the exhibition period

Representatives from Dial-A-Dump (EC) Pty Ltd (now owned by Bingo Industries) and EMM Consulting met with staff from DPE and EPA at the Pitt Street Offices of DPE on 16 May 2019.

This was an opportunity to brief officers from DPE and EPA on the main issues raised via the submissions. No additional or specific issues were raised by DPE or EPA. The Applicant was able to provide verbal advice and explanation on key attributes of the proposed modification, including noise, air quality, traffic and lighting.

# 4 Overview of submissions

During the exhibition period, a number of submissions were received from government authorities and the community.

There was a total of 13 responses from public authorities and 66 public submissions.

All submissions have been considered in the context of the proposed modification.

## 4.1 Submission response methodology

Public submissions were recorded and tabulated to identify the key issues raised in each submission. There was noted to be a number of matters, such as noise, air quality, traffic etc, which tended to be raised by multiple stakeholders, and in the interests of simplicity, the response to those 66 submissions has been based on the issues raised in submissions rather than an individual (and potentially repetitive) response to each individual stakeholder. Each public submission has been assigned a unique number and where responses are articulated there is cross referencing to assist those individual stakeholders to identify where their issues are summarised and addressed.

Public authority submissions tended to reflect the specific interests of each authority and there were few issues which were common across those submissions. The public authority responses are therefore addressed individually.

### 4.1.1 Technical matters

There were a number of technical matters raised, particularly but not exclusively by government authorities, and the Applicant has referred those matters to relevant technical experts for advice. This involved, where appropriate, checking and revision of modelling and analysis for impact assessment.

## 4.2 Submissions received - government authorities

Submissions were received from:

- Department of Planning and Environment (DPE) – now the Department of Planning, Industry and Environment;
- Environment Protection Authority (EPA);
- Department of Industry;
- NSW Fire and Rescue;
- Roads and Maritime Services (RMS);
- Office of Environment and Heritage (OEH);
- Endeavour Energy;
- TransGrid (x2);
- Transport for NSW (TfNSW);
- Sydney Water Corporation (SWC);

- Penrith City Council; and
- Blacktown City Council.

Some of the public authority responses acknowledged the proposal and did not raise any issues. This includes submissions from SWC, TfNSW, Department of Industry and OEH. These submissions are noted and will not be considered further as part of this Response to Submissions.

TransGrid made two submissions, one indicating no issues and a supplementary submission that outlined a range of measures which are required to protect the assets, access and interests of TransGrid in and near the site.

The remaining responses from government agencies identified a number of matters, ranging widely in terms of subject and complexity, relevant to the regulatory functions of those individual agencies. Responses to government authority submissions are detailed in Section 4 of this document.

## 4.3 Submissions received - community

There were 66 submissions received from community stakeholders. Many of the submissions did not identify the respondent but did indicate the location stated by the respondent (eg Minchinbury). Each of the submissions has been assigned a unique identifier number to assist in tabulating the responses. Refer to Table 6.1.

The vast majority of respondents who identified a location nominated adjoining local suburbs of:

- Minchinbury; and
- Erskine Park.

Other locations identified by respondents were:

- Rooty Hill;
- Seven Hills;
- Blacktown;
- St Clair;
- Emu Plains;
- Greystanes;
- Currans Hill;
- Emu Plains;
- Sydney (non specific); and
- Banyo, Qld.

All submissions identified that the responses were objections to the proposal. There was one submission which originally identified as a response in support of the proposal but the respondent later revised that response to be identified as an objection.

The key matters raised in public submissions, and the number of times that specific concern was raised in submissions, are summarised in Table 4.1 and Figure 4.1 below.

The most frequently raised concerns were:

- noise;
- air quality (including 'pollution');
- traffic;
- odour;
- asbestos;
- health impacts; and
- impacts on local amenity and residential land use.

**Table 4.1 Public submissions – concern and number of times raised**

| Concern regarding project | Number of times raised |
|---|---|
| Noise | 35 |
| Air quality (including dust and 'pollution') | 28 |
| Traffic | 21 |
| Odour | 21 |
| Asbestos | 16 |
| Health impacts | 16 |
| Impacts on local amenity and character / Inappropriate near residential areas / Nuisance | 14 |
| Public interest / Waste increases | 8 |
| Road impacts and public safety | 5 |
| Incinerator / Energy from Waste facility | 5 |
| Non-specific objection | 4 |
| Impact on local property values | 1 |
| Climate change | 1 |

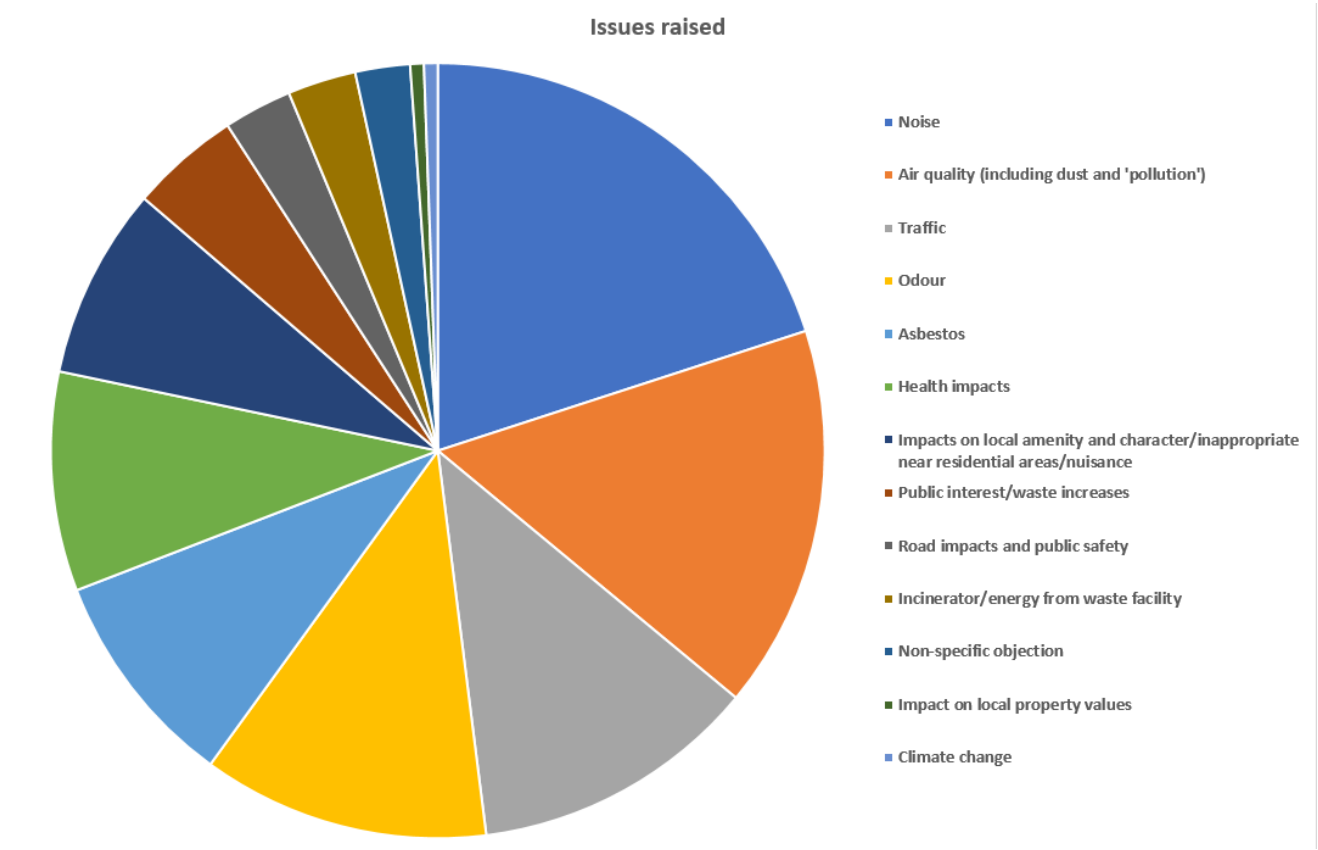



**Figure 4.1 Issues raised by number of times raised**

# 5 Response to public authority submissions

Public authorities responding to the exhibited proposal includes local government and State government agencies. A summary of the matters raised by public authorities is provided below in Table 5.1.

Table 5.2 provides a full record of comments received from public authorities, including local Councils, and responses to those comments. Note that public authorities responding with 'nil comments' are not included in Table 5.2. The comments received from the Department of Planning and Environment (DPE) and the responses to those comments are detailed in Table 5.3.

**Table 5.1 Summary of aspects raised**

| Agency | Summary of aspects raised |
|---|---|
| Blacktown City Council | Final landfill levels<br>Landfill lifespan<br>Approved waste streams<br>Traffic movements<br>Noise impact assessment<br>Ongoing consultation |
| Endeavour Energy | Surrounding land uses<br>Air quality (dust) |
| Environmental Protection Authority (EPA) | Noise and vibration<br>Air quality<br>Lighting<br>Leachate |
| Department of Planning and Environment (DPE) | Status of other landfill facilities<br>Landfill lifespan<br>Traffic, parking and haul routes<br>Employment<br>Noise impact assessment<br>Air quality |
| Fire and Rescue NSW (FRNSW) | FRNSW raised no objections or aspects for consideration. |
| Office of Environment and Heritage (OEH) | OEH raised no objections or aspects for consideration. |
| Penrith City Council | Regulatory compliance<br>Consultation |
| Roads and Maritime Services (RMS) | Car parking spaces<br>Traffic movements |
| Sydney Water | Sydney Water raised no objections or aspects for consideration. |
| Transport for NSW (TfNSW) | TfNSW raised no objections or aspects for consideration. |
| TransGrid | Design considerations |

## Table 5.2 Public authority matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| **Blacktown City Council** | Require confirmation that final landfill levels will be maintained. | Yes. There is no change proposed to the final landform or topography at the point of closure for the landfill void (ie the final 'level' of the filled void). | 3 |
| | Provide information regarding the lifespan of the landfill operations as a result of the proposed increase to the annual landfill limit. | This modification aims to optimise the important role the facility plays in managing Sydney's waste and generating beneficial recycled products for re-use in other development.<br>In simple terms, if the rate of waste input to the landfill increases, the lifespan of the landfill will reduce proportionally. This is because the total volume of landfill void which is available to be filled (airspace) will not change as a result of this proposed modification.<br>The void remaining at the facility was (at July 2018) 9,631,070 cubic metres.<br>Based on a current 'business as usual' scenario for current waste volumes, types and densities received at the facility, there is approximately 17 years of available landfilling capacity.<br>If we assumed that demand for waste processing was to immediately rise to the full 2M tpa gate limit, and that of that 2M tpa there was a full demand for all of the 1M tpa 'direct-to-landfill' waste, and assuming a 30% waste by-product that also required landfilling from the MPC, then the remaining lifespan of the void would be nine years. It is important to note however that there is not a pent-up waste disposal demand which would immediately give rise to this scenario and it represents an extremely unlikely outcome. The more feasible scenario is that the rate of filling would rise slowly in response to the fluctuations in development and infrastructure activity, and that the actual lifespan of the void would be somewhere in between those two scenarios.<br>The landfill capacity is not altered by the proposed modification but the rate at which the void is consumed by landfilling may vary, and this is dictated by demand. The lifespan of the void under the proposed modification is therefore somewhere in the range of nine to seventeen years.<br>It is also worth noting that any shortening of the landfill lifespan as a result of the proposed modification will have positive benefits in terms of bringing forward the closure and rehabilitation of the landfill, and cessation of any operational impacts associated with landfilling activities. | 3 |
| | Provide confirmation that the approved waste streams are not altered. | There is no change proposed to the approved waste streams under EPL13426. The facility will therefore continue to receive construction and demolition waste, commercial and industrial waste, waste streams complying with acceptable waste for general solid waste (non-putrescible) facilities, special waste (asbestos) and green waste. | 3 |

## Table 5.2 Public authority matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | Require detailed consideration of changes to traffic movements and volumes as a result of increased annual landfill limit. | The facility has approval to receive 2M tpa at the gate. This will not be altered and it remains the main factor influencing volumes and vehicle movements.<br>A detailed assessment of traffic impacts is provided in Appendix F of the Modification 6 Environmental Assessment report and summarised in Section 7.5.<br>It is noted that the original Traffic Impact Assessment (Transport and Traffic Planning Associates, 2008) prepared to support the Environmental Assessment for the Genesis Waste Management Facility proposal (06_0139) assessed the traffic that would be generated due to the receipt of 2M tpa of waste to the facility. The proposed modification does not propose to change the total throughput of the facility.<br>The current limit to annual direct-to-landfill waste received at the facility is 700,000 tpa, with the remaining 1.3M tpa currently being recycled or reprocessed. Landfill operations have the potential to generate fewer vehicle movements than recycling activities. This is because in addition to vehicles dropping off waste for recycling, additional vehicle trips are generated by recycled materials being collected for use or further recycling elsewhere. Increasing the proportion of the total 2Mtpa throughput that will be landfill may therefore result in reduced total vehicle movements.<br>Notwithstanding this, the modification will result in an altered distribution of vehicle movements as a result of the proposed changes to operational hours. As noted in Section 4.1 of the Traffic Impact Assessment (TIA) (Appendix F of the Modification 6 Environmental Assessment) the modification may result in an additional 492 truck movements during the evening and night-time periods. The impact associated with the change in traffic distribution into the night-time period is described in Section 4 of the TIA. | 7.5 |
| | A detailed noise impact assessment needs to be provided based on current noise readings and the proposed activities | An updated Noise and Vibration Impact Assessment report is provided as an Addendum to this report.<br>The noise assessment provides a comprehensive assessment of truck idling and reversing beepers, the enclosed unloading area, new plant and equipment and designated truck routes.<br>Importantly, site noise emissions during proposed operations are predicted to comply with the relevant PSNLs at all assessment locations considered as part of this assessment. In addition, current and future noise levels are predicted to be significantly less than existing ambient noise levels at the residential assessment locations which are primarily dictated by road traffic noise from the M4 motorway. Hence, noise levels from the modification are not expected to cause adverse impacts at any assessment location. | Appendix B |

## Table 5.2 Public authority matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | | It is important to note that the existing noise limits specified in the site's project approval and EPLs are below measured ambient noise levels at the nearest assessment locations. Further, during the site's bi-annual attended noise monitoring, the site's contribution is regularly unable to be quantified due to elevated ambient noise levels at the specified monitoring locations.<br>As presented in Section 7.2 of the modification 6 Environmental Assessment report it is recommended that the site's noise limits be increased, in line with the highest predicted noise levels or PSNLs adopted for this assessment. | |
| | Request opportunity to review any additional material and provide a response. | Noted. | NA |
| **Penrith City Council** | Ensure that the proposed modification and resulting operation complies with all applicable regulations. | The proposed modification and operation of the facility will remain subject to all relevant regulations and policies. | 5 |
| | Ensure that EPA is consulted as relevant licensing authority. | As noted in Section 6.2 of the Modification 6 Assessment Report and Section 2.3 of this EIS consultation has been undertaken with the EPA during the preparation of the modification. Any required amendments to the site's EPLs will be proposed in consultation with the EPA. | 5 |
| **EPA** | *Noise and vibration* | | |
| | The predicted levels for the approved operations exceed the current noise limits, both those in the project approval (06_0139) and in both of the Environment Protection Licences (EPLs) for the Facility.<br>The daytime limit for noise from landfill and the RRF [resource recovery facilities], at any residence in Minchinbury, is 37dBA in the project approval. However, predicted noise levels at assessment locations 1 to 8, in Minchinbury (Table 5.2) of the NVIA, are from 43dBA under calm conditions and up to 47dBA for noise-enhancing conditions. There does | An updated Noise and Vibration Impact Assessment report is provided as an Addendum to this report.<br>It is important to note that the existing noise limits specified in the site's project approval and EPLs are below measured ambient noise levels at the nearest assessment locations. Further, during the site's bi-annual attended noise monitoring, the site's contribution is regularly unable to be quantified due to elevated ambient noise levels at the specified monitoring locations.<br>As presented in Section 7.2 of the Modification 6 Environmental Assessment report it is recommended that the site's noise limits be increased, in line with the highest predicted noise levels or PSNLs adopted for this assessment.<br>EMM has established Project Specific Noise Levels (PSNL) in accordance with the INP. Operational levels are not predicted to exceed the PSNL i.e. operational noise levels are not predicted to generate intrusive noise impacts. | 7.2 |

## Table 5.2 Public authority matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | not appear to be an explanation for why noise from approved operations is up to 10dB above the approval limit. The EPA requests DPE to advise whether the NVIA needs to be revised or the Applicant seeks to modify their approval noise limits. | | |
| | Approval is being sought for 24 hour maintenance (including repairs) of machinery that appears to include crushers, screens and conveyors. In the EPA's experience this is likely to include generation of noise from equipment such as hammers, drills, generators, lighting plant and grinders. However, there is no assessment of this, or explanation of why there is no assessment, particularly in relation to the potential for sleep disturbance. | Refer to Section 5.4 of revised noise impact assessment report which is provided as an Addendum document to this report.<br>As noted in Section 5.4 of the revised noise impact assessment report noise modelling predicts that $L_{Amax}$ noise levels will satisfy the INP sleep disturbance screening criteria at all residential assessment locations. | Appendix B |
| | Plant and vehicles proposed to access and work in the premises at night are likely to use tonal movement alarms ("reversing beepers"). EPA's experience is that these alarms are highly audible and can generate an impact at large distances at night-time. This has not been assessed in the NVIA, nor have alternatives been proposed. | Refer to Section 5.4 of revised noise impact assessment report which is provided as an Addendum document to this report.<br>As noted in Section 5.4 of the revised noise impact assessment report noise modelling predicts that $L_{Amax}$ noise levels will satisfy the INP sleep disturbance screening criteria at all residential assessment locations. | Appendix B |
| | The assessment includes sound power levels for the MPC and the crusher/screen/stacker/excavator derived from measurements at the Facility. However, the assessment then relies on sound power levels from a database for a dozer, front end loader, compactor and conveyor. It is unclear why the levels of all plant and equipment were not measured while they were operating on the Facility. This is of | Refer to Section 5.1.1 of the revised noise impact assessment report which is provided as an Addendum document to this report.<br>The updated noise and vibration impact assessment report provided as an Addendum to this report summarises the operational noise sources and associated sound power levels used in the noise model. The equipment items and quantities are based on the current equipment inventory provided by the Proponent. Sound power levels were based on attended measurements at the site where possible. The sound power levels of plant and equipment that were unable to be measured during the site visit were sourced from an extensive EMM database of similar equipment. These types of plant and equipment have been measured | App'x B |

## Table 5.2 Public authority matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | particular concern given the predicted non-compliance of current operations with noise limits. | numerous times and the appropriate sound power levels of these items are widely recognised and acknowledged in numerous publications. Section 6.1 of the INP also allows for the situation where project-related noise source data cannot be sourced from direct measurements stating that noise data could also be sourced, for example, from previous Environmental Impact Statements or manufacturer's data. | |
| | Several errors were identified in the NVIA:<br>The statement in Section 3.4.3 that "All assessment locations are at a similar or higher elevation than the subject site." Topographic mapping places the site between about the 70 and 80m AHD contours. The most elevated residential receiver locations, to the north, are on the 70m AHD contour; residences to the west are on the 50m contour. Drainage winds therefore do need to be addressed.<br>Statements in Section 2.3.2 that:<br>- daytime is defined as certain hours in EPL 13426. Operating hours are specified in EPL 13426 – they are daytime hours therefore there is no definition of daytime in EPL 13426; and<br>- "…noise limits in the approval are inconsistent with those in the EPLs. Given that the Department of Planning and Environment (DP&E) is the approval authority, its consent should supersede the EPLs". EPA is the regulatory authority and its EPL conditions can vary from DP&Es consent conditions after the first licence review period. | Wording has been corrected – refer Sections 2.3.2 and 3.4.3 of the revised noise impact assessment report which is provided as an Addendum to this report. | Appendix B |
| | Require the most recent noise and vibration assessment to be provided, and to ensure that issues previously raised are addressed. | Refer revised noise impact assessment report. | Appendix B |

## Table 5.2 Public authority matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | *Air quality* | | |
| | Meteorological year not demonstrated to be representative. | This comment relates to EPA's review of the original Air Quality Impact Assessment (AQIA), dated September 2017 – Appendix C to the Environmental Assessment. It was addressed in the revised AQIA, dated August 2018, and confirmed by EPA that it has been adequately addressed in their letter to DPE dated 15 November 2018. Therefore, no further response is needed. | 7.3 |
| | CALMET meteorological data file not validated | EPA's letter to DPE dated 15 November 2018 required that the CALMET predicted data at the Prospect meteorological station be compared with the observations at the Prospect meteorological site.<br>To address this comment, CALMET performance is evaluated against statistical benchmarks / ideal scores for a number of statistical tests. It is noted that performance benchmarks for bias and error are not intended as necessarily a pass / fail grading system, rather to put the model's results in context with other models and meteorological data sets.<br>The results of the statistical evaluation are shown in Appendix A to this report (Table A.1).<br>Both wind speed and temperature show high correlation (>0.8) for Pearsons correlation coefficient and index of agreement (IOA). Similarly, the fraction of predictions within a factor of 2 (FAC2) are high for both (<0.8). Wind direction does not meet the benchmark for bias or error, however it achieves a high score for FAC2 (0.8) and achieves moderate correlation and IOA (0.6). The measured wind direction at Prospect displays a dominant north-northwest and southwest, whereas the CALMET predicted wind directions shift slightly to north-northeast and west (Figure A-1 in Appendix A to this report). The slight shift in wind direction is likely a result of the model's treatment of the Prospect Reservoir located to the south, both in terms of the influence the water body and the slightly elevated terrain. Notwithstanding, the model performance is considered to be adequate for assessment, based on meeting the majority of the statistical performance benchmarks evaluated. | 7.3 |
| | Peak emissions were not considered | The revised AQIA, dated August 2018 – provided as an Addendum to this report - accounted for peak emissions associated with the MPC. EPA's letter to DPE dated 15 November 2018, notes that this has been adequately addressed. | 7.3 |
| | The Applicant must present: | The modelled scenario of 1 Mtpa does account for potential peak daily emissions from landfilling and MPC concurrently. | 7.3 |

## Table 5.2 Public authority matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | Peak daily impacts associated with the landfill and MPC operating concurrently;<br>The predicted impacts associated with peak daily and annual production emissions. In particular the predicted impacts from the landfill and MPC operations at peak daily emissions concurrently. | There are three limits which need to be considered. The gate limit of 2M tpa; the landfilling limit of 700,000 tpa currently and proposed to be increased to 1M tpa; and a practical limit of what the MPC plant can process.<br>The emissions presented in Table 6-1 of the AQIA are based on an annual production rate of 1M tpa for the MPC, which equates to an average daily processing rate of 2,740 tonnes per day (tpd) or 114 tonnes per hour (tph).<br>When waste separation is optimal, the maximum processing rate is 150 tph; therefore to account for a theoretical worst-case day, the emissions from the MPC are increased by approximately 30% (i.e. 150/114). This, combined with a maximum of 1,000,000 tpa directed to landfill, provides a worst-case assessment for peak day operations.<br>The incoming material (or waste) quantities used to develop the emission inventory are shown below. | |

| ID | Material | Amount (tpa) | Details |
|---|---|---|---|
| A | Total Incoming | 2,000,000 | |
| B | Direct haul to landfill | 1,000,000 | 50% of A |
| C | Comingled and Segregated material | 1,000,000 | 50% of A |
| D | Segregated waste | 200,000 | 20% of C |
| E | Comingled waste through MPC | 800,000 | 80% of C |
| F | Comingled residual to landfill via chute | 240,000 | 30% of E |
| G | Greenwaste shredding | 80,000 | 10% of E |
| H | Crushing bricks concrete in Yard | 510,000 | ((60% of E) + D)*75% |
| I | Screening sand/soil in Yard | 170,000 | ((60% of E) + D)*25% |

To account for a worst case scenario for MPC emissions, the 'typical' processing pathways and percentages for a 1M tpa landfill limit (excluding MPC waste) – see table above - were scaled up by 30%.

The modelled scenario can be considered to account for potential for peak daily emissions as it involves between 1.25 and 2.5 times the amount of material that would be landfilled on any typical day.

It is also clarified that the revised AQIA, dated August 2018, presents 24-hour average modelling predictions based on peak daily throughput and annual average modelling predictions based on the annual average throughput.

## Table 5.2 Public authority matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | Scenarios 1 and 2 may not be indicative or worst-case emissions | This comment relates to EPA's review of the original AQIA, dated September 2017. It was addressed in the revised AQIA, dated August 2018, and confirmed by EPA that no further response is needed, as it is reflected in the previous comment on peak emissions. | Appendix C |
| | Unclear how some particulate emissions were calculated. | This comment relates to EPA's review of the original AQIA, dated September 2017. It was addressed in the revised AQIA, dated August 2018, and confirmed by EPA that it has been adequately addressed in their letter to DPE dated 15 November 2018. Therefore, no further response is needed. | Appendix C |
| | Not clear how composting has been accounted for in calculating odour emissions. | This comment relates to EPA's review of the original AQIA, dated September 2017. It was addressed in the revised AQIA, dated August 2018, and confirmed by EPA that it has been adequately addressed in their letter to DPE dated 15 November 2018. Therefore, no further response is needed. | Appendix C |
| | Ground level $PM_{10}$ and $PM_{2.5}$ concentrations are significant at nearby industrial receptors. The Applicant should:<br>Detail the current and proposed mitigation measures;<br>Where exceedances of the impact assessment criteria are predicted, the assessment should be revised to include additional pollution control strategies. Consideration needs to be given to the assessment of peak daily landfill operations, as advised in issue 3 [re peak emissions] | All existing mitigation measures are listed in Section 6 of the AQIA – Appendix C to the Environmental Assessment. These mitigation measures represent best practice dust controls and all reasonable and feasible measures that would be adopted/continued for the Modification. Also as discussed above, the emission scenario does account for peak daily emissions from the concurrent operation of the landfill and MPC.<br>The modelling predictions in the revised AQIA demonstrate that, provided mitigation measures are employed, the Modification would generally comply with impact assessment criteria at adjacent industrial receptors. There was a single predicted exceedance of the 24-hour $PM_{2.5}$ criterion, on a day when background was already elevated, and therefore the risk of additional exceedances was concluded to be low.<br>Notwithstanding, and as provided for in the Environmental Assessment (section 7.3.5), the Applicant commits to relocating their real-time monitoring station to a boundary location adjacent to the neighbouring industrial receptors, such that reactive management measures can be used to minimise the potential for adverse impacts from site operations. It is not possible to account for these reactive measures in the modelling and present revised results to demonstrate their effectiveness. However, the Applicant would review and update the site's Air Quality Management Plan to document suitable reactive measures and the monitoring-based triggers used to initiative these reactive measures, based on a combination of:<br>meteorological forecasts to predict when the risk of dust emissions may be high (due to adverse weather) and allow procedures and preparatory measures to be implemented;<br>visual monitoring to provide an effective mechanism for proactive control of dust at source, before it leaves the site; and | Appendix C |

## Table 5.2 Public authority matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | | real-time air quality monitoring to provide alerts when short-term dust levels increase, to allow management of the location and intensity of activities or increase controls | |
| | Results of TSP and dust deposition data for Scenario 2 not given. | This comment relates to EPA's review of the original AQIA, dated September 2017. It was addressed in the revised AQIA, dated August 2018, and confirmed by EPA that it has been adequately addressed in their letter to DPE dated 15 November 2018. Therefore, no further response is needed. | Appendix C |
| | Concentration isopleths should be provided. | This comment relates to EPA's review of the original AQIA, dated September 2017. It was addressed in the revised AQIA, dated August 2018, and confirmed by EPA that it has been adequately addressed in their letter to DPE dated 15 November 2018. Therefore, no further response is needed. | Appendix C |
| | Clarity be sort on the predicted dust deposition impacts noting the difference between tabulated deposited dust predictions and the isopleth in Appendix C. | The TSP contour was inadvertently included in the place holder for dust deposition. The correct dust deposition contour is shown in Appendix A of this report (Figure A-2). | 7.3 |
| | *Lighting* | | |
| | The EPA is concerned that lights used in internal and external operations areas during the proposed increased operational hours will negatively impact nearby receivers, in particular, those approximately 370m to the north and 1.1km to the west of the facility. The Applicant was requested to demonstrate that lighting levels in all operational areas at the facility will meet the requirements of the relevant EPA guidelines.<br>The facility is elevated to the surrounding environment and surrounded by 10m berms. The lighting requirements for internal traffic in the MPC and the landfill will impact nearby residential receivers both directly and indirectly. The lighting | As noted in Table 7.15 of the Modification 6 Environmental Assessment, and acknowledged by DPE, the lighting at the facility is mostly concealed from far-field views by the berms that surround the site from the former quarry operation. It is noted that the recycling facility already currently operates until 10:00pm at night and has associated lighting, but that there is a considerable distance from the MPC to the nearest residential receptors.<br>An important consideration is the type of lighting used in outdoor settings at the facility. Contrary to the assumption that lighting would need to reproduce 'daylight' conditions for outdoor operations such as landfilling, the optimal arrangement is to have low intensity lighting which provides sufficient illumination to operate safely, and no more. Internal lighting will be 'daylight' level but this is within an enclosed setting.<br>The issue with high intensity night time lighting outdoors is that it can create glare or shine directly into the eyes of operators and drivers, and the preference is for a more even spread of low light rather than pockets of high intensity light and relative darkness elsewhere. It takes a human eye approximately five minutes to fully adjust between bright daylight and darkness. | 7.6 |

## Table 5.2 Public authority matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | required to manage the recycling processes and the inspection of unloaded materials in the drop-off areas will require lighting comparable to daylight luminescence. The Applicant has not provided any information regarding the "likely changes required" and the potential for impacts to residential receivers.<br>In addition, the noise assessment report details transport routes including haul roads that appear to be located on the outside of the amenity berms. This is an elevated area and would appear to directly impact residential receivers from both permanent lighting and internal vehicle movements. | The operation of equipment within the landfill void is approximately 70m below the surrounding topography within the site and the potential light receptors are located approximately 20m below the general elevation of the site. Low intensity lighting is unlikely to create any light spill issues for residential areas. | |
| | *Leachate* | | |
| | The Leachate Management Plan has been developed with inputs developed from the scoping study commissioned in 2008. The modelling does not show any of the actual volumes of leachate that are currently treated and disposed of to Trade Waste. The modelling shows that the Trade Waste is capable of handling up to 237,250m3 per year or 650 KL per day. The EPA requires evidence of current leachate volumes that are treated and diverted to Trade Waste. | The most recent data of leachate discharged from the site provided to Consulting Earth Scientists (CES) by the Applicant are presented in Appendix B1 to this report. These records indicate that annual volume of discharge recorded between 20 March 2018 and 20 March 2019 is approximately 29,017.27 kilolitres (KL).<br>This volume is well below the annual capacity of 237,250 m3. Furthermore, the maximum daily discharge volume recorded for this 12-month period is 182 KL, which is well below the 650 KL daily limit. | 7.4 |
| | A comparison of aerial imagery of the landfill void walls indicates that the void walls have been modified and excavated in the last few years after the original studies were completed. This has created more surface area in the void and on the void walls and may not be representative of the modelling and | A review of the previous water balance undertaken for the site (Ref: CES161004-ECS-AD, dated 15 November 2016) was undertaken by CES in December 2018 to update the relevant assumptions used in the water balance prepared in 2016. It is stated in this review that there are no changes in landfill geometry; effects of landfilling operations have raised the base of the landfill, however, the same area is exposed to rainfall and the same area is exposed to irrigation operations undertaken by Dial A Dump Industries Pty Ltd (DADI) at the time of the review. | 7.4 |

## Table 5.2 Public authority matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | assumptions of estimated leachate volumes from the 2008 study. | | |
| | Require the most recent leachate generation report to be provided, and to ensure that issues previously raised are addressed | The most recent leachate generation report prepared by CES, MOD 6 Leachate Generation Report (CES Document Reference: CES170514-EMM-AC, dated 14 August 2017), is presented in Appendix B2 of this report. | 7.4 |
| **Endeavour Energy** | Require surrounding land use description to recognise Endeavour Energy's North Eastern Creek Zone Substation. | This facility is noted as an element in the surrounding land use. Note that the modification would not result in any land use changes and therefore would not result in any additional operational impacts to this infrastructure. | 2.3 |
| | Require consideration of dust emissions on substation (equipment and plant, not people) | The dust deposition contours (see Figure A-2 in Appendix A to this report) show the predicted levels for all areas around the site and can be reviewed to determine impacts on specific areas of concern (i.e. offsite plant and equipment). The nuisance-based criteria contained in the AQIA (Appendix C of the Modification 6 Environmental Assessment) would be a suitable benchmark to assess potential impacts. None are anticipated for the substation. | 7.3 |
| | Ensure dust controls are implemented, adhered to and monitored for effectiveness. | The current dust controls implemented on site will continue, including use of sprinkler/misting systems in the MPC and a water cart for dust suppression on internal haul roads. | 7.3 |
| **RMS** | Require that layout of car parking areas should be in accordance with Australian standards for heavy vehicle use. Parking restrictions may be required to maintain sight lines at driveway. | Any specific truck parking (rather than 'car parking') areas will comply with Australian standards. Most arriving or departing trucks will not need to park on the site.<br>Safety of the primary access route via Wonderland Drive, Honeycomb Drive and Kangaroo Avenue is very good as it has been constructed to a high design standard and the current speed limit is 50 km/hr. All the existing intersections along these routes have been well designed and have adequate sight distances for the prevailing speed limit. The relevant authority for the control of on-street parking is Blacktown City Council. Council will be contacted to determine whether parking restrictions are required to maintain good sight lines.<br>As noted in Section 7.5.1 of the Modification 6 Assessment Report the proposed modification has been assessed in accordance with the requirements of the Australian Standards (AS 2890) for access and car parking for cars and heavy vehicles. | 7.5 |
| | Require all vehicles to enter and leave the site in a forward direction. | Agreed. All vehicles will be required to exit in a forward direction. | 7.5 |

## Table 5.2 Public authority matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| **TransGrid** | Ensure that metal fence near the utility easement should be properly earthed | This matter appears to be in response to Modification 7 (rather than Modification 6) and will be addressed in the Response to Submissions Report for Modification 7. | NA |
| | Ensure access for TransGrid maintenance works during construction and operation | This matter appears to be in response to Modification 7 (rather than Modification 6) and will be addressed in the Response to Submissions Report for Modification 7. | NA |
| | Ensure access for TransGrid is to a standard suitable for 40 tonne trucks | This matter appears to be in response to Modification 7 (rather than Modification 6) and will be addressed in the Response to Submissions Report for Modification 7. | NA |
| | Ensure subsoil stability and surface drainage is not adversely impacted near TransGrid structures | This matter appears to be in response to Modification 7 (rather than Modification 6) and will be addressed in the Response to Submissions Report for Modification 7. | NA |
| | Ensure no placement of obstructions which will restrict TransGrid access | This matter appears to be in response to Modification 7 (rather than Modification 6) and will be addressed in the Response to Submissions Report for Modification 7. | NA |
| | The easement is not to be used for temporary storage of construction materials | This matter appears to be in response to Modification 7 (rather than Modification 6) and will be addressed in the Response to Submissions Report for Modification 7. | NA |
| | Ensure safe clearance distances near power lines | This matter appears to be in response to Modification 7 (rather than Modification 6) and will be addressed in the Response to Submissions Report for Modification 7. | NA |

## Table 5.3 DPE matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| **DPE** | Require details regarding closure of other landfill facilities. | A recent analysis completed for Bingo by MRA Consulting, indicates a number of likely landfill closures. The findings of this analysis are presented in Section 1.6 of this report. | 1.1.2 |
| | Provide details of how the modification will impact the life expectancy of the landfill. | In simple terms, if the rate of waste input to the landfill increases, the lifespan of the landfill will reduce proportionally. This is because the total volume of landfill void which is available to be filled (airspace) will not change as a result of this proposed modification.<br>The other two variables which will affect lifespan are:<br>- The rate of input of residuals from the MPC recovery process, which is proposed to be excluded from the annual landfill limit. MPC residuals are typically lightweight and consume more landfill airspace (on a per tonne basis) than most unprocessed, direct-to-landfill streams.<br>- Average density of the waste. The current direct-to-landfill waste is predominantly heavy streams such as asbestos soils and general non-putrescible waste. There are light (low density) streams such as shredder flock and residuals from recycling as noted above. It is difficult to predict the future waste mix as this will be driven by market demand, but if there is an increase in the proportion of light materials and a reduction in the overall average density of waste to landfill, then landfill airspace will be consumed more quickly for a given input tonnage.<br>The expected shortening of the landfill lifespan as a result of the proposed modification will have positive benefits in terms of bringing forward the closure and rehabilitation of the landfill, and cessation of operational impacts associated with landfilling activities. | 3 |
| | Require traffic impact assessment to reflect a 1M tpa limit for direct-to-landfill disposal. | It is acknowledged that the traffic impact assessment (Appendix F of the Modification 6 Environmental Assessment) incorrectly states that the landfilling limit would be removed within the 2Mtpa total facility limit. This represents a typographical error only, and the assessment presented in the traffic impact assessment has considered the 1Mtpa increase in direct-to-landfill activities. | 7.5 |

## Table 5.3 DPE matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | Provide explanation of how the number of future truck movements have been calculated. | The calculated future truck movements presented in the Traffic Impact Assessment (Appendix F of the Modification 6 Environmental Assessment) reflect the scenario of a 2Mtpa 'gate limit' for the overall Genesis Waste Management Facility, with a 1M tpa landfill limit.<br>The key variable which influences the number of truck movements is the 'gate limit' of 2M tpa. Within that limit – which is not being modified – an increase in the landfill limit will allow more landfilling from two sources – the direct-to-landfill waste arriving by trucks; and the residual waste from the materials processing centre (MPC).<br>If MPC by-product is bundled with direct-to-landfill waste as a form of landfill, then the extent to which recycling or direct-to-landfill is accepted at the facility is determined by the operational decisions of the waste facility operator. For example, the operator may prefer to limit the receipt of mixed recyclable waste in order to preserve space within the landfill limit for direct-to-landfill waste; or vice versa.<br>Recycling generates marginally more truck movements because it provides materials for resale and truck movements can therefore be generated by the sale of materials. Unladen trucks will arrive to be loaded with recycled material. If the facility provided no recycling, then there would not be unladen trucks arriving for collect materials.<br>The future truck movements associated with 2M tpa of inbound material was modelled with a recognition that there is a limit in terms of system capacity at the facility – mostly the capacity of the processing plant and the extent to which truck queuing can be accommodated. This results in a displacement of demand either side of the current peak operating patterns, meaning that some trucks will arrive earlier or later than they currently do. We do expect that, as is currently the case, most demand will occur between 7:00am and 4:00pm (based on current weighbridge data) but there is likely to be some 'peak spreading' as drivers and the generators of waste, such as the construction industry, modify their operations to avoid the constraints of the normal peak period. The number of movements assumed to occur at night is therefore based on the principle of 'peak spread' which causes the displacement of vehicle movements to periods outside the normal peak. | 7.5 |

## Table 5.3 DPE matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | Provide estimated vehicle movements for weekends. | The weekend truck movements based on an assumed 700,000 tpa being disposed to landfill limit is 398.<br>This would reduce to 370 movements if the direct-to-landfill limit waste increased to 1M tpa. There are two reasons for this:<br>The number of truck movements per tonne is less for 'direct-to-landfill' loads because trucks can carry more tonnage per trip – therefore the proportion of the 2M tpa gate limit for other loads which require more truck movements per tonne, such as the less dense recylable waste, is reduced.<br>Furthermore, a higher landfill rate results in fewer truck movements because, within an overall gate limit of 2M tpa, a greater proportion of direct-to-landfill waste means a lower proportion of recyclable materials received and processed. If less recyclable material is processed then there is less product available for sale and dispatch, and the availability of recycled material for sale is a generator of separate truck movements. A gate intake limit of 2M tpa therefore sets the overall limit on what comes into the facility, but it is only the non-landfill material (ie waste capable of recycling or reuse) that is received that has the capacity to generate additional outgoing loads.<br>These numbers assume that 85% of movements would occur Monday to Friday, and 15% on weekends. | 7.5 |
| | Provide information about the split between types of trucks and number of trucks which both tip waste and pick up materials. | The types of trucks and number of trucks is generally influenced by the purpose of the trip and the materials loaded.<br>The truck types and numbers (based on April 2017 data) are shown at Appendix C to this report.<br>A review of the current vehicle movements associated with the facility found that:<br>• For inbound comingled recyclable material (ie construction waste direct to the MPC) the predominant truck type is bin truck.<br>• For inbound recyclable/reuse material (ie to be processed by crushing and screening and stored on site) the predominant truck type is truck and dog.<br>• For landfill waste, the truck types are more evenly spread with bogie tipper and truck and dog being the main type of truck configuration.<br>It is estimated that 10% of trucks arriving at the facility to dispose of waste will, at the same time, collect recycled materials. | 7.5 |

## Table 5.3 DPE matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | Provide rationale for how truck movements per day will increase if the facility limit of 2M tpa is not to be increased. | There is a distinction to be made between the truck movements associated with the current level of actual operational activity ('current truck movements') and the truck movements associated with the latent upper limit of operations (2M tpa) permitted by the development consent for the facility ('approved future truck movements').<br>Since the 2M tpa gate limit is not increased, the approved future truck movement are also not increased.<br>Current truck movements however will increase until they are constrained by either the landfilling limit or the 2M tpa gate limit. This is because the waste generation trends in Sydney continue to increase, and the transport of that waste to appropriate facilities is also increasing. In short, more truck movements will be needed to deal with the increase in waste generation.<br>The increased truck movements reported within the traffic impact assessment (Appendix F of the Modification 6 Environmental Assessment) refer to an increase in movements compared to current 2016/17 movements, and an increase in movements in the night-time period. These 'increased' movements remain, however, within the total maximum vehicle movements associated with the total 2M tpa facility limit as assessed in the original Traffic Impact Assessment (Traffic and Traffic Planning Associates, 2008) prepared for the facility. | 7.5 |
| | Elaborate on how parking demand will be wholly met within the site, including periods of shift turnover. | Parking demand is currently met within the site including shift turnover periods. The proposed extension in hours of operation will, for any given volume of material being processed, spread the demand for parking because the staffing required per unit of waste processing is spread across a longer time period. | 7.5 |

## Table 5.3 DPE matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | Provide an estimate of additional job numbers. | The proposed modification will create approximately 10 or more additional roles at the facility. This is derived from the likely need for additional staff to undertake evening shift work but is a difficult matter to forecast accurately because there are many variables which can influence job numbers, such as the mix of waste types to be processed and the level of automation in processing.<br>It should also be clarified that the job numbers are not a comparison to current employment on site. The future employment is a comparison between (a) the facility operating at 2M tpa but with no change to landfill limit or hours of operation; and (b) the facility operating at 2M tpa with a 1M tpa landfill limit and extended hours for various activities. Job numbers will increase under both scenarios relative to today's employment numbers simply due to the increased through-put of materials. Scenario (a) compresses the work within fewer hours whereas Scenario (b) processes the same volume of waste over extended hours.<br>The additional numbers for Scenario (b) are assumed to increase due to the spread of hours, but also reduced somewhat by the increased proportion of waste disposed direct-to-landfill, since the latter requires fewer jobs. | 3.5 |
| | Provide traffic analysis of how forecast operational traffic will impact traffic from other local industrial and business operators during their operational hours. | Traffic impacts have been modelled in terms of traffic flow, queuing and congestion on local roads and intersections. These impacts consider the volume, time of day and characteristics of traffic on those roads and intersections, and it needs to be acknowledged that the aggregate traffic issues locally cannot be refined to a point of identifying the respective traffic contribution from, nor the traffic impact on, individual local businesses without detailed data regarding the vehicle movements and times of movement for those businesses. This is not information generally or publicly available.<br>It also needs to be acknowledged that the proposed changes to local roads, particularly the extension to Archbold Road, will bring both benefits and disbenefits to local businesses depending on their location and their transport needs.<br>The best arrangement is to consider the impacts which can be modelled for local traffic in aggregate and accept that the traffic improvements and impacts, if any, will be shared amongst road users regardless of the whether those road users are associated with local businesses or not. | 7.5 |
| | Identify night time haul routes. | Haul routes are described in Section 2.1 of the Traffic Impact Assessment (Appendix F of the Modification 6 Environmental Assessment). These routes do not vary materially according to time of day. | 7.5 |

## Table 5.3 DPE matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | Confirm whether MPC residual waste is included in the 1M tpa proposed limit for landfill; and on this basis whether the 'worst-case' scenario would be 1.3M tpa being landfilled and 1M tpa recycled through the MPC. | The proposal is to increase the landfill cap to 1M tpa excluding waste generated by recycling processes within the PSE and MPC.<br>It is important to separately account for by-products of recycling processes. This is because the purpose of the landfill limit is to influence greater application of recycling and reuse as waste management methods as opposed to 'direct-to-landfill' methods. Including by-products of recycling within a volume-based limit for landfilling undermines that intended outcome and ignores the influence of market forces which already drive waste processing towards more recycling and reuse. From both a business and environmental perspective, recycling and reuse is preferable. It should not be constrained by a landfill limit which is meant to promote recycling and reuse.<br>In terms of the 'worst-case' scenario, the total amount received on site will remain 2M tpa. If there is 1.3M tpa landfilled (being 1M tpa 'direct-to-landfill' plus 30% of the materials received at the PSE and MPC) then there is a need to avoid 'double counting' the 300,000 tpa that arrives in the landfill via a chute from the MPC. That 300,000 tpa is already counted in the 1M tpa that arrives at the site as either segregated recyclable material or as co-mingled recyclable material.<br>A better way to conceptualise the 'worst case' is to split the 2M tpa gate limit into two streams – direct to landfill waste being 1M tpa and other waste (recycling via PSE, MPC and SMA) being 1M tpa. The 'other' stream then produces a by-product which needs to go to landfill but this is not additional material coming in through the gate. It has already been counted towards the 2M tpa on the inbound truck, and this is simply further processing of material on site.<br>This is acknowledged and adopted for the purposes of modelling within the Air Quality Impact Assessment Report (included as an Addendum to this report) which states "A worst-case emissions assessment is considered based on a 50/50 split between the MPC and landfill" (section 2.2 of the AQIA). | 4.1.2 |
| | Confirm whether the monitoring site for PM10 will be relocated. | The Applicant has – as noted in the Environmental Assessment (section 7.3.5) - agreed to relocating their real-time monitoring station to a boundary location adjacent to the adjacent industrial receptors | 7.3 |

## Table 5.3 DPE matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | Provide detail of proposed measures to minimise and mitigate air quality impacts. | • All existing mitigation measures are listed in Section 6.1 of the AQIA (Appendix C to the Environmental Assessment). These mitigation measures represent best practice dust controls and all reasonable and feasible measures that would be adopted/continued for the Modification. The existing mitigation measures are:<br>• Enclosure of material handling and processing and storage within the MPC shed.<br>• Misting sprays operated within the shed to dampen material as it is sorted and before being loaded to the hopper.<br>• The majority of travel routes onsite are sealed (exceptions are the haul route into the pit and within the segregated materials area).<br>• Water sprays on the mobile crusher and shredder.<br>• Fixed water sprays on product storage areas.<br>• Water truck operating on unsealed haul road into the pit, within the landfill and on the paved roads as needed.<br>• Speed limit of 40km/hr for unsealed haul road into the pit.<br>• Water cannon operating within the pit.<br>• Established earth bund along the northern boundary of the pit.<br>• A fixed water spray system operates on the access roadway. | 7.3 |
| | Provide further detail on mitigation measures for odour impacts arising from green waste and composting. | A conservative emissions and modelling scenario for odour presented in the AQIA (Appendix C to the Environmental Assessment) predicted no exceedances of the odour goals. Additional mitigation measures are therefore not considered necessary. | 7.3 |
| | Ensure consistency between noise impact assessment and the 1M tpa annual limit for landfill. | An updated Noise and Vibration Impact Assessment report is provided as an Addendum to this report. The updated assessment identifies the proposed limit of direct-to-landfill waste of 1Mtpa. | 7.2 |

## Table 5.3 DPE matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | Confirm whether MPC residual waste is included in the 1M tpa proposed limit for landfill as is implied in the 50/50 split between landfill and recycling. | The 50/50 split is between the 'direct -to-landfill' waste stream (not 'landfill' generally) and the waste streams for recycling and reuse.<br>The proposal is to increase the landfill cap to 1M tpa excluding waste generated by recycling processes within the MPC and the Pre-Sort Building (PSB) which are the two stages of sorting materials in the co-mingled waste recycling stream. | 4.1.2 |
| | Use more contemporary data (not 2014) to measure background noise levels. | Monitoring was undertaken in March and April 2014. No significant changes have occurred in the area that would be expected to impact ambient noise levels since the noise monitoring was undertaken. Traffic noise may have increased slightly and some increased industrial development in the area may have the effect of increasing ambient noise levels. As such, use of noise levels measured in 2014 to determine intrusive noise goals is considered a conservative approach and suitable for the purpose of this assessment. It is a 'conservative approach' because noise impacts are measured against a level of background noise which is lower than the background noise levels which are likely being experienced by residents currently.<br>It might also assist in the reading of the NIA to clarify that when the NIA refers to the 'removal' of the current limit of 700,00 tpa, this is not suggesting that the consent should have no limit whatsoever for landfilling, but rather reflecting the proposed removal of the 700,000 tpa limit in favour of its replacement by an alternative limit of 1M tpa. | 7.2 |
| | Provide justification of why EMM database and not direct measurement of existing plant and equipment was used for operational noise sources. | Most existing plant noise were measured at site. The updated noise and vibration impact assessment report (provided as an Addendum to this report) summarises the operational noise sources and associated sound power levels used in the noise model. The equipment items and quantities are based on the current equipment inventory provided by the Proponent. Sound power levels were based on attended measurements at the site where possible. The sound power levels of plant and equipment that were unable to be measured during the site visit (for example, where the equipment was not operational at the time) were sourced from an extensive EMM database of similar equipment. These types of plant and equipment have been measured numerous times and the appropriate sound power levels of these items are widely recognised and acknowledged in numerous publications. Section 6.1 of the INP also allows for the situation where project-related noise source data cannot be sourced from direct measurements stating that noise data could also be sourced, for example, from previous Environmental Impact Statements or manufacturer's data. | 7.2 |

## Table 5.3 DPE matters raised and relevant responses

| Public authority | Matter raised | Response | Mod 6 EA section |
|---|---|---|---|
| | Provide additional information on proposed measures to minimise, mitigate and monitor noise levels from truck movements during the evening and night period. | Noise emission levels, as presented in Table 5.2 of the NIA, are predicted to be below (i.e. satisfy) the project specific noise levels at all assessment locations. Hence, in accordance with the INP, consideration of additional measures to mitigate noise is not necessary beyond adopting good practices. | 7.2 |

# 6 Response to community submissions

## 6.1 Community submissions

As noted, there were 66 submissions from community stakeholders. The approach adopted to respond to these submissions has been to aggregate and respond to the submissions on the basis of issues raised.

The level of detail in the responses varied significantly. For example, some respondents simply nominated an issue (eg “traffic”) while other respondents provided a more detailed response.

In order for community respondents to identify how and where their issue has been considered and addressed, each individual respondent has been identified by a unique number, and this is referenced in the themed responses to issues. It is also noted that where submissions were made via the DPE website, the DPE tracking system also allocated a six-digit number to that respondent. Not all community responses we received via the DPE website, and therefore not all have a DPE tracking number. The simplified numbering system used for this Response to Submission is provided below in Table 6.1.

**Table 6.1 Community submissions reference table**

| Respondent | Name | Location | DPE Tracking |
|---|---|---|---|
| 1 | Dobros, B | Minchinbury | 284426 |
| 2 | Turner, D | St Clair | 284749 |
| 3 | Clark, G | Minchinbury | 284416 |
| 4 | Acevedo, G | Currans Hill | 284432 |
| 5 | Figueira, J | St Clair | 284751 |
| 6 | Gucel, K | Rooty Hill | 284420 |
| 7 | Khan, M | Minchinbury | 283648 |
| 8 | Gucel, P | Rooty Hill | 284418 |
| 9 | Wimberley, S | Banyo, Qld | 283911 |
| 10 | Anon | Minchinbury | 284430 |
| 11 | Anon | Minchinbury | 283517 |
| 12 | Anon | Minchinbury | 283506 |
| 13 | Anon | Seven Hills | 284400 |
| 14 | Anon | Minchinbury | 284760 |
| 15 | Anon | Greystanes | 284755 |
| 16 | Anon | Minchinbury | 284434 |
| 17 | Anon | Minchinbury | 284675 |
| 18 | Anon | Minchinbury | 284436 |
| 19 | Anon | Erskine Park | 284747 |
| 20 | Anon | Minchinbury | 284694 |
| 21 | Briffa, A | Minchinbury | 285742 |
| 22 | Alessio, A | Erskine Park | 285921 |

## Table 6.1 Community submissions reference table

| Respondent | Name | Location | DPE Tracking |
|---|---|---|---|
| 23 | Yilmaz, A | Blaxland Rd, NSW | 285794 |
| 24 | Spiteri, C | Minchinbury | 285435 |
| 25 | Nathan, C | Minchinbury | 284908 |
| 26 | Cunich, D | Minchinbury | 285343 |
| 27 | Munzer, D | Minchinbury | 284852 |
| 28 | Smith, D | Minchinbury | 285576 |
| 29 | Brooke, E | Minchinbury | 285301 |
| 30 | Wilson, G | St Clair | 284768 |
| 31 | Bellingham, J | Emu Plains | 284836 |
| 32 | Bradbury, K (also via Blacktown City Council) | Minchinbury | 285744 |
| 33 | Allessio, S | Erskine Park | 285919 |
| 34 | Anon | St Clair | 285913 |
| 35 | Anon | Minchinbury | 285542 |
| 36 | Anon | Minchinbury | 285762 |
| 37 | Anon | Minchinbury | 285751 |
| 38 | Anon | Erskine Park | 284999 |
| 39 | Anon | Erskine Park | 284997 |
| 40 | Anon | Minchinbury | 285203 |
| 41 | Jacfin Pty Ltd | Sydney | 285982 |
| 42 | Eades, J | Minchinbury | 286005 |
| 43 | William, J | Minchinbury | 286069 |
| 44 | Moore, N | Minchinbury | 285999 |
| 45 | Anon | Minchinbury | 286074 |
| 46 | Anon | Minchinbury | 286071 |
| 47 | Anon | Minchinbury | 286065 |
| 48 | Anon | Minchinbury | 286063 |
| 49 | Anon | Minchinbury | 286061 |
| 50 | Anon | Blacktown | 286057 |
| 51 | Anon | Blacktown | 286055 |
| 52 | Anon | Blacktown | 286051 |
| 53 | Anon | Minchinbury | 286001 |
| 54 | Anon | Minchinbury | 285997 |
| 55 | Anon | Minchinbury | 285995 |
| 56 | Anon | Erskine Park | 285978 |
| 57 | Anon | Minchinbury | 286049 |

**Table 6.1 Community submissions reference table**

| Respondent | Name | Location | DPE Tracking |
|---|---|---|---|
| 58 | Anon | Blacktown | 286047 |
| 59 | Anon | Minchinbury | 286045 |
| 60 | Anon | Minchinbury | 286041 |
| 61 | Casey, A | Minchinbury | N/A |
| 62 | Uluc | Minchinbury | N/A |
| 63 | Llagas | Rooty Hill | N/A |
| 64 | Casey, S | Minchinbury | N/A |
| 65 | Partridge, S | Minchinbury | N/A |
| 66 | Toothill, V | Minchinbury | N/A |

### 6.1.1 Issues raised by community respondents and response

The main issues raised by community respondents, and the response to those issues by the Applicant, are examined in Table 6.2.

It is noted that several respondents indicated that they found the information “hard to understand”, “conflicting” and “confusing”. In an effort to address some of the inherently complex matters raised by this proposed modification, we have provided relatively lengthy and detailed responses to some of the matters raised by community respondents.

## Table 6.2 Response to community submissions

| Issue | Respondents | Details | Response/comment |
|---|---|---|---|
| Noise | 3, 7, 9, 10, 11, 12, 16, 17, 18, 20, 21, 22, 28, 30, 31, 32, 33, 34, 40, 41, 43, 44, 46, 49, 54, 55, 56, 57, 61, 62, 63, 64, 65, 66 | The majority of comments regarding noise were simply that noise was an issue for local residents.<br>Noise emanating from trucks and materials processing were highlighted as concerns. | Refer to the revised noise impact assessment (Addendum to this report) which shows that noise emissions from proposed operations are predicted to meet the relevant goals. |
| | | The noise impacts of the M4 motorway were noted as an existing acoustic impact on residents in Minchinbury and Erskine Park, particularly at night. | This is agreed and noted. Importantly, it is the character and impact of the ambient noise which informs the basis of the suggestion to recalibrate the prescribed noise thresholds for the facility. If the noise criteria specify an acoustic level which is materially below the ambient noise at residences, then a technical exceedance of that threshold is not meaningful for local residents if it is not detectable above the ambient noise. It is better to set performance criteria which take account of existing soundscapes and which therefore limit actual impacts. |
| | | Night time and early morning was noted as a times of most concern regarding noise | Refer to the revised noise impact assessment (Addendum to the report) which shows that noise emissions from proposed operations are predicted to meet the relevant goals. |
| | | Sleep deprivation was noted as a possible impact and there were comments that noise could cause 'long-term medical conditions'. | Refer to Section 5.4 of revised noise impact assessment report which is provided as an Addendum document to this report.<br>As noted in Section 5.4 of the revised noise impact assessment report noise modelling predicts that $L_{Amax}$ noise levels will satisfy the INP sleep disturbance screening criteria at all residential assessment locations. |
| | | One respondent observed that washing and maintenance of plant at night is inconsistent with other local provisions which prohibit mowing lawns at night | It is noted that Blacktown City Council restricts the use of powered garden tools (including lawn mowers) during the hours of 8:00pm to 7:00am weekdays and Saturdays, and 8:00pm to 8:00am on Sunday. Separate regulatory arrangements are put in place to manage noise at industrial premises. See for example the NSW EPA Noise Policy for Industry (2017). |
| | | Night readings should be at 03:00-04:00 rather than midnight | Determination of night-time noise criteria has considered long-term noise data including that measured between 3.00am and 4.00am. |
| | | Noise impacts do not take account of Modification 7 | Noise impacts associated with Modification 7 are addressed in the environmental assessment for that modification. Modification 6 and 7 propose different changes to the approved development and need to be considered independently. |

## Table 6.2 Response to community submissions

| Issue | Respondents | Details | Response/comment |
|---|---|---|---|
| | | The increase in hours of operation should be identified as an additional 13 hours per day | Current approved hours of operation are (for most activities) 7:00am to 6:00pm (Monday to Friday). An increase to operations at the facility for 24 hours does indeed represent an additional 13 hours of operation for those activities, on those days, since 7:00am to 6:00pm represents 11 hours of operation. The maintenance and related activities for the Materials Processing Centre, however, are currently authorised from 7:00am to 10:00pm (Monday to Friday). Other activities have different authorised hours again, and not all activities are proposed to be extended to 24 hours. For example, crushing and screening is proposed to be extended by one hour only. It is therefore appropriate to simply outline the proposal to extend hours for each activity in a table format rather than claim (incorrectly) that there is a generic increase of 13 hours per day for the operation of the facility. |
| | | An increase in noise levels of up to 11dB(A) above current approved levels will have significant impacts on residents, and justification is required as to why current thresholds are inadequate | Current noise limits are set well below those levels that would cause disturbance in the nearest residential areas. E.g. A night-time project specific noise level of 40dB has been determined for Erskine Park and 46dB for Minchinbury whereas the current noise limit is 35dB from the landfill and resource recovery facility. Actual current noise emissions are not increasing, but the predicted levels have been contemporised to current modelling and assessment methodologies. |
| | | Noise impact assessment uses background noise data which is dated 2014. More contemporary data is needed | Monitoring was undertaken in March and April 2014. No significant changes have occurred in the area that would be expected to impact ambient noise levels since the noise monitoring was undertaken. Traffic noise may have increased slightly and some increased industrial development in the area would have the effect of increasing ambient noise levels. As such, use of noise levels measured in 2014 to determine intrusive noise goals is considered a conservative approach and suitable for the purpose of this assessment. |
| | | Background noise data for Erskine Park residential area is not accurate due to extraneous noise sources such as frogs and insects | There is no evidence that the background noise data was affected by extraneous noise. |
| | | The assessment needs to specifically consider low frequency noise | Refer Section 5.1.1 of the NIA (Addendum to this report). Noise sources were examined for the presence of low frequency noise or other characteristics that could cause greater annoyance such as tonality or impulsiveness. Sources typically used at the site did not contain such features and, as such, the application of modifying factors was not considered necessary. |

## Table 6.2 Response to community submissions

| Issue | Respondents | Details | Response/comment |
|---|---|---|---|
| | | More explanation required regarding why current operational noise levels exceed levels set by consent and EPL, and need to validate using current noise measurements | It appears that the current noise limits have been established based on minimum noise criteria as per the INP. Given the relatively high ambient noise levels in the nearby residential areas it is likely that noise emissions from current operations would not be audible. As above, the current noise limits are set well below those levels that would cause disturbance. |
| | | Noise goals articulated in Eastern Creek Precinct Plan (Stage 3) are not considered | The Eastern Creek Precinct Plan (Stage 3) is noted as a relevant environmental planning instrument in the Environmental Assessment (section 5.3) and it is also considered in the Noise Impact Assessment Report at Section 4.1.3 of that report.<br>The Precinct Plan states (section 7.8 of the Plan):<br>*Given the nature of development within the Precinct, noise generation from the site is to*<br>*be restricted to a reasonable level. Noise is to be contained where possible and not unreasonably impact on the operations or amenity of adjoining or surrounding sites*.<br>The Precinct Plan sets optimum noise criteria for separate 'zones' within the precinct. The Genesis facility is in Zone 1. The Zone 1 optimum noise level is 57bBA (day); 47dBA (evening; and 42dBA (night).<br>The Precinct Plan suggests:<br>*These goals will provide adequate protection to the noise amenity of residential areas surrounding the Precinct without unduly restricting the operation of development.*<br>Importantly, the Precinct Plan stipulates that the development application "must comply with relevant Council and government authority guidelines".<br>The Precinct Plan describes the optimum noise levels generated within Zone 1 because it anticipates that the impact of those noise levels will provide adequate protection for noise amenity at residential (and industrial) receivers. This is not quite the same as the approach adopted by the "government authority guidelines" which propose noise criteria measured at the residential and industrial receivers, rather than the source of the noise.<br>Although the noise assessment, and the government guidelines on which it is based, are concerned with the measurement of noise at the receiver points (not the source), all of the guiding documents - the Precinct Plan, government guidelines and noise assessment – have the same outcome in mind and are compatible. |

## Table 6.2 Response to community submissions

| Issue | Respondents | Details | Response/comment |
|---|---|---|---|
| | | The level of noise for 'approved operations' should not be substituted for the level of noise for 'current operations' | It is agreed there is a need to ensure that the approved (ie latent) operational dimensions of the facility – such as a 2Mtpa gate limit for waste received at the site - is not substituted for the existing (ie actual) operational dimensions.<br>The actual operational dimensions, including noise, are however an appropriate input to the modelling if we are to understand the likely future impacts from those operations. The noise characteristics of (say) a crushing plant will not change simply because there has been a change to the volume of waste which can be sent to landfill. The purpose and the activities of the Eastern Creek site remain those of a waste management and processing facility. The use of the site will not change under the proposed modifications.<br>The matters being modified via this application are the hours of operation and the volume of waste permitted to be landfilled. There are two main points to consider here.<br>Firstly, the processing of waste, whether landfill or recycling, is what generates noise, not the approved limits for those activities under a development consent, and the extent of that activity is largely driven by external market forces such as the scale, type and location of waste generating activities such as building demolition.<br>Secondly, it is appropriate to model approved operations (based on the measurement of noise from current operations) because there is, subject to market demand, regulatory provision for the actual operations to increase to that limit but it will be activity of the same type. The intention is therefore to consider the 'real world' noise environment, including local topography and surrounding development, and apply that to a theoretical future scenario based on approved limits. |
| Air quality | 1, 5, 6, 7, 8, 11, 12, 17, 18, 20, 22, 26, 30, 31, 32, 33, 35, 38, 39, 41, 42, 45, 49, 56, 62, 63 | Respondents generally expressed an objection to increased 'pollution' which was taken to refer to air quality impacts.<br>Some respondents expressed a concern for 'toxic chemicals in the air' or 'toxic fumes' although there was no specific source identified, other than 'car tyres'.<br>Some respondents noted that air quality in the region is already poor.<br>It was suggested that the air quality in the local area had already reached 'the national standard'. | The National Environment Protection Measure for Ambient Air sets maximum goals or standards for each pollutant type, and exceedances are recorded.<br>The Office of Environment and Heritage notes that national air quality standards are exceeded from time to time due to ozone levels in urban areas and particle (PM10 and PM2.5) concentrations in urban and regional areas. Data for the Sydney South-West region suggests that air quality exceedances occur on approximately 5 days each year. |

## Table 6.2 Response to community submissions

| Issue | Respondents | Details | Response/comment |
|---|---|---|---|
| | | The air quality concerns were often linked to an anticipated increased volume of waste to be managed at the facility. | A number of community respondents indicated some confusion regarding the proposed 'increase' in waste processing, and many also assumed that the modification would allow more waste to be received at the facility. The modification does not propose to increase the existing 2M tpa limit. Rather it seeks to allow a greater proportion of the waste received to be disposed to landfill. There are two operational limits at present – the 'gate limit' of 2M tpa and the landfilling limit of 700,000 tpa. Increasing the nominal limit of landfilling to 1M tpa means potentially more landfilling activity but not an increase in the overall amount that can currently be received at the facility (ie the 'gate limit'). |
| | | The contribution of trucks to air quality impacts was also raised. A related comment was that residue from diesel emissions is already causing impacts on local residents. | Emissions from diesel trucks and other equipment has been estimated and modelled in the AQIA. |
| | | The modification will cause air quality to exceed the criteria for residential and commercial receptors for cumulative 24 hours average PM2.5 concentrations and 24-hour average ground level PM10 concentrations | No residential receptors are predicted to exceed the impact assessment criteria for 24-hour average PM10 and PM2.5. There was a single predicted exceedance of the 24-hour PM2.5 criterion at an adjacent industrial receptor, on a day when background was already elevated, and therefore the risk of additional exceedances was concluded to be low. |
| | | The increase in landfilling will generate increased dust because landfilling requires truck access to the pit via an unsealed road | Emissions from wheel generated dust for trucks entering the landfill has been estimated and modelled in the AQIA. |
| | | The technical assessment does not model impacts using a realistic 'worst case scenario' | As described above in the response to EPA comments, the modelling scenario presented in the AQIA represents potential peak daily operations. |
| | | The scenario of a 50/50 split (1M tpa each) between direct-to-landfill and recycling/reuse would result in more than 1M tpa being landfilled because the recycling effort could generate its own landfill requirement of around 300,000 tpa | The proposal is to increase the landfill cap to 1M tpa excluding waste generated as a by-product of the recycling processes conducted in the PSE and MPC.<br>In terms of the definition we have adopted to describe the waste streams, the by-product waste from recycling and reuse is not part of the 'direct-to-landfill' waste stream.<br>It is important to separately account for by-products of recycling processes. This is because the purpose of the landfill limit is to influence greater application of recycling and reuse as waste management methods as opposed to 'direct-to-landfill' methods. Including by-products of recycling within a volume-based limit for landfilling undermines that intended outcome and ignores the influence of market forces which |

## Table 6.2 Response to community submissions

<table>
<tr><th>Issue</th><th>Respondents</th><th>Details</th><th>Response/comment</th></tr>
<tr><td></td><td></td><td></td><td>already drive waste processing towards more recycling and reuse. From both a business and environmental perspective, recycling and reuse is preferable. It should not be constrained by a landfill limit which, ironically, is meant to promote recycling and reuse.<br><br>In terms of air quality modelling, the assessment has incorporated incoming material (or waste) quantities as shown below.<br><br>
<table>
<tr><th>ID</th><th>Material</th><th>Amount (tpa)</th><th>Details</th></tr>
<tr><td>A</td><td>Total Incoming</td><td>2,000,000</td><td></td></tr>
<tr><td>B</td><td>Direct haul to landfill</td><td>1,000,000</td><td>50% of A</td></tr>
<tr><td>C</td><td>Comingled and Segregated material</td><td>1,000,000</td><td>50% of A</td></tr>
<tr><td>D</td><td>Segregated waste</td><td>200,000</td><td>20% of C</td></tr>
<tr><td>E</td><td>Comingled waste through MPC</td><td>800,000</td><td>80% of C</td></tr>
<tr><td>F</td><td>Comingled residual to landfill via chute</td><td>240,000</td><td>30% of E</td></tr>
<tr><td>G</td><td>Greenwaste shredding</td><td>80,000</td><td>10% of E</td></tr>
<tr><td>H</td><td>Crushing bricks concrete in Yard</td><td>510,000</td><td>((60% of E) + D)*75%</td></tr>
<tr><td>I</td><td>Screening sand/soil in Yard</td><td>170,000</td><td>((60% of E) + D)*25%</td></tr>
</table>
<br>These are based on typical operations at the facility (in terms of the mix of waste streams) but calibrated to assume a maximum volume of 2M tpa received at the gate.<br><br>In summary, it is agreed that the 50/50 split will – on an assumed maximum volume received at the gate of 2M tpa and on an assumed 1M tpa of that waste received being ‘direct-to-landfill’ waste – result in more than 1M tpa being landfilled from all sources but not more than 1M tpa of direct-to-landfill waste.<br><br>The alternative to this proposed arrangement is to cease recycling when the landfill limit is reached; send ‘direct-to-landfill’ waste to alternative landfill facilities; send recyclable waste to other facilities; or a combination of these. Either way, the impacts will be greater because trucks carrying that waste will be forced to travel greater distances, through more suburbs, in search of an appropriate disposal location. If this cost and time burden becomes too great, it may also incentivise illegal dumping locally.</td></tr>
<tr><td></td><td></td><td>There should be consideration of dust generated by the proposed Hanson Concrete and Asphalt facility, to accurately assess cumulative air quality impacts.</td><td>Cumulative impacts are assessed by combining the contribution from the Modification with the existing ambient air quality environment, described based on baseline monitoring data for the region. The derived baseline is assumed to account for all existing emissions sources in the local airshed, including the Hanson facility. The standard methodology for deriving background air quality is to take into account all existing and reasonably foreseeable local development. The expansion of the Hanson facility was considered a speculative rather than reasonably foreseeable development, and was therefore not modelled for current background air quality purposes.</td></tr>
</table>

## Table 6.2 Response to community submissions

| Issue | Respondents | Details | Response/comment |
|---|---|---|---|
| | | The dispersion modelling uses points of reference for commercial and industrial receptors which are not the points of greatest potential impact, and therefore the results are under-estimated. | The points of reference for commercial and industrial receptors are selected based on where exposure to dust may occur, for example building openings, carparks, loading docks etc. The assessment approach is consistent with industry standard. |
| | | The air quality assessment does not provide predictions for ground level concentrations of dust and odour at the Jacfin site which represents future employment land. | The concentration and dust deposition contours show the predicted levels for all pollutants across all areas around the site and can be reviewed to determine impacts on specific areas of interest. |
| | | Haul route lengths assumed for unpaved roads do not represent the likely lengths of haulage. | The main impact associated with haul route length is dust generated by truck movements, and this is assumed to be the reason why the haul length on unpaved roads was raised.<br>For dust impacts associated with these matters please refer to the Air Quality section of this document, as the same matters were mentioned in relation to air quality. |
| | | Silt content for paved and unpaved roads are unrealistically low. | No site-specific measurements of silt content or silt loading were available; therefore the adopted values are taken from the literature. The silt content assumed for unpaved roads (6.4%) is the mean value reported for municipal solid waste landfills in the AP42 emission factor documentation for unpaved roads (chapter 13.2.2). Similarly, the silt loading assumed for paved roads within the site (7.4g/m2) is the mean value reported for municipal solid waste landfills in the AP42 emission factor documentation for paved roads (chapter 13.2.1). The silt loading assumed for the site access road (0.6g/m2) is the ubiquitous baseline value reported for public roads with <500 average daily traffic volumes in the AP42 emission factor documentation for paved roads (chapter 13.2.1).<br>Generally, the values selected are expected to be conservative. For example, silt contents measured for unpaved roads at coal mines in NSW are, on average 4.6%, lower than the value we used. |
| | | Unrealistically high emission control benefits have been assumed | All existing mitigation measures are listed in Section 6 of the AQIA. These mitigation measures represent best practice dust controls and all reasonable and feasible measures that would be adopted/continued for the Modification. The control efficiencies used are based on values reported in the literature. |
| | | There appear to be inaccuracies in the dust deposition rate contour plot at Figure A5-6 of the Air Quality Assessment. | The TSP contour was inadvertently included in the place holder for dust deposition. The correct dust deposition contour is shown in Figure A-2 of Appendix A to this report. |

## Table 6.2 Response to community submissions

| Issue | Respondents | Details | Response/comment |
|---|---|---|---|
| | | It was suggested that there was very limited information provided in relation to the odour assessment. | A detailed description of odour emission is provided in Section 6.2 of the AQIA. Modelling predictions for a worst-case odour emissions scenario area presented in Section 7.4. |
| | | Predicted ground-level concentrations of odour at the Jacfin land probably exceed the criterion for populated areas of 2 OU. The Air Quality Assessment has suggested a criterion of 7 OU applies to commercial activities, however this level is incorrect having regard to the nature of the surrounding development. | The 2 OU contour does not extent across the Jacfin property land. Please refer to Figure A5-7 in Appendix 5 'Contour plots' of the Air Quality Impact Assessment Report. |
| Traffic | 2, 6, 8, 9, 11, 12, 14, 16, 18, 25, 31, 32, 34, 35, 38, 39, 40, 42, 56, 62, 63 | Many respondents generically identified traffic as an issue and some suggested that local roads do not cope well with the existing levels of traffic. Most held a view that an increase in the landfilling limit will exacerbate the problem.<br>Some respondents pointed to heavy vehicles as the cause of local road choke points.<br>One respondent stated that there were already risks to children crossing roads and that additional traffic would increase that risk. One respondent suggested that ambulance and police vehicles have difficulty accessing local streets already. | The pattern of traffic movement associated with the Eastern Creek facility will have a diminished (ie diluted effect) the greater the distance from the facility. This is because the vehicle journey origins (for inbound) and destinations (for outbound) can be in a myriad of locations.<br>It is likely that the traffic closer to the facility, whether inbound or outbound, will focus on a small number of roads. The key feeder roads for the facility will be Archbold Road, the Great Western Highway, Western Motorway, Old Wallgrove Road and Wallgrove Road. Lesser volumes will use routes such as Rooty Hill Road South, The Horsey Drive, Rupertswood Road and Carlisle Avenue.<br>The main routes are not considered to represent a safety risk as there are adequate signalised crossing points.<br>With the vast majority of traffic associated with the site travelling via routes such as the Western Motorway, the Great Western Highway, Wallgrove Road and Archbold Road, these are multi-lane main roads capable of supporting heavy vehicle traffic without disruption to local streets. |
| | | It was suggested that when the Archbold Road extension is built, the trucks will use this as a short cut to the facility. | Archbold Road currently exists as a formed road from the Great Western Highway as far south as Sargents Road. Infrastructure, including an overpass crossing for the Western Motorway, is in place already. The extension of Archbold Road south of the Western Motorway has been a long-term plan for traffic management, and this includes traffic associated with the industrial precinct at and adjoining the Eastern Creek waste management facility. |

## Table 6.2 Response to community submissions

| Issue | Respondents | Details | Response/comment |
|---|---|---|---|
| | | | Most inbound vehicles delivering materials to the site from the north and west will enter Archbold Road at the intersection with the Great Western Highway and continue on the extended section of Archbold Road to approach the site.<br>This is not a 'short cut' in the sense of an unintended 'rat run' but rather as a route most suitable for the forecast traffic. |
| | | It was suggested that Wallgrove Road should be upgraded and that Grevillea Street should be 'opened up'. It was also suggested that an additional road be constructed | Grevillea Street is a 470m length of road, ending in a cul-de-sac. It is unlikely to be used by any of the vehicles associated with the Genesis facility.<br>Wallgrove Road is approved by Roads and Maritime Services as suitable for 25m B-double vehicles. |
| Odour | 2, 3, 7, 14, 16, 18, 19, 21, 25, 28, 29, 30, 31, 34, 35, 38, 39, 41, 42, 42, 62 | There were several submissions which nominated odour or smell generically as an issue of concern because of the 'proposed expansion of the facility'.<br>Several respondents stated that they could "smell the tip" from their homes on most days.<br>Some respondents indicated that odour was worse at night time and caused discomfort. Others suggested that the odour was worst on hot mornings.<br>It was suggested that odour issues may be more problematic during summer months. | The changes proposed under Modification 6 do not propose to expand the facility or change the type of waste currently authorised to be received at the site. The overall gate limit of 2M tpa remains unchanged. The classification of waste remains unchanged. The Modification seeks to increase the proportion of that overall limit which can be disposed to landfill and to increase the hours of operation for the facility.<br>The facility has remained compliant with the relevant environment protection licence (EPL #13426) which requires "an annual audit of the design, operation and odour management practices of the operation with the primary aim of identifying improvements that lead to attainment of best practice in regard to minimising odour emitted from the premises". The EPA regulates odour impact via the EPL and, as a condition of the EPL, the EPA can require Genesis to conduct assessments or investigations that identify the extent of any potentially offensive odour emissions beyond the boundary of the premises.<br>The air quality assessment prepared by Ramboll (Appendix C to the Environmental Assessment) found that the worst-case potential odour impact from landfilling at 1M tpa combined with green waste processing and composting, would not result in exceedances of the odour goal of 2 OU at any residential receptor. The contour lines for odour impact are found in Appendix 5 'Contour plots' of the Air Quality Impact Assessment Report (see specifically Figure A5-7). |
| | | It was suggested that there needs to be a 'down time' when odour is able to disperse. | A conservative emissions and modelling scenario for odour presented in the AQIA predicted no exceedances of the odour goals. Therefore, additional mitigation measures are not considered necessary, including downtime. |

## Table 6.2 Response to community submissions

| Issue | Respondents | Details | Response/comment |
|---|---|---|---|
| | | One respondent suggested that odour emissions will stifle employment generating development on adjoining land. | A conservative emissions and modelling scenario for odour presented in the AQIA predicted no exceedances of the odour goals. |
| | | One respondent suggested that the receptor locations used for modelling odour impacts are not the points of greatest exposure to odour, and that the modelling in the assessment report under-represents the impact. Specifically, the Jacfin site was mentioned. | A conservative emissions and modelling scenario for odour presented in the AQIA predicted no exceedances of the odour goals. The 2 OU contour does not extent across the Jacfin property land. |
| | | Odour impacts were said to be under-estimated due to:<br>(i) haul route lengths on unpaved roads assumed do not represent the likely lengths of haulage given the proposed scope of operations if approval is given to the Modification Application;<br>(ii) silt content for paved and unpaved roads are unrealistically low; and<br>(iii) unrealistically high emission control benefits have been assumed. | Haul route lengths and the silt content of roads do not appear to have any influence on odour. For dust impacts associated with these matters please refer to the Air Quality section of this document, as the same matters were mentioned in relation to air quality.<br>A conservative worst-case odour emission scenario was modelled, for landfilling at 1M tpa plus green waste processing and composting at the MPC. |
| | | It was also suggested that the level of information regarding odour modelling was insufficient to form a view on the adequacy of the assessment. | A detailed description of odour emission is provided in Section 6.2 of the AQIA. Modelling predictions for a worst-case odour emissions scenario area presented in Section 7.4. |
| Asbestos | 34, 37, 43, 47, 48, 49, 50, 51, 52, 57, 58, 59, 60, 61, 64, 66 | A large number of respondents made specific mention of asbestos as a matter of concern. Some respondents claimed that the past record of the facility in terms of asbestos handling was poor and that historical 'non-compliance' should be considered.<br>Some respondents suggested that the facility should not be allowed to accept more asbestos than is currently allowed. Others suggested that no asbestos should be accepted at this facility. | The storage, disposal and transport of asbestos waste is regulated by the NSW EPA or the local council under the Protection of the Environment Operations Act 1997 and the Protection of the Environment Operations (Waste) Regulation 2014.<br>There are nine waste facilities within the Sydney metropolitan regions which are authorised by the EPA to accept and dispose of asbestos waste. These facilities are in the north, south and west of the metropolitan area.<br>The issue of illegal dumping of asbestos on local roads is a concern to regulators, waste facility operators and the local community. There can be any number of reasons why illegal dumping occurs and the proposed modification for the Genesis facility is one way of addressing the issue. This is because dumping can be incentivised if |

## Table 6.2 Response to community submissions

| Issue | Respondents | Details | Response/comment |
|---|---|---|---|
| | | Others suggested that illegal asbestos dumping on local roads was an issue. | appropriately licensed landfill facilities are not open when needed, or if facilities are not allowed to accept asbestos contaminated material for landfilling because the landfilling limit has been reached.<br>The suggestion that no asbestos be accepted at the facility confronts a similar issue. While there is an understandable sentiment that the existence of Sydney's legacy of asbestos contamination is regrettable, the most appropriate method for mitigating the hazard is to allow appropriately authorised waste facilities to treat and dispose the waste to landfill. |
| Health impacts | 13, 25, 27, 30, 34, 35, 41, 42, 45, 46, 47, 48, 52, 56, 63, 66 | A number of respondents pointed to health concerns, specifically local individuals already suffering with respiratory complaints such as asthma.<br>Other medical conditions were linked to pollution and waste by respondents, including dementia, mesothelioma and cancer.<br>The health impacts on young children was also a matter raised by a few respondents.<br>Mental health issues were also raised in relation to noise. | The health effects of potential impacts from the facility are measured in terms of compliance with various EPA metrics for key parameters such as air quality, particularly dust, and noise.<br>The environmental assessment includes the modelling of air quality and noise impacts, and these are shown to be acceptable. While it can be acknowledged that individuals may have concerns, there is reassurance that the relevant EPA standards and guidelines provide the best indication of appropriate levels of control for health-related matters. |
| Local amenity and character; Inappropriate near residential areas; Nuisance | 4, 7, 16, 25, 28, 32, 35, 36, 37, 41, 44, 53 | A notable number of respondents expressed a concern that the facility was too close to residential areas.<br>Mention was also made of proximity to schools, child care centres, playing fields, businesses and a proposed future Western Sydney Zoo. | The proximity to residential areas, businesses, playing fields and related community infrastructure is assessed not by the simple metric of distance but based on the impact of a specific operational variable such as light, noise and air quality. These variables are all subject to different performance measures set by public authorities such as the EPA. While there is no specific assessment of 'distance to residential' or similar, there are assessments of the separate impacts which can arise from the proposed operations, and these are addressed in the relevant sections of the assessment report. |
| | | Several respondents advanced a view that amenity will be adversely impacted by 24-hour operation.<br>Some respondents noted the sense of community in local suburbs, and expressed their aspirations to raise a family here, and there was | Neighbourhood amenity is a legitimate issue but 'amenity' is a fairly generic term describing the attributes of a neighbourhood which might be considered useful, pleasant or desirable. The assessment of 'amenity' is addressed in this assessment by examining those impacts which might individually or cumulatively materially influence the amenity of the area. Those impacts, such as air quality, traffic, noise and visual impacts are all considered separately in the assessment. |

## Table 6.2 Response to community submissions

| Issue | Respondents | Details | Response/comment |
|---|---|---|---|
| | | concern that the modification may erode that benefit. | |
| | | There was a view that the community needed to feel safe. | The assumption here is that the community needs to feel safe with respect to the presence of a waste management facility in the region.<br>Safety with respect to air quality, traffic and noise are dealt with in those sections of this report.<br>Other public safety aspects, such as crime or anti-social behaviour, are best dealt with through NSW Police and the Community Safety committees within Blacktown City Council (refer to Blacktown City Crime Prevention Plan 2017). |
| | | There was also a view that the development was out of character with the current and future vision for the locality, including the stated objectives for the State Environmental Planning Policy (Western Sydney Employment Area) 2009 ('WSEA SEPP'). | It is noted that the State Environmental Planning Policy (Western Sydney Employment Area) 2009 makes specific provision, within Schedule 1, for the Eastern Creek precinct to include an additional permitted use, being a "waste facility for general solid waste" at the former Wallgrove quarry. |
| | | The existing Genesis facility was seen as a 'heavy industry' and out of character with the Eastern Creek Business Hub. The proposed modification was seen as inconsistent with the future Business Hub tenants. | The Eastern Creek Business Park Precinct Plan applies to specific land in the Eastern Creek area. The entire Eastern Creek Precinct was known to have a wide range of existing land-uses and long-term activities, including a landfill and waste management facility, at the time the Business precinct plan was prepared. It is, therefore, not inconsistent with the future vision for the area that the Business Hub and the Genesis facility co-exist.<br>It is also noted that the operation of the facility depends on performance consistent with the conditions of two environmental protection licences (EPLs), and these licences ensure that facilities are managed to high environmental standards to reduce any risk of harm to the community and the environment. |
| Public interest; Waste increases | 10, 22, 25, 26, 30, 41, 55, 62 | It was suggested by some respondents that this proposed modification provided no benefit to the local community and that there is no public interest in approving the application.<br>The view was expressed that communities will bear the environmental and social cost. | It is important to get the balance right when setting limits of various waste processing methods, and the balance needs to recognise the overall 'gate limit' of 2M tpa.<br>Under current consent conditions, there is potential for the facility to be unable to accept co-mingled material for recycling if the MPC is unable to operate because it cannot dispose the non-recyclable by-product to landfill because the landfilling limit has been reached through acceptance of direct-to-landfill waste. It is also possible that |

## Table 6.2 Response to community submissions

| Issue | Respondents | Details | Response/comment |
|---|---|---|---|
| | | There were also some general claims that the modification would be 'bad for Western Sydney'. It was suggested that waste could be transported to Lithgow and used as fuel to generate electricity.<br>Respondents suggested that rather than modify the consent, the applicant (or perhaps government) should work on strategies to reduce the waste generated.<br>One respondent suggested that the modification was inconsistent with the NSW recycling policies, notably the WARR Strategy, because it will increase the amount of waste being disposed to landfill.<br>It was suggested that an increased capacity to receive direct-to-landfill waste would discourage waste-producing industries from innovating and developing methods to increase reuse and recycling.<br>It was also claimed that the modification would reduce recycling at the facility because the increase in the direct-to-landfill proportion reduces the remaining volume of the available 'gate limit' (2M tpa) which is available for recycling from 1.3M to 1M tpa. | the facility may find that it is unable to accept recyclable material because the annual volume of waste through the gate has reached 2M tpa.<br>Of these two scenarios, based on current market demand, the most likely constraint on recycling is the limit on landfilling.<br>This is why the modification proposes to exclude MPC by-product from the landfilling volume limit.<br>Quite separate to this, the modification proposes to increase the current direct-to-landfill limit from 700,00 tpa to 1M tpa. This is in response to the market demand for landfilling and in particular the likely future increase in demand as major infrastructure projects are commenced.<br>It is important to note that the setting of a limit for landfill volumes at this facility does not influence the extent to which waste is generated by development in the Sydney region. If the appropriate treatment method for a waste stream is landfilling, then the only effect of the annual limit on landfilling is to displace that legitimate need for landfilling to more remote landfill sites. Displacement of demand brings other externalities such as longer haul routes for waste and greater risk of illegal dumping.<br>The incentive for recycling is not driven by limits on landfilling. It is driven by an established market for recycled material. Any operator of a waste facility where landfilling and recycling are both available, will be driven to prefer recycling simply because it makes economic sense. |
| Road impacts and public safety | 11, 13, 30, 34, 35 | A few residents raised specific concerns regarding the impact of trucks on local roads. Damage to road surface and congestion were mentioned. | The pattern of traffic movement associated with the Eastern Creek facility will have a diminished (ie diluted effect) the greater the distance from the facility. This is because the vehicle journey origins (for inbound) and destinations (for outbound) can be in a myriad of locations.<br>While the point of waste generation or materials delivery may be in any location, including residential, commercial or industrial areas, the traffic associated with that need will be minor. The aggregation of vehicle movements associated with the operation of the Eastern Creek waste management facility will only be evident on the major roads used to approach or depart the site. These feeder roads for the facility will |

## Table 6.2 Response to community submissions

| Issue | Respondents | Details | Response/comment |
|---|---|---|---|
| | | | be Archbold Road, the Great Western Highway, Western Motorway, Old Wallgrove Road and Wallgrove Road.<br>These are multi-lane main roads capable of supporting heavy vehicle traffic. |
| Incinerator / Energy from Waste facility | 1, 34, 35, 41, 49 | Some respondents raised the issue of the separately proposed (and refused) Energy from Waste (EFW) development.<br>Some respondents stated that the objections to the EFW facility should equally apply to this modification.<br>Others felt that the modification was a 'back door' method of introducing an EFW facility or that the modification was in response to the refusal of the EFW application. There were a number of respondents who felt that the increase in the landfill limit may be a precursor to a revival of the EFW concept.<br>One respondent thought that the EFW facility was proposed as part of this modification. | The Energy from Waste development is not within the scope of this modification. |
| Non-specific objection | 15, 23,24, 33 | The specific concerns at the heart of these objections was difficult to categorise for some responses which included "Na", "Enough is enough", "Nonsense" and "We are not a dumping ground". | The nature of these objections has been noted and the responses have been interpreted as a general objection to any increase in volumes of waste or hours of operation, which have been addressed in other responses. |
| Impact on local property values | 7 | The respondent anticipates that the value of residential property will decline, causing financial loss. | The Genesis facility is pre-existing, as are other industrial facilities in this precinct, and any influence of proximity to these facilities will already be factored into local property values. These local businesses are also a source of employment, which can be a positive factor for local property. Ultimately, the market will determine the value of property based on a range of factors. |
| Climate change | 4 | It is suggested that the facility should do more to address climate change. | The recycling of materials at the facility assists in the mitigation of climate change impacts by reducing demand for new resources and supplying materials back to industry, as well as reducing waste to landfill leading to the reduction in greenhouse gas emissions from landfills. |

# 7 Proposed amended conditions of consent and mitigation

## 7.1 Key elements

The proposed modification seeks changes to three aspects of current operations:

- the volume of waste which can be landfilled on an annual basis;
- the hours of operation for various activities; and
- the noise criteria.

## 7.2 The proposed amendments to consent conditions

The conditions proposed for amendment are:

- Schedule 2, Condition 2;
- Schedule 3, Condition 1;
- Schedule 3, Condition 38; and
- Schedule 3, Condition 39.

The proposed amendments to the relevant conditions of the project approval are described below. The proposed modifications are shown in green and redundant text is shown as ~~strike-through~~.

### 7.2.1 Amendment to Schedule 2, Condition 2

**ADMINISTRATIVE CONDITIONS**

**Terms of Approval**

2. The Proponent shall carry out the project in accordance with the:

a) EA;

b) Statement of Commitments;

c) Site plan and building elevation drawings at Appendix 1;

d) Modification application 06_0139 Mod 1 with supporting document titled Light Horse Business Centre, Environmental Assessment Report: Project Modification prepared by Light Horse Business Centre, dated August 2010 and Additional Information, dated 6.9.2010 and 13.9.2010;

e) Modification application 06_0139 Mod 2 dated 9.11.10;

f) Modification application 06_0139 Mod 3 dated 10 May 2011 with supporting document titled Light Horse Business Centre, Environmental Assessment Report: Modification 3, September 2011 prepared by Light

Horse Business Centre (which contains 'LandPartners' operational landform plan, 'Martens' report for stormwater management, and building elevations);

g) Modification Application 06_0139 Mod 4 with supporting document titled the document titled S75W Modification 4, dated October 2013 and prepared by Urbis Pty Ltd;

h) Modification Application 06_0139 Mod 5 and supporting documents titled Section 75W Report, Modification 5, dated 18 March 2015, prepared by Urbis Pty Ltd; Response to Submissions, dated 19 May 2015, prepared by Urbis Pty Ltd; and Spoil Management Plan, dated September 2015, prepared by Genesis Xero Waste;

i) Modification Application 06_0139 Mod 6 and supporting documents titled Genesis Xero Waste Facility Modification 6, dated October 2017, prepared by EMM Consulting Pty Limited; Response to Submissions, dated [TBC], prepared by EMM Consulting Pty Limited; and

j) Conditions of this approval.

### 7.2.2 Schedule 3, Condition 1

**SPECIFIC ENVIRONMENTAL CONDITIONS**

**Limits on Input**

1. The Proponent shall not:

a) landfill more than ~~700,000~~1,000,000 tonnes of non-putrescible waste per calendar year (excluding waste generated by recycling processes within the Materials Processing Centre and the Pre-Sort Building);

a) receive or landfill putrescible waste on site;

b) stockpile more than 50 tonnes of tyres on site at any one time;

c) stockpile more than 20,000 tonnes of green waste on site at any one time.

d) receive waste on site that is contaminated by chemicals and/ or pathogens that will not be rendered harmless by the process or that may constitute a health or environmental risk, including clinical and related waste and diseased carcasses; and

e) receive waste on site containing contaminants classified as hazardous waste, restricted waste (other than asbestos) or liquid waste under the POEO Act.

## 7.3 Schedule 3, Condition 38

**Noise Impact Assessment Criteria**

38. The Proponent shall ensure that noise from the project does not exceed the noise limits in Table 4.

**Table 4 Noise Impact Assessment Criteria (consent condition Table 4)**

| Location | Day | Evening | Night | Morning shoulder |
|---|---|---|---|---|
| | $LA_{eq(15\ minute)}$ dB(A) | $LA_{eq(15\ minute)}$ dB(A) | $LA_{eq(15\ minute)}$ dB(A) | $LA_{eq(15\ minute)}$ dB(A) |
| Minchinbury residential receivers | ~~36~~ 48 | ~~35~~ 47 | ~~35~~ 44 | ~~35~~ 47 |
| Erskine Park residential receivers | ~~36~~ 39 | ~~35~~ 40 | ~~35~~ 37 | ~~35~~ 40 |

Notes: (a) Noise from the development is to be measured at the most affected point or within the residential boundary, or at the most affected point within 30 metres off a dwelling (rural situations) where the dwelling is more than 30 metres from the boundary, to determine compliance with LAeq (15 minute) noise limits. Where it can be demonstrated that direct measurement of noise from the project is impractical, the EPA may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.
(b) The noise emission limits identified apply under meteorological conditions of:
Wind speed up to 3m/s at 10 metres above ground level; or
Temperature inversion conditions of up to 3oC/100m and wind speed up to 2m/s at0 metres above the ground.

### 7.3.1 Hours of operation

39. The Proponent shall comply with the restrictions in Table 5.

**Table 5 Construction and Operation Hours for the Project (consent condition Table 5)**

| Activity | Days | Hours |
|---|---|---|
| **Construction** | Monday-Friday | 7:00am-6:00pm |
| | Saturday | 8:00am-4:00pm |
| | Sunday and Public Holidays | Nil |
| ~~**Operations (including waste deliveries and chute use)**~~ | ~~Monday-Friday~~ | ~~7:00am-6:00pm~~ |
| | ~~Saturday, Sunday and Public Holidays~~ | ~~8:00am-4:00pm~~ |
| ~~MPC~~ | ~~Monday-Friday~~ | ~~6:00am-10:00pm~~ |
| | ~~Saturday, Sunday and Public Holidays~~ | ~~6:00am-4:00pm~~ |

**Table 5** **Proposed hours (new Table 5)**

| Activity | Days | Existing times | Proposed times |
|---|---|---|---|
| Construction | Monday – Friday | 7:00 am to 6:00 pm | 7:00am-6:00pm |
| | Saturday | 8:00 am to 4:00 pm | 8:00am-4:00pm |
| | Sunday and Public holidays | Nil | |
| MPC Operations (waste deliveries and chute use | Monday – Friday | 7:00 am to 6:00 pm | 24 hours |
| | Saturday, Sunday and Public holidays | 8:00 am to 4:00 pm | 24 hours |
| Crushing and screening | Monday – Friday | 7:00 am – 6:00 pm | 6:00 am to 6:00 pm |
| MPC (including maintenance) | Monday – Friday | 6:00 am to 10:00 pm | 24 hours |
| | Saturday, Sunday and Public holidays | 6:00 am to 4:00 pm | 24 hours |
| Land fill deliveries (by trucks only) | Monday – Sunday | 7:00 am to 6:00 pm | 5:00 am to 9:00 pm |

39a. Operating hours of the conveyor and chute system are to be restricted to the facility's operational hours as defined in condition 39 of Schedule 3.

39b. Waste deliveries shall be restricted to the facility's operational hours as defined in condition 39 of Schedule 3.

39c. ~~Notwithstanding condition 39 of Schedule 3, the MPC may be operated during the extended hours of 6am to 10pm Monday to Friday, and 6am to 4pm Weekends and Public Holidays~~.

## 7.4 Impact management and mitigation

The changes noted above need to be viewed in the context of their likely impacts but also in terms of the extent to which impacts can be mitigated or managed.

### 7.4.1 Changes to noise criteria

There will be no impact on local residential areas.

The current noise criteria for the operation of the facility are set below background noise levels and therefore do not provide a reliable benchmark for any noise impact from the facility.

If the changes are approved, the facility will be required to operate within the new noise criteria.

### 7.4.2 Changes to the landfill limit

There are two changes proposed.

#### i Re-define landfill to mean 'direct-to-landfill' waste only

This change will prevent a situation where landfilling of by-products from recycling processes if forced to cease because if the landfilling from the recycling is not allowed, then the recycling of co-mingled waste also needs to cease.

Environmental Protection Licence #13426 requires that the by-product be disposed to landfill.

There is no negative impact on the local community from this change but there is a broader community benefit in ensuring that recycling can continue to be provides at the facility.

#### ii Increase the landfill limit to 1M tpa

This change will allow more 'direct-to-landfill' waste to be accepted at the facility each year.

There are less truck movements required per tonne of waste when trucks are transporting direct-to-landfill waste because the types of trucks are generally larger capacity and the direct-to-landfill waste is a more dense form of waste. This also means that if the landfilling proportion of the 2M tpa gate limit is increased from 700,000 tpa to 1M tpa, then the gate limit allocated to other materials such as mixed demolition waste is decreased from 1.3M tpa to 1M tpa. These other wastes generate more truck movements per tonne carried, and so the overall effect is to reduce the number of truck movements that would otherwise occur for a 2M tpa gate limit.

When comparing the operation of the facility at maximum capacity without the proposed changes to the operation of the facility at maximum capacity with the proposed changes, the latter will generate less traffic impacts on local roads and residents.

Increasing the amount of landfilling does generate additional dust because there are more vehicles travelling into and out of the landfill pit, but the dust impacts under the 1M tpa landfilling scenario do not exceed the relevant air quality standards.

The Applicant will also relocate the real time air quality monitoring device to a boundary location adjacent to the neighbouring industrial premises, so that reactive management measures can be used to minimise the potential for adverse impacts from site operations. The Applicant will review and update the site's Air Quality Management Plan to document suitable reactive measures and the monitoring-based triggers used to initiative these reactive measures, such as monitoring meteorological forecasts to predict risks of dust emissions (eg wind conditions). This will allow management of the location and intensity of activities or to increase controls relative to daily conditions.

Also note that all current mitigation measures, such as watering of the void haul route and dust suppression (misting) within processing buildings will continue.

### 7.4.3 Changes to hours of operation

No changes are proposed to the existing conditions relating to construction hours.

New operational hours are proposed based on the different types of activity.

The challenge for this facility is how to manage the forecast increase in Sydney's waste generation with the least impact on the community. There is no simple solution. Waste transporters will invariably seek out the most convenient and appropriate waste management facility for the disposal of waste materials. If Eastern Creek is the nearest appropriate facility, then the drivers will attempt to deliver waste to Eastern Creek.

As the demand increases within the 2M tpa gate limit, the choices are to either force all of the associated activity – truck transport of materials, sorting, processing, stockpiling, plant maintenance and landfilling – into the 7:00am to 6:00pm (Monday-Friday) hours; or to provide more flexibility and avoid congestion for activities by extending the hours.

Hours proposed are tailored to the likely noise impacts of the specific activity. Enclosed activities, such as the operation of the MPC, are lower risk activities in terms of noise impacts on residential areas; whereas outdoor activities such as crushing and screening are a higher risk of noise generation. This is why a modest extension of hours is proposed for crushing and screening, and the proposed hours for the MPC are more generous. These changes are possible without unacceptable impacts on neighbours.

Without the changes, the noise impacts are also acceptable but the risk in terms of congestion, truck queuing and traffic impacts is elevated.

### 7.4.4 Environmental Management System and management plans

The facility operates subject to a number of operational plans which form part of the Environmental Management System for the site. These are required under conditions to the development consent for the facility and include:

- Noise Monitoring Program;
- Air Quality, Odour and Greenhouse Gas Management Plan;
- Traffic and Transport Code of Conduct;
- Soil, Water and Leachate management Plan;
- Landscape and Vegetation Management Plan;
- Aboriginal Heritage Management Plan;
- Landfill Plan;
- Emergency ad Fiore Response Plan; and
- Rehabilitation and Closure Plan.

These plans and strategies remain relevant to the operation of the facility and the proposed changes within this modification do not radically alter the fundamental aspects of the facility which are addressed by the management plans. The plans will be updated to reflect the changes arising from this proposed modification.

# 8 Summary

## 8.1 Addressing the issues

The matters raised by both the public authorities and the community focussed on the predominant common areas of interest being:

- noise;
- air quality; and
- traffic.

The public authority submissions also sought clarification of matters such as:

- lighting; and
- water and leachate management.

Other issues which attracted a substantial number of comments from the community were:

- odour;
- asbestos;
- health; and
- local character, amenity and nuisance concerns.

All of the main issues, as well as those issues registering fewer comments, were able to be addressed through the provision of additional information or further explanatory text.

A few matters were raised which were considered out of scope. Notably there were some community references to the previously proposed 'waste to energy' facility which is not within the subject site or the subject of this modification, is unrelated to the operation of the subject facility, and was the focus of a separate development proposal. It should also be clarified that the proposal does not seek to vary the 2M tpa gate limit, which is already a condition of the existing approval.

Other than the replacement of Appendix B to the Environmental Assessment - Noise Impact Assessment Report - with the correct version of the Noise Impact Assessment Report, the Environmental Assessment remains unchanged.

## 8.2 The role of the facility

The facility at Eastern Creek is part of a broader network of waste management facilities across Sydney. This facility, and others, fulfil an important role in the way that the city functions.

While waste generation can be reduced, the population growth, urban development and infrastructure programs which inevitably create waste materials will continue for the foreseeable future.

The facility at Eastern Creek provides two important services to the community. It enables more efficient and effective use of resources by providing facilities to sort, screen and process recyclable waste materials and then

adding value by providing the recycled materials to the market for application in a wide range of developments. The facility also provides an essential means to dispose of waste to landfill where landfilling is the only safe and economic solution for certain waste streams.

The facility is also appropriately licensed to undertake this activity and has the benefit of an existing development consent to receive up to 2M tonnes of waste each year.

This modification seeks to change some of the conditions of the existing development consent which are, or are likely to, create adverse outcomes.

There is a question of balance in what is proposed.

Is it better, for example, to curtail the processing of recyclable material so that a nominal landfill limit is not breached; or to disregard recycling by-product waste when setting landfill limits? Is it better to accept more 'direct-to-landfill' waste at this facility; or send that waste to more distant landfill facilities? Is it better to extend the hours of operation for some activities; or to increase traffic impacts by constraining truck movements to lesser hours?

While there are no simple solutions, a waste management facility needs to deal in waste, and there are impacts associated with that activity. The proposed modification has carefully considered how changes can be made to the conditions relating to volumes, hours and noise criteria while achieving impact levels within objective government guidelines and taking into account both the concerns of the local community and the needs of the broader urban areas of Sydney in terms of demand for waste management.

It is important to note that this proposed modification does not alter the approved 2M tpa 'gate limit' for the facility nor the types of waste which are authorised to be received on site. It does not seek to enlarge to operational area of the facility nor the general arrangement of plant and equipment on site.

The modification was proposed so that the operator of the facility can meet the policy objectives of the NSW Government for recycling, accommodate the increasing demands of Sydney's development activities, and to recalibrate noise measures so that they are meaningful and reliable as indicators of adverse impacts.

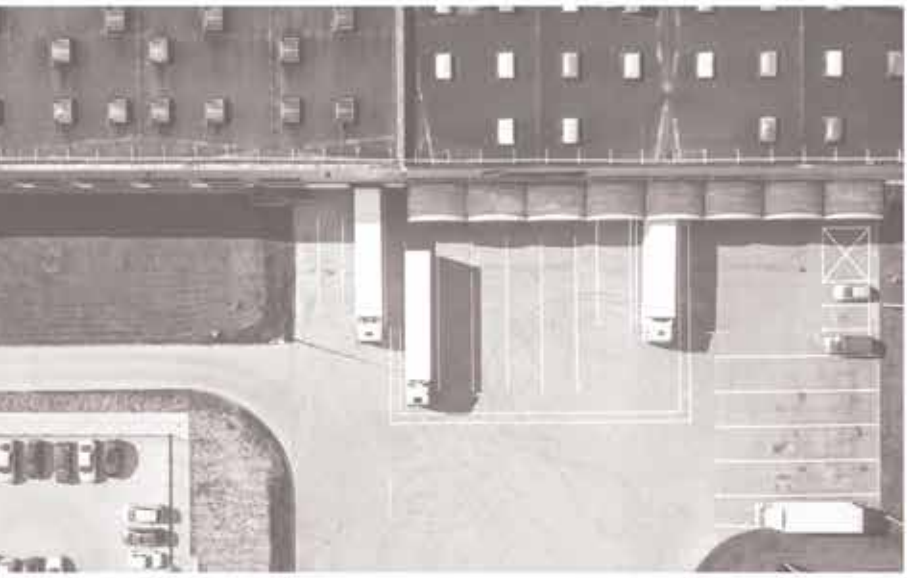
## 8.3 Closing

The responses to both the community and public authority submissions form part of the assessment for this proposed modification, and the information provided in the Response to Submissions Report should be read in conjunction with the main Environmental Assessment.

Finally, we would like to thank the individuals and organisation who took the time to prepare responses to the exhibited Environmental Assessment. All matters received appropriate consideration and a response.

# Appendix A

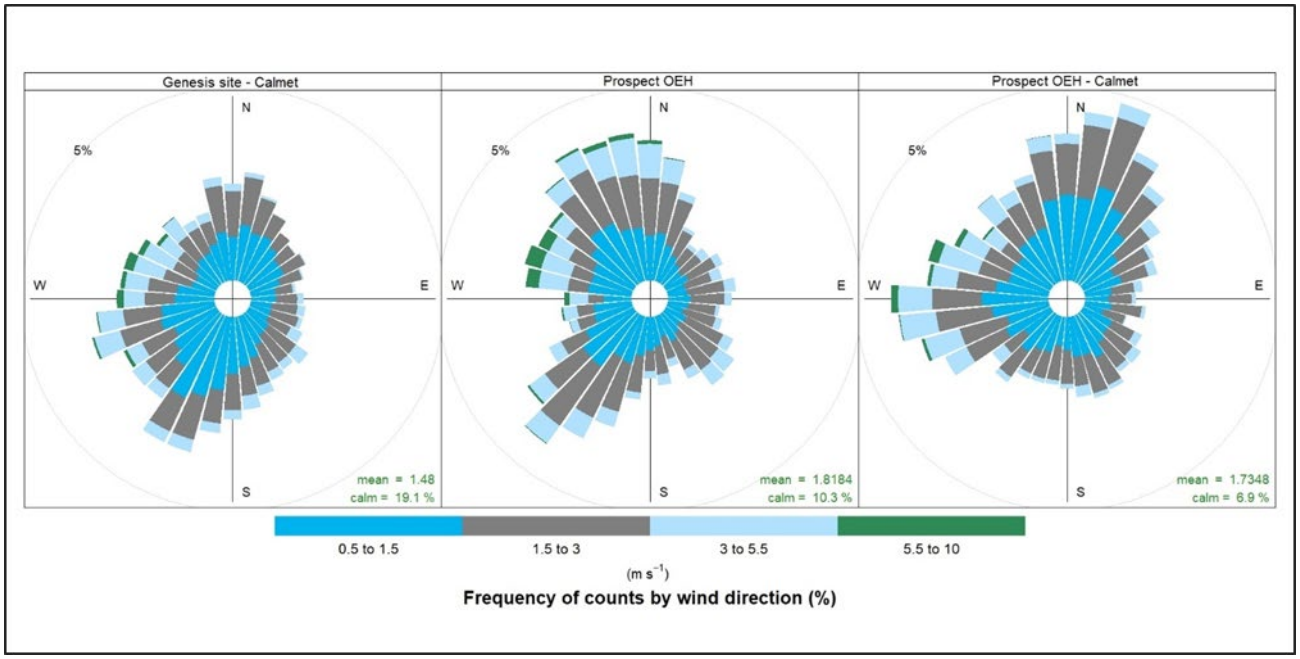
## Air quality tables and figures



## A.1 Tables and figures

### Table A.1 Statistic evaluation

| Statistical test | Wind speed | | Wind Direction | | Temperature | |
|---|---|---|---|---|---|---|
| | Benchmark | Result | Benchmark | Result | Benchmark | Result |
| Fraction of predictions within a factor of 2 (FAC2) | ≥ 0.5 | 0.8 | ≥ 0.5 | 0.8 | ≥ 0.5 | 1.0 |
| Mean bias (MB) | ≤± 0.5 m/s | -0.09 | ≤± 10 degrees | **-20.8** | ≤± 0.5 K | -0.28 |
| Mean Gross Error (MGE) | ≤± 2.0 m/s | 0.6 | ≤± 30 degrees | **65.0** | ≤± 2.0 K | 0.9 |
| Pearson correlation coefficient (r) | 1 | 0.8 | 1 | 0.5 | 1 | 1.0 |
| Index of Agreement (IOA) | 1 | 0.7 | 1 | 0.6 | 1 | 0.9 |




### Figure A.1 Observed and CALMET predicted winds for Prospect

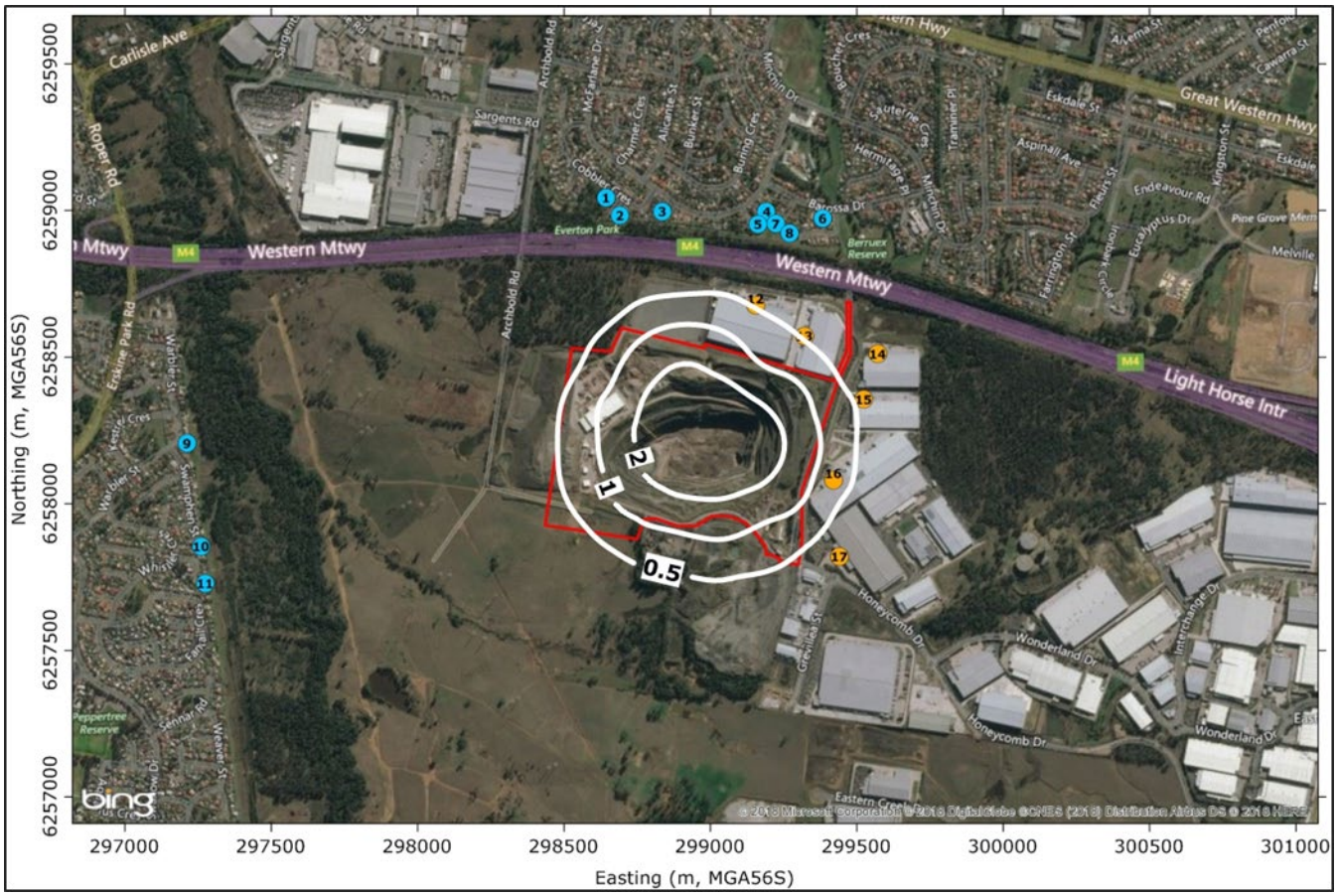
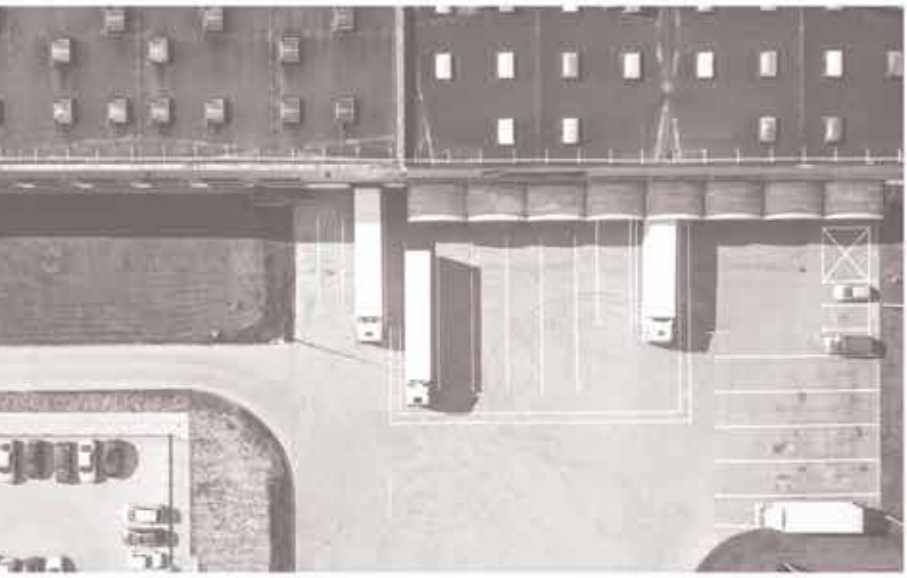
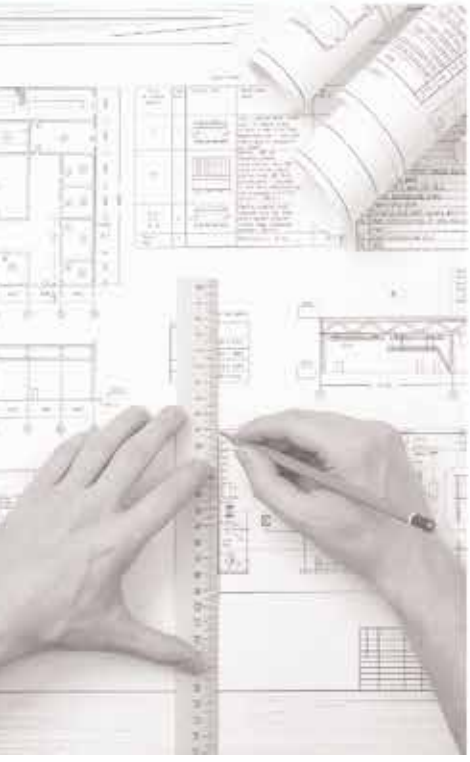



**Figure A.2 Dust deposition contours for Mod6**

# Appendix B

## Water and leachate management





## B.1 Water and leachate data

CES170514-EMM-AH

Genesis Waste Management Facility
Modification 6 Response to Submissions

CONSULTING EARTH SCIENTISTS

| Date | Total Discharge (KL) | Average daily (kL) discarge between records |
|---|---|---|
| 20/03/2018 | 198174 | 43 |
| 21/03/2018 | 198217 | 42.890625 |
| 22/03/2018 | 198259.8906 | 42.890625 |
| 23/03/2018 | 198302.7813 | 42.890625 |
| 24/03/2018 | 198345.6719 | 42.890625 |
| 25/03/2018 | 198388.5625 | 42.890625 |
| 26/03/2018 | 198431.4531 | 42.890625 |
| 27/03/2018 | 198474.3438 | 42.890625 |
| 28/03/2018 | 198517.2344 | 42.890625 |
| 29/03/2018 | 198560.125 | 42.890625 |
| 30/03/2018 | 198603.0156 | 42.890625 |
| 31/03/2018 | 198645.9063 | 42.890625 |
| 1/04/2018 | 198688.7969 | 42.890625 |
| 2/04/2018 | 198731.6875 | 42.890625 |
| 3/04/2018 | 198774.5781 | 42.890625 |
| 4/04/2018 | 198817.4688 | 42.890625 |
| 5/04/2018 | 198860.3594 | 42.890625 |
| 6/04/2018 | 198903.25 | 42.890625 |
| 7/04/2018 | 198946.1406 | 42.890625 |
| 8/04/2018 | 198989.0313 | 42.890625 |
| 9/04/2018 | 199031.9219 | 42.890625 |
| 10/04/2018 | 199074.8125 | 42.890625 |
| 11/04/2018 | 199117.7031 | 42.890625 |
| 12/04/2018 | 199160.5938 | 42.890625 |
| 13/04/2018 | 199203.4844 | 42.890625 |
| 14/04/2018 | 199246.375 | 42.890625 |
| 15/04/2018 | 199289.2656 | 42.890625 |
| 16/04/2018 | 199332.1563 | 42.890625 |
| 17/04/2018 | 199375.0469 | 42.890625 |
| 18/04/2018 | 199417.9375 | 42.890625 |
| 19/04/2018 | 199460.8281 | 42.890625 |
| 20/04/2018 | 199503.7188 | 42.890625 |
| 21/04/2018 | 199546.6094 | 42.890625 |
| 22/04/2018 | 199589.5 | 42.890625 |
| 23/04/2018 | 199632.3906 | 42.890625 |
| 24/04/2018 | 199675.2813 | 42.890625 |
| 25/04/2018 | 199718.1719 | 42.890625 |
| 26/04/2018 | 199761.0625 | 42.890625 |
| 27/04/2018 | 199803.9531 | 42.890625 |
| 28/04/2018 | 199846.8438 | 42.890625 |
| 29/04/2018 | 199889.7344 | 42.890625 |
| 30/04/2018 | 199932.625 | 42.890625 |
| 1/05/2018 | 199975.5156 | 42.890625 |
| 2/05/2018 | 200018.4063 | 42.890625 |
| 3/05/2018 | 200061.2969 | 42.890625 |
| 4/05/2018 | 200104.1875 | 42.890625 |
| 5/05/2018 | 200147.0781 | 42.890625 |

| Date | Total Discharge (KL) | Average daily (kL) discarge between records |
|---|---|---|
| 6/05/2018 | 200189.9688 | 42.890625 |
| 7/05/2018 | 200232.8594 | 42.890625 |
| 8/05/2018 | 200275.75 | 42.890625 |
| 9/05/2018 | 200318.6406 | 42.890625 |
| 10/05/2018 | 200361.5313 | 42.890625 |
| 11/05/2018 | 200404.4219 | 42.890625 |
| 12/05/2018 | 200447.3125 | 42.890625 |
| 13/05/2018 | 200490.2031 | 42.890625 |
| 14/05/2018 | 200533.0938 | 42.890625 |
| 15/05/2018 | 200575.9844 | 42.890625 |
| 16/05/2018 | 200618.875 | 42.890625 |
| 17/05/2018 | 200661.7656 | 42.890625 |
| 18/05/2018 | 200704.6563 | 42.890625 |
| 19/05/2018 | 200747.5469 | 42.890625 |
| 20/05/2018 | 200790.4375 | 42.890625 |
| 21/05/2018 | 200833.3281 | 42.890625 |
| 22/05/2018 | 200876.2188 | 42.890625 |
| 23/05/2018 | 200919.1094 | 42.890625 |
| 24/05/2018 | 200962 | 182 |
| 25/05/2018 | 201144 | 164.16 |
| 26/05/2018 | 201308.16 | 164.16 |
| 27/05/2018 | 201472.32 | 164.16 |
| 28/05/2018 | 201636.48 | 164.16 |
| 29/05/2018 | 201800.64 | 164.16 |
| 30/05/2018 | 201964.8 | 164.16 |
| 31/05/2018 | 202128.96 | 164.16 |
| 1/06/2018 | 202293.12 | 164.16 |
| 2/06/2018 | 202457.28 | 164.16 |
| 3/06/2018 | 202621.44 | 164.16 |
| 4/06/2018 | 202785.6 | 164.16 |
| 5/06/2018 | 202949.76 | 164.16 |
| 6/06/2018 | 203113.92 | 164.16 |
| 7/06/2018 | 203278.08 | 164.16 |
| 8/06/2018 | 203442.24 | 164.16 |
| 9/06/2018 | 203606.4 | 164.16 |
| 10/06/2018 | 203770.56 | 164.16 |
| 11/06/2018 | 203934.72 | 164.16 |
| 12/06/2018 | 204098.88 | 164.16 |
| 13/06/2018 | 204263.04 | 164.16 |
| 14/06/2018 | 204427.2 | 164.16 |
| 15/06/2018 | 204591.36 | 164.16 |
| 16/06/2018 | 204755.52 | 164.16 |
| 17/06/2018 | 204919.68 | 164.16 |
| 18/06/2018 | 205083.84 | 164.16 |
| 19/06/2018 | 205248 | 171 |
| 20/06/2018 | 205419 | 102.75 |
| 21/06/2018 | 205521.75 | 102.75 |

| Date | Total Discharge (KL) | Average daily (kL) discarge between records |
|---|---|---|
| 22/06/2018 | 205624.5 | 102.75 |
| 23/06/2018 | 205727.25 | 102.75 |
| 24/06/2018 | 205830 | 102.75 |
| 25/06/2018 | 205932.75 | 102.75 |
| 26/06/2018 | 206035.5 | 102.75 |
| 27/06/2018 | 206138.25 | 102.75 |
| 28/06/2018 | 206241 | 102.75 |
| 29/06/2018 | 206343.75 | 102.75 |
| 30/06/2018 | 206446.5 | 102.75 |
| 1/07/2018 | 206549.25 | 102.75 |
| 2/07/2018 | 206652 | 102.75 |
| 3/07/2018 | 206754.75 | 102.75 |
| 4/07/2018 | 206857.5 | 102.75 |
| 5/07/2018 | 206960.25 | 102.75 |
| 6/07/2018 | 207063 | 102.75 |
| 7/07/2018 | 207165.75 | 102.75 |
| 8/07/2018 | 207268.5 | 102.75 |
| 9/07/2018 | 207371.25 | 102.75 |
| 10/07/2018 | **207474** | **196** |
| 11/07/2018 | **207670** | 134.122449 |
| 12/07/2018 | 207804.1224 | 134.122449 |
| 13/07/2018 | 207938.2449 | 134.122449 |
| 14/07/2018 | 208072.3673 | 134.122449 |
| 15/07/2018 | 208206.4898 | 134.122449 |
| 16/07/2018 | 208340.6122 | 134.122449 |
| 17/07/2018 | 208474.7347 | 134.122449 |
| 18/07/2018 | 208608.8571 | 134.122449 |
| 19/07/2018 | 208742.9796 | 134.122449 |
| 20/07/2018 | 208877.102 | 134.122449 |
| 21/07/2018 | 209011.2245 | 134.122449 |
| 22/07/2018 | 209145.3469 | 134.122449 |
| 23/07/2018 | 209279.4694 | 134.122449 |
| 24/07/2018 | 209413.5918 | 134.122449 |
| 25/07/2018 | 209547.7143 | 134.122449 |
| 26/07/2018 | 209681.8367 | 134.122449 |
| 27/07/2018 | 209815.9592 | 134.122449 |
| 28/07/2018 | 209950.0816 | 134.122449 |
| 29/07/2018 | 210084.2041 | 134.122449 |
| 30/07/2018 | 210218.3265 | 134.122449 |
| 31/07/2018 | 210352.449 | 134.122449 |
| 1/08/2018 | 210486.5714 | 134.122449 |
| 2/08/2018 | 210620.6939 | 134.122449 |
| 3/08/2018 | 210754.8163 | 134.122449 |
| 4/08/2018 | 210888.9388 | 134.122449 |
| 5/08/2018 | 211023.0612 | 134.122449 |
| 6/08/2018 | 211157.1837 | 134.122449 |
| 7/08/2018 | 211291.3061 | 134.122449 |

| Date | Total Discharge (KL) | Average daily (kL) discarge between records |
|---|---|---|
| 8/08/2018 | 211425.4286 | 134.122449 |
| 9/08/2018 | 211559.551 | 134.122449 |
| 10/08/2018 | 211693.6735 | 134.122449 |
| 11/08/2018 | 211827.7959 | 134.122449 |
| 12/08/2018 | 211961.9184 | 134.122449 |
| 13/08/2018 | 212096.0408 | 134.122449 |
| 14/08/2018 | 212230.1633 | 134.122449 |
| 15/08/2018 | 212364.2857 | 134.122449 |
| 16/08/2018 | 212498.4082 | 134.122449 |
| 17/08/2018 | 212632.5306 | 134.122449 |
| 18/08/2018 | 212766.6531 | 134.122449 |
| 19/08/2018 | 212900.7755 | 134.122449 |
| 20/08/2018 | 213034.898 | 134.122449 |
| 21/08/2018 | 213169.0204 | 134.122449 |
| 22/08/2018 | 213303.1429 | 134.122449 |
| 23/08/2018 | 213437.2653 | 134.122449 |
| 24/08/2018 | 213571.3878 | 134.122449 |
| 25/08/2018 | 213705.5102 | 134.122449 |
| 26/08/2018 | 213839.6327 | 134.122449 |
| 27/08/2018 | 213973.7551 | 134.122449 |
| 28/08/2018 | 214107.8776 | 134.122449 |
| 29/08/2018 | 214242 | 126 |
| 30/08/2018 | 214368 | 118.0952391 |
| 31/08/2018 | 214486.0952 | 118.0952391 |
| 1/09/2018 | 214604.1905 | 118.0952391 |
| 2/09/2018 | 214722.2857 | 118.0952391 |
| 3/09/2018 | 214840.381 | 118.0952391 |
| 4/09/2018 | 214958.4762 | 118.0952391 |
| 5/09/2018 | 215076.5714 | 118.0952391 |
| 6/09/2018 | 215194.6667 | 118.0952391 |
| 7/09/2018 | 215312.7619 | 118.0952391 |
| 8/09/2018 | 215430.8572 | 118.0952391 |
| 9/09/2018 | 215548.9524 | 118.0952391 |
| 10/09/2018 | 215667.0476 | 118.0952391 |
| 11/09/2018 | 215785.1429 | 118.0952391 |
| 12/09/2018 | 215903.2381 | 118.0952391 |
| 13/09/2018 | 216021.3333 | 118.0952391 |
| 14/09/2018 | 216139.4286 | 118.0952391 |
| 15/09/2018 | 216257.5238 | 118.0952391 |
| 16/09/2018 | 216375.6191 | 118.0952391 |
| 17/09/2018 | 216493.7143 | 118.0952391 |
| 18/09/2018 | 216611.8095 | 118.0952391 |
| 19/09/2018 | 216729.9048 | 118.0952391 |
| 20/09/2018 | 216848 | 54 |
| 21/09/2018 | 216902 | 80.58928571 |
| 22/09/2018 | 216982.5893 | 80.58928571 |
| 23/09/2018 | 217063.1786 | 80.58928571 |

| Date | Total Discharge (KL) | Average daily (kL) discarge between records |
|---|---|---|
| 24/09/2018 | 217143.7679 | 80.58928571 |
| 25/09/2018 | 217224.3571 | 80.58928571 |
| 26/09/2018 | 217304.9464 | 80.58928571 |
| 27/09/2018 | 217385.5357 | 80.58928571 |
| 28/09/2018 | 217466.125 | 80.58928571 |
| 29/09/2018 | 217546.7143 | 80.58928571 |
| 30/09/2018 | 217627.3036 | 80.58928571 |
| 1/10/2018 | 217707.8929 | 80.58928571 |
| 2/10/2018 | 217788.4821 | 80.58928571 |
| 3/10/2018 | 217869.0714 | 80.58928571 |
| 4/10/2018 | 217949.6607 | 80.58928571 |
| 5/10/2018 | 218030.25 | 80.58928571 |
| 6/10/2018 | 218110.8393 | 80.58928571 |
| 7/10/2018 | 218191.4286 | 80.58928571 |
| 8/10/2018 | 218272.0179 | 80.58928571 |
| 9/10/2018 | 218352.6071 | 80.58928571 |
| 10/10/2018 | 218433.1964 | 80.58928571 |
| 11/10/2018 | 218513.7857 | 80.58928571 |
| 12/10/2018 | 218594.375 | 80.58928571 |
| 13/10/2018 | 218674.9643 | 80.58928571 |
| 14/10/2018 | 218755.5536 | 80.58928571 |
| 15/10/2018 | 218836.1429 | 80.58928571 |
| 16/10/2018 | 218916.7321 | 80.58928571 |
| 17/10/2018 | 218997.3214 | 80.58928571 |
| 18/10/2018 | 219077.9107 | 80.58928571 |
| 19/10/2018 | 219158.5 | 80.58928571 |
| 20/10/2018 | 219239.0893 | 80.58928571 |
| 21/10/2018 | 219319.6786 | 80.58928571 |
| 22/10/2018 | 219400.2679 | 80.58928571 |
| 23/10/2018 | 219480.8571 | 80.58928571 |
| 24/10/2018 | 219561.4464 | 80.58928571 |
| 25/10/2018 | 219642.0357 | 80.58928571 |
| 26/10/2018 | 219722.625 | 80.58928571 |
| 27/10/2018 | 219803.2143 | 80.58928571 |
| 28/10/2018 | 219883.8036 | 80.58928571 |
| 29/10/2018 | 219964.3929 | 80.58928571 |
| 30/10/2018 | 220044.9821 | 80.58928571 |
| 31/10/2018 | 220125.5714 | 80.58928571 |
| 1/11/2018 | 220206.1607 | 80.58928571 |
| 2/11/2018 | 220286.75 | 80.58928571 |
| 3/11/2018 | 220367.3393 | 80.58928571 |
| 4/11/2018 | 220447.9286 | 80.58928571 |
| 5/11/2018 | 220528.5179 | 80.58928571 |
| 6/11/2018 | 220609.1071 | 80.58928571 |
| 7/11/2018 | 220689.6964 | 80.58928571 |
| 8/11/2018 | 220770.2857 | 80.58928571 |
| 9/11/2018 | 220850.875 | 80.58928571 |

| Date | Total Discharge (KL) | Average daily (kL) discarge between records |
|---|---|---|
| 10/11/2018 | 220931.4643 | 80.58928571 |
| 11/11/2018 | 221012.0536 | 80.58928571 |
| 12/11/2018 | 221092.6429 | 80.58928571 |
| 13/11/2018 | 221173.2321 | 80.58928571 |
| 14/11/2018 | 221253.8214 | 80.58928571 |
| 15/11/2018 | 221334.4107 | 80.58928571 |
| 16/11/2018 | 221415 | 46.58278146 |
| 17/11/2018 | 221461.5828 | 46.58278146 |
| 18/11/2018 | 221508.1656 | 46.58278146 |
| 19/11/2018 | 221554.7483 | 46.58278146 |
| 20/11/2018 | 221601.3311 | 46.58278146 |
| 21/11/2018 | 221647.9139 | 46.58278146 |
| 22/11/2018 | 221694.4967 | 46.58278146 |
| 23/11/2018 | 221741.0795 | 46.58278146 |
| 24/11/2018 | 221787.6623 | 46.58278146 |
| 25/11/2018 | 221834.245 | 46.58278146 |
| 26/11/2018 | 221880.8278 | 46.58278146 |
| 27/11/2018 | 221927.4106 | 46.58278146 |
| 28/11/2018 | 221973.9934 | 46.58278146 |
| 29/11/2018 | 222020.5762 | 46.58278146 |
| 30/11/2018 | 222067.1589 | 46.58278146 |
| 1/12/2018 | 222113.7417 | 46.58278146 |
| 2/12/2018 | 222160.3245 | 46.58278146 |
| 3/12/2018 | 222206.9073 | 46.58278146 |
| 4/12/2018 | 222253.4901 | 46.58278146 |
| 5/12/2018 | 222300.0728 | 46.58278146 |
| 6/12/2018 | 222346.6556 | 46.58278146 |
| 7/12/2018 | 222393.2384 | 46.58278146 |
| 8/12/2018 | 222439.8212 | 46.58278146 |
| 9/12/2018 | 222486.404 | 46.58278146 |
| 10/12/2018 | 222532.9868 | 46.58278146 |
| 11/12/2018 | 222579.5695 | 46.58278146 |
| 12/12/2018 | 222626.1523 | 46.58278146 |
| 13/12/2018 | 222672.7351 | 46.58278146 |
| 14/12/2018 | 222719.3179 | 46.58278146 |
| 15/12/2018 | 222765.9007 | 46.58278146 |
| 16/12/2018 | 222812.4834 | 46.58278146 |
| 17/12/2018 | 222859.0662 | 46.58278146 |
| 18/12/2018 | 222905.649 | 46.58278146 |
| 19/12/2018 | 222952.2318 | 46.58278146 |
| 20/12/2018 | 222998.8146 | 46.58278146 |
| 21/12/2018 | 223045.3974 | 46.58278146 |
| 22/12/2018 | 223091.9801 | 46.58278146 |
| 23/12/2018 | 223138.5629 | 46.58278146 |
| 24/12/2018 | 223185.1457 | 46.58278146 |
| 25/12/2018 | 223231.7285 | 46.58278146 |
| 26/12/2018 | 223278.3113 | 46.58278146 |

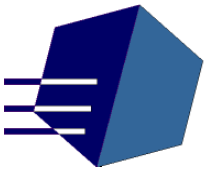
| Date | Total Discharge (KL) | Average daily (kL) discarge between records |
|---|---|---|
| 27/12/2018 | 223324.894 | 46.58278146 |
| 28/12/2018 | 223371.4768 | 46.58278146 |
| 29/12/2018 | 223418.0596 | 46.58278146 |
| 30/12/2018 | 223464.6424 | 46.58278146 |
| 31/12/2018 | 223511.2252 | 46.58278146 |
| 1/01/2019 | 223557.8079 | 46.58278146 |
| 2/01/2019 | 223604.3907 | 46.58278146 |
| 3/01/2019 | 223650.9735 | 46.58278146 |
| 4/01/2019 | 223697.5563 | 46.58278146 |
| 5/01/2019 | 223744.1391 | 46.58278146 |
| 6/01/2019 | 223790.7219 | 46.58278146 |
| 7/01/2019 | 223837.3046 | 46.58278146 |
| 8/01/2019 | 223883.8874 | 46.58278146 |
| 9/01/2019 | 223930.4702 | 46.58278146 |
| 10/01/2019 | 223977.053 | 46.58278146 |
| 11/01/2019 | 224023.6358 | 46.58278146 |
| 12/01/2019 | 224070.2185 | 46.58278146 |
| 13/01/2019 | 224116.8013 | 46.58278146 |
| 14/01/2019 | 224163.3841 | 46.58278146 |
| 15/01/2019 | 224209.9669 | 46.58278146 |
| 16/01/2019 | 224256.5497 | 46.58278146 |
| 17/01/2019 | 224303.1325 | 46.58278146 |
| 18/01/2019 | 224349.7152 | 46.58278146 |
| 19/01/2019 | 224396.298 | 46.58278146 |
| 20/01/2019 | 224442.8808 | 46.58278146 |
| 21/01/2019 | 224489.4636 | 46.58278146 |
| 22/01/2019 | 224536.0464 | 46.58278146 |
| 23/01/2019 | 224582.6291 | 46.58278146 |
| 24/01/2019 | 224629.2119 | 46.58278146 |
| 25/01/2019 | 224675.7947 | 46.58278146 |
| 26/01/2019 | 224722.3775 | 46.58278146 |
| 27/01/2019 | 224768.9603 | 46.58278146 |
| 28/01/2019 | 224815.543 | 46.58278146 |
| 29/01/2019 | 224862.1258 | 46.58278146 |
| 30/01/2019 | 224908.7086 | 46.58278146 |
| 31/01/2019 | 224955.2914 | 46.58278146 |
| 1/02/2019 | 225001.8742 | 46.58278146 |
| 2/02/2019 | 225048.457 | 46.58278146 |
| 3/02/2019 | 225095.0397 | 46.58278146 |
| 4/02/2019 | 225141.6225 | 46.58278146 |
| 5/02/2019 | 225188.2053 | 46.58278146 |
| 6/02/2019 | 225234.7881 | 46.58278146 |
| 7/02/2019 | 225281.3709 | 46.58278146 |
| 8/02/2019 | 225327.9536 | 46.58278146 |
| 9/02/2019 | 225374.5364 | 46.58278146 |
| 10/02/2019 | 225421.1192 | 46.58278146 |
| 11/02/2019 | 225467.702 | 46.58278146 |

| Date | Total Discharge (KL) | Average daily (kL) discarge between records |
|---|---|---|
| 12/02/2019 | 225514.2848 | 46.58278146 |
| 13/02/2019 | 225560.8675 | 46.58278146 |
| 14/02/2019 | 225607.4503 | 46.58278146 |
| 15/02/2019 | 225654.0331 | 46.58278146 |
| 16/02/2019 | 225700.6159 | 46.58278146 |
| 17/02/2019 | 225747.1987 | 46.58278146 |
| 18/02/2019 | 225793.7815 | 46.58278146 |
| 19/02/2019 | 225840.3642 | 46.58278146 |
| 20/02/2019 | 225886.947 | 46.58278146 |
| 21/02/2019 | 225933.5298 | 46.58278146 |
| 22/02/2019 | 225980.1126 | 46.58278146 |
| 23/02/2019 | 226026.6954 | 46.58278146 |
| 24/02/2019 | 226073.2781 | 46.58278146 |
| 25/02/2019 | 226119.8609 | 46.58278146 |
| 26/02/2019 | 226166.4437 | 46.58278146 |
| 27/02/2019 | 226213.0265 | 46.58278146 |
| 28/02/2019 | 226259.6093 | 46.58278146 |
| 1/03/2019 | 226306.1921 | 46.58278146 |
| 2/03/2019 | 226352.7748 | 46.58278146 |
| 3/03/2019 | 226399.3576 | 46.58278146 |
| 4/03/2019 | 226445.9404 | 46.58278146 |
| 5/03/2019 | 226492.5232 | 46.58278146 |
| 6/03/2019 | 226539.106 | 46.58278146 |
| 7/03/2019 | 226585.6887 | 46.58278146 |
| 8/03/2019 | 226632.2715 | 46.58278146 |
| 9/03/2019 | 226678.8543 | 46.58278146 |
| 10/03/2019 | 226725.4371 | 46.58278146 |
| 11/03/2019 | 226772.0199 | 46.58278146 |
| 12/03/2019 | 226818.6026 | 46.58278146 |
| 13/03/2019 | 226865.1854 | 46.58278146 |
| 14/03/2019 | 226911.7682 | 46.58278146 |
| 15/03/2019 | 226958.351 | 46.58278146 |
| 16/03/2019 | 227004.9338 | 46.58278146 |
| 17/03/2019 | 227051.5166 | 46.58278146 |
| 18/03/2019 | 227098.0993 | 46.58278146 |
| 19/03/2019 | 227144.6821 | 46.58278146 |
| 20/03/2019 | 227191.2649 | 46.58278146 |
| 21/03/2019 | 227237.8477 | 46.58278146 |
| 22/03/2019 | 227284.4305 | 46.58278146 |
| 23/03/2019 | 227331.0132 | 46.58278146 |
| 24/03/2019 | 227377.596 | 46.58278146 |
| 25/03/2019 | 227424.1788 | 46.58278146 |
| 26/03/2019 | 227470.7616 | 46.58278146 |
| 27/03/2019 | 227517.3444 | 46.58278146 |
| 28/03/2019 | 227563.9272 | 46.58278146 |
| 29/03/2019 | 227610.5099 | 46.58278146 |
| 30/03/2019 | 227657.0927 | 46.58278146 |

| Date | Total Discharge (KL) | Average daily (kL) discarge between records |
|---|---|---|
| 31/03/2019 | 227703.6755 | 46.58278146 |
| 1/04/2019 | 227750.2583 | 46.58278146 |
| 2/04/2019 | 227796.8411 | 46.58278146 |
| 3/04/2019 | 227843.4238 | 46.58278146 |
| 4/04/2019 | 227890.0066 | 46.58278146 |
| 5/04/2019 | 227936.5894 | 46.58278146 |
| 6/04/2019 | 227983.1722 | 46.58278146 |
| 7/04/2019 | 228029.755 | 46.58278146 |
| 8/04/2019 | 228076.3377 | 46.58278146 |
| 9/04/2019 | 228122.9205 | 46.58278146 |
| 10/04/2019 | 228169.5033 | 46.58278146 |
| 11/04/2019 | 228216.0861 | 46.58278146 |
| 12/04/2019 | 228262.6689 | 46.58278146 |
| 13/04/2019 | 228309.2517 | 46.58278146 |
| 14/04/2019 | 228355.8344 | 46.58278146 |
| 15/04/2019 | **228449** | 86.6 |
| 16/04/2019 | 228535.6 | 86.6 |
| 17/04/2019 | 228622.2 | 86.6 |
| 18/04/2019 | **228709** | 135.8 |
| 19/04/2019 | 228844.8 | 135.8 |
| 20/04/2019 | 228980.6 | 135.8 |
| 21/04/2019 | 229116.4 | 135.8 |
| 22/04/2019 | 229252.2 | 135.8 |
| 23/04/2019 | **229388** | 135.8 |
| 24/04/2019 | **229519** | 131 |
| 25/04/2019 | 229679.5 | 160.5 |
| 26/04/2019 | **229840** | 160.5 |
| 27/04/2019 | 229928.3333 | 88.33333 |
| 28/04/2019 | 230016.6667 | 88.33333 |
| 29/04/2019 | **230105** | 88.33333 |
| 30/04/2019 | **230201** | 96 |
| **Total (KL)** | **32027** | |

Data provided by Bingo Industries Pty Ltd.
**BOLD** - Confirmed volumes [remainder volumes have been averaged]

## B.2 Leachate generation model (Consulting Earth Scientists)



# CONSULTING EARTH SCIENTISTS

**MOD 6 – LEACHATE GENERATION MODEL**

GENESIS LANDFILL AND RECYCLING FACILITY

PREPARED FOR DIAL-A-DUMP INDUSTRIES PTY LTD

CES DOCUMENT REFERENCE: CES170514-EMM-AC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CONSULTING
EARTH
SCIENTISTS

# MOD 6 – LEACHATE GENERATION MODEL

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# MOD 6 – LEACHATE GENERATION MODEL

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## TABLE OF CONTENTS

# 1 INTRODUCTION

Consulting Earth Scientists Pty Ltd (CES) was commissioned by Dial-A-Dump Industries Pty Ltd (DADI) (the client) to provide an updated leachate generation model for the Genesis Landfill and Recycling Facility (the Site), to support the Major Project Approval No. 06_139 Modification 6 (Mod 6) application to modify the landfill cap and to change the operating hours for all activities within the facility. The change in operating hours will change the leachate generation profile over the filling period of the site, due to increased filling rates and increased volumes of irrigation water being used for dust suppression.

# 2 OBJECTIVES

The objective of the leachate model is to estimate the amount leachate generated at the site under the proposed Mod 6 operating conditions. To assess the amount of leachate generated at the site, CES has completed the following work:

- Reviewed available information pertaining to leachate management provided by DADI;
- Reviewed the existing site water balance assessment produced by CES (CES Document Reference: CES161004-ECS-AD);
- Conducted a back analysis of leachate generation using the information from the above water balance assessment;
- Development of a landfill filling and leachate generation model for the site under the proposed operating conditions, being the removal of the 700,000 tonne per annum landfilling limit, using the outputs from the Mod 6 water balance assessment (CES Document Reference CES170514-EMM-AB); and,
- Preparation of this report assessing leachate generation under the proposed Mod 6 operating conditions.

# 3 BACKGROUND INFORMATION

## *3.1 SITE LOCATION AND DESCRIPTION*

The Genesis Landfill and Recycling Facility is located at Eastern Creek, NSW and is surrounded by a mix of commercial, open space, infrastructure (M4 motorway) and industrial developments.

The facility currently operates under two different Environmental Protection Licenses (EPL) issued by the NSW EPA, licence numbers 13426 and 20121.

## *3.2 LANDFILL HISTORY*

The predominant feature at the site is a breccia quarry, formerly known as the Pioneer Quarry, where it is understood that extractive operations started in the 1950s. The quarry reached the end of its economic life and all quarrying activities at the site ceased in September 2006, although the open cut quarry void remains.

## *3.3 LANDFILL GEOMETRY*

The landfill geometry information was reported in the *Leachate Collection System, Concept Design* (ERM, August 2008) as:

The open cut elliptical void is approximately 430 metres (m) x 700 m and up to 150 m in depth. The surface area is approximately 288,000 $m^2$ at ground surface and 12,000 $m^2$ at the base.

The landfill geometry used in this report is based upon that estimated from the site water balance assessment (CES161004-ECS-AD). Pertinent dimensions to this leachate generation model are:

**Table 1: Estimated Landfill Areas**

| **Dimension** | **Estimated area ($m^2$)** |
|---|---|
| Total Landfill Catchment Area | 472,000 |
| Operating area of landfill (as at September 2016) | 73,000 |
| Area of 8 ML stormwater pond | 5,525 |

### 3.3.1 Walls of Void

Benches of approximately 7 to 8 m in width exist along the sides of the void. The upper part of the quarry is excavated through unconsolidated sediments including clays and weathered shales and therefore has lower angled slopes. A spiral access road around 20 m in width around the edge of the void descends to the quarry base. Stormwater drains control run-off on the access road.

### 3.3.2 Base of void

A rectangular level area (-57m above Australian Height Datum (AHD) forms the base of the former void. A raised area (approximately 8m higher) is present to the east of the rectangular base. The base is fairly flat and drains to a sump from which groundwater ingress and run off is currently pumped. These areas have been entirely covered with landfill material.

The current base of the void is at approximately -10 m AHD and is approximately 10m lower than the 8 ML stormwater dam located in the western portion. The active filling area is in the eastern portion of the pit.

## *3.4 GEOLOGY AND HYDROGEOLOGY*

A full review of the geology and hydrogeology of the site is set out in *Groundwater Assessment* (ERM, July 2008). The key features that relate to the collection of leachate are:

- the surficial geology comprises clay and weathered shales to a depth of approximately 32 m below ground level (bgl). Intact (Bringelly) shales predominate below the weathered shales down to depths approximating 146 m bgl. The Hawkesbury Sandstone is likely to be located approximately 20 m below the base of the quarry;
- there is an intermittent shallow perched groundwater system located around the quarry within the fill, clay and weathered shale. Permeabilities of these deposits range from $1.46E^{-3}$ m/day to 0.25 m/day. Based on the very isolated seepage observed from the clay and weathered shales exposed on the pit walls, this system is not in significant hydraulic contact with the quarry. This suggests that, provided leachate levels within the pit are kept below the base of the shallow aquifer system, leachate migration into this system is unlikely to occur. The water quality of this aquifer is considered to be poor and of limited human and environmental value; and
- there is a deeper regional groundwater system located within the shale deposits. The permeability of this shale has been calculated to be very low (1.75E-6 m/day to 8.7E-6 m/day). The elevation of this water table is likely to be in excess of 24 m AHD, which approximates 82 m above the original pit base. This indicates a strong inward hydraulic

gradient and suggests that the bulk formation hydraulic properties (including fracturing) of the surrounding geology are low. Given the low permeabilities of the geology surrounding the pit there is unlikely to be significant hydraulic contact between the quarry pit and the underlying Hawkesbury Sandstone. Overall, seepage from regional groundwater system into the quarry pit was estimated to approximate 2 $m^3$/day. The water quality of this aquifer is considered to be poor and of limited human and environmental value.

## *3.5 PROJECT APPROVAL*

The current Project Approval (06_0139) provides for:

- A waste recovery facility including a MPC and greenwaste area. It is noted that the facility is not currently operating a greenwaste activities;
- Rehabilitation of the quarry void via a Class 2 (non-putrescible) landfill;
- Total throughput of up to 2 million tonnes of materials at the site per calendar year;
- Landfilling of up to 700,000 tonnes of non-putrescible waste (including asbestos);
- Stockpiling of up to 50 tonnes of tyres on site at any one time; and
- Stockpiling of up to 20,000 tonnes of greenwaste on site at any one time.

Although not all of the approved modifications are strictly relevant to the leachate modelling, the following modifications to the above original consent have been approved and included in this report for completeness:

### 3.5.1 Modification 1

Modification 1 (MOD 1 granted by the Minister on 30 September 2010) approved the following components:

- Electrically powered conveyor and chute;
- Postponed commencement of construction;
- Two way traffic on Fourth Avenue;
- Concrete bay walls within the greenwaste processing area; and
- Relocation of the wheelwash.

### 3.5.2 Modification 2

Modification 2 (MOD 2 granted by the Minister on 9 November 2010) comprised a correction to the land description details of the project Approval. The corrected reference to the land being Lots 1, 2, 3 and 4 in DP 1145808.

### 3.5.3 Modification 3

Modification 3 (MOD 3 granted by the Minister on 5 December 2011) approved the following components:

- Revised final landform level of the fill pad at Area D;
- Operational landform levels and site stormwater design;
- Internal office and external amenities to the Weighbridge;
- New amenities building;
- New amenities building associated with the spotter stations;
- New administrative/office building;
- New amenities at the tarp stand area;
- Approval for the use and relocation of the vehicle turning bay which works have already been carried out; and
- Voluntary planning agreement.

### 3.5.4 Modification 4

Modification 4 (MOD 4 granted by the Minister on 14 December 2013) approved the following components:

- Extended operating hours for the MPC allowing it to be operated during the hours of 6am to 10pm Monday to Friday, and 6am to 4pm Weekends and Public Holidays; and
- Modifications to the noise levels in Table 4, which provided that the Proponent would not exceed 36 LAeq (15 minute) dB(A) during the day and 35 LAeq (15 minute) dB(A) during the evening and Morning Shoulder.

### 3.5.5 Modification 5

Modification 5 (MOD 5 granted by the Minister on 17 March 2016) approved the following components:

- Allow construction of a Pre-Sort Enclosure in accordance with the plans submitted with the modification application.

## *3.6 MODIFICATION 6*

### 3.6.1 Current Operations Conditions

The Proponent currently operates as follows:

**Table 2 – Current Genesis Landfill and Recycling Facility Operation Hours (Table 5, Condition 39, Schedule 3, Project Approval (06_0139) as amended by MOD 4.**

| Activity | Day | Time |
|---|---|---|
| Construction | Monday – Friday | 07:00am to 18:00pm |
| | Saturday | 08:00am to 16:00pm |
| | Sunday and Public Holidays | Not Approved |
| Operation | Monday – Friday | 07:00am to 18:00pm |
| | Weekend and Public Holidays | 08:00am to 16:00pm |
| MPC | Monday – Friday | 06:00am to 22:00pm |
| | Weekend and Public Holiday | 06:00am to 16:00pm |

Clause 39a of the Project Approval states:

- *Operating hours of the conveyor and chute system are to be restricted to the facility's operational hours (and not times governing the Operation of the MPC as above) and as defined in condition 39 of Schedule 3.*

The maximum mass of material applied to land if 700,000tpa, with a maximum limit of material received at the facility of 2Mtpa.

### 3.6.2 Proposed Modification to Operating Conditions

The proponent proposes to amend the Existing Table 5 of Condition 39 (as set out above and amended by Modification 4).

**Table 3 – Proposed Changes to Table 5, Condition 39**

| Activity | Sub-activity | Days | Hours |
|---|---|---|---|
| Construction | | Monday-Friday | 6am-6pm |
| | | Saturday | 8am-4pm |
| | | Sunday and public holidays | nil |
| MPC and PSE | Receive Materials | Monday to Sunday | 24 Hours |
| | Operations | Monday to Sunday | 24 Hours |
| SMA | Receive Materials | Monday to Sunday | 24 Hours |
| | Crushing and Screening | Monday to Sunday | 6:00am to 6:00pm |
| Landfill | Receive Materials by truck | Monday to Sunday | 5am-9pm |

| | | | |
|---|---|---|---|
| | Convey waste from MPC to landfill via chute | Monday to Sunday | 24 Hours |
| Maintenance | | | |
| MPC, PSE and landfill | Repair machinery | Monday to Sunday | 24 Hours |
| SMA | Cleaning and machinery repairs | Monday to Sunday | 24 Hours |
| Chute | Clearing of blockages and general repairs | Monday to Sunday | 24 Hours |

The landfilling limit of 700,000tpa is removed. The 2Mtpa limit on material received at the facility is unchanged by this modification.

### 3.7 *INFILLING PROCEDURE AND LANDFILL LEACHATE GENERATION*

It is understood that the currently achieved infilling rate of the landfill is approximately 500,000tpa (estimated to be 295,000 $m^3$/year).

In 2008 ERM developed a leachate model for the site. The key data relevant to this document are summarized as follows:

- The design of the infilling system will allow separation of surface water run-off from the sides of the landfill from the rain falling directly onto the landfill waste and infiltrating to become leachate. This will significantly reduce the volume of leachate generated;
  However, it should be noted that the separated rainwater that is pumped/discharged to the pit stormwater dam and the surface dams (including the tanks underneath the Materials Processing Centre (MPC) is used for irrigation/dust suppression of the waste area. As a result, this water may generate leachate.
- ERM conservatively estimated the volumes of surface water and leachate generated within the landfill. Based on this, leachate generated is anticipated to range between 45 and 872 $m^3$/day, with an average of 241 $m^3$/day;
- As a result, ERM estimated that in order to maintain groundwater elevations at acceptable levels within the landfill, pumping rates from the landfill will be required to range between 250 $m^3$/day and 500 $m^3$/day;
- ERM stated that provided that pumping rates do not fall below 241 $m^3$/day, the landfill will be able to be used as a storage facility during times of high rainfall. This pumping rate

allowed a constant flow rate to be achieved from the leachate collection system and would negate the need for surface storage capacity for leachate pumped from the landfill;

- At the completion of the landfill and subsequent capping, leachate generation is likely to fall below 90 $m^3$/day. Due to the potentially poor ability of the regional groundwater system to absorb this volume of leachate there is potential for leachate elevations to eventually rise above the regional groundwater elevation and begin recharging the shallow perched groundwater system. Post landfill monitoring will help to quantify this process, however, there is potential for ongoing pumping to be required to prevent impact to receptors in potential hydraulic contact with the landfill.

### *3.8 BASECASE WATER BALANCE*

In 2016 CES prepared a water balance (CES document reference CES161004-ECS-AD) for the site to assess the measured leachate extraction rates with the expected water inflows and outflows. For the purpose of this leachate generation model, the water balance has been modified such that the data reflects actual operating conditions at the site. The following assumptions were used in preparation of the water balance:

- Total leachate generating landfill footprint area = 288,000 $m^2$;
- Initial base of operating landfill footprint area = 73,000 $m^2$ (as at September 2016);
- Total footprint area of 8 ML stormwater pond = 5,525 $m^2$;
- Assume 10% of rainfall on the sidewalls interacts with landfill waste; 90% is collected by stormwater systems, adsorbed, or evaporated.
- Irrigation volumes of; 10,260 $m^3$/year water cart irrigation, 113,763$m^3$/year water cannon irrigation volume, 31,026 $m^3$/year sprinkler volume, for a total leachate volume from irrigation of 21,707 $m^3$/year, assuming 14% of irrigation waters interacts with waste in the landfill pit. The 14% assumption has been based upon a reconciliation of leachate production against the 2016 water balance (CES document reference CES161004-ECS-AD).
- The estimated flow rate of groundwater into the landfill is reported by ERM as 2 $m^3$/day (730 $m^3$/yr).
- Evaporation of 1.3091 m/year (Bureau of Metrology).
- 90$^{th}$ percentile rainfall of 1.1782m/year (Bureau of Metrology).

Based on the information above, the Water Balance Summary has been estimated and is reproduced in Table 4.

**Table 4:** Leachate Volume Summary

| Source | | Volume ($m^3$/yr) |
|---|---|---|
| $V_1$ | Net Rainfall on waste in landfill pit | +126,509 |
| $V_2$ | Net Irrigation on waste in landfill pit | +21,707 |
| $V_3$ | Seepage from groundwater | +730 |
| | Total Estimated Water Inputs | +161,927 |
| $V_4$ | Evaporation from Landfill pit with current waste deposit at -10 mAHD | -88,332 |
| | **Net Water Balance ($m^3$/yr)** | **+60,614** |
| $V_5$ | Leachate pumped out from landfill pit | -61,485 |

This water balance conducted between 30/09/2015 and 1/10/2016 has been included in this report as the basis of the back analysis exercise. Note that this water balance differs from the Mod 6 water balance assessment (CES document reference CES170514-EMM-AB), which provides an assessment of the water balance under the Mod 6 conditions, and has been utilised in the leachate model below.

# 4 LEACHATE MODELLING

## *4.1 BACK ANALYSIS*

A back-analysis of leachate generation has been conducted utilising the water balance information presented in Table 4. The back-analysis which has been conducted reconciles the theoretical modelled leachate generation with observed leachate generation from the site. This model validation improves the confidence in the results from the Mod 6 projection leachate model. The leachate generation model was run over a period of 100 years, and the median volume of leachate generated was calculated for the initial landfill geometry (that is to say, the geometry which was used in the formation of the water balance presented above), calculated. The subsurface inflow parameter for the vertical percolation layer (waste) was varied such that the average annual volume of leachate collected was approximately equal to $V_5$, measured leachate pumped out from the landfill pit. This was calculated to be 0.10cm/day/$m^2$. This inflow accounts for $V_2$ net irrigation on waste in landfill pit. Details of the hydrogeological model are discussed in in Section 3.7.1.

**Table 5: Leachate Generation Back Analysis**

| Model | Leachate collection volume ($m^2$) |
|---|---|
| Recorded Leachate Extraction (01/10/15 to 30/09/2016) | 61,485 |

| | |
|---|---|
| Back Analysis (irrigation of 0.10cm/day/$m^2$) | 62,408[(1)] |

[(1)]Median over 100 year period using synthetic weather model.

Groundwater seepage into the pit of an estimated volume of 2$m^3$/day was added separately to the calculated leachate generation (ERM, 2008).

Based on the results of the Mod 6 water balance, the expected irrigation water use on the landfill pit is 26,753$m^3$/year. This represents a 23% increase of the base case, and therefore an irrigation rate of 0.123cm/day/$m^2$ has been adopted for use in the leachate generation model for Mod 6.

### 4.1.1 Hydrogeological Model

The Hydrological Evaluation of Landfill Performance (HELP) model developed by the United States Environment Protection Agency (USEPA) Risk Reduction Engineering Laboratory was used to provide estimates of leachate generation rates for the completed landfill profile at the site.

The HELP model is a quasi-two-dimensional, unsaturated zone hydrological model. The model was developed by the USEPA to assist in predicting landfill hydrologic processes and testing the effectiveness of landfill designs. The model provides information on the percolation of water through the landfill profile, changes in the volume of water stored in each landfill component and the predicted quantity of water moving out of a landfill.

The landfill profile modelled in the hydrological simulations using HELP comprises the following components:

- Vertical percolation layers (Waste);
- Lateral Drainage layers (Gravel);
- Barrier soil (Clay).

Vertical water movement is modelled through the landfill cap, waste, and barrier layers. The following layer properties have been considered in the HELP model:

- Porosity.
- Field capacity.
- Wilting point (relevant for layers used as a growing medium).
- Saturated hydraulic conductivity.
- Subsurface inflow (irrigation and groundwater inflow may be crudely incorporated using this property).
- Initial moisture content.

Landfill water-balance modelling using the HELP model has been carried out in the following sequence:

1. Construct a conceptual model of the landfill in the form of a HELP profile.
2. Select climatic locations for weather data.
3. Nominate a time frame for modelling.
4. Evaluate the results of each model run.
5. Modify the profile as required and re-run the model.

It is important to note that the HELP model provides only broad-scale estimates of leachate generation, which can vary considerably from field conditions. As such, results should be regarded as coarse estimates only.

The landfill modelled using HELP is presented in Table 6.

**Table 6: Water Balance Modelled Landfill Profile**

| Layer Number | Layer Type | Thickness (m) | Porosity | Field Capacity | Saturated Hydraulic Conductivity[1] | Sub-surface Inflow (mm/d) | Leachate Re-circulated (%) Collected |
|---|---|---|---|---|---|---|---|
| 1 | General Solid Waste | 100(3) | 0.671 | 0.292 | $1.0x10^{-3}$ | 0.10(2) | 0 |
| 2 | Aggregate Drainage Layer (gravel) | 0.3 | 0.397 | 0.032 | 0.3 | 0 | 0 |
| 3 | Barrier Soil (Compacted Clay) | 1.0 | 0.427 | 0.418 | $8.64x10^{-4}$ | 0 | 0 |

(1) Saturated hydraulic conductivity expressed in units of cm $s^{-1}$, consistent with HELP model input. For example, permeability of $10^{-8}$ m $s^{-1}$ is equivalent to $10^{-6}$ cm $s^{-1}$.
(2) Determined through iteration to approximate leachate collection data.
(3) This value was varied between 15 and 100m, with a difference in leachate generation of approximately 1.1% calculated. This difference is considered insignificant and as such the effect of variable waste thickness has not been included in the model.

A synthetic weather generator has been incorporated into the HELP model. Data for Sydney Airport meteorological station has been used in the modelling exercise. The HELP model was run on a yearly timescale for 100 years.

### *4.2 CONCLUSION AND MODIFICATION 6 PROJECTION*

The following assumptions and changes have been made for the leachate generation model under the Modification 6 operating conditions:

- Irrigation volumes are increased by 23% as a result of additional dust suppression requirements, and
- Landfilling rate is increased as a result of additional allowable time for waste delivery and removal of the landfilling limit of 700,000tpa.

A landfilling model has been prepared to assist with calculation of the leachate volumes. The average annual leachate collection of the HELP model has been applied to the area of the landfill base, with the addition of leachate being generated from the pit walls at a rate of 10% of the annual precipitation. The landfilling model assumes the pit to be filled at an even rate, with the pit being approximated to be a truncated cone. Two scenarios under the Modification 6 operating conditions have been considered in this assessment; the maximum case where the 2Mpta received is all landfilled, and a 50% increase over the currently realised filling rate.

The parameters varied in the models are presented in Table 7.

**Table 7: Leachate model scenarios**

| | **Landfilling rate ($m^3$/year)** | **Landfilling rate (tpa)** | **Irrigation rate (cm/day/$m^2$)** |
|---|---|---|---|
| Base case | 295,000 | 472,000 | 0.100 |
| Modification 6 – 50% increase over existing filling rate | 442,500 | 708,000 | 0.123 |
| Modification 6 – 2Mtpa | 1,250,000 | 2,000,000 | 0.123 |

The estimated leachate generation, compared to the base case estimation is presented in Figure 1 below.

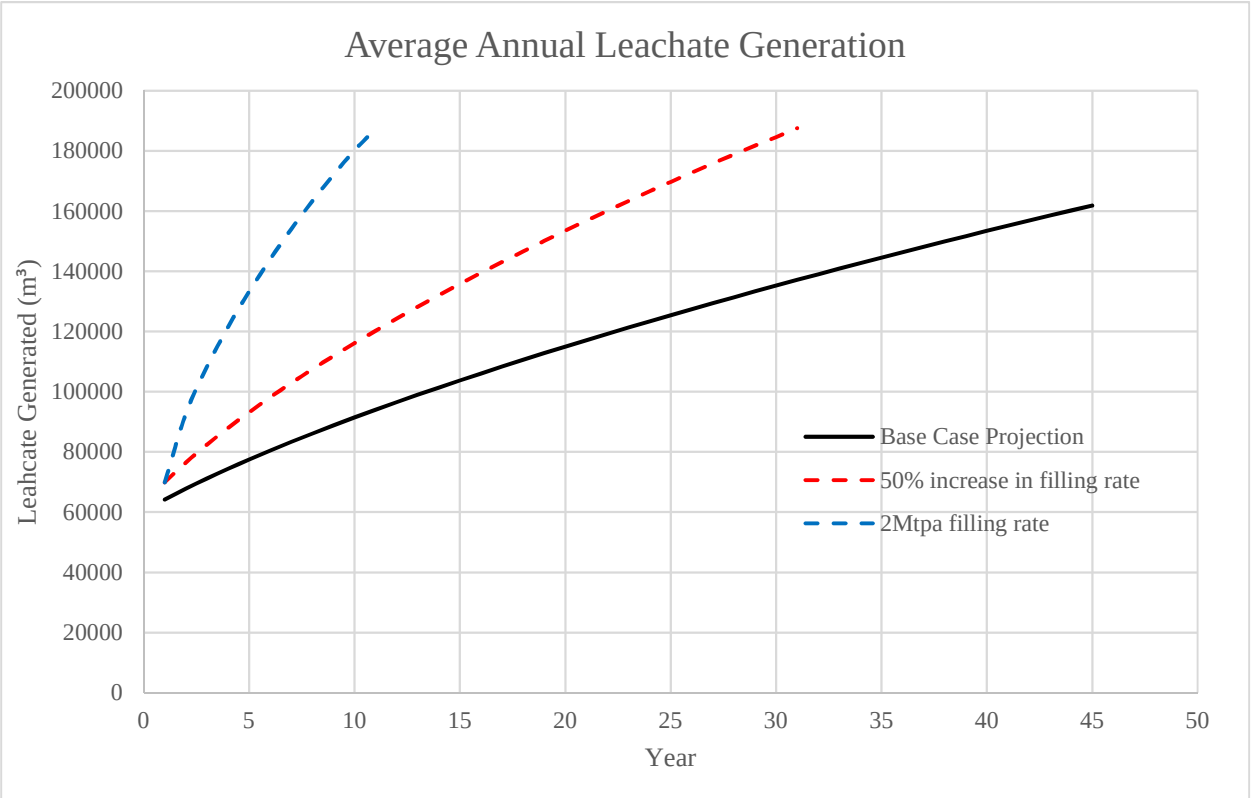


**Figure 1: Estimated Leachate Generation**

Figure 1 shows that initially Modification 6 results in approximately 9% additional leachate being generated over the base case, increasing to 15% at the time of landfill completion. Under the Mod 6 case, the average expected initial leachate extraction rate is 192m$^3$/day, increasing to 505m$^3$/day at the completion of landfilling.

It should be noted that leachate generation under this model is primarily a function of the height of waste in the landfill pit, and therefore the area where rainfall will interact with waste.

CES understands that Genesis has capacity for leachate treatment of approximately 219,000m$^3$/year via five Sequence batch reactors (SBRs), based on 7 to 9 hours treatment time. The leachate generation model using the Mod 6 conditions indicates the maximum annual leachate volume generated will be approximately 185,000m$^3$/year, which is less than the current leachate treatment activity. It is further understood that the Tradewaste Water Consent for treated leachate disposal has a maximum discharge of 650kL/day (237,250m$^3$m/year), which is greater than the expected maximum leachate generation volume.

During periods of prolonged or heavy rainfall, it could be expected that leachate generation rates exceed those reported here for a short time. CES understands that the leachate conveyance system has capacity to store excess leachate within the pit prior to treatment and discharge.

This model does not consider the effect of capping of the landfill once filling is complete, and the leachate generation estimate of the capped landfill previously reported in ERM (2008) is not affected by Mod 6.

CES understands that the leachate collection system has a designed capacity of 890m$^3$/day (324,850m$^3$/year) which is greater than the maximum expected leachate volume under the Mod 6 conditions.

# 5 REFERENCES

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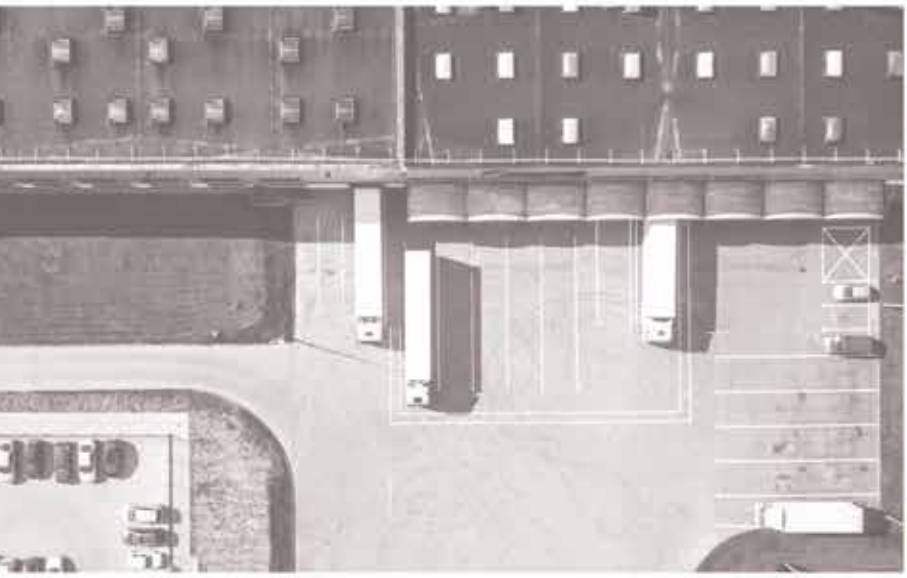
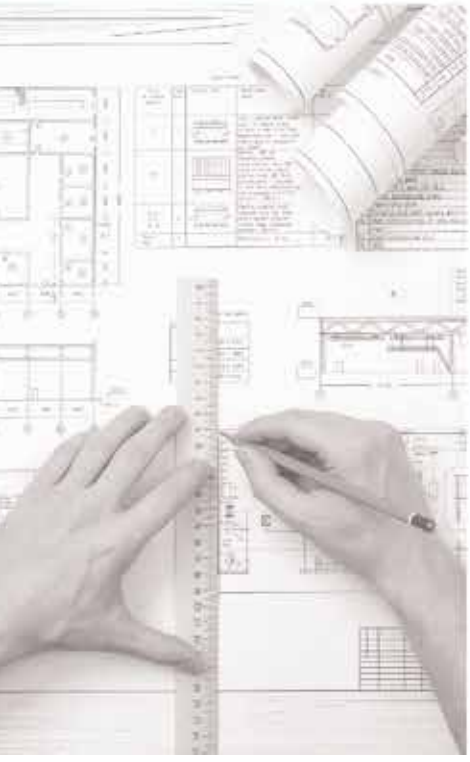
DADI Group Pty Ltd, Environmental Management Strategy; Soil, Waste and Leachate Management Plan, Revised March 2017

DADI Group Pty Ltd, Environmental Management Strategy; Leachate Collection Conveyance and Management System, Revised 16 March 201

# Appendix C

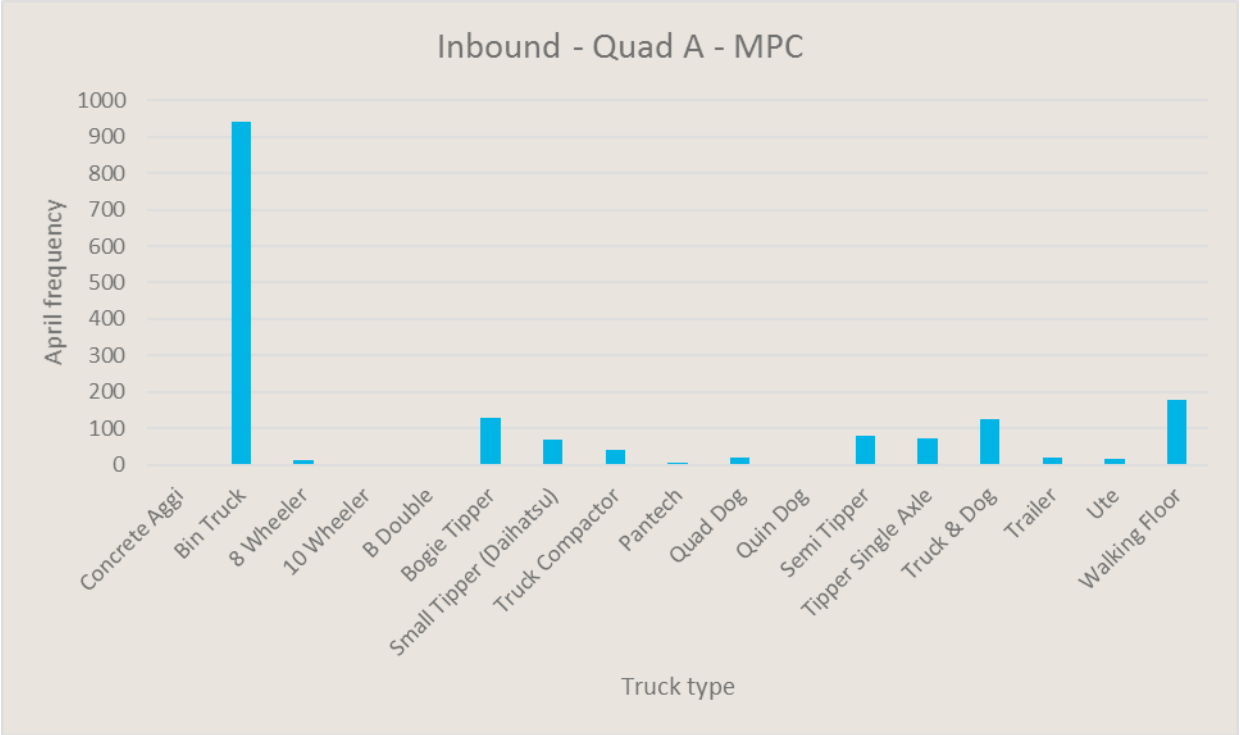
## Traffic

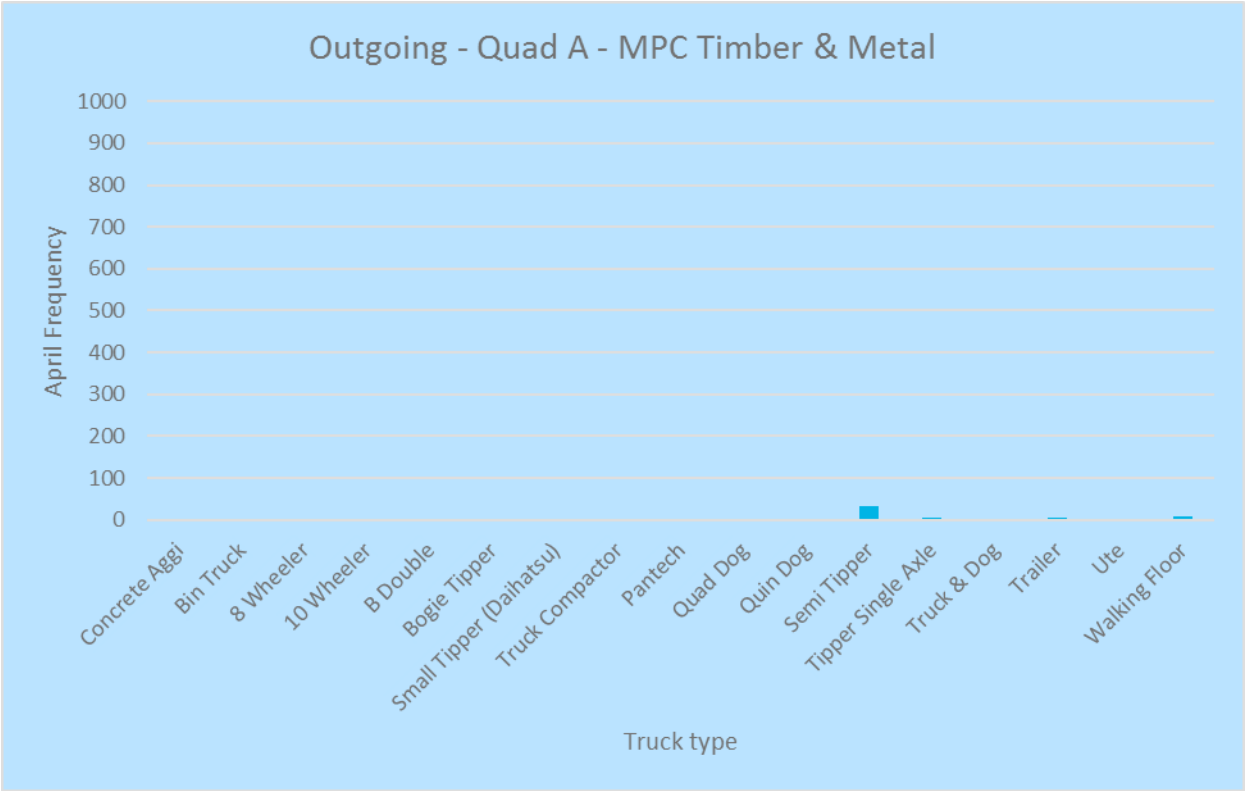




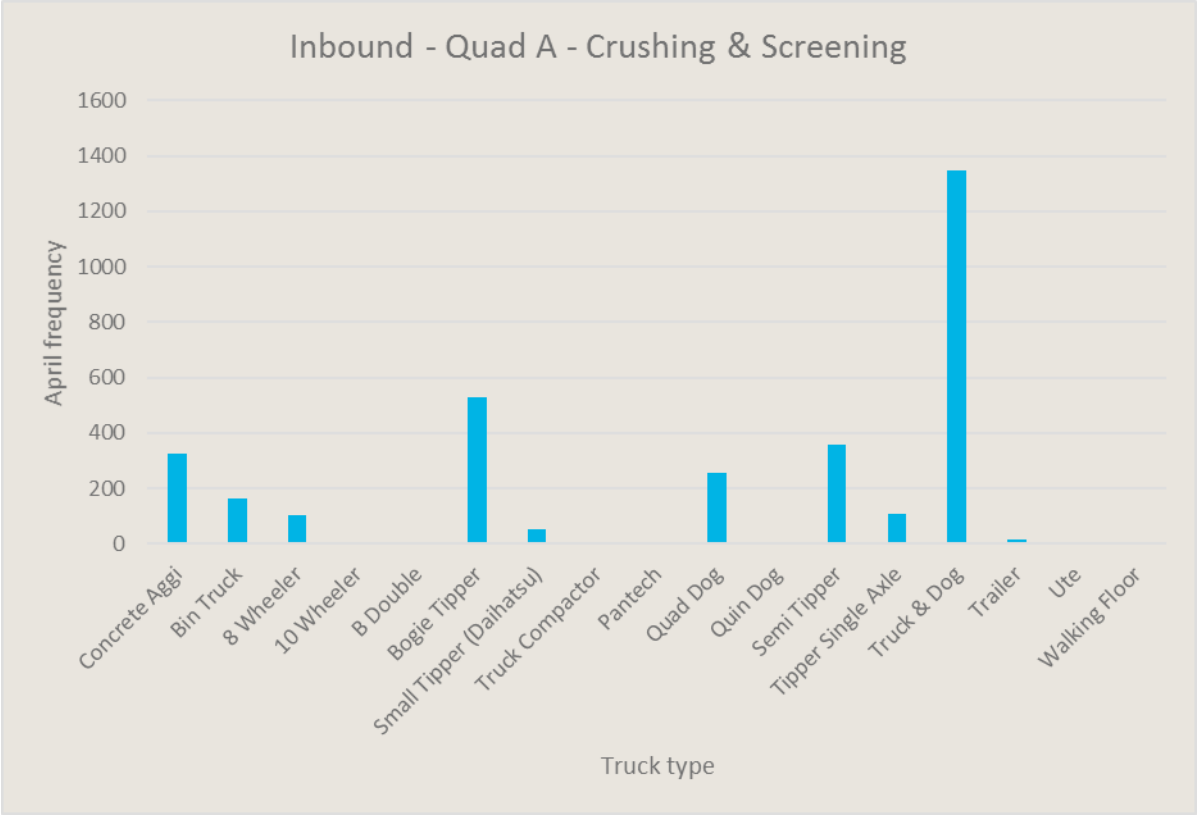
## C.1 Truck types and numbers

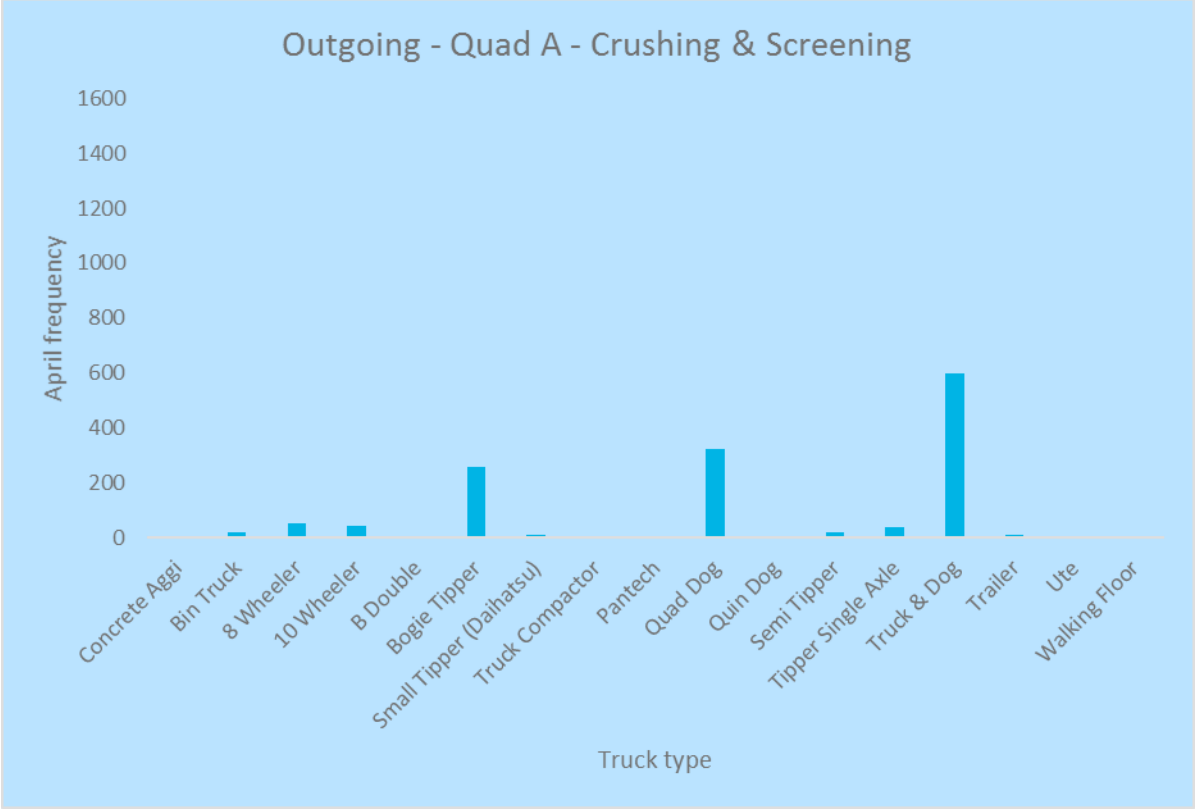
Combined load in and load out.



Combined load in and load out.



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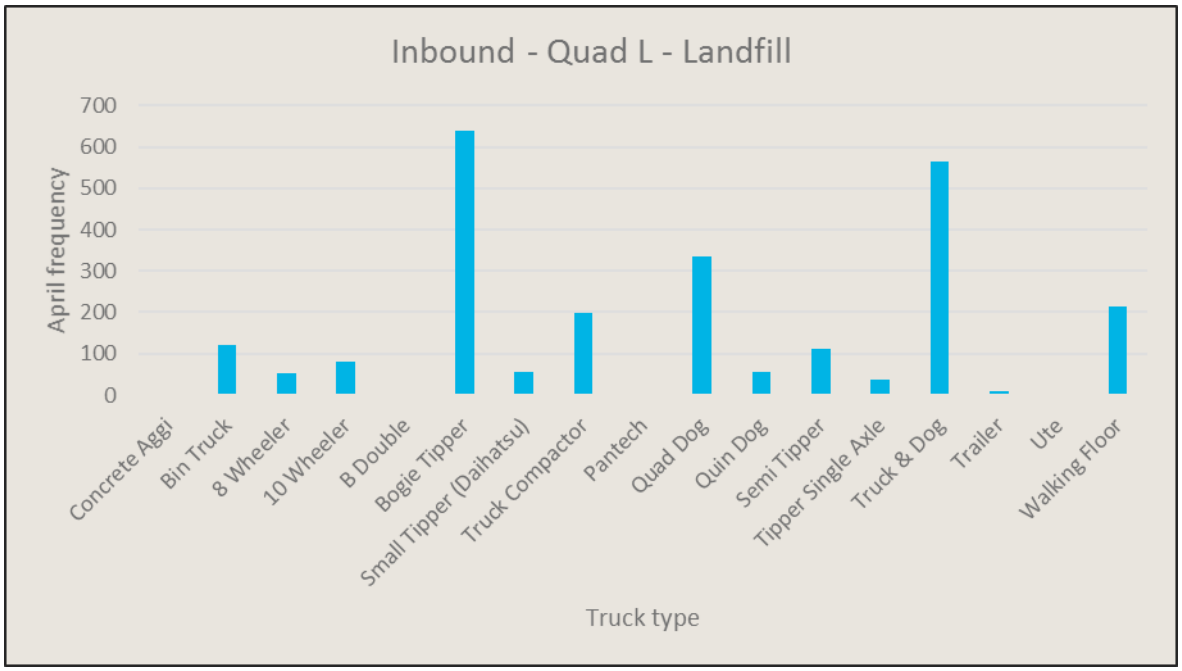


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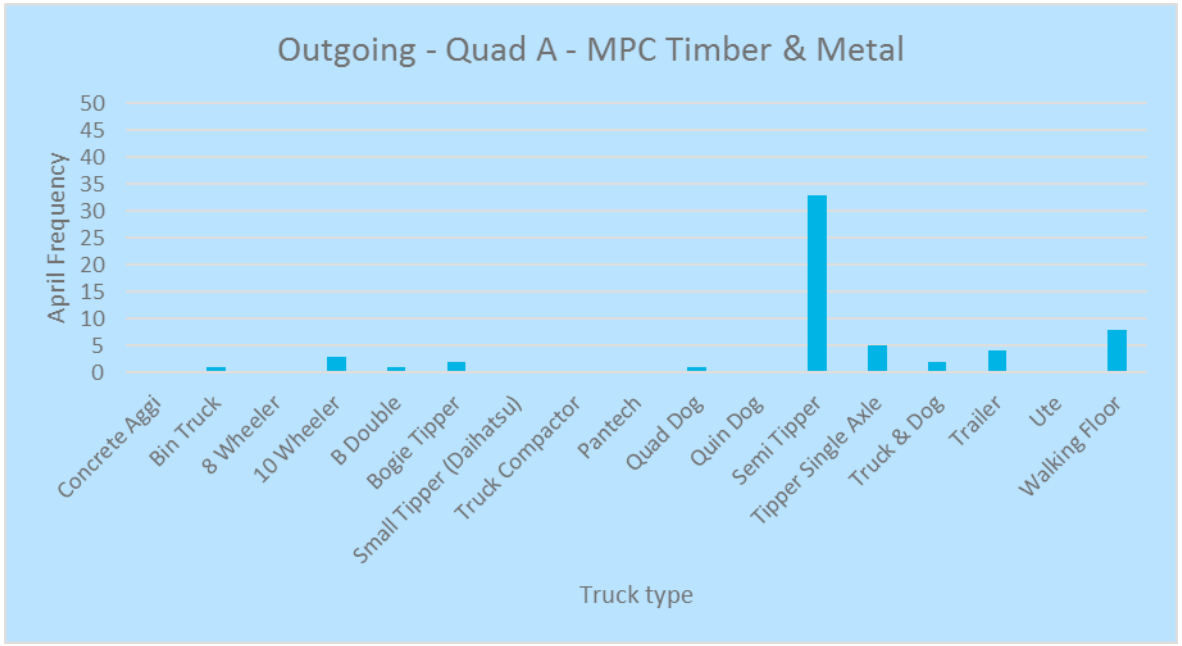

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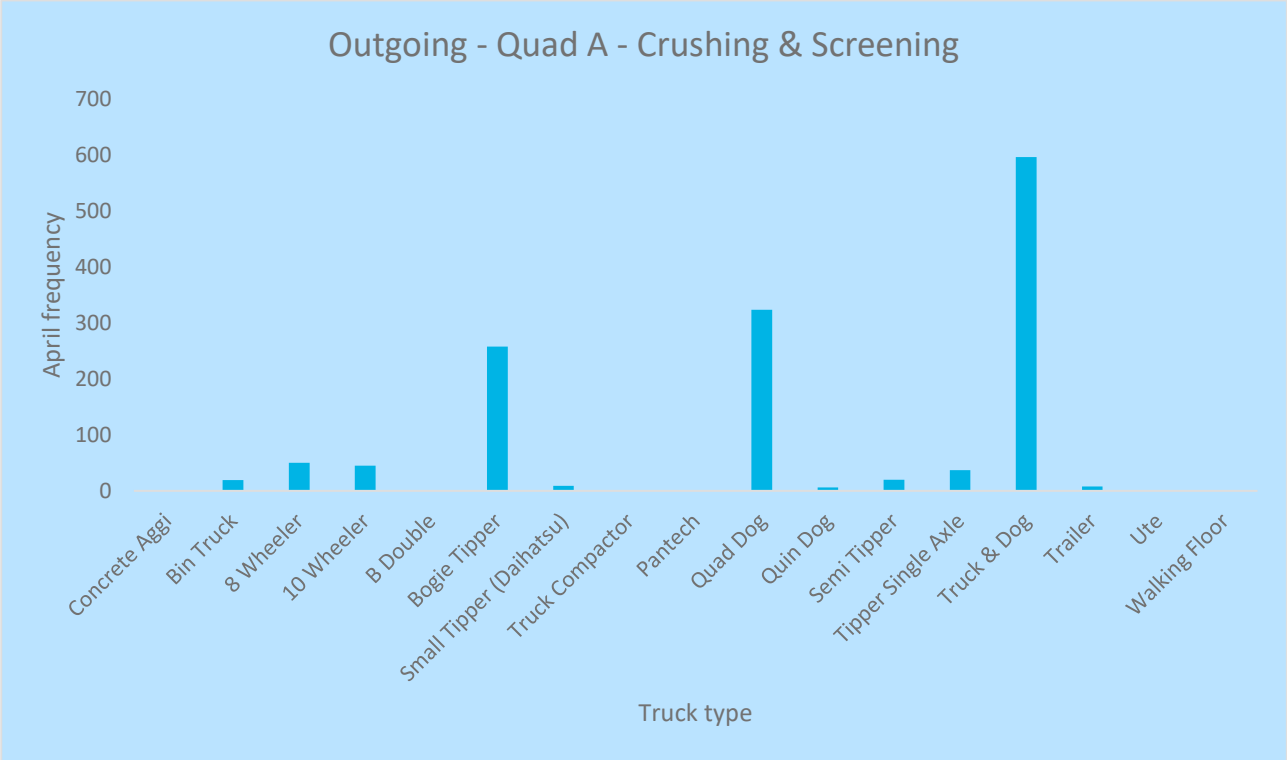
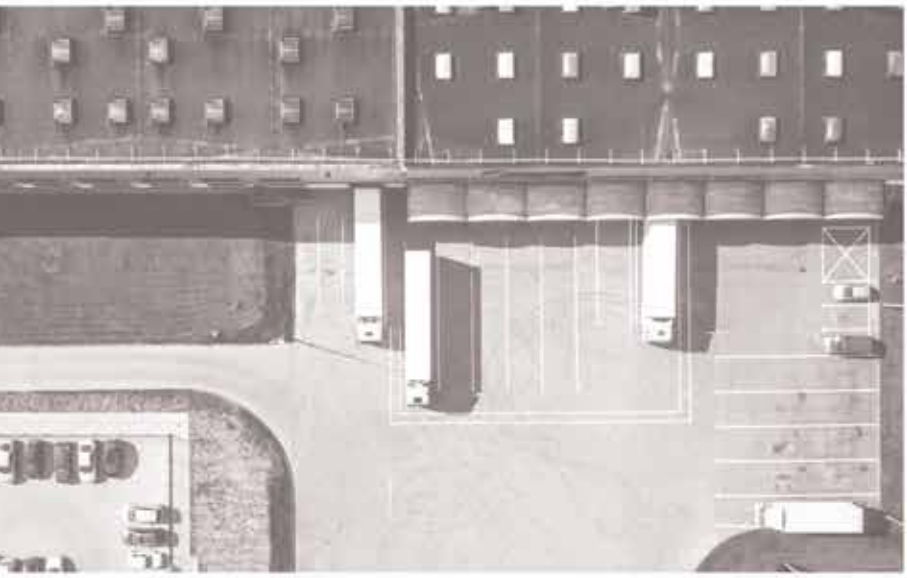


# Appendix D

Letter directing the preparation of a Response to Submissions report



**Planning Services**
**Industry Assessments**
Contact: Bianca Thornton
Phone: 02 8217 2040
Email: bianca.thornton@planning.nsw.gov.au

Our Ref: 06_0139 MOD 6

1/11/2018

Allan Young
EMM Consulting c/o Dial-A-Dump Industries
PO Box 21
St Leonards NSW 1590

Email: ayoung@emmconsulting.com.au

Dear Mr Young

**Response to Submissions**
**Genesis Waste Management Facility (06_0139 MOD 6)**

The exhibition of the modification request for the above project ended on Wednesday 17 October 2018. All submissions received by the Department during the exhibition of the project are available on the Department's website at:

http://www.majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8319

The EPA has advised they will commenting on the Air Quality Impact Assessment and these comments will be provided to you as soon as possible.

The Department requires that you provide a written response to each of the issues raised in a Response to Submissions (RTS) report. In addition, it is requested you address the issues raised by the Department in **Attachment 1**. Your RTS should include any revised management and mitigation measures, if considered necessary.

It would be appreciated if you could provide your RTS within two months of the date of this letter. If you have any questions, please contact Bianca Thornton on the details listed above.

Yours sincerely

Kelly McNicol
**Team Leader, Industry Assessments**
**Planning Services**

**ATTACHMENT 1**

The Department of Planning and Environment has reviewed the Environmental Assessment (EA) prepared by EMM dated 30 August 2018, and requires that the following issues be fully addressed in a Response to Submissions report:

**General**

- The EA states that several landfills have recently closed and many more are slated for closure. Provide details of these landfills.
- How will the proposed modification impact the life expectancy of the landfill?

**Traffic and parking**

- The Traffic Impact Assessment (TIA) references removal of the landfill limit, which was previously proposed at the Request for SEARs stage. The TIA should be consistent with the EA (which proposes a 1,000,000 tpa direct-to-landfill limit) for ease of understanding, particularly as these inconsistencies raised concerns for nearby community members.
- Section 3.1 and 4.1 of the TIA makes statements that the daily truck movements 'will remain within the maximum limit inferred through the condition limiting incoming waste volumes to 2 Mtpa.' This is misleading and implies an unlimited amount of traffic generated from the facility is permitted so long as the facility stays within the 2,000,000 tpa limit.
- The EA indicates there will be an increase in 492 truck movements per weekday, during the evening and night time periods on a weekday, and 20 light vehicle movements per weekday.
  - Please provide further breakdown of how the number of future vehicle movements has been calculated.
  - Estimated vehicle movements for the weekends have not been provided.
  - Further clarity is required regarding the split of types of trucks and how many trucks both tip and pick up waste.
  - Provide rational for how there will be an increase of 492 truck movements per day if the facility limit will not change from 2,000,000 tpa.
- Section 4.3 of the EA mentions parking is 'generally adequate' and the employee numbers will marginally change.
  - Elaborate on how all parking associated with the facility will be wholly contained within the site. No provision appears to have been made for shift changeover times when there would be an overlap of arriving and departing staff.
  - Provide an estimated number of additional jobs.
- The TIA focusses on traffic impacts on surrounding intersections during the peak commuter traffic hours. Further assessment should be undertaken on the operational traffic impacts on the surrounding industrial estate road users and businesses during their hours of operation. Traffic within the industrial estate was identified as an existing issue by community members.
- Identify the night time haul routes.

**Air Quality and Odour**

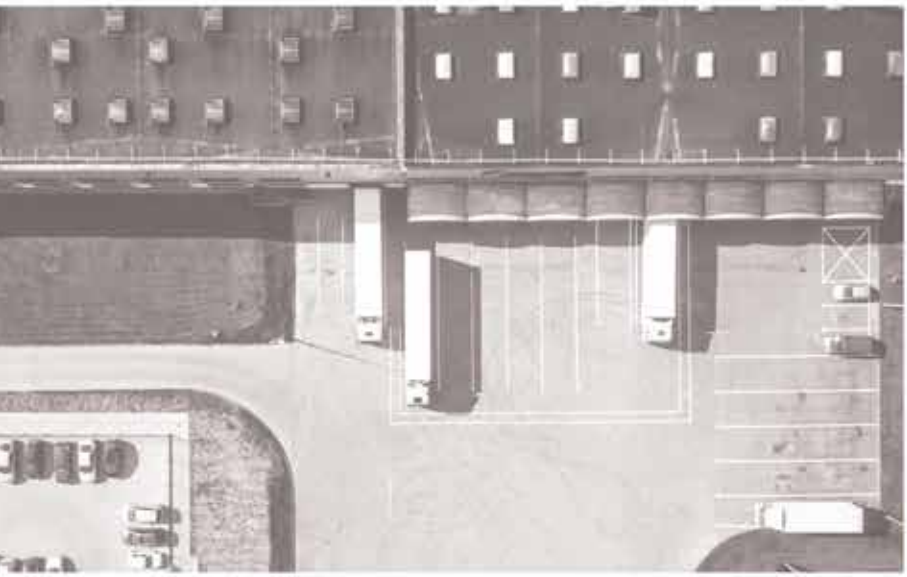
- The worst-case scenario utilised in the Air Quality Impact Assessment (AQIA) assumes that 1,000,000 tpa of waste is landfilled and 1,000,000 tpa of waste is recycled. Section 1.1 of the EA states that approximately 30% of the waste that is processed through the MPC is residual waste and is landfilled. On this basis, the worst-case scenario would be 1,300,000 tpa landfilled and 1,000,000 tpa recycled (ie. processed through the MPC).
- Section 8 of the AQIA states that the Proponent *will consider* relocating the $PM_{10}$ monitoring site in Minchinbury. Provide confirmation whether the Proponent will relocate the monitoring site. Given the concerns raised by the community relating to air quality and human health, additional information is required on the proposed measures to minimise and mitigate air quality impacts.
- Several public submissions identified odour emanating from the site as an issue. Elaborate on the mitigation measures for greenwaste and composting.

**Noise**

- Similar to the TIA, the Noise Impact Assessment (NIA) references removal of the landfill limit which is inconsistent with the EA.
- Similar to the AQIA, the worst-case scenario is based on a 50/50 split of landfilling and recycling.
- Background noise levels are based on measurements from 2014. This is considered outdated as there has been several developments adjacent to the Genesis site since the noise measurements were taken (depicted in the figure below).
- The predicted operational noise utilises data from an EMM database. Provide justification for why direct measurements of the existing plant and equipment was not used for all operational noise sources.
- Section 5.3 of the NIA states that main noise source was from truck movements. The TIA estimates an additional 492 truck movements per weekday during the evening and night period. Night time noise was raised as a key concern for the community. Information on the proposed measures to minimise, mitigate and monitor increased noise levels, particularly during the evening and night period, is required.

# Appendix E

## Addenda

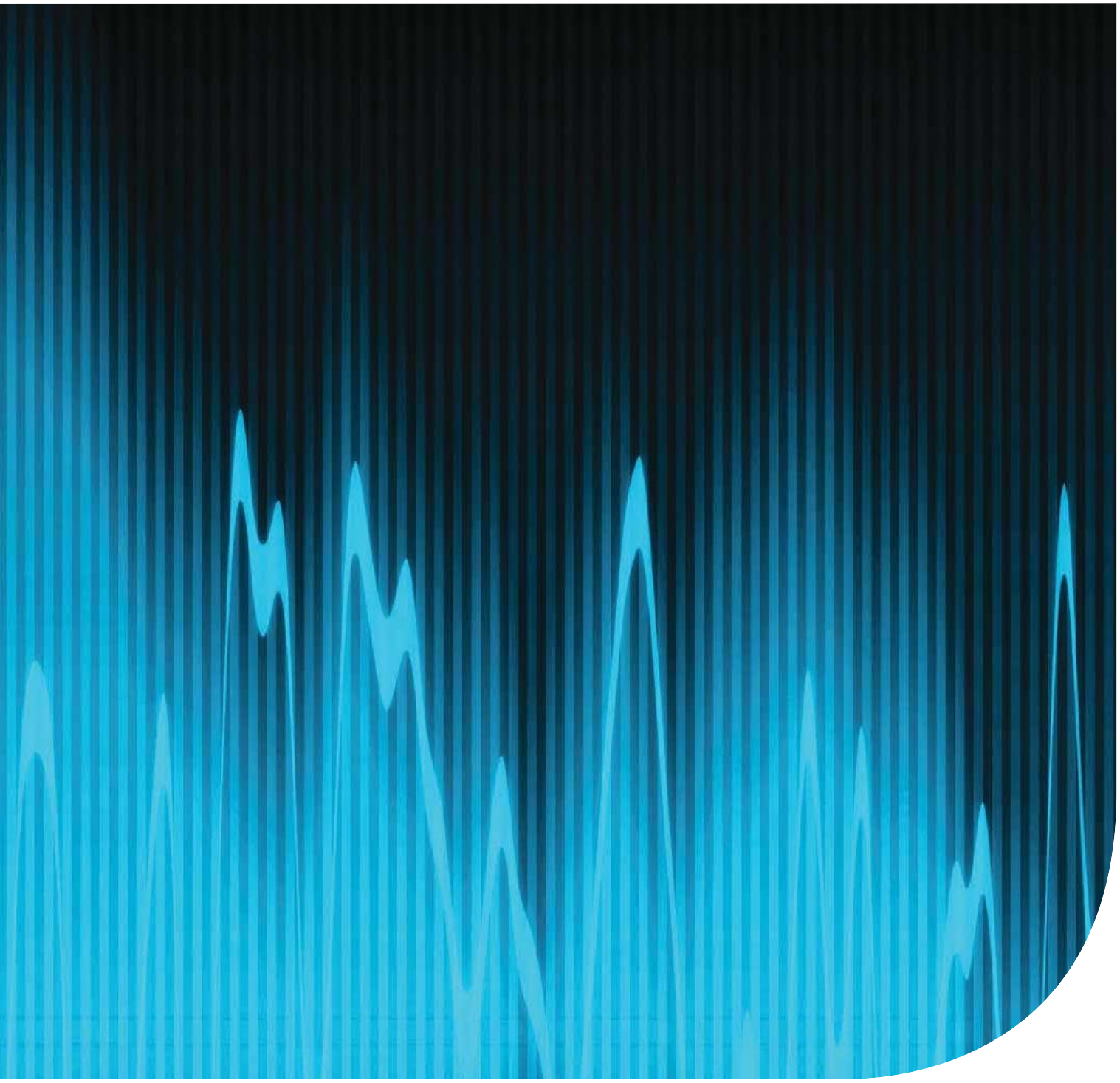


## E.1 Noise Impact Assessment Report

# Genesis Xero Waste

## Noise and Vibration Impact Assessment | Modification 6

Prepared for Dial A Dump Industries Pty Limited | 15 August 2018



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# Genesis Xero Waste

Final

Report J17117RP1 | Prepared for Dial A Dump Industries Pty Limited | 15 August 2018

| | | | |
|---|---|---|---|
| Prepared by | **Katie Teyhan** | Approved by | **Najah Ishac** |
| Position | Associate Consultant | Position | Director |
| Signature |  | Signature |  |
| Date | 15/08/2018 | Date | 15/08/2018 |



**Document Control**

| Version | Date | Prepared by | Reviewed by |
|---|---|---|---|
| V1 | 13 September 2017 | Lucas Adamson | Katie Teyhan/Najah Ishac |
| V2 | 26 September 2017 | Lucas Adamson | Katie Teyhan |
| V3 | 9 October 2017 | Lucas Adamson | Najah Ishac |
| V4 | 15 August 2018 | Katie Teyhan | Najah Ishac |

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# Table of contents

# Table of contents *(Cont'd)*



## Appendices



## Tables

## Tables



## Figures

# 1 Introduction

## 1.1 Background

The Proponent operates the Genesis Xero Waste Facility (the Facility) at Eastern Creek in the Blacktown Local Government Area (LGA). The Facility is located at 1 Kangaroo Avenue and comprises a Resource Recovery Facility (RRF) and a general solid waste (non-putrescibles) landfill. The RRF includes a Materials Processing Centre (MPC) and a Waste Transfer Station. The site currently operates under project approval MP 06_0139 and environment protection licences (EPLs) 13426 and 20121.

The proponent proposes to modify MP 06_0139 to alter the hours of operation and increase the yearly limit on the quantity of waste that can be landfilled. This modification will be known as Modification 6. This will enable the Facility to accept the waste streams that will be generated during major construction projects, some of which will be generated outside standard construction hours. This would not necessitate any modifications/alterations to the existing site infrastructure, production equipment or approved Facility footprint.

This report presents the results and findings of a noise assessment which has been prepared to accompany the modification with reference to the following guidelines and policies:

- the *NSW Industrial Noise Policy* (EPA 2000) (INP);
- the *NSW Industrial Noise Policy Application Notes* (EPA 2013);
- the *NSW Road Noise Policy* (EPA 2011) (RNP); and
- *State Environmental Planning Policy (SEPP) 59 – Eastern Creek Precinct Plan (Stage 3)* (Blacktown City Council 2005).

This noise assessment also evaluates the existing level of noise from the site in accordance with the methodology outlined in the INP and associated Application Notes for the assessment of noise from existing industrial premises.

## 1.2 Secretary's Environmental Assessment Requirements

Secretary's Environmental Assessment Requirements (SEARs) were issued for the proposed modification. The noise specific requirements and where they have been addressed in this NIA are provided in Table 1.1.

**Table 1.1 SEARs**

| Key issue | Requirement | Section addressed |
|---|---|---|
| **Department of Planning & Environment** | | |
| Noise | An assessment of any potential impacts as a result of noise and vibration on all surrounding receivers, and including an assessment based on the EPA's *NSW Road Noise Policy*. | Section 5 |
| **NSW Environment Protection Authority** | | |
| Noise | Noise and vibration Impacts on all receivers from not only on site activities but also from traffic on local roads. | Section 5 |
| **Blacktown City Council** | | |
| Noise | An acoustic assessment must be conducted that explicitly outlines the expected noise levels at all affected receivers, and satisfies the noise criteria outlined in the EPA Licence 2012. | Section 5 |
| | 24 hour maintenance work in the landfill may create problems as the repair and maintenance of machines could be used to conceal landfilling operations, which would certainly have an impact on the ability to meet noise criteria. | Section 5.3 |

## 1.3 Glossary of acoustic terms

A number of technical terms are required for the discussion of noise. These are explained in Table 1.2.

**Table 1.2 Glossary of acoustic terms**

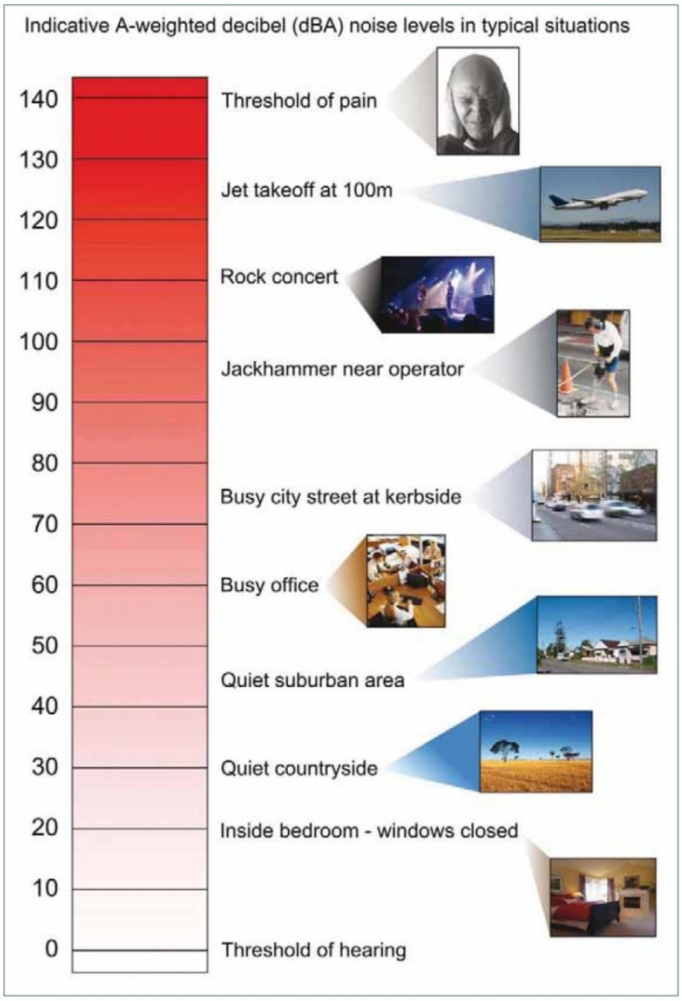
| Term | Description |
|---|---|
| dB | Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear. |
| $L_{A1}$ | The noise level exceeded for 1% of a measurement period. |
| $L_{A10}$ | A noise level which is exceeded 10% of the time. It is approximately equivalent to the average of maximum noise levels. |
| $L_{A90}$ | Commonly referred to as the background noise, this is the level exceeded 90% of the time. |
| $L_{Aeq}$ | It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period. The $L_{eq,15\ minute}$ descriptor refers to an Leq noise level measured over a 15-minute period. |
| $L_{Amax}$ | The maximum root mean squared sound pressure level received at the microphone during a measuring interval. |
| $L_{Amin}$ | The minimum root mean squared sound pressure level received at the microphone during a measuring interval. |
| RBL | The Rating Background Level (RBL) is an overall single value background level representing each assessment period over the whole monitoring period. |
| Sound power level | This is a measure of the total power radiated by a source. The sound power of a source is a fundamental property of the source and is independent of the surrounding environment. |
| Temperature inversion | A positive temperature gradient. A meteorological condition where atmospheric temperature increases with altitude. |

It is useful to have an appreciation of decibels, the unit of noise measurement. Table 1.3 gives an indication as to what an average person perceives about changes in noise levels.

**Table 1.3 Perceived change in noise**

| Change in noise level (dB) | Perceived change in noise |
|---|---|
| Up to 2 | typically indiscernible |
| 3 | just perceptible |
| 5 | noticeable difference |
| 10 | twice (or half) as loud |
| 15 | large change |
| 20 | four times (or quarter) as loud |

Examples of common noise levels are provided in Figure 1.1.




*Source: Road Noise Policy (Department of Environment, Climate Change and Water (DECCW) 2011).*

**Figure 1.1 Common noise levels**

# 2 Project and site description

## 2.1 Background

The site is located at the end of Honeycomb Drive on Lot 1 DP 1145808 and Lot 8 DP 1200048 in Eastern Creek, which is in the Blacktown LGA, as shown in Figure 2.1. The site is surrounded by Kangaroo Avenue to the east and north-east, the Western Motorway to the north, Archbold Road to the west and open grassland to the south.

Further afield there is the residential suburb of Minchinbury beyond the Western Motorway to the north and in Erskine Park beyond Archbold Road to the west, and predominantly undeveloped land containing high voltage powerlines to the west and south-west.

The site is permitted to receive and process 2 million tonnes per annum (Mtpa) of construction, demolition, commercial and industrial waste and green waste clean ups for resource recovery and landfill. A total of 700,000 tpa of resource recovery process rejects and special waste (asbestos) is currently permitted to be sent to landfill at the site. The Facility comprises:

- access and internal roads;
- weighbridge and material inspection area;
- materials processing centre (MPC) and approved but yet to be constructed pre-sort enclosure (PSE) which are large sheds where material is unloaded and fed into the processing plant;
- segregated material area (SMA) where materials such as bricks, concrete and sand are stockpiled directly from client trucks or from the MPC and reprocessed into saleable products such as aggregates and sands; and
- asbestos discovered during pre-processing and landfill rejected during the resource recovery process are applied to the base of a former quarry. Incoming loads pre-classified as special waste are directed straight to the landfill for immediate disposal and covering.

## 2.2 The proposal

The purpose of Modification 6 is to modify the operational hours and to allow greater flexibility in relation to the waste volume permitted to landfill.

For the most part, operations at the Facility will continue in accordance with MP 06_0139, as amended. There will be no modification to the maximum volume of waste that may be accepted in a single year.

The operating hours are proposed to be changed to meet the demand of large infrastructure 24-hour construction projects such as motorways and to enable maintenance and cleaning outside of standard hours so that plant is more available during standard hours. The approved construction and operating hours from the project approval (Table 5 of Condition 39) are reproduced in Table 2.1.

### Table 2.1 Approved hours

| Activity | Days | Hours |
|---|---|---|
| Construction | Monday-Friday | 7am-6pm |
| | Saturday | 8am-4pm |
| | Sunday and public holidays | Nil |
| Operations (waste deliveries and use of chute) | Monday-Friday | 7am-6pm |
| | Saturday, Sunday and public holidays | 8am-4pm |
| Operations (MPC) | Monday-Friday | 6am-10pm |
| | Saturday, Sunday and public holidays | 6am-4pm |

The proposed operating hours are provided in Table 2.2, and if approved would replace Table 5 of Condition 39.

### Table 2.2 Proposed hours

| Activity | Sub-activity | Days | Hours |
|---|---|---|---|
| **Construction** | | Monday-Friday | 6am-6pm |
| | | Saturday | 8am-4pm |
| | | Sunday and public holidays | Nil |
| **Operations (waste deliveries, processing and land filling)** | | | |
| MPC and PSE | Receive materials | Monday-Sunday | 24 hours |
| | Operations | Monday-Sunday | 24 hours |
| SMA | Receive materials | Monday-Sunday | 24 hours |
| | Crushing and screening | Monday-Sunday | 6am-6pm |
| Landfill | Receive materials by truck | Monday-Sunday | 5am-9pm |
| | Convey waste from MPC to landfill via chute | Monday-Sunday | 24 hours |
| **Maintenance** | | | |
| MPC, PSE and Landfill | Repair machinery | Monday-Sunday | 24 hours |
| SMA | Cleaning and machinery repairs | Monday-Sunday | 24 hours |
| Chute | Clearing of blockages and general repairs | Monday-Sunday | 24 hours |

The limit on landfill volumes of 700,000 tpa is proposed to be increased to 1,000,000 tpa. This will not change the cap on volumes of 2 Mtpa approved to be received at Genesis. Modification of the cap will allow Genesis operational flexibility to meet the increased demand of more special waste during the aforementioned major construction projects.

## 2.3 Current noise limits

Noise assessment criteria for the site are stipulated in the site's development consent and two EPLs.

### 2.3.1 Project Approval MP 06_0139

Condition 38 of MP 06_0139 details noise impact assessment criteria for daytime, evening and morning shoulder periods. The condition regarding noise is reproduced as follows:

> *Noise Impact Assessment Criteria*
>
> *38. The Proponent shall ensure that noise from the project does not exceed the noise limits in Table 4.*

***Table 4: Development Noise Limits (dBA)***

| ***Location*** | ***Day $L_{Aeq,15\ minute}$, dB*** | ***Evening $L_{Aeq,15\ minute}$, dB*** | ***Morning Shoulder $L_{Aeq,15\ minute}$, dB*** |
|---|---|---|---|
| *Any receiver* | *37* | *36* | *36* |

> *38a. Noise generated by the project is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the latest version of the NSW Industrial Noise Policy.*

MP 06_0139 defines day as the period from 7 am to 6 pm on Monday to Saturday, and 8 am to 6 pm on Sundays and Public Holidays, evening as the period from 6 pm to 10 pm and morning shoulder as the period from 6 am to 7 am on Monday to Saturday, and 6 am to 8 am on Sunday and Public Holidays.

### 2.3.2 EPL 13426 & EPL 20121

Condition L4.1 of EPLs 13426 and 20121 details the site generated noise limits for the nearest affected receivers in Minchinbury and Erskine Park.

Condition L4.1 of EPL 13426 regarding noise is reproduced as follows:

> *L4.1 Noise generated from the Landfill must not exceed the noise limits presented in the table below:*

| ***Residence Location*** | ***Day $L_{Aeq,15\ minute}$, dB*** | ***Noise Criteria $L_{Aeq,15\ minute}$, dB*** |
|---|---|---|
| *Nearest affected receiver (Minchinbury)* | *36* | *36* |
| *Nearest affected receiver (Erskine Park)* | *36* | *36* |

Condition L4.1 of EPL 20121 regarding noise is reproduced as follows:

> *L4.1 Noise generated from the Landfill and Resource Recovery Facility must not exceed the noise limits presented in the table below:*

| ***Residence Location*** | ***Day $L_{Aeq,15\ minute}$, dB*** | ***Night $L_{Aeq,15\ minute}$, dB*** |
|---|---|---|
| *Nearest affected receiver (Minchinbury)* | *36* | *35* |
| *Nearest affected receiver (Erskine Park)* | *36* | *35* |

It is of note that EPL 20121 specifies a night-time noise criteria of $L_{Aeq,15\ minute}$ 35 dB while EPL 13426 has no mention of night-time noise criteria. The day-time noise criteria in both EPLs are consistent (ie $L_{Aeq,15\ minute}$ 36 dB). It should also be noted that day and night-time are defined differently in the EPLs.

- In EPL 13426, daytime is not specifically defined however operating hours are defined as 7:00 am to 6:00 pm from Monday to Friday and 8:00 am to 4:00 pm on Saturdays, Sundays and public holidays.

- In EPL 20121, daytime is defined as 6:00 am to 6:00 pm from Monday to Friday and 8:00 am to 4:00 pm on Saturdays, Sundays and public holidays while night-time is defined as 6:00 pm to 6:00 am. This definition appears to include a morning shoulder period.

It is also of note that the noise limits in the project approval are inconsistent with those in the EPLs.

### 2.3.3 SEPP 59 – Eastern Creek Precinct Plan (Stage 3)

The *SEPP 59 – Eastern Creek Precinct Plan (Stage 3)* is dated December 2005 and hence post dates the EPA's INP (2000). It establishes noise targets for a number of zones within the subject industrial precinct. The criteria or targets provided in SEPP 59 are 'period' based limits, a term that aligns with the INP's amenity criteria. Zone 1 is applicable to the DADI facility and importantly this zone also encompasses existing warehousing type facilities to the north only. No other existing industrial sites form part of Zone 1 and we understand that there are limited opportunities for additional industrial uses to be developed within this zone in the future. Table 1 and Figure 14 of Section 7.8 of *SEPP 59 – Eastern Creek Precinct Plan (Stage 3)* are reproduced as follows:

Table 1 – Optimum noise level goals

| Period | Zone 1 | Zone 2 | Zone 3 | Zone 4 | Zone 5 | Zone 6 |
|---|---|---|---|---|---|---|
| Day | 57 dB(A) | 54 dB(A) | 56 dB(A) | 54 dB(A) | 49 dB(A) | 52 dB(A) |
| Evening | 47 dB(A) | 44 dB(A) | 46 dB(A) | 44 dB(A) | 39 dB(A) | 42 dB(A) |
| Night | 42 dB(A) | 40 dB(A) | 40 dB(A) | 39 dB(A) | 34 dB(A) | 37 dB(A) |

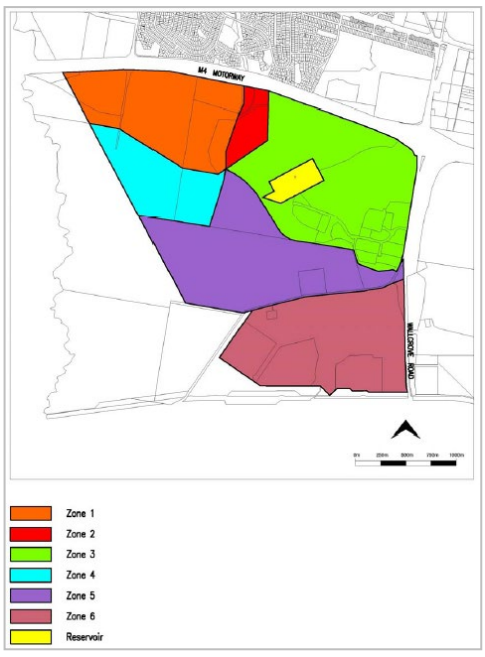



Figure 14 – Noise Emission Zones


\\emmsvr1\EMM\Jobs\2017\J17117 - DADJ MOD 6\GIS\02 Maps\N002 NoiseMonAndAssessLocs 20171005 05.mxd 5/10/2017

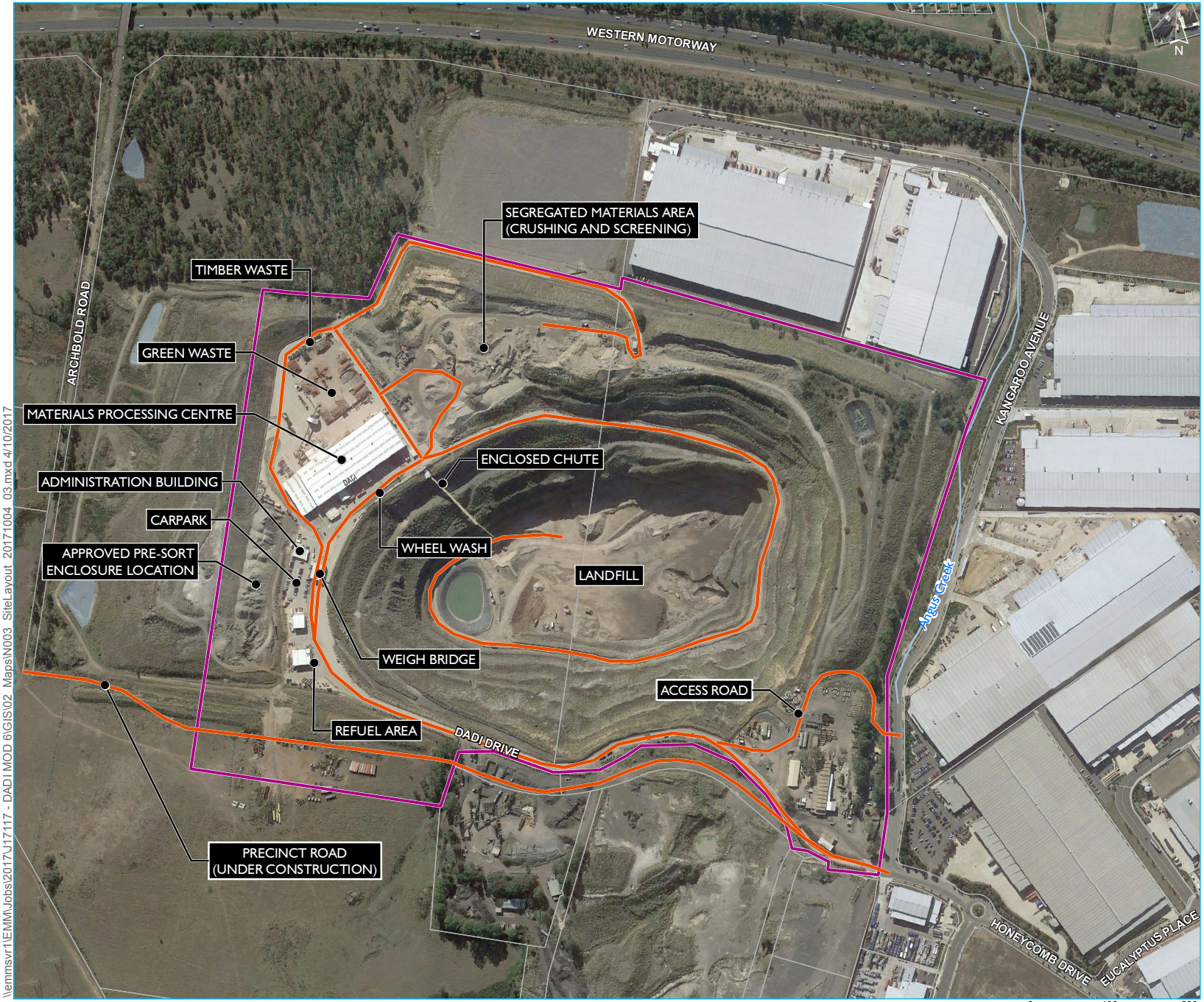
*Source: EMM (2017); GA (2017)*

Noise monitoring and assessment locations

Genesis Xero Waste
Modification 6
Noise and vibration impact assessment

Figure 2.1

EMM

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*Source: EMM (2017); DFSI (2017); LPI (2015); GA (2015)*

Site layout

Genesis Xero Waste
Modification 6
Noise and vibration
impact assessment

Figure 2.2

EMM

# 3 Existing environment

## 3.1 Noise sensitive receivers

The site is located within an industrial and commercial precinct. The closest residential properties are approximately 400 m to the north of the site on the opposite side of the M4 Motorway. Other surrounding land uses are industrial, with the site directly bounded by industrial properties on the north, east and south. The site's location in its local context can be seen in Figure 2.1.

Nearest representative noise sensitive locations to the site have been identified and are provided in Table 3.1 hereafter referred to in this report as assessment locations. The assessment locations are shown in Figure 2.1.

**Table 3.1 Assessment locations**

| ID | Type[1] | Address |
|---|---|---|
| 1 | Urban Residential | 3-21 Cobbler Crescent, Minchinbury |
| 2 | Urban Residential | 1-7 Tod Place, Minchinbury |
| 3 | Urban Residential | 1-6 Eber Place, Minchinbury |
| 4 | Urban Residential | 158-192 McFarlane Drive, Minchinbury |
| 5 | Urban Residential | 1-10 Bergin Place, Minchinbury |
| 6 | Urban Residential | 2-22 Barossa Drive, Minchinbury |
| 7 | Urban Residential | 3-11 Rookin Place, Minchinbury |
| 8 | Urban Residential | 1-8 Rutherglen Place, Minchinbury |
| 9 | Suburban Residential | 2-44 Warbler Street, Erskine Park |
| 10 | Suburban Residential | 1-19 Swamphen Street, Erskine Park |
| 11 | Suburban Residential | 3-8 Blackbird Glen, Erskine Park |
| 12 | Industrial | 21 Kangaroo Avenue, Eastern Creek |
| 13 | Industrial | 17 Kangaroo Avenue, Eastern Creek |
| 14 | Industrial | 16 Kangaroo Avenue, Eastern Creek |
| 15 | Industrial | 12 Kangaroo Avenue, Eastern Creek |
| 16 | Industrial | 4 Kangaroo Avenue, Eastern Creek |
| 17 | Industrial | 1 Eucalyptus Place, Eastern Creek |
| 18 | Industrial | 2 Grevillea Street, Eastern Creek |
| 19 | Industrial | Proposed Hanson Concrete & Asphalt Facility - Lot 1, Kangaroo Avenue, Eastern Creek |
| 20 | Industrial | Proposed Warehousing Facility - Lot 6, Kangaroo Avenue, Eastern Creek |
| 21 | Industrial | Fulton Hogan Asphalt - Dadi Drive, Eastern Creek |
| 22 | School | 202 McFarlane Drive, Minchinbury |
| 23 | School | 53 Peppertree Drive, Erskine Park |

*Notes: 1. As defined in the INP.*

## 3.2 Existing noise levels

A key element in assessing potential noise impacts from industry is to quantify the existing ambient acoustic environment, including any existing industrial noise where present.

Existing ambient noise levels for the residential areas to the north (Minchinbury) and west (Erskine Park) of the site have previously been measured and reported in *Energy from waste Facility, Eastern Creek (SSD6236) – Noise Impact assessment* prepared by Pacific Environment (October 2016). These unattended noise monitoring locations are shown in Figure 2.1. Monitoring was undertaken in March and April 2014. No significant changes have occurred in the area that would be expected to impact ambient noise levels since the noise monitoring was undertaken. Traffic noise may have increased slightly and some increased industrial development in the area may have the effect of increasing ambient noise levels. As such, use of noise levels measured in 2014 to determine intrusive noise goals is considered a conservative approach and suitable for the purpose of this assessment.

The existing ambient noise levels measured by Pacific Environment are presented in Table 3.2. The results are presented in the metrics of Rating Background Level (RBL) and $L_{Aeq}$. The RBL is an overall single value background level representing each assessment period (ie day, evening or night) over the whole monitoring period. It is an INP term and is used to represent the background noise level when assessing industrial noise. The $L_{Aeq}$ is the A-weighted energy average noise level, and it represents the equivalent continuous sound pressure level over a given period.

**Table 3.2 Summary of existing and ambient background noise levels**

| Monitoring Location (refer to Figure 2.1) | Period[1] | RBL[2], dB | Ambient $L_{Aeq, period}$ noise level[3], dB |
|---|---|---|---|
| BG1 (24 Cobbler Crescent, Minchinbury) | Day | 43 | 55 |
| | Evening | 48 | 54 |
| | Night | 41 | 51 |
| BG2 (4 Blackbird Glen, Erskine Park) | Day | 37 | 53 |
| | Evening | 44 | 57 |
| | Night | 35 | 46 |

*Notes* *1. Day: 7 am - 6 pm Monday - Saturday; 8 am - 6 pm Sundays and public holidays; Evening: 6 pm - 10 pm; Night: all remaining periods.*

*2. RBL is the overall single figure background level representing each assessment period (day/evening/night) over the whole monitoring period.*

*3. Represents the energy average noise level over the relevant period.*

*4. Source: Pacific Environment (2016)*

## 3.3 Attended noise monitoring

### 3.3.1 Methodology

Operator attended noise measurements are used to quantify and document the existing noise sources including the existing industrial noise contribution during the relevant periods. Operator attended noise measurements have previously been measured and reported in the *Energy from waste Facility, Eastern Creek (SSD6236) – Noise Impact assessment* prepared by Pacific Environment (October 2016). These attended noise monitoring locations are shown in Figure 2.1 and are consistent with the unattended noise monitoring locations.

### 3.3.2 Attended noise monitoring results

The attended noise monitoring results from the Pacific Environment report are summarised in Table 3.3.

**Table 3.3 Attended noise measurements**

| Location | Time | Period | Noise measurement, dB | | Existing industrial noise contribution, dB | Comments |
|---|---|---|---|---|---|---|
| | | | $L_{Aeq,15\ minute}$ | $L_{A90,15\ minute}$ | $L_{Aeq,period}$ | |
| BG1 | 18/3/14 11:57 | Day | 50 | 47 | Nil | Noise environment dominated by road traffic from M4. Other sources included some community noise (hammering and dog barking) and occasional bird calls Industrial noise was not noted. |
| BG1 | 18/3/14 20:20 | Evening | 47 | 45 | Nil | Noise environment dominated by road traffic noise from M4, distant traffic on the Great Western Highway and insect noise. Industrial noise was not noted. |
| BG1 | 19/3/14 00:37 | Night | 51 | 48 | <41 | Noise environment dominated by road traffic noise from M4. Some distant industrial noise from directly west of monitoring location estimated at <41 dB. Insect noise was also audible. |
| BG2 | 18/3/14 13:03 | Day | 47 | 40 | Nil | Noise environment consisted of constant distant road traffic noise from M4, occasional community noise and birds, frogs and insects and cicadas. Industrial noise was not noted. |
| BG2 | 18/3/14 19:34 | Evening | 55 | 53 | Nil (See comments) | Noise environment dominated by frogs and insects, road traffic noise. Other sources noted included community noise and one occurrence of tonal reversing alarm at <47 dB. |
| BG2 | 19/3/14 00:05 | Night | 50 | 49 | Nil | Noise environment dominated by frogs and insects. Other sources noted included road traffic and community noise. Industrial noise was not noted. |

Several industrial developments currently operate in the area surrounding the site, including major industrial areas to the east, south east and south west. Observations outlined in the Pacific Environment report suggest the noise environment at BG1 is dominated by road traffic on the M4 Motorway during all periods. An industrial noise contribution (unrelated to the subject site) was noted to be present from the industrial area to the west of BG1 and was estimated at $L_{Aeq,period}$ <41 dB during the night-time period.

The noise environment at BG2 was noted to consist of distant road traffic noise from the M4 Motorway and noise from birds, frogs and insects. No industrial contribution was noted at this location.

## 3.4 Meteorology

Noise propagation over distance can be significantly affected by the prevailing weather conditions. Of most interest are source to receiver winds, the presence of temperature inversions and drainage flow effects, as these conditions can enhance received noise levels. To account for these phenomena, the INP specifies meteorological analysis procedures to determine the prevalent weather conditions.

### 3.4.1 Prevailing winds

The INP recommends consideration of wind effects if they are a "feature" of the area. The INP defines "feature" as the presence of source-to-receiver winds at speeds up to 3 m/s (measured at 10 m above ground level), occurring for 30% of the time in any assessment period and season.

This is further clarified by defining source-to-receiver wind direction as being the directional component of wind. The INP states that where wind is identified to be a feature of the area then assessment of noise impacts should consider the highest wind speed below 3 m/s, which is considered to prevail for at least 30% of the time.

A thorough review of the vector components of the 15-minute wind data was undertaken using 5 years of data (2012-2017) from the Bureau of Meteorology (BoM) Horsley Park AWS (Station 067119), located approximately 6 km south-south-east of the subject site. The analysis shows that the frequency of occurrence of winds up to 3 m/s triggers the 30% INP assessment requirement for all assessment periods (ie day, evening and night). These can be seen in Table 3.4.

### 3.4.2 Temperature inversions

Temperature inversions (ie where atmospheric temperature increases with altitude) typically occur during the night-time period in the winter months and can also increase (ie focus) noise levels at surrounding assessment locations. As per the INP, temperature inversions are to be assessed when they are found to occur for 30% of the time (about two nights per week) or greater during the winter months. The INP also states that the assessment of the impact of temperature inversions be confined to the night-time noise assessment period where temperature inversions occur.

The frequency of temperature inversions was determined based on sigma-theta data obtained from the BoM Horsley Park AWS. Analysis of the data found that F or G stability class (temperature inversions) may occur for greater than 30% of the night-time period and, as such, have been considered in the prediction and assessment of noise emissions for the night-time period.

### 3.4.3 Drainage winds

The INP states that a default drainage wind value should be applied where sources are at a higher altitude than the assessment location with no intervening topography. All assessment locations are either at a similar or higher elevation than the subject site or, where they are lower (i.e. the receptors to the west of the site), there is intervening topography between the noise sources and receptors. Therefore, drainage winds have not been adopted in this assessment.

### 3.4.4 Assessed meteorological conditions

Predicted operational noise levels from the site have been calculated based on the meteorological parameters shown in Table 3.4.

**Table 3.4 Weather conditions considered in noise modelling**

| Assessment period | Meteorological condition | Air temperature | Relative humidity | Wind speed[1] | Direction | Stability category (temperature gradient) |
|---|---|---|---|---|---|---|
| Day | Calm | 20°C | 70% | 0 m/s | n/a | D class |
| Day | Winds | 20°C | 70% | 1.9 m/s | 292.5° to 315° | D class |
| Evening | Calm | 10°C | 90% | 0 m/s | n/a | D class |
| Evening | Winds | 10°C | 90% | 2.4 m/s | 67.5° to 292.5° | D class |
| Night/Morning shoulder | Calm | 10°C | 90% | 0 m/s | n/a | D class |
| Night/Morning shoulder | Winds | 10°C | 90% | 2.5 m/s | 157.5° to 315° | D class |
| Night/Morning shoulder | Temp. inversion | 10°C | 90% | 0 m/s | n/a | F class |

*Note 1. Based on the 10$^{th}$ percentile wind speed of all winds present for 30% of the time during the relevant period.*

# 4 Assessment criteria

## 4.1 Industrial noise

Noise from industrial sites or processes in NSW are regulated by the local council, DP&E and/or the NSW Environment Protection Authority (EPA) and usually have a licence and/or approval conditions stipulating noise limits. These limits are normally derived from operational noise criteria applied at assessment locations. They are based on INP guidelines (EPA 2000) or noise levels that can be achieved at a specific site following the application of all reasonable and feasible noise mitigation.

The INP guidelines for assessing industrial facilities have been used for this assessment. With respect to the criteria, the guidelines state:

> *They are not mandatory, and an application for a noise producing development is not determined purely on the basis of compliance or otherwise with the noise criteria. Numerous other factors need to be taken into account in the determination. These factors include economic consequences, other environmental effects and the social worth of the development.*

The objectives of noise assessment criteria for industry are to protect the community from excessive intrusive noise and to preserve amenity for specific land uses.

To ensure these objectives are met, the EPA provides two separate criteria: intrusiveness criteria and amenity criteria. The fundamental difference being intrusiveness criteria apply over 15 minutes in any period (day, evening or night), whereas the amenity criteria apply to the entire assessment period (day, evening or night).

### 4.1.1 Intrusiveness

The intrusiveness criteria require that $L_{Aeq,15\ minute}$ noise levels from the subject site during the relevant operational periods (ie day, evening and night) do not exceed the RBL by more than 5 dB.

The RBLs for the evening period have been adjusted in accordance with the INP application notes. In this regard, the INP application notes state:

> *In determining project-specific noise levels from the RBLs, the community's expectations also need to be considered. The community generally expects greater control of noise during the more sensitive evening and night-time periods than the less sensitive daytime period. Therefore, in determining project-specific noise levels for a particular development, it is generally recommended that the intrusive noise level for evening be set at no greater than the intrusive noise level for daytime. The intrusive noise level for night-time should be no greater than the intrusive noise level for day or evening.*

Table 4.1 presents the intrusive noise criteria determined for the site based on the adopted RBLs.

**Table 4.1 Intrusive noise criteria**

| Location | Period[1] | Measured RBL, dB(A) | Adopted RBL, dB(A) | Intrusive criteria dB, $L_{Aeq,15\ minute}$ |
|---|---|---|---|---|
| Residential assessment locations (Minchinbury) (1-8) | Day | 43 | 43 | 48 |
| | Evening | 48 | 43[2] | 48 |
| | Night | 41 | 41 | 46 |
| | Morning Shoulder[3] | N/A | 42 | 47 |
| Residential assessment locations (Erskine Park) (9-11) | Day | 37 | 37 | 42 |
| | Evening | 44 | 37[2] | 42 |
| | Night | 35 | 35 | 40 |
| | Morning Shoulder[3] | N/A | 36 | 41 |

*Notes:* *1. Day: 7 am - 6 pm Monday - Saturday; 8 am - 6 pm Sundays and public holidays; Evening: 6 pm - 10 pm; Night: all remaining periods.*

*2. The RBL measured for day has been adopted for the evening period in accordance with the INP Application Notes procedures.*

*3. The RBL adopted for the morning shoulder period has been taken as the midpoint of the RBLs determined for day and night-time periods in accordance with the INP Application Notes.*

### 4.1.2 Amenity

The assessment of amenity is based on noise criteria specific to the land use. The criteria relate only to industrial noise and exclude road or rail noise. Where the measured existing industrial noise approaches recommended amenity criteria, it needs to be demonstrated that noise levels from new industry will not contribute to existing industrial noise.

Residential assessment locations in Minchinbury (assessment locations 1-8) that are potentially affected by the modification have been categorised in the INP (EPA 2000) urban amenity category as they are dominated by 'urban hum' and through traffic with heavy and continuous traffic flows during peak periods, while residential assessment locations in Erskine Park (assessment locations 9-11) have been categorised in the INP (EPA 2000) suburban amenity category due to its intermittent traffic flows and limited commerce/industry. The corresponding recommended amenity criteria for the project are given in Table 4.2.

### Table 4.2 Amenity criteria

| Assessment location | Indicative area | Time period | Recommended noise level dB, $L_{Aeq,period}$ | |
|---|---|---|---|---|
| | | | Acceptable | Maximum |
| All residential areas | Urban | Day | 60 | 65 |
| | | Evening | 50 | 55 |
| | | Night | 45 | 50 |
| | Suburban | Day | 55 | 60 |
| | | Evening | 45 | 50 |
| | | Night | 40 | 45 |
| Commercial Premises | All | When in use | 65 | 70 |
| Industrial Premises | All | When in use | 70 | 75 |
| School Classroom[2] | All | Noisiest 1-hour period when in use | 35 $L_{Aeq,1\ hour}$ (internal)<br>45 $L_{Aeq,1\ hour}$ (external) | 40 $L_{Aeq,1\ hour}$ (internal)<br>50 $L_{Aeq,1\ hour}$ (external) |

*Notes: 1. Day: 7 am - 6 pm Monday - Saturday; 8 am - 6 pm Sundays and public holidays; Evening: 6 pm - 10 pm; Night: all remaining periods.*

*2. External noise criteria based on internal criteria as recommended in the INP + 10 dB.*

If existing industrial noise approaches the acceptable amenity criteria in Table 4.2, the criteria for the project is to be adjusted to ensure the total industrial level does not exceed the acceptable amenity criteria. This is achieved by applying modification factors to the recommended criteria which are reproduced from Table 2.2 of the INP in Table 4.3 below.

### Table 4.3 Modification to acceptable noise level (ANL)* to account for existing levels of industrial noise

| Total existing $L_{Aeq}$ noise level from industrial noise sources | Maximum $L_{Aeq}$ noise level for noise from new sources alone, dB |
|---|---|
| ≥ Acceptable noise level plus 2 dB | If existing noise level is likely to decrease in future acceptable noise level minus 10 dB<br>If existing noise level is unlikely to decrease in future existing noise level minus 10 dB |
| Acceptable noise level plus 1 dB | Acceptable noise level minus 8 dB |
| Acceptable noise level | Acceptable noise level minus 8 dB |
| Acceptable noise level minus 1 dB | Acceptable noise level minus 6 dB |
| Acceptable noise level minus 2 dB | Acceptable noise level minus 4 dB |
| Acceptable noise level minus 3 dB | Acceptable noise level minus 3 dB |
| Acceptable noise level minus 4 dB | Acceptable noise level minus 2 dB |
| Acceptable noise level minus 5 dB | Acceptable noise level minus 2 dB |
| Acceptable noise level minus 6 dB | Acceptable noise level minus 1 dB |
| < Acceptable noise level minus 6 dB | Acceptable noise level |

*Notes: * ANL = recommended acceptable $L_{Aeq}$ noise level for the specific receiver, area and time of day from Table 4.2 .*

### 4.1.3 SEPP 59

The *SEPP 59 – Eastern Creek Precinct Plan (Stage 3),* dated December 2005, establishes noise targets for Zone 1 as described earlier. The Zone 1 optimum noise level goals for the daytime, evening and night periods are reproduced in Table 4.4.

**Table 4.4 SEPP 59 – Optimum noise level goals**

| Assessment location | Indicative area | Time period | Optimum noise level goal, dB, $L_{Aeq,period}$ |
|---|---|---|---|
| All residential assessment locations | Zone 1 | Day | 57 |
| | | Evening | 47 |
| | | Night | 42 |

### 4.1.4 Project specific noise level

The project specific noise level (PSNL) is the most stringent of either the calculated intrusive or amenity criteria. The PSNL for the daytime, evening and night periods are indicated in Table 4.5. The SEPP 59 target noise levels have been adopted and are comparable to the INP amenity criteria. These apply to all industrial sites in Zone 1, however the subject site dominates the emission levels from this zone with limited opportunities for additional future sites.

**Table 4.5 Project specific noise levels**

| Assessment location | Period | Intrusive criteria, dB, $L_{Aeq,15\ minute}$ | SEPP59 Zone 1 Amenity criteria, dB, $L_{Aeq,period}$ | PSNL, dB |
|---|---|---|---|---|
| Assessment locations 1-8 (Minchinbury residences) | Day | 48 | 57 | 48 $L_{Aeq,15\ minute}$ |
| | Evening | 48 | 47 | 48 $L_{Aeq,15\ minute}$[1] |
| | Night | 46 | 42 | 42 $L_{Aeq,period}$<br>46 $L_{Aeq,15\ minute}$ |
| | Morning Shoulder | 47 | N/A | 47 $L_{Aeq,15\ minute}$ |
| Assessment locations 9-11 (Erskine Park residences) | Day | 42 | 57 | 42 $L_{Aeq,15\ minute}$ |
| | Evening | 42 | 47 | 42 $L_{Aeq,15\ minute}$ |
| | Night | 40 | 42 | 40 $L_{Aeq,15\ minute}$[1] |
| | Morning Shoulder | 41 | N/A | 41 $L_{Aeq,15\ minute}$ |
| Commercial premises | When in use | - | 65 | 65 $L_{Aeq,period}$ |
| Industrial premises | When in use | - | 70 | 70 $L_{Aeq,period}$ |
| Assessment locations 22-23 (School Classrooms) | When in use | - | 35 (internal)<br>45 (external) | 35 $L_{Aeq,1\ hour}$ (internal)<br>45 $L_{Aeq,1\ hour}$ (external) |

*Notes: 1. It has been conservatively assumed that $L_{Aeq,period}$ noise levels from site are 3 dB less than the $L_{Aeq,15\ minute}$ noise level. On this basis, an intrusive criterion is equal to an amenity criterion -3 dB.*

## 4.2 Applying INP criteria to existing noise sources

The INP also provides guidance on the application of noise criteria to existing operations such as the Genesis Eastern Creek Facility. Chapter 10 of the INP states:

> *The application of the criteria to existing sources of noise would occur where significant modifications (such as to warrant serious and/or ongoing development consent or EPA approval) are made to existing developments or where complaints are received. In applying the policy to existing operations it is acknowledged that the scope for applying reasonable and feasible mitigation measures to existing noise sources is usually far more limited than for new developments. Careful consideration of noise impacts and the feasible and reasonable mitigation measures available at these sites may result in less stringent noise limits than would ideally apply. Sometimes the resultant noise limits will be above the criteria.*

The INP Application Notes state that if PSNLs are not achieved from existing operations, a preliminary review of feasible and reasonable mitigation measures should be undertaken to identify potential opportunities to reduce existing operational noise levels.

The INP Application Notes state that if the existing premises cannot achieve PSNLs after the feasible and reasonable noise mitigation review, the proposed modification should not significantly increase the existing noise emissions.

## 4.3 Sleep disturbance criteria

The subject site does not currently operate during the night-time period (10 pm to 7 am) however the Proponent is seeking to modify the existing project approval to allow limited 24 hour operations. Therefore, assessment of sleep disturbance is required in accordance with EPA procedures.

The operational criteria described in Section 4.1, which consider the average noise emission of a source over 15 minutes, are appropriate for assessing noise from generally steady-state sources, such as conveyor noise. However, transient noise from sources such as truck movements is intermittent (rather than continuous) and needs to be assessed using the $L_1$ or $L_{max}$ noise metrics.

The INP application notes (last updated June 2013) recognise that the current sleep disturbance criteria is not ideal. The assessment of potential sleep disturbance is complex and poorly understood and the EPA believes that there is insufficient information to determine a suitable alternative criteria.

Prior to the EPA determining a standard method to assess the potential for sleep disturbance, the INP application notes suggests that $L_{A1,1\ minute}$ level of 15 dB above the RBL is a suitable screening criteria for the night-time period. Guidance regarding potential for sleep disturbance is also provided in the *NSW Road Noise Policy* (RNP) (DECCW 2011). The RNP calls upon a number of studies that have been conducted into the effect of maximum noise levels on sleep. The RNP acknowledges that, at the current level of understanding, it is not possible to establish absolute noise level criteria that would correlate to an acceptable level of sleep disturbance. However, the RNP provides the following conclusions from the research on sleep disturbance:

- maximum internal noise levels ($L_{Amax}$) below 50 to 55 dB are unlikely to awaken people from sleep; and
- one or two noise events per night, with maximum internal noise levels ($L_{Amax}$) of 65 to 70 dB, are not likely to affect health and wellbeing significantly.

It is commonly accepted by acoustic practitioners and regulatory bodies that a facade including a partially open window will reduce external noise levels by 10 dB. Therefore, external $L_{Amax}$ noise levels in the order of 60 to 65 dB calculated at the facade of a residence are unlikely to cause awakening.

The descriptors $L_{max}$ and $L_1$ may be considered interchangeable; this approach is accepted by the EPA.

If noise levels over the screening criteria are identified, then additional analysis would consider factors such as:

- how often the events would occur;
- the time the events would occur (between 10 pm and 7 am); and
- whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods).

Table 4.6 provides the sleep disturbance screening criteria for the residential assessment locations.

**Table 4.6 Sleep disturbance screening criteria, residential assessment locations**

| Assessment location | Adopted RBL, dB | Sleep disturbance criteria dB, $L_{Amax}$ |
|---|---|---|
| Assessment locations 1-8 (Minchinbury) | 41 | 56 |
| Assessment locations 9-11 (Erskine Park) | 35 | 50 |

*Notes: 1. The sleep disturbance assessment applies to residential assessment locations only.*

## 4.4 Road traffic noise criteria

Project related traffic is proposed to travel on existing project traffic routes. Project traffic currently travels directly between the site and the arterial road network (M4 and M7 motorways) via Kangaroo Avenue, Honeycomb Drive and Wonderland Drive.

The principle guidance for assessing the impact of road traffic noise is the RNP. Table 4.7 presents the road noise assessment criteria reproduced from Table 3 of the RNP.

**Table 4.7 Road traffic noise assessment criteria for residential land uses**

| Road category | Type of project/development | Assessment criteria, dB | |
|---|---|---|---|
| | | Day (7 am to 10 pm) | Night (10 pm to 7 am) |
| Freeway/arterial/sub-arterial roads | Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments. | $L_{Aeq(15\text{-}hr)}$ 60 (external) | $L_{Aeq(9\text{-}hr)}$ 55 (external) |

*Source: EPA (2011).*

The RNP states that where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2 dB, after consideration of all feasible and reasonable mitigation measures.

In addition to meeting the assessment criteria, any significant increase in total traffic noise at assessment locations must be considered. Table 4.8 presents the relative increase assessment criteria reproduced from

Table 6 of the RNP. Assessment locations experiencing increases in total traffic noise levels above those outlined in Table 4.8 should be considered for mitigation.

**Table 4.8 Relative increase criteria for residential land uses**

| Road category | Type of project/development | Total traffic noise level increase, dB | |
|---|---|---|---|
| | | Day (7 am to 10 pm) | Night (10 pm to 7 am) |
| Freeway/arterial/sub-arterial roads and transitways | New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road. | Existing traffic $L_{Aeq(15\text{-}hr)}$+12 dB (external) | Existing traffic $L_{Aeq(9\text{-}hr)}$+ 12 dB (external) |

Road traffic generated by the proposal travels directly between the site and the arterial road network (M4 and M7 motorways) via Kangaroo Avenue, Honeycomb Drive and Wonderland Drive. There are no residential or other noise sensitive assessment locations located along Kangaroo Avenue, Honeycomb or Wonderland Drives. The proportion of site traffic on the M4 and M7 are inconsequential to average noise levels. Therefore, road traffic noise has not been considered further.

# 5 Operational noise assessment

## 5.1 Noise modelling method

This section presents the methods and base parameters used to model and assess the site's predicted noise emissions.

Quantitative modelling of noise emissions was undertaken using Brüel & Kjær Predictor Version 11.00 noise prediction software. This software calculates total noise levels at receptors from the concurrent operation of multiple noise sources. The model incorporates factors such as:

- the lateral and vertical location of plant and equipment;
- source-to-receptor distances;
- ground effects;
- atmospheric absorption;
- topography; and
- meteorological conditions.

Two scenarios were modelled to compare the noise levels from approved and proposed operations for daytime, evening, night-time and morning shoulder periods under calm and prevailing meteorological conditions. Operational modelling scenarios represent a worst-case 15 minute period, with peak truck volumes assumed and all approved/proposed plant and equipment operating concurrently.

### 5.1.1 Plant and equipment sound power levels

Table 5.1 summarises the operational noise sources and associated sound power levels used in the noise model. The equipment items and quantities are based on the current equipment inventory provided by the Proponent. Sound power levels were based on attended measurements at the site where possible. The sound power levels of plant and equipment that were unable to be measured during the site visit were sourced from an extensive EMM database of similar equipment. These types of plant and equipment have been measured numerous times and the appropriate sound power levels of these items are widely recognised and acknowledged in numerous publications. Section 6.1 of the INP also allows for the situation where project-related noise source data cannot be sourced from direct measurements stating that noise data could also be sourced, for example, from previous Environmental Impact Statements or manufacturer's data.

Noise sources were also examined for the presence of low frequency noise or other characteristics that could cause greater annoyance such as tonality or impulsiveness. Sources typically used at the site did not contain such features and, as such, the application of modifying factors was not considered necessary.

A map of on-site plant and equipment locations is presented in Appendix A.

**Table 5.1 Operational plant and equipment sound power levels**

| Plant and equipment | Quantity (per worst-case 15 minute period) | | | | | | | | Sound power level ($L_w$) per unit, $L_{Aeq,15\ minute}$, dB |
|---|---|---|---|---|---|---|---|---|---|
| | Existing operations | | | | Proposed operations | | | | |
| | Day | Evening | Night | Morning Shoulder | Day | Evening | Night | Morning Shoulder | |
| MPC[1, 3] | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 103 |
| Dozer[2] | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 116 |
| Front end loader[2] | 6 | 0 | 0 | 0 | 6 | 6 | 3 | 6 | 105 |
| Crusher/Screen/ Stacker/Excavator[1] | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 113 |
| Compactor[2] | 3 | 0 | 0 | 0 | 3 | 3 | 0 | 3 | 116 |
| Conveyor[2] | 2 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 102 |
| Truck & Dog/Haul Truck[2] | 45 | 0 | 0 | 0 | 58 | 29 | 9 | 29 | 105 (Driving)/ 97 (Idling) |
| Maintenance – SMA | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 97 |
| Maintenance - Landfill | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 97 |

*Notes:* *1. $L_w$ calculated from direct measurement during site visit.*

*2. Taken from EMM database of similar equipment.*

*3. MPC comprises numerous activities including loading and unloading of trucks, sorting, stockpiling and processing of materials. As these processes occur in an enclosed building, the MPC has been modelled as a single source of noise.*

### 5.1.2 Operating assumptions

In addition to the sound power levels and quantities provided, main operating assumptions adopted for a worst-case 15 minute period are as follows:

- for existing operations:
  - all equipment on-site are assumed to operate continuously in any 15 minutes during the daytime period;
  - only the MPC is assumed to operate continuously in any 15 minutes during the evening and morning shoulder periods;
- for proposed operations:
  - all equipment on-site are assumed to operate continuously in any 15 minutes during the daytime and morning shoulder periods;
  - all equipment on-site with the exception of crushers, screens and associated stackers are assumed to operate continuously in any 15 minutes during the evening period;
  - all equipment on-site with the exception of crushers, screens and associated stackers, compactors and trucks running to landfill are assumed to operate continuously in any 15 minutes during the night-time period;
- all onsite vehicle movements are 20 kilometres per hour (km/hr);
- all trucks on-site are assumed to idle for at least 10% of the 15 minute period; and

- it has been conservatively assumed that $L_{Aeq,period}$ noise levels are 3 dB below the $L_{Aeq,15\ minute}$ noise level from site.

## 5.2 Noise modelling results

The predicted approved and proposed noise levels at each assessment location for each assessment period are provided in Table 5.2. The results reflect the changes in operating hours and the additional plant described in Table 5.1.

**Table 5.2 Predicted site noise emissions - approved and proposed operations**

| Assessment location | Period | Approved operations, dB | | Proposed operations, dB | | PSNL, dB |
|---|---|---|---|---|---|---|
| | | Calm | Adverse[1] | Calm | Adverse[1] | |
| 1 | Day | 46 | 46 | 47 | 47 | 48 $L_{Aeq,15\ minute}$ |
| | Evening | <35 | <35 | 43 | 46 | 48 $L_{Aeq,15\ minute}$[1] |
| | Night | N/A | N/A | 37<br>40 | 40<br>43 | 42 $L_{Aeq,period}$<br>46 $L_{Aeq,15\ minute}$ |
| | Morning Shoulder | <35 | <35 | 43 | 46 | 47 $L_{Aeq,15\ minute}$ |
| 2 | Day | 46 | 46 | 47 | 47 | 48 $L_{Aeq,15\ minute}$ |
| | Evening | <35 | <35 | 44 | 47 | 48 $L_{Aeq,15\ minute}$[1] |
| | Night | N/A | N/A | 38<br>41 | 40<br>43 | 42 $L_{Aeq,period}$<br>46 $L_{Aeq,15\ minute}$ |
| | Morning Shoulder | <35 | <35 | 44 | 47 | 47 $L_{Aeq,15\ minute}$ |
| 3 | Day | 47 | 46 | 48 | 48 | 48 $L_{Aeq,15\ minute}$ |
| | Evening | <35 | <35 | 44 | 47 | 48 $L_{Aeq,15\ minute}$[1] |
| | Night | N/A | N/A | 38<br>41 | 41<br>44 | 42 $L_{Aeq,period}$<br>46 $L_{Aeq,15\ minute}$ |
| | Morning Shoulder | <35 | <35 | 44 | 47 | 47 $L_{Aeq,15\ minute}$ |
| 4 | Day | 44 | 46 | 45 | 47 | 48 $L_{Aeq,15\ minute}$ |
| | Evening | <35 | <35 | 42 | 45 | 48 $L_{Aeq,15\ minute}$[1] |
| | Night | N/A | N/A | 36<br>39 | 39<br>42 | 42 $L_{Aeq,period}$<br>46 $L_{Aeq,15\ minute}$ |
| | Morning Shoulder | <35 | <35 | 42 | 45 | 47 $L_{Aeq,15\ minute}$ |
| 5 | Day | 45 | 46 | 45 | 47 | 48 $L_{Aeq,15\ minute}$ |
| | Evening | <35 | <35 | 43 | 45 | 48 $L_{Aeq,15\ minute}$[1] |
| | Night | N/A | N/A | 36<br>39 | 39<br>42 | 42 $L_{Aeq,period}$<br>46 $L_{Aeq,15\ minute}$ |
| | Morning Shoulder | <35 | <35 | 43 | 45 | 47 $L_{Aeq,15\ minute}$ |
| 6 | Day | 43 | 45 | 43 | 46 | 48 $L_{Aeq,15\ minute}$ |
| | Evening | <35 | <35 | 40 | 43 | 48 $L_{Aeq,15\ minute}$[1] |
| | Night | N/A | N/A | <35<br>37 | 36<br>39 | 42 $L_{Aeq,period}$<br>46 $L_{Aeq,15\ minute}$ |
| | Morning Shoulder | <35 | <35 | 40 | 43 | 47 $L_{Aeq,15\ minute}$ |
| 7 | Day | 45 | 47 | 45 | 47 | 48 $L_{Aeq,15\ minute}$ |
| | Evening | <35 | <35 | 42 | 45 | 48 $L_{Aeq,15\ minute}$[1] |
| | Night | N/A | N/A | 35<br>38 | 38<br>41 | 42 $L_{Aeq,period}$<br>46 $L_{Aeq,15\ minute}$ |
| | Morning Shoulder | <35 | <35 | 42 | 45 | 47 $L_{Aeq,15\ minute}$ |

## Table 5.2 Predicted site noise emissions - approved and proposed operations

| Assessment location | Period | Approved operations, dB | | Proposed operations, dB | | PSNL, dB |
|---|---|---|---|---|---|---|
| | | Calm | Adverse[1] | Calm | Adverse[1] | |
| 8 | Day | 44 | 47 | 45 | 47 | 48 $L_{Aeq,15\ minute}$ |
| | Evening | <35 | <35 | 42 | 45 | 48 $L_{Aeq,15\ minute}$[1] |
| | Night | N/A | N/A | 35<br>38 | 38<br>41 | 42 $L_{Aeq,period}$<br>46 $L_{Aeq,15\ minute}$ |
| | Morning Shoulder | <35 | <35 | 42 | 45 | 47 $L_{Aeq,15\ minute}$ |
| 9 | Day | 39 | 39 | 39 | 39 | 42 $L_{Aeq,15\ minute}$ |
| | Evening | <35 | <35 | 37 | 40 | 42 $L_{Aeq,15\ minute}$ |
| | Night | N/A | N/A | 35 | 37 | 40 $L_{Aeq,15\ minute}$ |
| | Morning Shoulder | <35 | <35 | 37 | 37 | 41 $L_{Aeq,15\ minute}$ |
| 10 | Day | 38 | 38 | 39 | 39 | 42 $L_{Aeq,15\ minute}$ |
| | Evening | <35 | <35 | 37 | 40 | 42 $L_{Aeq,15\ minute}$ |
| | Night | N/A | N/A | <35 | 37 | 40 $L_{Aeq,15\ minute}$ |
| | Morning Shoulder | <35 | <35 | 37 | 37 | 41 $L_{Aeq,15\ minute}$ |
| 11 | Day | 38 | 38 | 39 | 39 | 42 $L_{Aeq,15\ minute}$ |
| | Evening | <35 | <35 | 37 | 40 | 42 $L_{Aeq,15\ minute}$ |
| | Night | N/A | N/A | <35 | 37 | 40 $L_{Aeq,15\ minute}$ |
| | Morning Shoulder | <35 | <35 | 37 | 37 | 41 $L_{Aeq,15\ minute}$ |
| 12 | Day | 52 | 52 | 52 | 52 | 70 $L_{Aeq,period}$ |
| | Evening | <35 | <35 | 49 | 50 | 70 $L_{Aeq,period}$ |
| | Night | N/A | N/A | 46 | 47 | 70 $L_{Aeq,period}$ |
| | Morning Shoulder | <35 | <35 | 49 | 50 | 70 $L_{Aeq,period}$ |
| 13 | Day | 41 | 43 | 41 | 44 | 70 $L_{Aeq,period}$ |
| | Evening | <35 | <35 | 38 | 40 | 70 $L_{Aeq,period}$ |
| | Night | N/A | N/A | 35 | 38 | 70 $L_{Aeq,period}$ |
| | Morning Shoulder | <35 | <35 | 38 | 40 | 70 $L_{Aeq,period}$ |
| 14 | Day | 39 | 42 | 40 | 42 | 70 $L_{Aeq,period}$ |
| | Evening | <35 | <35 | 37 | 40 | 70 $L_{Aeq,period}$ |
| | Night | N/A | N/A | <35 | 37 | 70 $L_{Aeq,period}$ |
| | Morning Shoulder | <35 | <35 | 37 | 40 | 70 $L_{Aeq,period}$ |
| 15 | Day | 39 | 41 | 39 | 42 | 70 $L_{Aeq,period}$ |
| | Evening | <35 | <35 | 37 | 39 | 70 $L_{Aeq,period}$ |
| | Night | N/A | N/A | <35 | 36 | 70 $L_{Aeq,period}$ |
| | Morning Shoulder | <35 | <35 | 37 | 39 | 70 $L_{Aeq,period}$ |
| 16 | Day | 45 | 47 | 46 | 48 | 70 $L_{Aeq,period}$ |
| | Evening | <35 | <35 | 43 | 45 | 70 $L_{Aeq,period}$ |
| | Night | N/A | N/A | 38 | 41 | 70 $L_{Aeq,period}$ |
| | Morning Shoulder | <35 | <35 | 43 | 45 | 70 $L_{Aeq,period}$ |
| 17 | Day | 46 | 48 | 47 | 49 | 70 $L_{Aeq,period}$ |
| | Evening | <35 | <35 | 44 | 46 | 70 $L_{Aeq,period}$ |
| | Night | N/A | N/A | 39 | 42 | 70 $L_{Aeq,period}$ |
| | Morning Shoulder | <35 | <35 | 44 | 46 | 70 $L_{Aeq,period}$ |

**Table 5.2 Predicted site noise emissions - approved and proposed operations**

| Assessment location | Period | Approved operations, dB | | Proposed operations, dB | | PSNL, dB |
|---|---|---|---|---|---|---|
| | | Calm | Adverse[1] | Calm | Adverse[1] | |
| 18 | Day | 48 | 50 | 49 | 51 | 70 $L_{Aeq,period}$ |
| | Evening | <35 | <35 | 46 | 48 | 70 $L_{Aeq,period}$ |
| | Night | N/A | N/A | 41 | 43 | 70 $L_{Aeq,period}$ |
| | Morning Shoulder | <35 | <35 | 46 | 48 | 70 $L_{Aeq,period}$ |
| 19 | Day | 50 | 52 | 51 | 53 | 70 $L_{Aeq,period}$ |
| | Evening | <35 | <35 | 48 | 50 | 70 $L_{Aeq,period}$ |
| | Night | N/A | N/A | 43 | 45 | 70 $L_{Aeq,period}$ |
| | Morning Shoulder | <35 | <35 | 48 | 50 | 70 $L_{Aeq,period}$ |
| 20 | Day | 57 | 58 | 58 | 59 | 70 $L_{Aeq,period}$ |
| | Evening | <35 | <35 | 55 | 56 | 70 $L_{Aeq,period}$ |
| | Night | N/A | N/A | 50 | 50 | 70 $L_{Aeq,period}$ |
| | Morning Shoulder | <35 | <35 | 55 | 56 | 70 $L_{Aeq,period}$ |
| 21 | Day | 57 | 57 | 58 | 58 | 70 $L_{Aeq,period}$ |
| | Evening | <35 | <35 | 55 | 56 | 70 $L_{Aeq,period}$ |
| | Night | N/A | N/A | 50 | 51 | 70 $L_{Aeq,period}$ |
| | Morning Shoulder | <35 | <35 | 55 | 56 | 70 $L_{Aeq,period}$ |
| 22 | Day | 43 | 44 | 44 | 45 | 45 $L_{Aeq,1\ hour}$ |
| 23 | Day | <35 | <35 | 35 | 36 | 45 $L_{Aeq,1\ hour}$ |

*Notes:* *1. Adverse is the worst case result from prevailing winds or temperature inversion conditions at each assessment location. NB daytime adverse winds are favourable in direction for assessment locations in Minchinbury and Erskine Park, hence predicted calm weather results were adopted. Similarly, morning shoulder adverse weather are not applicable for Erskine Park residences given inversions are unlikely to trigger the INP's 30% occurrence threshold and given the assessable wind directions found for the day and night periods which straddles the morning shoulder.*

*2. Assessment location is a school and therefore operates during the day-time only Notwithstanding, noise levels for all other assessment periods would also satisfy criteria.*

## 5.3 Discussion of results and recommendations

Site noise emissions during proposed operations are predicted to comply with the relevant PSNLs at all assessment locations considered as part of this assessment.

The results of the noise modelling showed that the main noise sources contributing to noise emissions at residential areas were as follows:

- site trucking movements (for residences to the north); and
- site trucking movements and equipment operating in the landfill pit (for residences to the west).

The maintenance of equipment in the landfill pit is not expected to be able to conceal or mask landfilling operations due to the relatively low noise levels of maintenance activity compared to operational activities. Land-filling operations have been included in the modelling and total noise emissions are predicted to comply with the PSNLs for all assessment locations during calm and adverse meteorological conditions for all periods.

In addition, current and future noise levels are predicted to be significantly less than existing ambient noise levels at the residential assessment locations which are primarily dictated by road traffic noise from the M4

motorway. Hence, noise levels from the modification are not expected to cause adverse impacts at any assessment location.

It is of note that the existing noise limits specified in the site's project approval and EPLs are below measured ambient noise levels at the nearest assessment locations. Further, during the site's bi-annual attended noise monitoring, the site's contribution is regularly unable to be quantified due to elevated ambient noise levels at the specified monitoring locations.

It is recommended that the site's noise limits be increased, in line with the highest predicted noise levels or PSNLs adopted for this assessment. INP procedures ensure that appropriate noise criteria (ie PSNLs) are established with a view to maintaining acceptable noise amenity levels at assessment locations and with consideration of potential cumulative noise impacts from existing and/or successive developments.

## 5.4 Sleep disturbance assessment

The predicted $L_{Amax}$ noise levels from the site at the nearest residential assessment locations are presented in Table 5.3 for worst-case meteorological conditions (ie temperature inversions). The predictions are for the night period only (10 pm to 7 am) coinciding with the typical sleep period and in accordance with the INP.

Typical maximum noise level events include the following:

- trucks dumping;
- front end loader or excavator scraping concrete;
- bangs/hammering associated with maintenance activity; or
- vehicles reversing, inclusive of tonal reversing alarms.

The sound power level of these types of events has been measured to be up to $L_{Amax}$ 126 dB and represents the likely highest maximum noise level events from the site.

**Table 5.3 Predicted $L_{Amax}$ noise levels during night period**

| Assessment location[1] | Predicted $L_{Amax}$ noise levels, dB | $L_{Amax}$ screening criteria, dB |
|---|---|---|
| | Worst-case meteorological conditions | |
| 1 | 51 | 56 |
| 2 | 51 | 56 |
| 3 | 53 | 56 |
| 4 | 48 | 56 |
| 5 | 49 | 56 |
| 6 | 44 | 56 |
| 7 | 47 | 56 |
| 8 | 47 | 56 |
| 9 | 44 | 50 |
| 10 | 42 | 50 |
| 11 | 41 | 50 |

*Notes: 1. The sleep disturbance assessment applies to residential assessment locations only.*

Noise modelling predicts that $L_{Amax}$ noise levels will satisfy the INP sleep disturbance screening criteria at all residential assessment locations.

## 5.5 Cumulative noise assessment

Potential cumulative noise impacts from existing and successive developments are considered by the INP procedures by ensuring that the appropriate noise criteria are established with a view to maintaining acceptable noise *amenity* levels. Therefore, the cumulative impact of the Facility with existing industrial noise sources has been assessed in the determination of the acceptable amenity levels at the assessment locations.

It is of note that Hanson currently has approval for the construction and operation of a concrete and asphalt Facility on a site to the south east. *Construction, Operating and Traffic Noise Assessment – Concept Plan for the redevelopment of Lot 11 DP558723, Lot 1 DP200697 and Lot 2 DP262213* (Heggies 2006) indicates that Hanson site noise levels are predicted to comply with all amenity criteria. Further, a noise criterion of $L_{Aeq,15\ minute}$ 35 dB has been applied to the Hansen site for all periods in its project approval.

The Hansen site is proposed to be located outside the Zone 1 as per the SEPP 59 Eastern Creek Precinct Plan (refer Appendix B herein). Therefore, this site is to be assessed against separate noise targets stipulated in the SEPP 59. These noise goals are specified to provide adequate protection to the amenity of surrounding residential areas without unduly restricting the development of, and operations within, the precinct.

Cumulative noise impacts from noise sources within Zone 1 have been assessed in accordance and demonstrate compliance with the Eastern Creek Stage 3 Precinct Plan.

# 6 Conclusion

EMM has completed a noise assessment for the modification. This noise assessment has been prepared in accordance with the methodology outlined in the INP and associated Application Notes for the assessment of noise from industrial premises.

The Proponent proposes to modify the project approval to alter the hours of operation and to improve flexibility in relation to the waste volume permitted to be landfilled, by removing the annual cap. This would not necessitate any modifications/alterations to the existing site infrastructure, production equipment or approved Facility footprint.

A noise model was developed to compare noise levels from existing approved and proposed operations. The model adopted sound power levels of key acoustically significant plant and equipment derived from attended site measurements and a database of similar equipment.

For the assessment of proposed operations, all equipment was assumed to operate during the daytime and morning shoulder periods, all equipment excluding the crushers, screens and associated stackers was assumed to operate during the evening period and all equipment excluding crushers, screens, associated stackers and trucks running to landfill was assumed to operate during the night-time period.

Findings of the assessment are summarised below:

- Operational noise levels were assessed for the daytime, evening, night-time and morning shoulder periods during calm and prevailing weather conditions. The assessment found that operating noise from the site during both existing and proposed operations satisfies relevant INP PSNLs for all periods at all assessment locations.

- The potential for sleep disturbance from the modification during the night-time period has been assessed. The highest predicted external maximum noise level from site is $L_{Amax}$ 53 dB in Minchinbury and $L_{Amax}$ 44 dB in Erskine Park which is below the noise levels likely to cause sleep disturbance affects. Hence, it is unlikely that night-time operations from the project will cause sleep disturbance at the residential assessment locations.

- Road traffic generated by the proposal travels directly between the site and the arterial road network via Kangaroo Avenue, Honeycomb Drive and Wonderland Drive. There are no residential assessment locations located along nearby roads and, therefore, the potential for the road traffic noise or relative increase criteria to be exceeded is highly unlikely.

- A review of cumulative industrial noise from the Facility together with other industrial noise sources in the vicinity was also conducted. The Facility is not predicted to increase industrial noise levels above the relevant amenity criteria.

- It is recommended that the site's noise limits be increased, in line with the highest predicted noise levels or Project Specific Noise Levels adopted for this assessment.

# References


Australian Standard AS 1055-1997, *Acoustics - Description and Measurement of Environmental Noise – Parts 1, 2 and 3.*

*Heggies Australia 2006, Noise Assessment – Concept Plan for the redevelopment of Lot 11 DP558723, Lot 1 DP200697 and Lot 2 DP262213.*

NSW Department of Environment, Climate Change and Water (DECCW) 2011, *Road Noise Policy*.

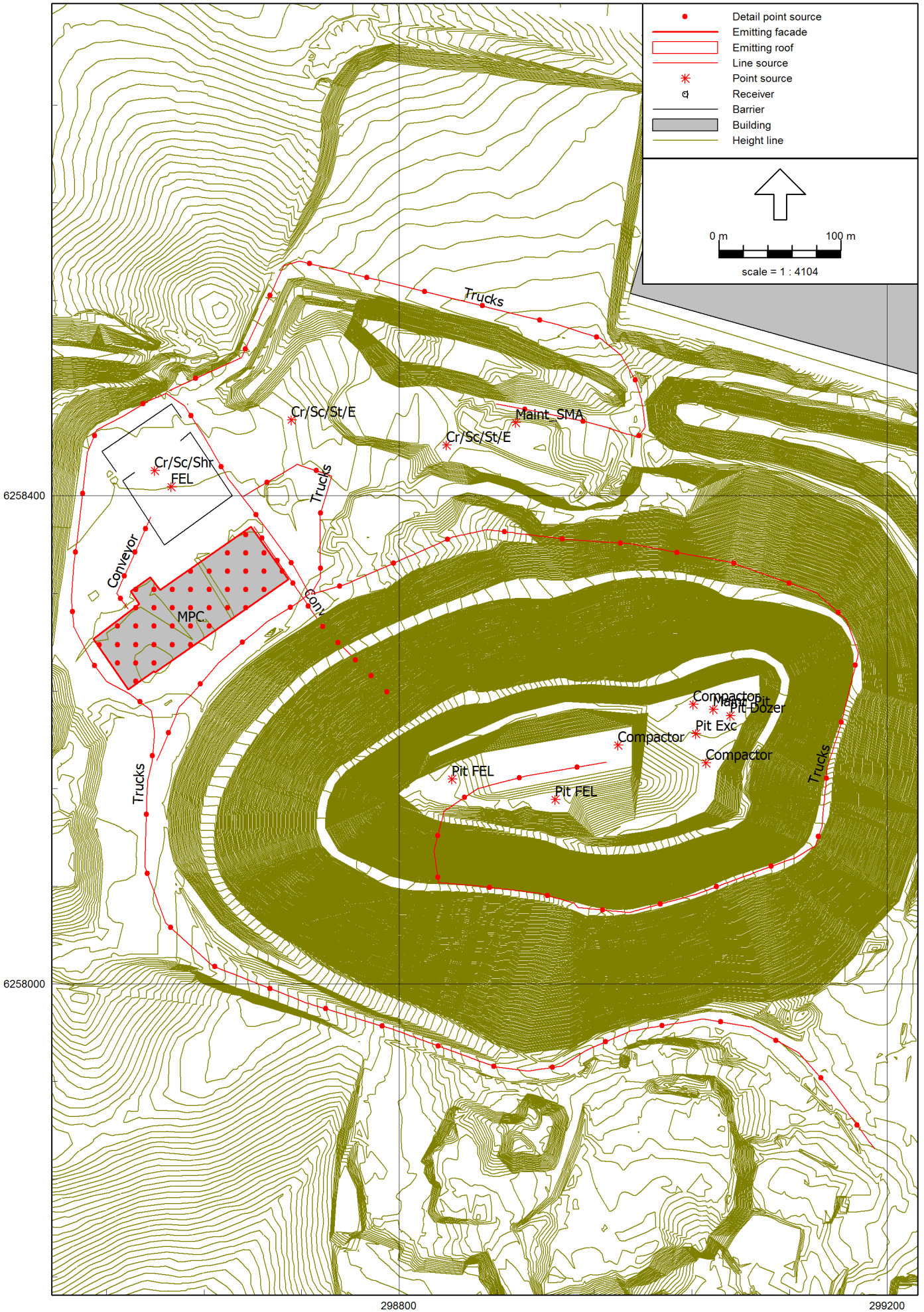
NSW Environmental Protection Authority (EPA) 2000, *Industrial Noise Policy.*

NSW Environmental Protection Authority (EPA) 2013, *Industrial Noise Policy Application Notes.*

Blacktown City Council 2005*, State Environmental Planning Policy (SEPP) 59 – Eastern Creek Precinct Plan (Stage 3)*

# Appendix A

On-site plant and equipment locations


Detail point source
Emitting facade
Emitting roof
Line source
Point source
Receiver
Barrier
Building
Height line
0 m
100 m
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Trucks
Cr/Sc/St/E
Maint_SMA
Cr/Sc/St/E
Cr/Sc/Shr
FEL
Trucks
Conveyor
MPC
Conv
Compactor
Maint_pit
Pit Dozer
Pit Exc
Compactor
Compactor
Trucks
Pit FEL
Pit FEL
Trucks
6258400
6258000
298800
299200

# Appendix B

## Eastern Creek Precinct Plan Stage 3 - Noise limits

## 7.8 Noise and Vibration

Given the nature of development within the Precinct, noise generation from the site is to be restricted to a reasonable level. Noise is to be contained where possible and not unreasonably impact on the operations or amenity of adjoining or surrounding sites.

**Objectives**

Ensure that development does not cause adverse environmental impacts from noise and vibration.

**Controls**

(a) Development Applications should provide an assessment, and identify necessary mitigation measures, to minimise the potential environmental impacts from noise and vibration generated by the proposed development.

(b) Development Applications must comply with relevant Council, and government authority guidelines, to ensure no adverse environmental impacts occur both during and after development of the Precinct.

(c) Where appropriate, development may need to be treated to minimise the impact from noise generated both on and off site.

(d) Consideration shall be given to:

(i) the appropriate spatial arrangement of sensitive land uses;

(ii) the sensitive location of buildings on lots; and

(iii) the design of buildings to attenuate noise inside the building.

(e) The optimised noise level goals for the Precinct are outlined in Table 1. These goals will provide adequate protection to the noise amenity of residential areas surrounding the Precinct without unduly restricting the operation of development.

| Period | Zone 1 | Zone 2 | Zone 3 | Zone 4 | Zone 5 | Zone 6 |
|---|---|---|---|---|---|---|
| Day | 57 dBA | 54 dBA | 56 dBA | 54 dBA | 49 dBA | 52 dBA |
| Evening | 47 dBA | 44 dBA | 46 dBA | 44 dBA | 39 dBA | 42 dBA |
| Night | 42 dBA | 40 dBA | 40dBA | 39 dBA | 34 dBA | 37 dBA |

**Table 1 – Optimum Noise Level Goals**

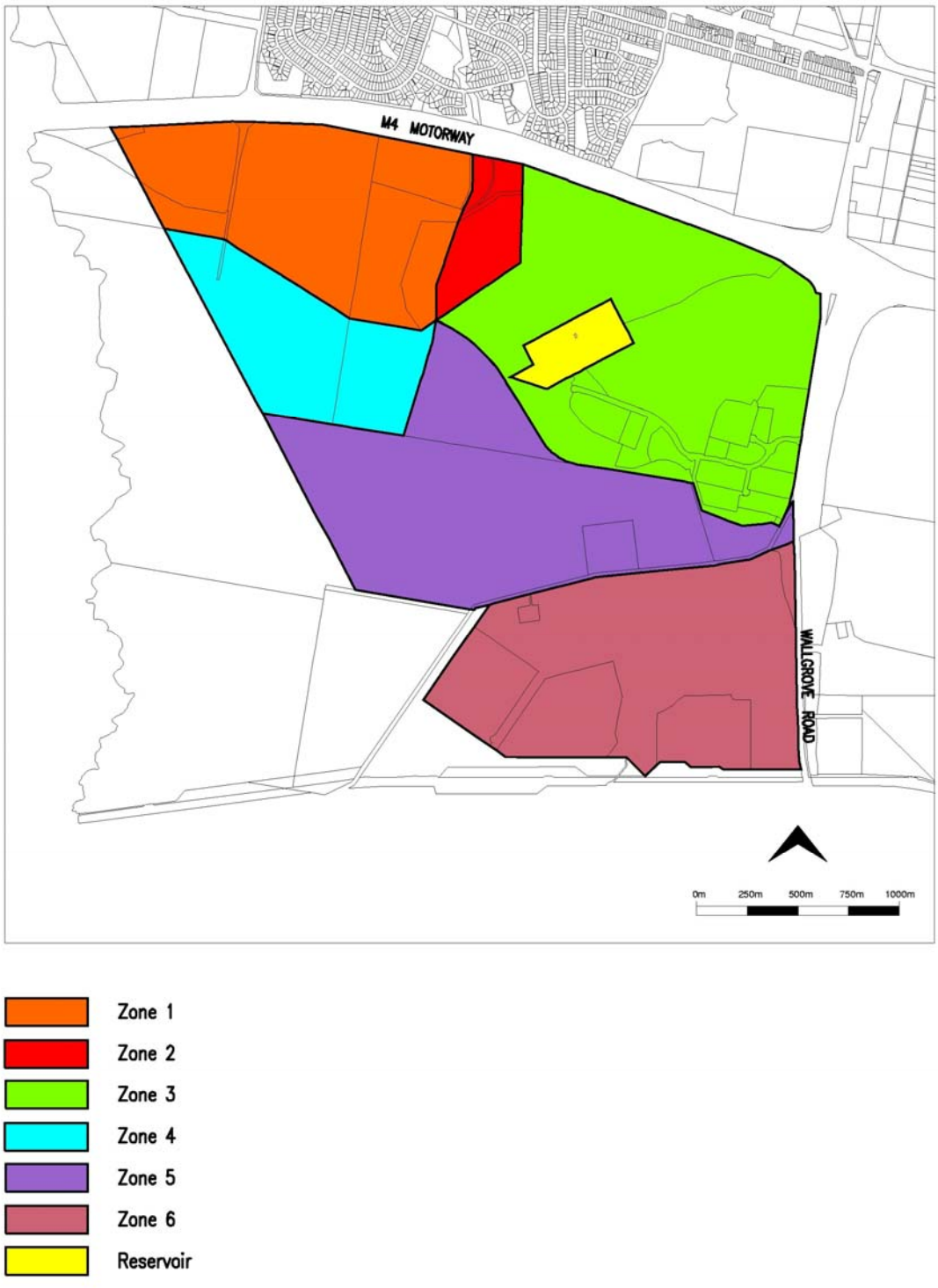


**Figure 14 - Noise Emission Zones**

## E.2 Air Quality Impact Assessment Report

Intended for
**Dial-a-Dump Industries**
**C/- EMM Consulting**

Document type
**Report**

Date
**August 2018**

Project No.
**318000225**

# AIR QUALITY IMPACT ASSESSMENT
# GENESIS XERO WASTE FACILITY MODIFICATION 6

RAMBOLL

# AIR QUALITY IMPACT ASSESSMENT
# GENESIS XERO WASTE FACILITY MODIFICATION 6

| Revision | Date | Made by | Checked by | Approved by | Signed |
|---|---|---|---|---|---|
| Draft V1.1 | 3/08/2017 | R.Kellaghan | S. Fishwick | | |
| Draft V1.2 | 04/10/2017 | R.Kellaghan | S. Fishwick | R. Kellaghan |  |
| Final V3 | 29/08/2018 | R.Kellaghan | S. Fishwick | R. Kellaghan | |

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# EXECUTIVE SUMMARY


**Introduction**

An air quality impact assessment has been prepared for a modification to the Genesis Zero Waste Facility at Eastern Creek (the Facility), which is owned and operated by Dial a Dump Industries Pty Limited (the proponent). The modification seeks to alter the hours of operation and increase the annual landfill cap limit of 700,000 tonnes to 1,000,000 tonnes (whilst not increasing the overall tonnes that may be accepted at the Facility.

**Study approach**

Local air quality impacts from the modification are assessed using a Level 2 assessment approach in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA, 2016). Emissions are estimated for all activities and dispersion modelling is used to predict ground level concentrations at surrounding receptors. Cumulative impacts are assessed by combining the contribution from the modification with the existing ambient baseline.

**Existing environment**

Baseline meteorology is described with reference to the closest Bureau of Meteorology (BoM) automatic weather stations (AWS) and NSW Office of Environment and Heritage (OEH) monitoring sites. Surface observations from regional monitoring sites are included in the meteorological modelling using CALMET. Baseline air quality is described with reference to OEH monitoring sites at Prospect and St Marys and a monitoring site operated by the facility in the suburb of Minchinbury. Annual mean $PM_{10}$ concentrations across the three sites are 61% to 76% of the impact assessment criteria, while annual mean $PM_{2.5}$ concentrations for the region are 98%-108% of the impact assessment criteria (i.e. already at or above the impact assessment). Elevated concentrations of $PM_{2.5}$ for the Western Sydney region are strongly influenced by vehicle emissions (cars, trucks and off-road equipment) and from wood heaters during winter months. Exceedances of the 24-hour average criteria occur on occasion in Western Sydney, typically associated with periods of bushfire, hazard reduction and/or dust storms (NSW EPA, 2016).

**Emissions**

Modification 6 seeks to increase the landfill limit from 700,000 tpa to 1,000,000 tpa, to improve the operational flexibility to respond to market demand. A worst-case emissions assessment is considered based on a 50/50 split between the MPC and landfill. Modelling a scenario with 1,000,000 tpa hauled to landfill provides a conservative worst-case assessment of impacts, as hauling along the unsealed access road to the pit is the largest potential source.

Emissions inventories were developed for Total suspended particulate matter (TSP), $PM_{10}$ and $PM_{2.5}$. A conservative worst-case odour emission scenario was modelled, for landfilling at 1 Mpta plus greenwaste processing and composting at the MPC.

**Results and conclusion**

The predicted cumulative annual average $PM_{10}$ concentrations comply with the impact assessment criterion at all receptor locations. With the addition of existing background, there are no additional exceedances of the 24-hour average $PM_{10}$ impact assessment criterion at any receptor location.

The cumulative annual average $PM_{2.5}$ concentrations exceed the impact assessment criterion at all locations, however this is because the annual average background concentrations of $PM_{2.5}$ already exceed.

The cumulative 24-hour average $PM_{2.5}$ concentrations result in additional exceedances of the impact assessment criterion at residential and commercial receptor locations. This is caused by a combination of elevated background with the additional dust emissions from the modification. It is noted that the background $PM_{2.5}$ concentration on this day is already close to the impact assessment criterion (24.4 µg/m³). Additional statistical analysis shows that the probability or risk of any

additional exceedances of the 24-hour $PM_{2.5}$ impact assessment criterion does not increase significantly, above what is already caused by background (i.e. up to one additional day as a worst case).

Cumulative annual average TSP concentrations comply with the impact assessment criterion at all receptor locations. Similarly, predicted dust deposition levels comply with both the incremental and cumulative impact assessment criteria at all receptor locations.

The worst case potential odour impact from landfilling at 1 Mtpa combined with greenwaste processing and composting, would not result in exceedances of the odour goal of 2 OU at any residential receptor.

To better monitor the effectiveness of existing controls and ongoing performance of the site, the proponent will consider relocating the $PM_{10}$ monitoring site in Minchinbury to a boundary location at the northern and/or eastern site boundary.

It is noted that the modelling scenarios presented in this report are unlikely from an operational point of view; as the Facility will continue to recycle as much waste as possible with limited amounts transferred to landfill.

## CONTENTS



## TABLE OF TABLES

## TABLE OF FIGURES



## APPENDICES

# 1. INTRODUCTION

Dial A Dump Industries Pty Limited (the proponent) operates the Genesis Zero Waste Facility (the Facility) at Eastern Creek in the Blacktown Local Government Area (LGA) (**Figure A1-1**). The facility is at 1 Kangaroo Avenue and comprises a Materials Processing Centre (MPC) and a general solid waste (non-putrescible) landfill (**Figure A1-2**).

The original project approval for the site was granted by the Minister for Planning in 2009 (MP 06_0139) under Section 75J of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act). The operations commenced in 2012 and the project approval has been modified five times, most recently in March 2016.

The Facility is approved to accept up to 2 million tonnes per annum (Mtpa) of construction, demolition, commercial and industrial waste. The majority of the waste is directed to the MPC for sorting, processing and resale as products suitable for application to land such as road base. Material which is not suitable for recycling is disposed in the landfill, which is approved to accept up to 700,000 tonnes per annum (tpa) of rejects from the and waste received from offsite.

The proponent proposes to modify the project approval to alter the hours of operation and increase the landfill limit from 700,000 tonnes per annum to 1,000,000 tonnes per annum (excluding waste generated by recycling processes within the MPC.

This will enable the facility to have flexibility to accept the waste streams that will likely be generated during planned major construction projects in Sydney, some of which will be generated outside standard construction hours.

Ramboll has been commissioned to prepare an air quality impact assessment (AQIA) to support the environmental assessment (EA) prepared by EMM Consulting Pty Limited (EMM) for the modification.

## 1.1 Overview of Modification 6

### 1.1.1 Operating hours

The construction and operating hours are proposed to be changed to meet the demand of large infrastructure 24-hour construction projects such as motorways and commercial/residential development and to enable maintenance and cleaning outside of standard hours. The approved construction and operating hours from the project approval (Table 5 of Condition 39) are in **Table 1-1**.

**Table 1-1: Approved hours**

| Activity | Days | Hours |
|---|---|---|
| Construction | Monday-Friday | 7am-6pm |
| | Saturday | 8am-4pm |
| | Sunday and public holidays | Nil |
| Operations (waste deliveries and use of chute) | Monday-Friday | 7am-6pm |
| | Saturday, Sunday and public holidays | 8am-4pm |
| Operations (MPC) | Monday-Friday | 6am-10pm |
| | Saturday, Sunday and public holidays | 6am-4pm |

The proposed revised operating hours are in **Table 1-2**, which is proposed to replace Table 5 of Condition 39.

**Table 1-2: Proposed hours**

| Activity | Sub-activity | Days | Hours |
|---|---|---|---|
| **Construction** | | Monday-Friday | 6am-6pm |
| | | Saturday | 8am-4pm |
| | | Sunday and public holidays | Nil |
| **Operations (waste deliveries, processing and landfilling)** | | | |
| MPC and PSE | Receive materials | Monday-Sunday | 24 hours |
| | Operations | Monday-Sunday | 24 hours |
| SMA | Receive materials | Monday-Sunday | 24 hours |
| | Crushing and screening | Monday-Sunday | 6am-6pm |
| Landfill | Receive materials by truck | Monday-Sunday[1] | 5am-9pm |
| | Convey waste from MPC to landfill via chute | Monday-Sunday | 24 hours |
| **Maintenance** | | | |
| MPC, PSE and landfill | Repair machinery | Monday-Sunday | 24 hours |
| SMA | Cleaning and machinery repairs | Monday-Sunday | 24 hours |
| Chute | Clearing of blockages and general repairs | Monday-Sunday | 24 hours |

1.1.2 Landfill limit

The 700,000 tpa limit on landfilling is proposed to be increased to 1,000,000 tpa (excluding waste generated by recycling processes within the MPC and the Pre-Sort Building (PSB), which are the two stages of sorting materials in the co-mingled waste recycling stream). This will enable the Facility to provide waste disposal services for Sydney's current and proposed major construction projects including those in Western Sydney, which are likely to contain large volumes of material which cannot be recycled such as asbestos containing material.

## 1.2 Study objectives and requirements

The AQIA has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs), issued by NSW Department of Planning and Environment (DP&E) on 3 April 2017, as well as specific requirements provided by the NSW Environment Protection Authority (EPA) and Blacktown Council.

**Table 1-3** provides a summary of the SEARs and agency comments relevant to this study and where the requirement has been addressed in this report.

**Table 1-3: Summary of SEARs for air quality**

| Requirement | How requirement is addressed |
|---|---|
| **SEARs** | |
| *Air Quality – including an assessment of the impacts of air emissions on all surrounding receivers, including dust, odour and other potential pollutants.* | Report prepared in accordance with the Approved Methods (refer **Section** 2). |
| **NSW EPA's requirement** | |
| *Impacts of air emissions on all receivers, including odour from the Premises must be assessed.* | Report prepared in accordance with the Approved Methods (refer **Section** 2). |
| *The EPA is concerned that the proposal to increase operating hours and removal of the landfill cap of 700,000 tonnes per annum will dramatically increase the volume of waste material entering the Premises, and as a result will potentially be generating an increase of pollutants discharged to air. The Proponent must demonstrate effective control of dust, odour and other potential pollutants from the Premises in particular how it will be managed during the increased hours of operation.* | It is noted that the modification seeks to increase the landfill limit from 700,000 tpa to 1,000,000 tpa. A worse case modelling scenario is assessed based on 1 Mtpa being processed through the MPC and 1 Mtpa directed to landfill. |
| *In addition the preliminary proposal states odour is never an issue during MPC operations. There have been odour complaints relating to the Premises from the public. The complaints register on the Proponents website also confirms this. The Proponent must consider odour from the MPC and the Landfill and all potential pollutants which may be generated. The Proponent must prepare an assessment of the impacts of odour from the Premises, in particular from the landfill. The assessment must consider the impact that the increased operational activities within the landfill will have on odour as it must be considered that it would be possible for the proponent to landfill up to 2 million tonnes of waste per year.* | It is noted that the modification seeks to increase the landfill limit from 700,000 tpa to 1,000,000 tpa.<br>Worst case potential odour emissions and impacts are discussed and presented in **Section 6.2** and **Section 7.4** |
| **Blacktown Councils response** | |
| *Potential odour impacts of the 24/7 operation including machinery emissions and greenwaste activities (given the stockpiling of green waste is approved in this application. Should greenwaste no longer form part of this project, it should be deleted from the application).* | Odour from 24/7 operations, including greenwaste processing is addressed in **Section 6.2** and **7.4** |

# 2. STUDY APPROACH

## 2.1 Assessment approach

The approach to the assessment follows guidelines recommended in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* ("the Approved Methods") (NSW EPA, 2016). Local air quality impacts are assessed using a Level 2 assessment approach (i.e. refined dispersion modelling technique using site-representative input data). The assessment approach is summarised as follows:

- Key pollutant indicators are identified, in this case dust and odour.
- Emissions are estimated for all dust generating activities associated with the facility.
- Dispersion modelling is undertaken using a regulatory dispersion model to predict ground level concentrations (GLCs) for key pollutants at nearby sensitive receptors.
- Cumulative impacts are assessed by taking into account the combined effect of facility with existing baseline air quality and/or other local sources of emissions.

## 2.2 Assessment scenarios

Modification 6 seeks to increase the landfill limit from 700,000 tpa to 1,000,000 tpa, to improve the operational flexibility to respond to market demand. For typical operations, 60%-80% of material enters the MPC and 20% to 40% of material is directed to landfill. A worst-case emissions assessment is considered based on a 50/50 split between the MPC and landfill. Modelling a scenario with 1,000,000 tpa hauled to landfill provides a conservative worst-case assessment of impacts, as hauling along the unsealed access road to the pit is the largest potential source.

## 2.3 Pollutant indicators

The key pollutants of concern during the operation of the Genesis facility are:

- Fugitive dust / particulate matter (PM), generated from waste receipt, handling, processing and product dispatch.
- Odour from greenwaste processing, landfilling and leachate management.

The combustion of diesel in trucks and other equipment would result in combustion-related emissions including PM, oxides of nitrogen (NOx), sulfur dioxide (SO2), carbon dioxide (CO2), carbon monoxide (CO) and volatile organic compounds (VOCs).

Combustion derived PM has been included as part of the overall site emissions, as for $PM_{2.5}$, in particular, it can be a relatively important component of total site emissions. Other combustion derived emissions however have not been quantitatively assessed, as they would not result in significant off-site concentrations.

The air quality indicators that have been considered in this report are summarised in **Table 2-1**.

**Table 2-1: Air quality indicators for assessment**

| Emission source | Air quality indicator |
|---|---|
| Waste handling, processing and product dispatch | Particulate matter (TSP[1], $PM_{10}$[2] and $PM_{2.5}$[3]) |
| | Nuisance dust (dust deposition) |
| Diesel fuel combustion | $PM_{10}$ and $PM_{2.5}$ |
| Greenwaste processing, landfilling and leachate management | Odour |

Note:
[1] Total Suspended Particulate matter
[2] Particulate matter less than 10 microns in aerodynamic diameter
[3] Particulate matter less than 2.5 microns in aerodynamic diameter

## 2.4 Assessment criteria

### 2.4.1 Particulate matter

When first regulated, airborne PM was assessed based on concentrations of "total suspended particulate matter" (TSP). In practice, this typically referred to PM smaller than about 30-50 micrometres (µm) in diameter. As air sampling technology improved and the importance of particle size and chemical composition become more apparent, ambient air quality standards have been revised to focus on the smaller particle sizes, thought to be most dangerous to human health. Contemporary air quality assessment typically focuses on "fine" and "coarse" inhalable PM, based on health-based ambient air quality standards set for $PM_{10}$ and $PM_{2.5}$.

Air quality criteria for PM in Australia are given for particle size metrics including TSP, $PM_{10}$ and $PM_{2.5}$. The 2016 update to the 'Approved Methods', gazetted on 20 January 2017, includes particle assessment criteria that are consistent with revised National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM) national reporting standards (National Environment Protection Council [NEPC], 1998; NEPC, 2015).

For the purpose of this report, predicted ground level concentrations (GLCs) are assessed against the NSW EPA's impact assessment criteria presented in **Table 2-2**.

**Table 2-2: Impact assessment criteria for PM**

| PM metric | Averaging period | Concentration (µg/m³) |
|---|---|---|
| TSP | Annual | 90 |
| $PM_{10}$ | 24 hour | 50 |
| | Annual | 25 |
| $PM_{2.5}$ | 24 hour | 25 |
| | Annual | 8 |

Note: µg/m³ = micrograms per cubic metre.

The Approved Methods specifies that the impact assessment criteria for 'criteria pollutants[1]' are applied at the nearest existing or likely future off-site sensitive receptor and compared against the 100th percentile (i.e. the highest) dispersion modelling prediction. Both the incremental and cumulative impacts need to be considered (consideration of existing ambient background concentration is required).

The Approved Methods also prescribes nuisance based goals for dust deposition, which relate to amenity type impacts such as soiling of exposed surfaces. The NSW EPA impact assessment criteria for dust deposition are summarised in **Table 2-3**, illustrating the maximum increase and total dust deposition rates which would be acceptable so that dust nuisance can be avoided.

**Table 2-3: Dust deposition criteria**

| Pollutant | Maximum Increase in Dust Deposition | Maximum Total Dust Deposition Level |
|---|---|---|
| Deposited dust (assessed as insoluble solids) | 2 g/m²/month | 4 g/m²/month |

Note: g/m² = grams per square metre.

[1] 'Criteria pollutants' is used to describe air pollutants that are commonly regulated and typically used as indicators for air quality. In the Approved Methods, the criteria pollutants are TSP, $PM_{10}$, nitrogen dioxide ($NO_2$), sulphur dioxide ($SO_2$), carbon monoxide (CO), ozone ($O_3$), deposited dust, hydrogen fluoride and lead.

#### 2.4.2 Odour

Dynamic olfactometry is the accepted method of odour measurement and involves a sample of odorous air being presented to a panel of people with decreasing quantities of clean odour-free air. The panellists note when the smell becomes detectable and the correlation between the known dilution ratios and the panellists' responses are used to calculate the number of dilutions required to achieve the odour detection threshold. The units for odour measurement are "odour units" (ou), which, according to the method described above, are effectively "dilutions to threshold".

The odour nuisance level can be as low as 2 ou and as high as 10 ou (for less offensive odours), whereas an odour assessment criterion of 7 ou is likely to represent the level below which 'offensive' odours should not occur. The NSW EPA's *Technical framework - Assessment and management of odour from stationary sources in NSW* (NSW EPA, 2006a) recommends that, as a design criterion, no individual should be exposed to ambient odour levels of greater than 7 ou.

The Approved Methods prescribes odour goals which take into account the population density for a particular area. The most stringent odour goal of 2 ou is acceptable for the whole population and therefore appropriate for urban areas (NSW EPA, 2016).

The 2 ou odour goal should be compared against the 99$^{th}$ percentile of the dispersion modelling predictions. The 1-hour average dispersion modelling prediction is converted to a peak (i.e. 1-second 'nose response average') based on a peak to mean ratio of 2.3, in accordance with the Approved Methods.

## 2.5 Overview of modelling approach

The modelling for this assessment uses a combination of TAPM and CALMET/CALPUFF, as follows:

- TAPM is used to generate gridded three-dimensional upper air data for each hour of the model run period for input into CALMET.
- CALMET, the meteorological pre-processor for the dispersion model CALPUFF, calculates fine resolution three-dimensional meteorological data using a combination of surface observations and the prognostic TAPM upper air data.
- CALPUFF then calculates the dispersion of plumes within this three-dimensional meteorological field.

## 2.6 Cumulative impacts

Cumulative impacts are assessed by combining the contribution from the Facility with the existing ambient air quality environment, described based on baseline monitoring data for the region (refer to **Section 5**). The derived baseline is assumed to account for all existing emissions sources in the local airshed.

# 3. LOCAL SETTING AND ASSESSMENT LOCATIONS

## 3.1 Location

The facility is on a site that comprises 52 hectares (ha) at the following lots (**Figure A1-2**):

- Lot 1 DP 1145808; and
- Lot 8 DP 1200048.

The site address is 1 Kangaroo Avenue. It is accessed from Kangaroo Avenue. The volume of the final quarry void was estimated to be 11 million $m^3$.

## 3.2 Surrounding land use

The site is in an area being developed for commercial and industrial use under State Environmental Planning Policy (Western Sydney Employment Area) 2009. Adjacent landowners are:

- Australand, which owns and leases warehousing to the north-east;
- Hanson, which owns an asphalt batching plant to the south-east;
- NSW Department of Planning and Infrastructure, which owns vacant land to the south-west; and
- Sargents, which is developing land to the west.

The site is surrounded by Kangaroo Avenue to the east and north-east, the M4 Western Motorway to the north, Archbold Road to the west and the future Precinct Road to the south.

Further afield there is residential development in Minchinbury beyond the Western Motorway to the north and in Erskine Park beyond Archbold Road to the west, and predominantly undeveloped land containing high voltage powerlines to the west and south-west.

## 3.3 Sensitive receivers

The residential areas of Minchinbury are approximately 430 m north and of Erskine Park approximately 1,200 m west of the nearest site boundaries. The nearest commercial premises are adjacent to the northern boundary of the site. Locations representative of these sensitive receivers have been identified and selected as discrete sensitive receptors (refer to **Figure A5-1** in **Appendix 5**).

Nearby residences and industrial / commercial facilities not identified as discrete sensitive receptors can be assessed with reference to the contour plots presented in this report, which show predicted ground level concentrations of key pollutants across all areas in the vicinity of the facility.

# 4. OVERVIEW OF LOCAL AND REGIONAL METEOROLOGY

## 4.1 Introduction

Meteorological mechanisms govern the generation, dispersion, transformation and eventual removal of pollutants from the atmosphere. To adequately characterise the dispersion meteorology of a region, information is needed on the prevailing wind regime, ambient temperature, rainfall, relative humidity, mixing depth and atmospheric stability.

Analysis of meteorology for region is presented based on the closest Bureau of Meteorology (BoM) automatic weather station (AWS) and NSW Office of Environment and Heritage (OEH) monitoring sites, as follows:

- St Marys OEH site – located approximately 6 km west of the site.
- Horsley Park Equestrian Centre AWS– located approximately 6 km southeast of the site.
- Badgerys Creek AWS – located approximately 14 km southwest of the site.
- Penrith Lakes AWS – located approximately 16.5 km west of the site.
- Bankstown Airport AWS – located approximately 19 km southeast of the site.
- Holsworthy Control Range AWS – located approximately 21.5 km southeast of the site.
- Sydney Olympic Park AWS - located approximately 22 km southeast of the site.
- Richmond RAAF AWS - located approximately 23 km northwest of the site.
- Camden Airport AWS – located approximately 29 km southwest of the site.

These surface observation sites are included in the modelling (referred to as data assimilation) to provide real-world observations and improve the accuracy of the wind field. It is noted that the proponent operates an on-site weather station, however the station is used for operational dust control (i.e. to trigger water sprays) and the siting makes it unsuitable for the purposes of dispersion modelling. It is also noted that another OEH monitoring site at Prospect, located 8 km east of the site, has not been used for data assimilation. This site is compared to CALMET meteorology to review and evaluate the accuracy and representativeness of the predicted wind field (**Section 4.4**).

In the absence of upper air measurements, CALMET is run using prognostic upper air data (three-dimensional '3D.dat' file generated using TAPM), used to drive an 'initial guess' wind field. The model then incorporates mesoscale and local scale effects, including the surface observations, to adjust the final wind field. This modelling approach is known as the "hybrid" approach (TRC, 2011). TAPM and CALMET model settings are described in **Appendix 2**, selected in accordance with recommendations in the Approved Methods and in TRC (2011).

## 4.2 Selecting a representative year for modelling

To select a representative year for modelling, five years of monitoring data were reviewed from the sites closest to the Genesis facility (Horsley Park and St Marys). These sites are those most likely to influence CALMET modelling, based on the selected radius of influence (R1 and RMAX, as described in **Appendix 2**).

Annual wind roses for the period 2012 to 2016 for both Horsley Park and St Marys are presented in **Figure 4-1** and **Figure 4-2**. The wind roses demonstrate a high degree of consistency in winds across the five years, in terms of wind direction, average winds speed and percentage occurrence of calms conditions. Based on this review, the calendar year 2016 is selected as a suitable representative year for modelling.

Furthermore, ambient temperature recorded during 2016 is compared with long-term records at the BoM Prospect Reservoir long term monitoring station and shown to correlate well with the long-term trends. The minimum, maximum, mean and upper and lower quartile temperatures for each month of the modelling year (2016) are presented as a box and whisker plot shown in **Figure 4-3**, and show that the upper and lower quartile and mean temperatures fall within the long term mean monthly maximum and minimum temperatures.

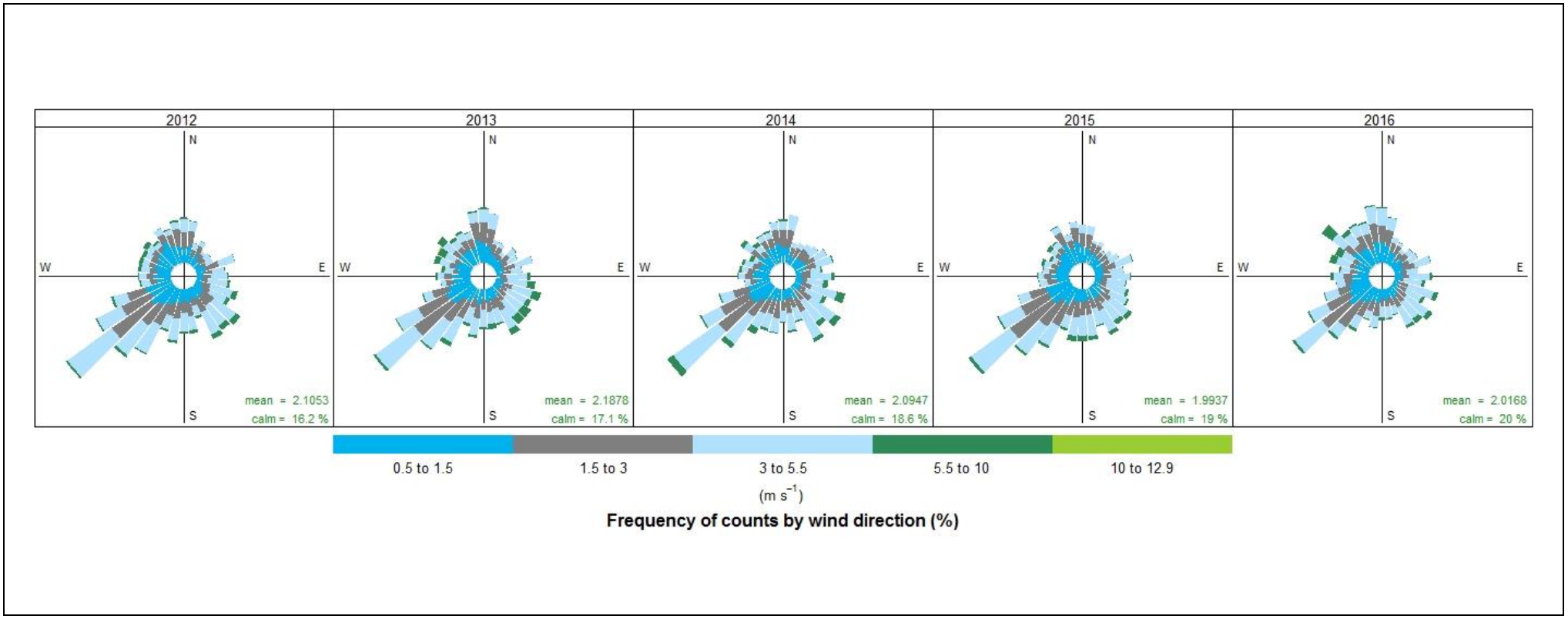



**Figure 4-1: Annual wind rose for Horsley Park BoM site – 2012 - 2016**

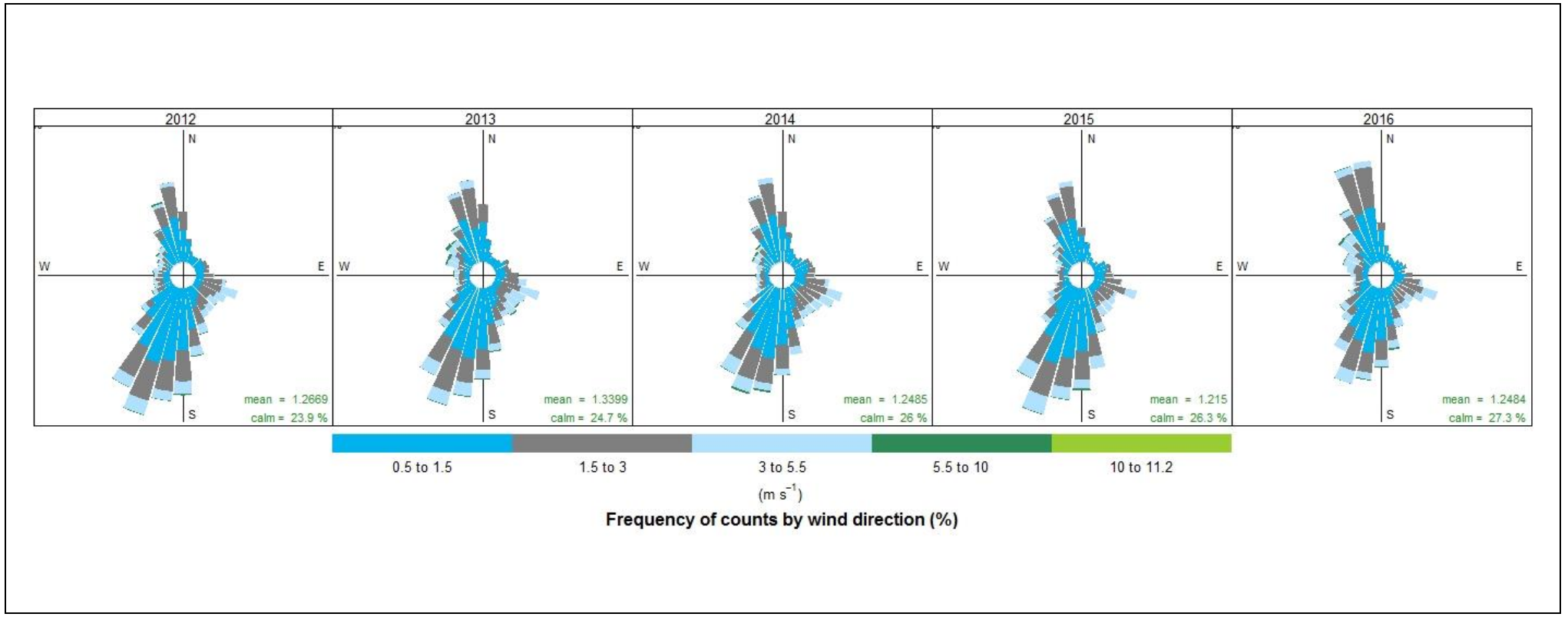
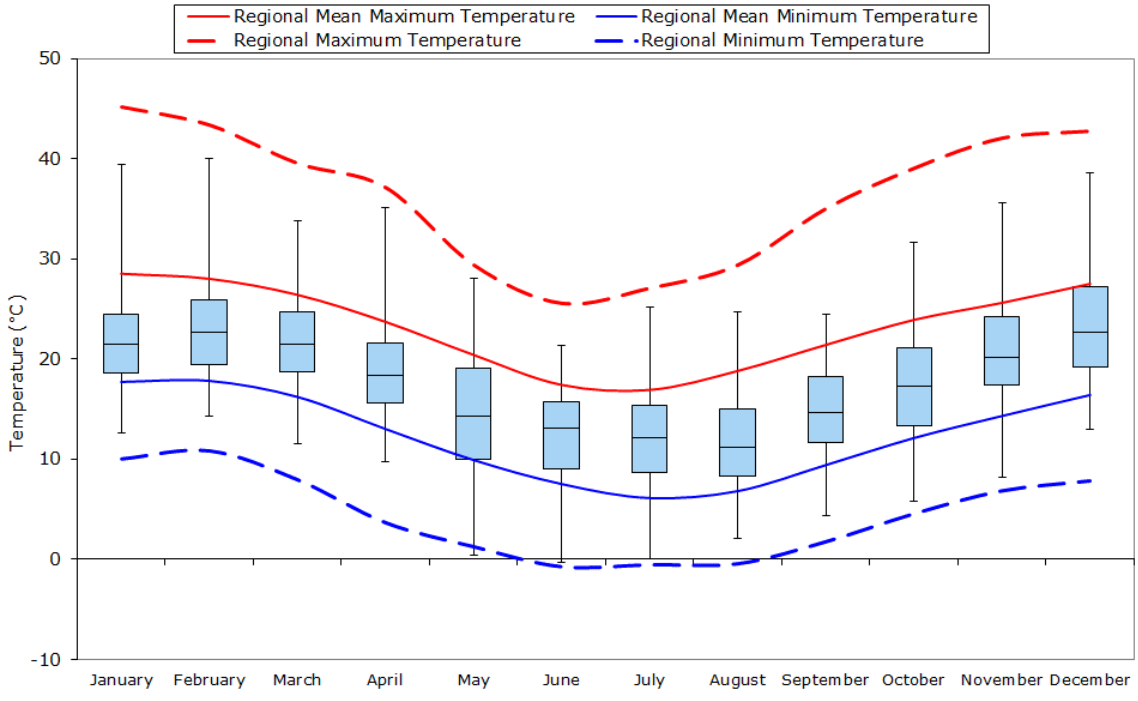



**Figure 4-2: Annual wind rose for St Marys OEH site – 2012 - 2016**




2016 data are illustrated by the 'box and whisker' plot. Boxes indicate 25th, median and 75th percentile temperature values while upper and lower whiskers indicate maximum and minimum values.

**Figure 4-3: Comparison of long-term temperature records with modelling period**

## 4.3 Prevailing winds for the region

The 2016 annual wind rose for each surface observation site is presented in **Figure 4-4**. The dominant prevailing wind pattern varies across the region. At some of the observations sites, it appears that local features influence the prevailing winds (for example Sydney Olympic Park and St Marys).

Across many of the sites there is a dominant southwest component to the annual wind rose, although winds from all directions are recorded for a small percentage of time. Average wind speeds range from 2 to 3 metres per second (m/s) while the percentage occurrence of calm winds (<0.5 m/s) ranges from low at Holsworthy (7%) to high St Marys (33%).

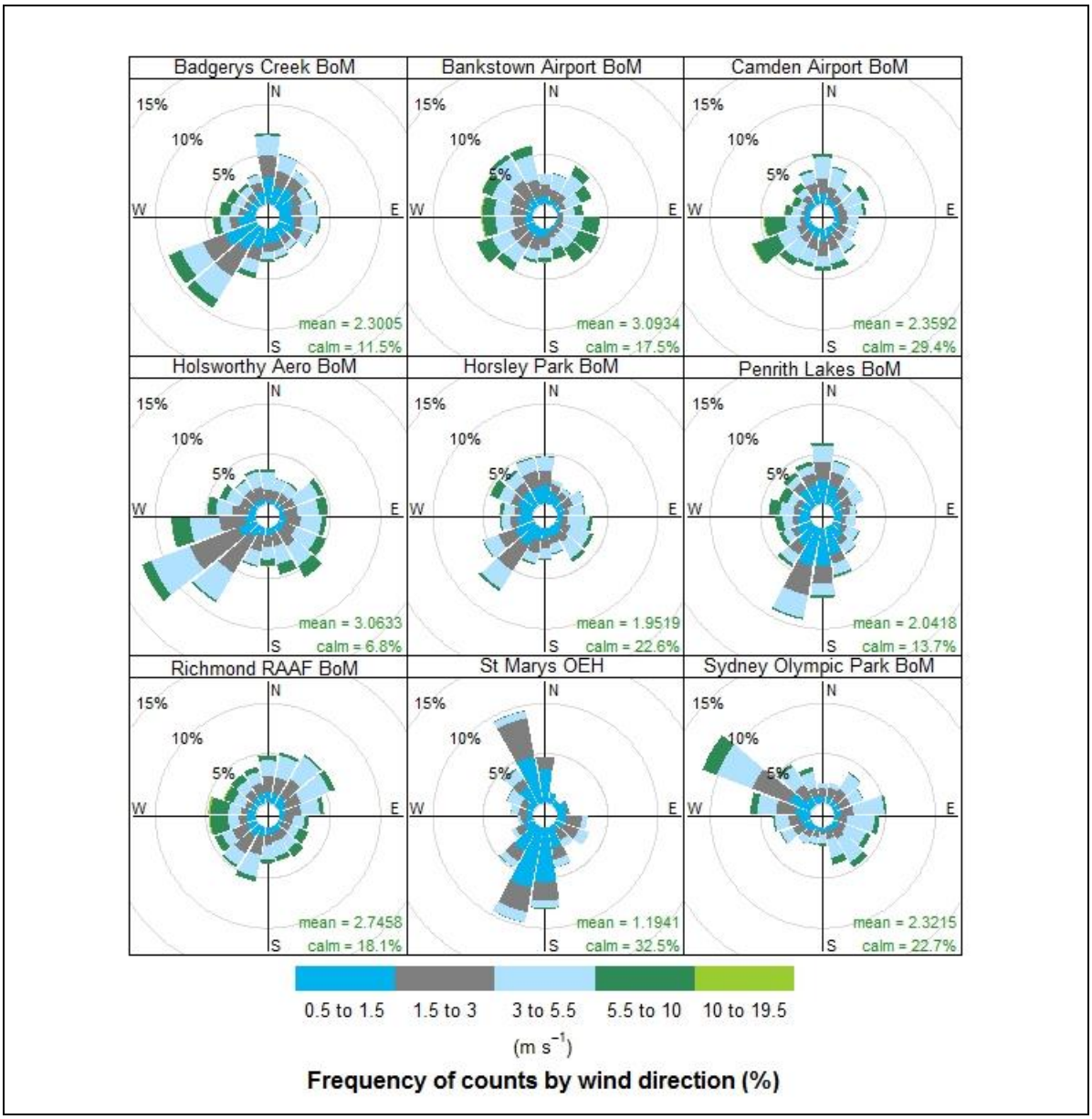



**Figure 4-4: Annual wind roses for the region**

## 4.4 Evaluation of CALMET predicted winds

CALMET is a non-steady state model which generates a temporal and spatial varying wind field across the modelling domain; therefore, no single wind rose is representative of the dispersion conditions used by the model. However, an evaluation of CALMET performance is presented in **Figure 4-5**, comparing predicted CALMET winds with observations at the Badgerys Creek BoM site.

To facilitate this comparison, the CALMET model was run without data assimilation for the Badgerys Creek BoM site. The wind rose presented in **Figure 4-5** shows comparable wind directions, wind speeds and percentage occurrence of calm winds between observed and predicted and based on this comparison, it is concluded the model predicts regional wind conditions with a suitable level of accuracy.

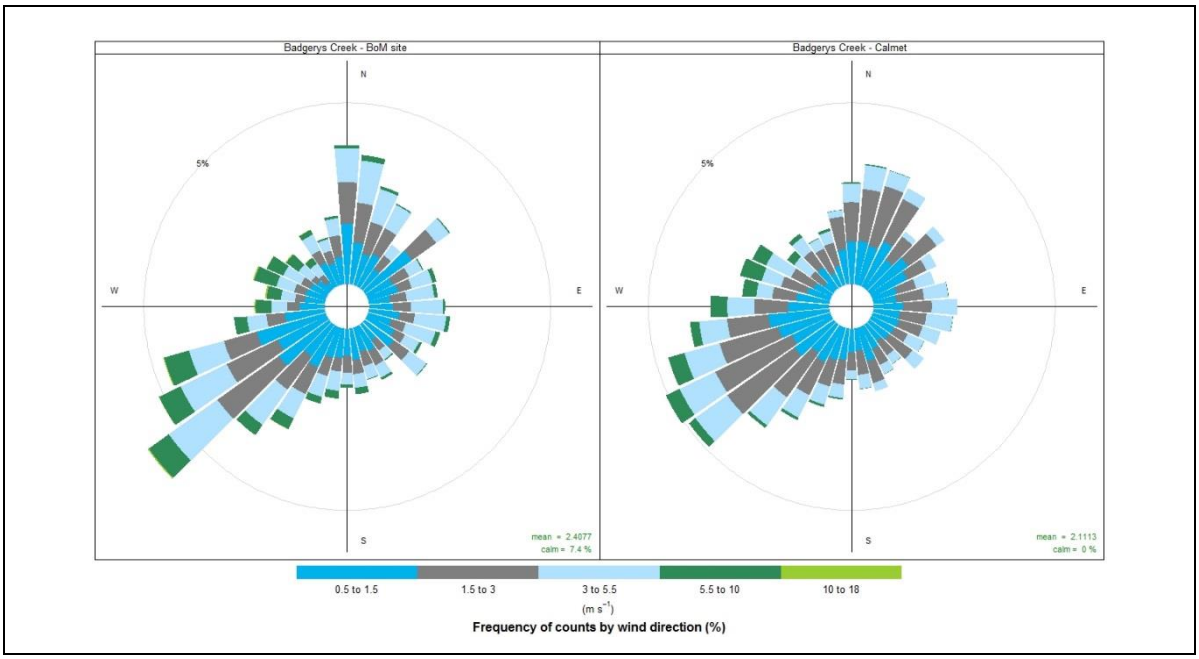



**Figure 4-5: Comparisons of observed and CALMET predicted winds for the Badgerys Creek BoM site**

A further comparison is presented in **Figure 4-6**, showing CALMET winds at the Genesis site (indicative of dispersion conditions in the immediate vicinity of the emission source) and observations at Prospect, approximately 8 km to the east. Prospect was not included as a data assimilation site for modelling.

The wind roses display similar patterns, with winds recorded from most directions and a slightly higher frequency of occurrence from the south west quadrant at both sites. Prospect records a slightly higher frequency of occurrence from the north and northwest quadrant, compared to CALMET. Annual average wind speeds are comparable (1.5 m/s and 1.8 m/s) while the percentage occurrence of calm winds is higher onsite (19%) compared to Prospect (10%). Based on this comparison, it is concluded that the CALMET derived wind field provides a suitable representation of local meteorology for the assessment. Seasonal and diurnal wind roses for CALMET at the Genesis site are shown in **Appendix 3**.

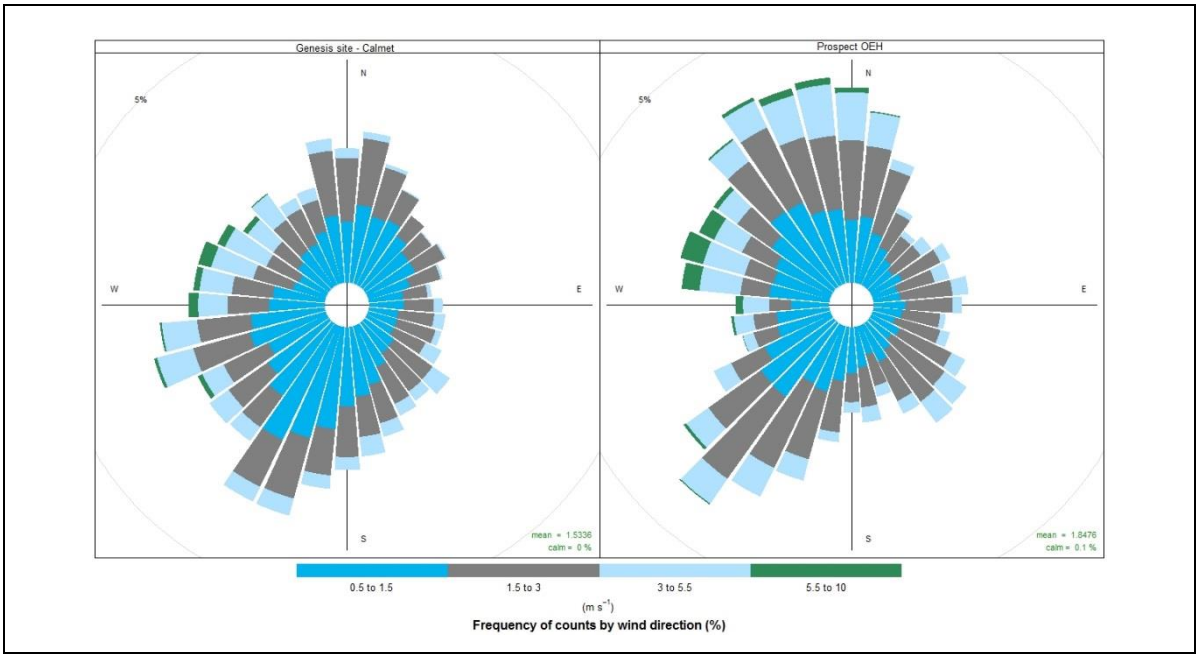


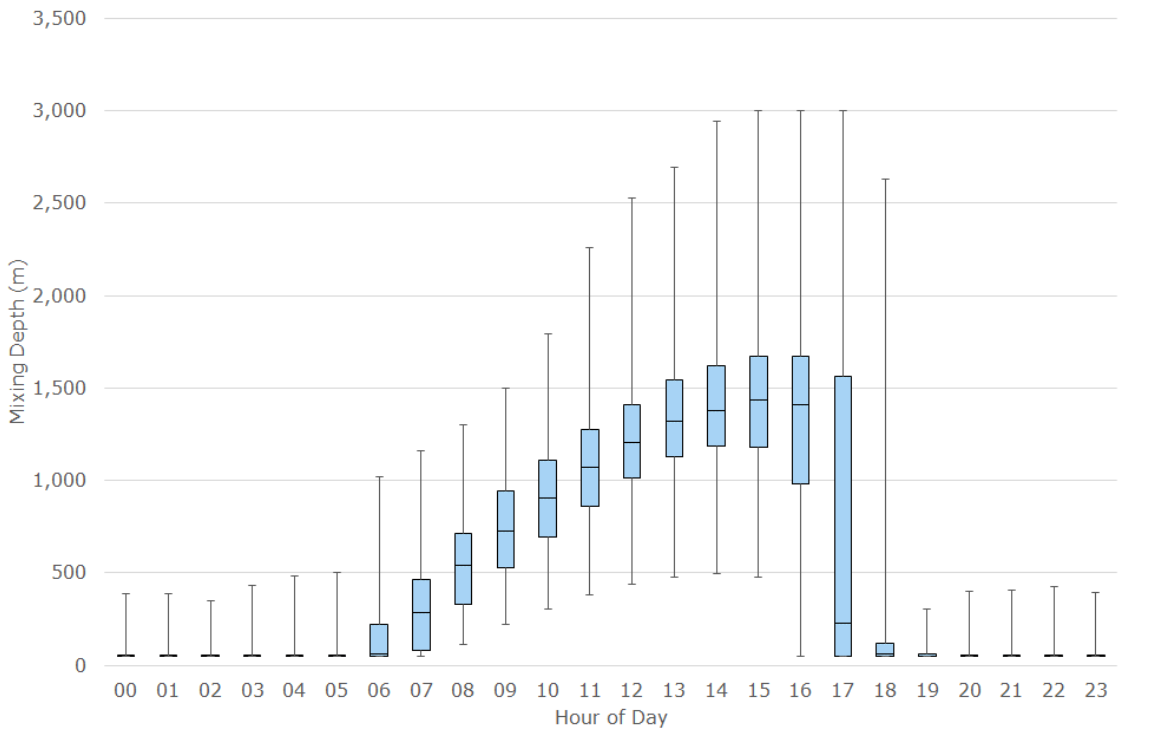

**Figure 4-6: Comparisons of CALMET winds for the Genesis site with Prospect OEH**

## 4.5 Atmospheric boundary layer heights

The atmospheric boundary layer constitutes the first few hundred metres of the atmosphere. This layer is directly affected by the earth's surface, either through the retardation of air flow due to the frictional drag of the earth's surface (mechanical mechanisms), or as result of the heat and moisture exchanges that take place at the surface (convective mixing) (Stull, 1997; Oke, 2003).

During the daytime, the atmospheric boundary layer is characterised by thermal turbulence due to the heating of the earth's surface and the extension of the mixing layer to the lowest elevated subsidence inversion. Due to radiative flux divergence, nights are typically characterised by weak to no vertical mixing and the predominance of stable conditions. These conditions are normally associated with low wind speeds and hence lower dilution potentials.

CALMET generated mixing heights are extracted at site and the average boundary layer heights by hour of the day is shown in **Figure 4-7**. As seen in median and upper and lower quartiles, the highest boundary layer heights are experienced during the day time hours, peaking in the mid to late afternoon. Higher day-time wind velocities and the onset of incoming solar radiation increases the amount of mechanical and convective turbulence in the atmosphere. As turbulence increases so too does the depth of the boundary layer, generally contributing to higher mixing depths and greater potential for atmospheric dispersion of pollutants.




Lower, middle and upper box markers indicate 25th percentile, median and 75th percentile of CALMET-generated mixing height data respectively, while upper and lower whiskers indicate maximum and minimum values.

**Figure 4-7: CALMET-generated diurnal variations in average boundary layer depth**

## 4.6 Atmospheric stability

Atmospheric stability refers to the degree of turbulence or mixing that occurs on the atmosphere and is a controlling factor in the rate of atmospheric dispersion of pollutants. The Monin-Obukhov length (L) provides a measure of the stability of the surface layer (i.e. the layer above the ground in which vertical variation of heat and momentum flux is negligible - typically about 10% of the mixing height). Negative L values correspond to unstable atmospheric conditions, while positive L values correspond to stable atmospheric conditions. Very large positive or negative L values correspond to neutral atmospheric conditions.

**Figure 4-8** illustrates the diurnal variation of atmospheric stability derived from the Monin-Obukhov length calculated by CALMET. The diurnal profile at all locations illustrates that atmospheric instability increases during daylight hours as convective energy increases, while stable atmospheric conditions prevail during the night-time. The potential for atmospheric dispersion of emissions is therefore greatest during day time hours and lowest during evening through to early morning hours.

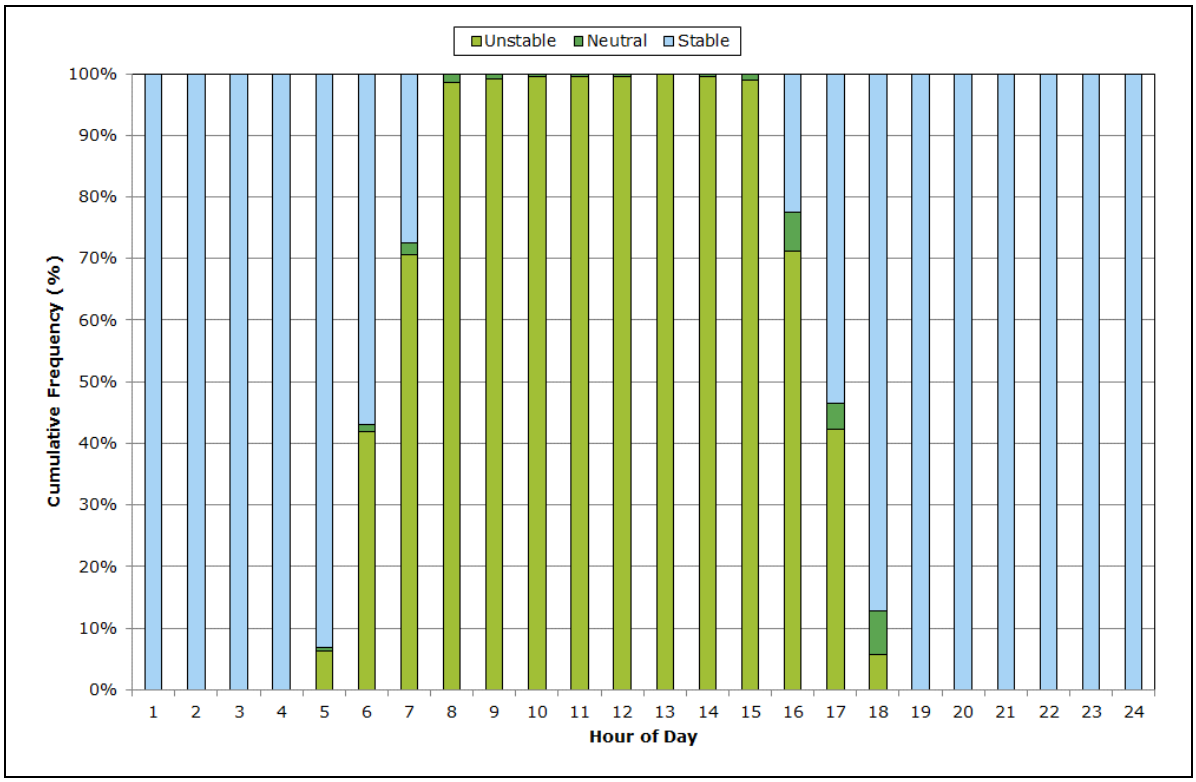



**Figure 4-8: Diurnal variations in atmospheric stability derived from CALMET generated Monin-Obukhov length**

# 5. EXISTING ENVIRONMENT

## 5.1 $PM_{10}$ and $PM_{2.5}$

The Facility operates a BAM $PM_{10}$ monitor at Minchinbury, which has been operational since mid-2012 and summary statistics for the modelling period (2016) are presented in **Table 5-1**. Reference is also made to the closest OEH sites at St Marys and Prospect (within 6 km of the site). Both OEH sites measure concentrations of $PM_{10}$ and $PM_{2.5}$ (which is not measured by the Facility), although it is noted that $PM_{2.5}$ was only added as a parameter at St Marys in March 2016.

Annual mean $PM_{10}$ concentrations across the three sites are 61% to 76% of the impact assessment criteria, while annual mean $PM_{2.5}$ concentrations for the region are 98%-108% of the impact assessment criteria (i.e. already at or above the impact assessment criteria). Elevated concentrations of $PM_{2.5}$ for the Western Sydney region are strongly influenced by vehicle emissions (cars, trucks and off-road equipment) and from wood heaters during winter months.

A timeseries plot of the 24-hour average concentrations in **Figure 5-1** shows the periods when the 24-hour average $PM_{10}$ concentration exceeds 50 µg/m³ and in **Figure 5-2** when the 24-hour average $PM_{2.5}$ concentration exceeds 25 µg/m³. Exceedances of the 24-hour average criteria in Sydney are typically associated with periods of bushfire, hazard reduction and/or dust storms (NSW EPA, 2016).

**Table 5-1: 2016 summary statistics (µg/m³) for $PM_{10}$ and $PM_{2.5}$**

| Metric | Statistic | Genesis | St Marys | Prospect |
|---|---|---|---|---|
| **$PM_{10}$** | Annual mean | 15.3 | 16.1 | 18.9 |
| | Daily maximum | 125.0* | 100.2 | 110.1 |
| | 95$^{th}$ percentile | 27.0 | 29.9 | 33.7 |
| | 90$^{th}$ percentile | 23.7 | 26.4 | 29.5 |
| | Number of exceedances | 2* | 3 | 4 |
| **$PM_{2.5}$** | Annual mean | - | 7.8 | 8.7 |
| | Daily maximum | - | 93.2 | 84.9* |
| | 95$^{th}$ percentile | - | 13.7 | 17.8 |
| | 90$^{th}$ percentile | - | 11.4 | 14.0 |
| | Number of exceedances | - | 5 | 5* |
| Note: * Not based on a full year of observations so not a true daily maximum or number of exceedances | | | | |

## 5.2 TSP

TSP concentrations are not measured in the vicinity of the site, however historical measurements of TSP and $PM_{10}$ in Sydney[2] indicate that $PM_{10}$/TSP ratios in urban areas typically range from 0.4 to 0.5. These ratios can be applied to the $PM_{10}$ concentration data to derive an annual average TSP concentration.

## 5.3 Dust deposition

Dust deposition is measured at four locations on the site and results for the previous four years are summarised in **Table 5-2**. The measured dust deposition across all sites and years is 1.7 g/m$^2$/month, which is consistent with background measurements seen across much of NSW (which is typically in the range of 1 g/m$^2$/month to 2 g/m$^2$/month).

[2]Reported in Quarterly Air Quality Monitoring Reports - http://www.environment.nsw.gov.au/aqms/datareports.htm#quarterlies

**Table 5-2: Annual average dust deposition**

| Site | 2016 | 2015 | 2014 | 2013 | Average |
|---|---|---|---|---|---|
| North DDG | 1.1 | 2.9 | 1.9 | 1.3 | **1.6** |
| East DDG | 1.5 | 2.9 | 1.4 | 2.0 | **1.8** |
| South DDG | 1.6 | 1.6 | 1.9 | 1.8 | **1.7** |
| West DDG | 2.1 | 1.8 | 2.4 | 1.6 | **1.8** |
| **Average** | **1.2** | **1.6** | **2.3** | **1.9** | **1.7** |

## 5.4 Adopted background for cumulative assessment

The baseline air quality adopted for cumulative assessment is summarised in **Table 5-3**. Annual average concentrations are generally based on the highest of the mean concentrations presented in **Table 5-1** (i.e. the Prospect monitoring site), however gaps in the daily data have been filled using both St Marys and the Facility's datasets. In the case of $PM_{2.5}$ (which isn't measured at the Facility and was only added at St Marys in March 2016) additional gaps in the daily data are estimated from the average $PM_{10}/PM_{2.5}$ ratio from the available data.

As previously described, background concentrations of $PM_{2.5}$ are already approaching or exceeding the impact assessment criteria and therefore assessment of impact will also be discussed in the context of the incremental increase from the proposal. For short term impacts, daily varying $PM_{10}$ and $PM_{2.5}$ concentrations in 2016 are paired with modelling predictions for the same period.

**Table 5-3: Adopted background for cumulative assessment**

| Pollutant | Averaging period | Adopted background value |
|---|---|---|
| $PM_{10}$ | 24-hour average | Daily varying |
| | Annual average | 18.9 µg/m³ |
| $PM_{2.5}$ | 24-hour average | Daily varying |
| | Annual average | 8.6 µg/m³ |
| TSP | Annual average | 47.2µg/m³ |
| Dust deposition | Annual average | 2 g/m²/month |

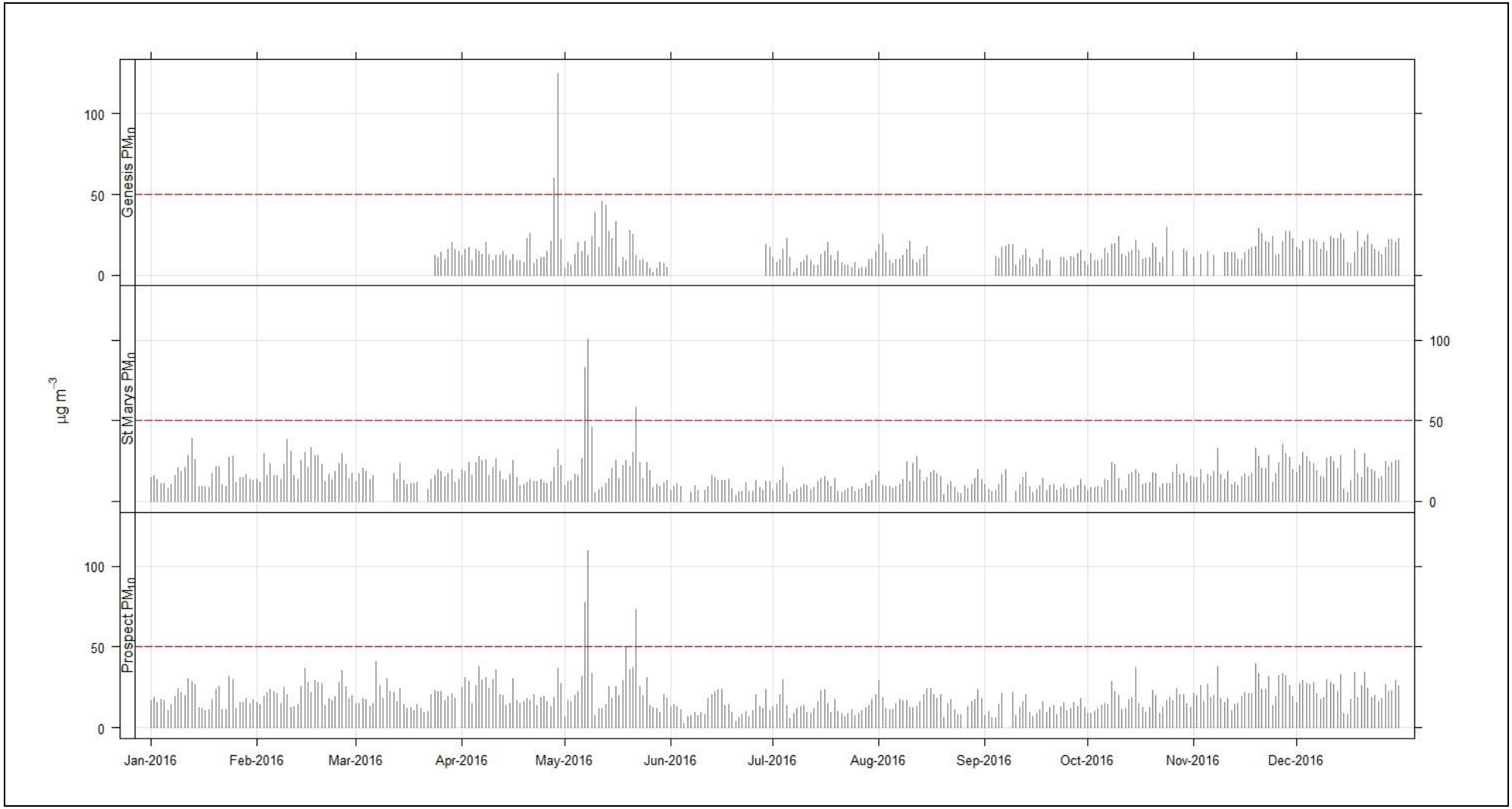



**Figure 5-1: 24-hour average $PM_{10}$ concentrations**

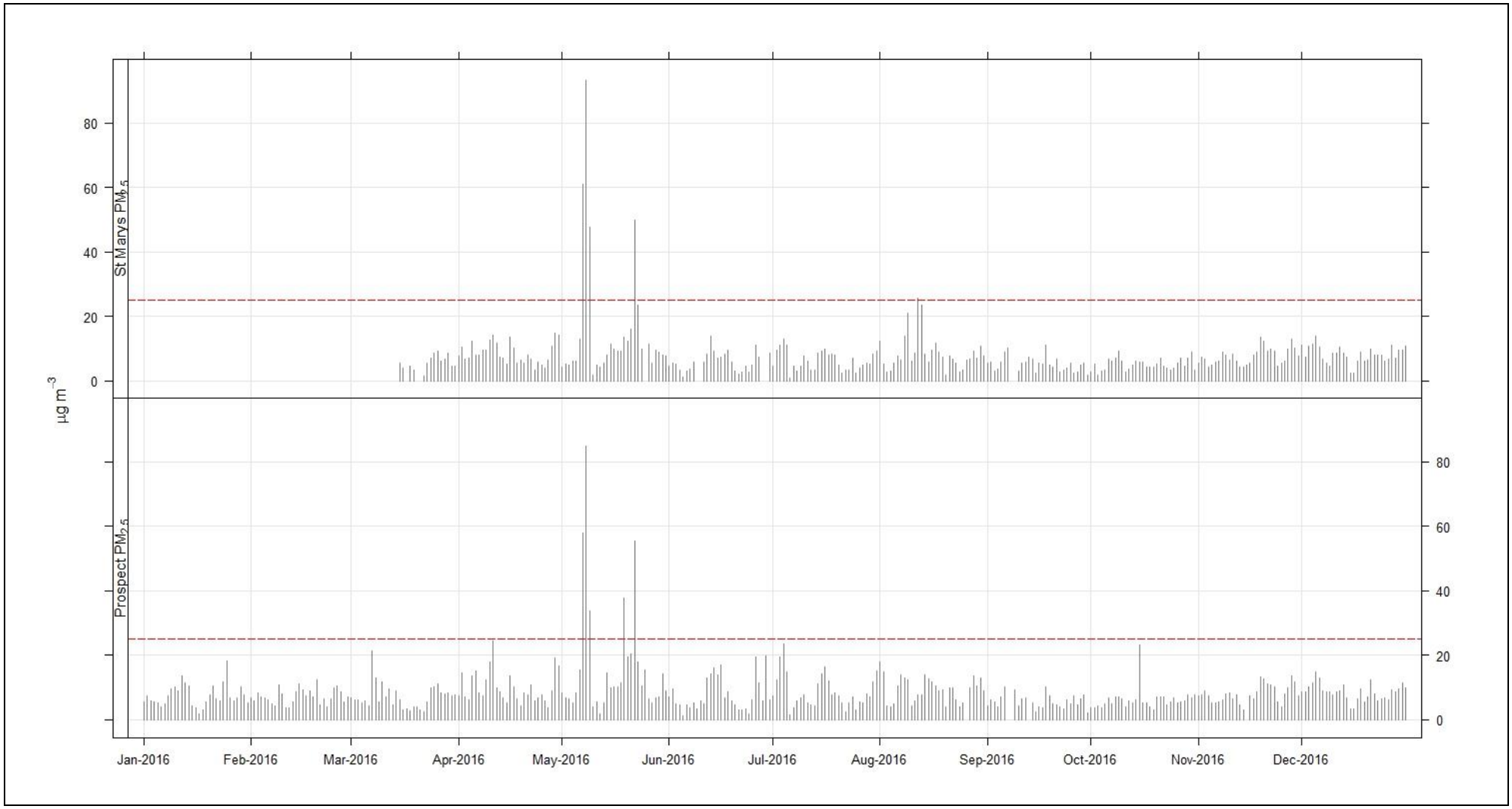



**Figure 5-2: 24-hour average $PM_{2.5}$ concentrations**

# 6. EMISSION INVENTORY

## 6.1 Dust emissions

Emission factors developed by the US EPA[3] have been applied to estimate the amount of dust produced by each activity (i.e. wheel generated dust, waste handling / processing and wind erosion). Emissions estimates have been developed for TSP, $PM_{10}$ and $PM_{2.5}$, with the emission estimates for TSP also used to estimate dust deposition rates.

The extent to which the US EPA emissions factors account for the diesel exhaust component of each activity varies according to the emission factor and/or monitoring method which was used in deriving the emission factor. For hauling on paved surfaces, the exhaust component is not included whereas for material processing/handling, the emission factors may include some of the diesel exhaust component. To be conservative for this assessment, we have assumed that all emission factors do not include the exhaust component and emissions from diesel combustion are included as a separate emissions source.

Emissions are estimated based on a 50/50 split between the MPC and the landfill; that is, of the 2 Mtpa entering site, 1 Mtpa is processed through the MPC and 1 Mtpa enters the landfill. A summary of the annual TSP, $PM_{10}$ and $PM_{2.5}$ emissions are presented in **Table 6-1**.

Further details on the emission inventory development, including the assumptions, input data and emission factors used, is provided in **Appendix 4**.

### 6.1.1 Existing dust controls

A number of existing and proposed dust controls are accounted for in the emissions estimates, as follows:

- Enclosure of material handling and processing and storage within the MPC shed.
- Misting sprays operated within the shed to dampen material as it is sorted and before being loaded to the hopper.
- The majority of travel routes onsite are sealed (exceptions are the haul route into the pit and within the segregated materials area).
- Water sprays on the mobile crusher and shredder.
- Fixed water sprays on product storage areas.
- Water truck operating on unsealed haul road into the pit, within the landfill and on the paved roads as needed.
- Speed limit of 40km/hr for unsealed haul road into the pit.
- Water cannon operating within the pit.
- Established earth bund along the northern boundary of the pit.
- A fixed water spray system operates on the access roadway.

Some of the dust controls listed above are incorporated into the emissions inventory for each relevant activity, based on control efficiencies reported in the literature. For example, all activities occurring within the shed are assigned a control efficiency of 40%. This is based on reported control efficiencies for material handling/transfer from enclosure or wind shielding, which range from 40% to 70% depending on roof/side wall wind shielding or full enclosure on all sides (Katestone, 2011). To provide a conservative (upper bound) estimate of emissions, we have adopted the lower of these reported control efficiencies. Also, to account for the mist sprays within the shed a control efficiency of 70% is assumed for waste sorting and loading the hopper (combination of 50% for watering and 40% for wind shielding).

[3]US EPA AP-42 Compilation of Air Pollutant Emission Factors (US EPA, 1998b; US EPA, 2004; US EPA, 2006).

**Table 6-1: Particulate matter emissions for Modification 6 (kg/annum)**

| Activity | Controlled emissions (kg/annum) | | |
|---|---|---|---|
| | TSP | $PM_{10}$ | $PM_{2.5}$ |
| Waste trucks entering site - site access to MPC (paved) | 2,483 | 477 | 115 |
| Trucks unloading | 92 | 44 | 7 |
| Ex/FEL sorting waste | 92 | 44 | 7 |
| FEL loading hopper | 64 | 30 | 5 |
| Screening in MPC | 154 | 52 | 4 |
| Transfer points | 387 | 183 | 28 |
| Unloading to product storage | 172 | 81 | 12 |
| Rehandle to product storage (loading trucks) | 172 | 81 | 12 |
| Rehandle to product storage (hauling) | 1,303 | 250 | 61 |
| Mobile crusher - concrete/brick for roadbase product | 306 | 138 | 26 |
| Mobile screening - sand/soil | 187 | 63 | 4 |
| Shredding greenwaste | 48 | 22 | 4 |
| Loading product stockpiles | 291 | 138 | 21 |
| Loading product trucks | 291 | 138 | 21 |
| Product trucks leaving site - MPC to site access (paved) | 1,078 | 207 | 50 |
| Chute unload to landfill | 9 | 4 | 0.6 |
| Wheel generated dust - weighbridge to landfill (unpaved) | 12,569 | 3,393 | 339 |
| Trucks unloading | 25 | 12 | 2 |
| Dozer pushing waste at landfill | 4,084 | 739 | 103 |
| Excavator/loader at landfill | 31 | 15 | 2 |
| Wind erosion - landfill | 1,488 | 744 | 112 |
| Wind erosion - greenwaste storage bay | 255 | 128 | 19 |
| Wind erosion - soil storage area | 701 | 351 | 53 |
| Wind erosion - aggregate stockpile area | 1,275 | 638 | 96 |
| Diesel combustion - off-road | 665 | 665 | 645 |
| Diesel combustion - on-road trucks | 151 | 151 | 139 |
| **Total** | **28,373** | **8,784** | **1,884** |

6.1.2 Accounting for peak day operations

The emissions presented in **Table 6-1** are estimated based on an annual production rate of 1,000,000,tpa for the MPC, which equates to an average daily processing rate of 2,740 tonnes per day (tpd) or 114 tonnes per hour (tph). When waste separation is optimal, the maximum processing rate is 150 tph; therefore to account for a theoretical worst-case day, the emissions from the MPC are increased by approximately 30% (i.e. 150/114). This, combined with a maximum of 1,000,000 tpa directed to landfill provides a worst-case assessment for peak day operations.

## 6.2 Odour emissions

The facility operates as a general solid waste (non-putrescible) landfill, and therefore odour emissions can be expected to be less significant when compared with a landfill which accepts putrescible waste (e.g. household waste, food waste, nappies, animal waste etc.). Recent odour audits for the current site found that no significant odour was detected beyond the site boundary (TOU, 2015; SEMA, 2017).

Notwithstanding, a proportion of the incoming waste is organic (wood waste, garden waste, paper and cardboard) and therefore has the potential to generate odour during decomposition. During normal operations the facility would aim to recover as much of this organic waste as possible, and therefore only a small volume of degradable waste would be disposed to landfill.

However, to address EPA's requirements, a worst-case scenario of 1 Mtpa directed to landfilled needs to be considered. Furthermore, although composting is not currently undertaken onsite,

the facility is approved and licenced for this activity and therefore composting is included for a worst-case odour assessment.

The following odour sources are included in the model:

- Landfill (including active tip face, daily cover, intermediate cover and final cap).
- Greenwaste storage.
- Composting (including fresh and aged compost windrows).

One of the main challenges in accounting for an increase in odour emissions from landfilling at an increased rate, is how to appropriately scale existing odour emission data. The odour assessment for the 2008 EIS (HAS, 2008) did not have access to site specific monitoring data and instead used historical odour data from another landfill. After accounting for variations in emissions over time and across the landfill area, the historical emissions data were adjusted pro rata based on the reduced tonnages of organic waste landfilled at the Genesis facility. In other words, because most of the organic waste is recovered at modern landfills, the decomposition and resultant emissions would be much lower than for the historical monitoring data which was used.

An odour assessment undertaken as part of the Independent Environmental Audit in 2015 noted some limitations in this approach and suggested a better approach would be to adjust odour emission rates based on potential fugitive gas emissions (TOU, 2015). However, there are insufficient data available to take this approach and, regardless, for our worst-case scenario of 1 Mtpa landfilled, we have to assume that limited organic waste is recovered.

Site specific odour monitoring was completed onsite in 2013 for sources including the active tip face, the leachate sump/riser and the leachate treatment tanks. While these monitoring results are considered appropriate to derive emission rates for existing operations, no measurements were taken across the covered or capped areas of the landfill, although these areas of the landfill are expected to have low emissions potential. Furthermore, these measurements were taken while the MPC was operational and the organic waste volume may therefore not necessarily be representative of our worst-case scenario.

It is noted that subsequent odour assessments for the site in 2015 (TOU, 2015) and 2017 (SEMA, 2017) completed downwind odour surveys and did not measure odour sources directly. These reports, while useful in providing an indication of existing odour impact, cannot be used to derive odour emission rates for dispersion modelling.

To derive odour emission rates for a worst-case scenario, odour emission data for other putrescible waste landfills was reviewed, with a focus on sites where relatively recent odour monitoring was conducted. A summary of these data is provided in **Table 6-2**.

The approach taken for this assessment is to use the average specific odour emissions rate (SOER, expressed as $OU.m^3/m^2/s$) from the four putrescible waste landfills presented in **Table 6-2**. As shown, this provides a higher SOER than measurements taken at the existing facility and is generally higher than the emission rates used in the original EIS. To provide an additional level of conservatism, the source areas, across which these SOERs are applied, are scaled from the existing site layout according to the production increase.

**Table 6-2: Review of odour emissions data and odour emission rates for modelling**

| Source | Specific Odour Emission Rate ($OU.m^3/m^2/s$) | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Whytes Gully[1]** | **Spring Farm[2]** | **Woodlawn[3]** | **Lucas Heights[4]** | **SOER Average** | **Genesis site monitoring** | **Used in original EIS** |
| Active tip face | 1.115 | 0.424 | 0.7 | *26-40 $OU.m^3/s$ | **0.7** | 0.4 | |
| Daily cover | 1.023 | 0.069 | | 0.03 | **0.4** | | 3.83 |
| Intermediate cover | 0.035 | 0.019 | 0.3 | 0.05 | **0.1** | | |
| Final cap | | 0.026 | | | **0.03** | | 0.00051 |
| Leachate storage | 0.153 | 0.108 | 3.6 | 1.8 | **1.4** | 0.2 | 0.069 |
| Greenwaste storage | | 1.279 | *2.37 $OU.m^3/s$ | 4 | **2.6** | | |
| Compost windrow (fresh) | | 2.654 | 5.65 | 1.95 | **3.3** | | 0.105 |
| Compost windrow (aged/product) | | 0.18 | 0.83 | 0.34 | **0.4** | | |

Note: * expressed as an OER ($OU.m^3/s$) and not included in the SOER average
[1] PAEHolmes, 2012
[2] Heggies, 2010
[3] GHD, 2015
[4] Pacific Environment, 2013

# 7. DISPERSION MODELLING RESULTS

## 7.1 PM10

The predicted ground level concentrations (GLCs) of $PM_{10}$at each receptor location are presented in **Table 7-1**. Results are presented for the Modification 6 increment alone, as well as cumulative which includes the addition of the existing background (described in **Section 5.4**).

The highest incremental annual average $PM_{10}$ concentration at a residential receptor is 2.3 µg/m³ (R05 and R08). The highest incremental annual average $PM_{10}$ concentration at a commercial receptor is 4.9 µg/m³ (effectively on the site boundary). With the addition of existing background, the cumulative annual average GLCs comply with the impact assessment criterion at all receptor locations.

The highest incremental 24-hour average $PM_{10}$ concentration at a residential receptor is 10.4 µg/m³ (R05) and 21.6 µg/m³ at a commercial receptor (R12). With the addition of existing background, the cumulative 24-hour average GLCs comply with the impact assessment criterion at all receptor locations.

**Table 7-1: $PM_{10}$ modelling predictions for Modification 6**

| Receptor ID | Receptor type | Modification 6 increment | | Cumulative | |
|---|---|---|---|---|---|
| | | 24-Hour Max | Annual Ave | 24-Hour Max[1] | Annual Ave |
| | Criteria | 50 µg/m³ | 25 µg/m³ | 50 µg/m³ | 25 µg/m³ |
| R01 | Residential | 7.7 | 1.3 | 44.1 | 20.2 |
| R02 | | 8.7 | 1.6 | 44.7 | 20.5 |
| R03 | | 9.1 | 1.9 | 43.2 | 20.8 |
| R04 | | 9.7 | 2.0 | 41.8 | 20.9 |
| R05 | | 10.4 | 2.3 | 41.8 | 21.2 |
| R06 | | 9.6 | 1.8 | 42.1 | 20.7 |
| R07 | | 10.1 | 2.2 | 41.8 | 21.1 |
| R08 | | 10.3 | 2.3 | 41.8 | 21.2 |
| R09 | | 1.7 | 0.3 | 42.4 | 19.2 |
| R10 | | 2.2 | 0.3 | 42.5 | 19.2 |
| R11 | | 2.4 | 0.4 | 42.2 | 19.3 |
| R12 | Commercial /industrial | 21.6 | 4.9 | 49.2 | 23.8 |
| R13 | | 20.2 | 4.8 | 49.9 | 23.7 |
| R14 | | 11.6 | 2.8 | 43.5 | 21.7 |
| R15 | | 15.1 | 3.6 | 46.7 | 22.5 |
| R16 | | 19.3 | 4.8 | 46.2 | 23.7 |
| R17 | | 14.8 | 2.5 | 44.3 | 21.4 |

Note: [1]As described in **Section 5**, the background dataset contains four existing exceedances of the impact assessment criteria and the cumulative 24-hour average $PM_{10}$ is therefore calculated using the 5$^{th}$highest background day (excluding the background days already at or over 50 µg/m³)

## 7.2 PM2.5

The predicted ground level concentrations (GLCs) of $PM_{2.5}$ at each sensitive receptor are presented in **Table 7-2**. Results are presented for the Modification 6 increment alone, as well as cumulative which includes the addition of existing background (described in **Section 5.4**).

The highest incremental annual average $PM_{2.5}$ concentration at a residential receptor is 0.6 µg/m³. The highest incremental annual average $PM_{2.5}$ concentration at a commercial receptor is 1.2 µg/m³ (effectively on the site boundary). With the addition of existing background, the cumulative annual average GLCs exceed the impact assessment criterion at all locations, however this is because the annual average background concentrations of $PM_{2.5}$ already exceed the impact assessment criterion.

The highest incremental 24-hour average $PM_{2.5}$ concentration at a residential receptor is 3.0 µg/m³ (R05). With the addition of existing background, the cumulative 24-hour average GLCs result in additional exceedances of the impact assessment criterion at a number of receptor locations (shown in bold). This is caused by a combination of elevated background with the additional dust emissions from the modification. It is noted that the background $PM_{2.5}$ concentration is already close to the impact assessment criterion (24.4 µg/m³).

Further analysis, showing the risk of additional exceedances above background, as a result of the modification, is presented below.

**Table 7-2: $PM_{2.5}$ modelling predictions for Modification 6**

| Receptor ID | Receptor type | Modification 6 increment | | Cumulative | |
|---|---|---|---|---|---|
| | | 24-Hour Max | Annual Ave | 24-Hour Max[1] | Annual Ave |
| | | 25 µg/m³ | 8 µg/m³ | 25 µg/m³ | 8 µg/m³ |
| R01 | Residential | 2.1 | 0.4 | 24.8 | **9.0** |
| R02 | | 2.4 | 0.5 | 24.8 | **9.1** |
| R03 | | 2.6 | 0.5 | **25.1** | **9.1** |
| R04 | | 2.8 | 0.6 | **25.3** | **9.2** |
| R05 | | 3.0 | 0.6 | **25.4** | **9.2** |
| R06 | | 2.6 | 0.5 | **25.2** | **9.1** |
| R07 | | 2.9 | 0.6 | **25.3** | **9.2** |
| R08 | | 2.9 | 0.6 | **25.3** | **9.2** |
| R09 | | 0.5 | 0.1 | 24.4 | **8.7** |
| R10 | | 0.6 | 0.1 | 24.4 | **8.7** |
| R11 | | 0.7 | 0.1 | 24.4 | **8.7** |
| R12 | Commercial /industrial | 4.8 | 1.2 | **26.5** | **9.8** |
| R13 | | 4.1 | 1.1 | **26.9** | **9.7** |
| R14 | | 2.7 | 0.7 | **26.2** | **9.3** |
| R15 | | 3.3 | 0.9 | **26.4** | **9.5** |
| R16 | | 4.2 | 1.1 | **26.8** | **9.7** |
| R17 | | 3.8 | 0.7 | **25.5** | **9.3** |

Note: [1]As described in **Section 5**, the background dataset contains five existing exceedances of the impact assessment criteria and the cumulative 24-hour average $PM_{2.5}$ is therefore calculated using the 6th highest background day (excluding the background days already at or over 25 µg/m³)

In addition to the paired-in-time cumulative analysis presented above, to provide an analysis of the statistical likelihood of compliance with the impact assessment criterion, every predicted 24-hour average concentration (366 individual concentrations) has been paired with multiple years of measured 24-hour average concentrations from the NSW OEH Prospect and St Marys sites (a total of 1,007 measurements). Each combination of model prediction and recorded concentration (376,190 potential combinations) is combined, assuming that any background value from the data set could occur on any given day of the proposed operations.

For the receptors presented in **Table 7-2** with additional exceedance days (residential receptors R3 to R8 and commercial receptors R12 to R17), the number of cumulative 24-hour average $PM_{2.5}$ concentrations greater than 25 µg/m$^3$ is presented in **Figure 7-1**.

The analysis shows that for residential and commercial receptors, risk of any additional exceedances of the 24-hour $PM_{2.5}$ impact assessment criterion does not increase significantly, above what is already caused by background (i.e. up to one additional day as a worst case).

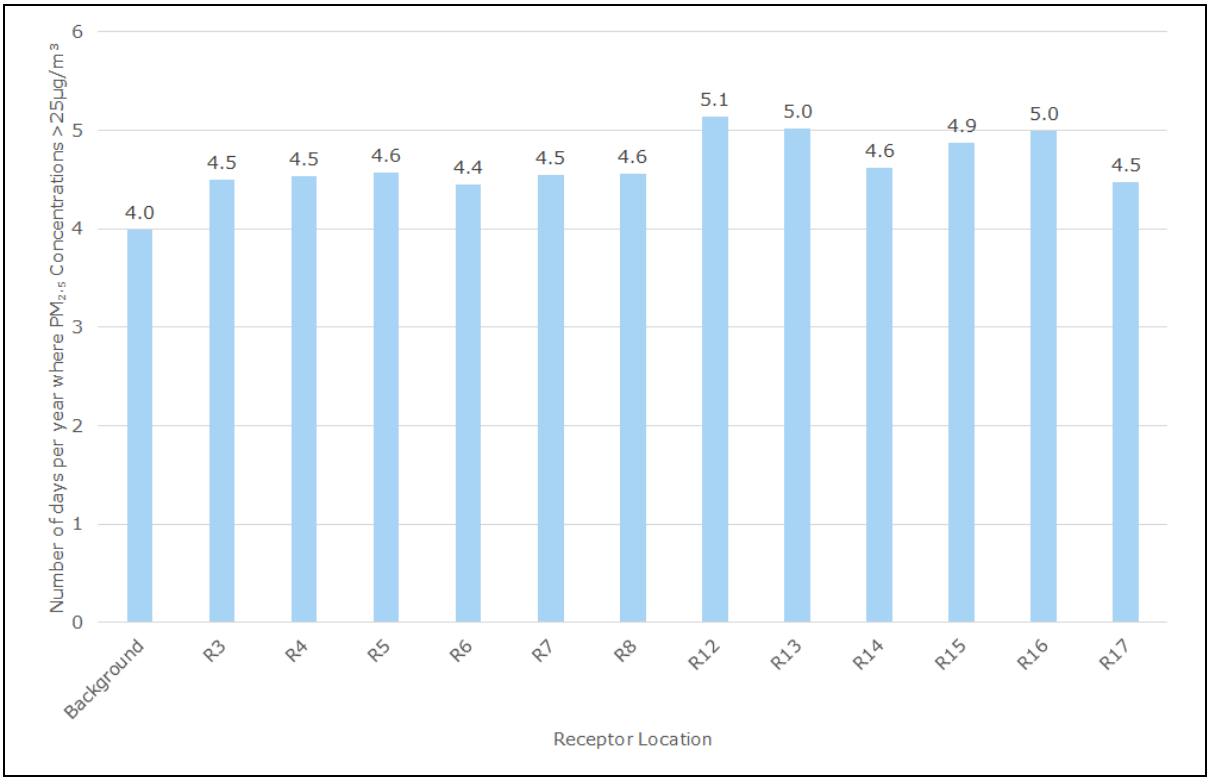



**Figure 7-1: Frequency distribution of cumulative 24-hour average PM $_{2.5}$ concentration**

## 7.3 TSP and Dust Deposition

The predicted ground level concentrations (GLCs) of TSP and dust deposition at each receptor are presented in **Table 7-3**. Results are presented for the Modification 6 increment alone, as well as cumulative which includes the addition of existing background (described in **Section 5.4**).

The incremental increase in annual average TSP is minor and with the addition existing background, the cumulative annual average GLCs comply with the impact assessment criterion at all receptor locations. Similarly, the predicted dust deposition complies with both the incremental and cumulative impact assessment criteria at all receptor locations.

**Table 7-3: TSP and dust deposition modelling predictions for Modification 6**

| Receptor ID | Receptor type | Modification 6 increment | | Cumulative | |
|---|---|---|---|---|---|
| | | TSP | Dust Depos | TSP | Dust Depos |
| | | 90 µg/m$^3$ | 2 g/m$^2$/month | 90 µg/m$^3$ | 4 g/m$^2$/month |
| R01 | Residential | 2.0 | 0.1 | 49.2 | 2.1 |
| R02 | | 2.6 | 0.1 | 49.8 | 2.1 |
| R03 | | 3.0 | 0.1 | 50.2 | 2.1 |
| R04 | | 3.2 | 0.1 | 50.4 | 2.1 |
| R05 | | 3.6 | 0.2 | 50.8 | 2.2 |
| R06 | | 2.8 | 0.1 | 50.0 | 2.1 |
| R07 | | 3.4 | 0.1 | 50.6 | 2.1 |
| R08 | | 3.6 | 0.1 | 50.8 | 2.1 |
| R09 | | 0.4 | 0.0 | 47.6 | 2.0 |
| R10 | | 0.4 | 0.0 | 47.6 | 2.0 |
| R11 | | 0.4 | 0.0 | 47.6 | 2.0 |
| R12 | Commercial /industrial | 9.9 | 0.5 | 57.1 | 2.5 |
| R13 | | 10.2 | 0.5 | 57.4 | 2.5 |
| R14 | | 5.0 | 0.3 | 52.2 | 2.3 |
| R15 | | 7.5 | 0.4 | 54.7 | 2.4 |
| R16 | | 12.3 | 0.7 | 59.5 | 2.7 |
| R17 | | 5.4 | 0.3 | 52.6 | 2.3 |

## 7.4 Odour

A theoretical worst-case odour scenario is modelled based on the potential for landfilling to occur up to the 1 Mtpa, in addition to greenwaste processing through the MPC (storage, processing and composting). It is noted that greenwaste processing is currently limited to shredding to produce various mulch products. However, as the facility is approved for composting, this is also included as an odour source in the modelling, nominally placed within the current greenwaste storage area.

The predicted ground level concentrations (GLCs) of odour for this worst-case scenario are presented in **Table 7-4**. All modelling predictions at residential receptors are below odour goal of 2 OU and therefore comply with the impact assessment criteria. Modelling predictions at commercial receptors are all less than 7 OU, which is considered an appropriate odour goal for this type of receptor.

**Table 7-4: Predicted ground level concentration of odour (99th percentile, nose response average)**

| Receptor ID | Receptor type | Modification 6 increment |
|---|---|---|
| | | Odour |
| | | 2 OU |
| R01 | Residential | <1 |
| R02 | | 1 |
| R03 | | 1 |
| R04 | | <2 |
| R05 | | <2 |
| R06 | | 1 |
| R07 | | <2 |
| R08 | | 1 |
| R09 | | <1 |
| R10 | | <1 |
| R11 | | <1 |
| R12 | Commercial /industrial | 2 |
| R13 | | 3 |
| R14 | | 2 |
| R15 | | 2 |
| R16 | | 3 |
| R17 | | 2 |

# 8. MANAGEMENT AND MONITORING

The principal fugitive dust emission sources during operation are:

- Movement of vehicles on travel routes and re-entrainment of dust from paved and unpaved surfaces.
- Material handling (trucks unloading, loading, screening, crushing, sorting).
- Wind erosion from exposed surfaces and stockpiles.
- Diesel vehicle exhaust from the trucks, front end loaders, excavators etc.

The existing and proposed dust controls include:

- Enclosure of material handling and processing and storage within the MPC shed.
- Misting sprays operated within the shed to dampen material as it is sorted and before being loaded to the hopper.
- The majority of travel routes onsite are sealed (exceptions are the haul route into the pit and within the segregated materials area).
- Water sprays on the mobile crusher and shredder.
- Fixed water sprays on product storage areas.
- Water truck operating on unsealed haul road into the pit, within the landfill and on the paved roads as needed.
- Speed limit of 40km/hr for unsealed haul road into the pit.
- Water cannon operating within the pit.
- Established earth bund along the northern boundary of the pit.
- A fixed water spray system operates on the access roadway.

The existing facility operates under an Operational Environmental Management Plan (OEMP) which outlines the roles, responsibilities and the tasks to be performed to ensure environmental impacts are minimised. The OEMP will be reviewed and updated, where required, for the modification.

Based on the modelling results presented in this report, the existing controls appear to be effective in preventing dust impacts in surrounding residential areas. This conclusion is supported by the existing monitoring data which demonstrate compliance with impact assessment criteria at the site boundary (dust deposition) and in the suburb of Minchinbury ($PM_{10}$).

There is a small risk of additional exceedances of the 24-hour average $PM_{2.5}$ concentrations at residential and commercial receptor locations (i.e. up to one additional day as a worst case). To better monitor the effectiveness of existing controls and ongoing performance of the site, the proponent will consider relocating the $PM_{10}$ monitoring site in Minchinbury to a boundary location at the northern and/or eastern site boundary. The four existing boundary dust deposition monitoring sites remain appropriate for the modification.

# 9. CONCLUSION

Local air quality impacts are assessed using a Level 2 assessment approach in accordance with the Approved Methods. Emissions are estimated for all activities and dispersion modelling is used to predict ground level concentrations at surrounding sensitive receptors. Cumulative impacts are assessed by combining the contribution from the modification with the existing ambient baseline.

A worst-case emissions assessment is considered based on a 50/50 split between the MPC and landfill. Modelling a scenario with 1,000,000 tpa hauled to landfill provides a conservative worst-case assessment of impacts, as hauling along the unsealed access road to the pit is the largest potential source.

The predicted cumulative annual average $PM_{10}$ concentrations comply with the impact assessment criterion at all receptor locations. With the addition of existing background, there are no additional exceedances of the 24-hour average $PM_{10}$ impact assessment criterion at any receptor location.

The cumulative annual average $PM_{2.5}$ concentrations exceed the impact assessment criterion at all locations, however this is because the annual average background concentrations of $PM_{2.5}$ already exceed the impact assessment criteria. The cumulative 24-hour average $PM_{2.5}$ concentrations result in additional exceedances of the impact assessment criterion at residential and commercial receptor locations. It is noted that the background $PM_{2.5}$ concentration is already close to the impact assessment criterion (24.4 µg/m³). Furthermore, additional statistical analysis shows that the probability or risk of any additional exceedances of the 24-hour $PM_{2.5}$ impact assessment criterion does not significantly increase, above what is already caused by background (i.e. up to one additional day as a worst case).

Cumulative annual average TSP concentrations comply with the impact assessment criterion at all receptor locations. Similarly, predicted dust deposition levels comply with both the incremental and cumulative impact assessment criteria at all receptor locations.

The worst case potential odour impact from landfilling at 1 Mtpa combined with greenwaste processing and composting, would not result in exceedances of the odour goal of 2 OU at any residential receptor.

To better monitor the effectiveness of existing controls and ongoing performance of the site, the proponent will consider relocating the $PM_{10}$ monitoring site in Minchinbury to a boundary location at the northern and/or eastern site boundary.

# 10. REFERENCES

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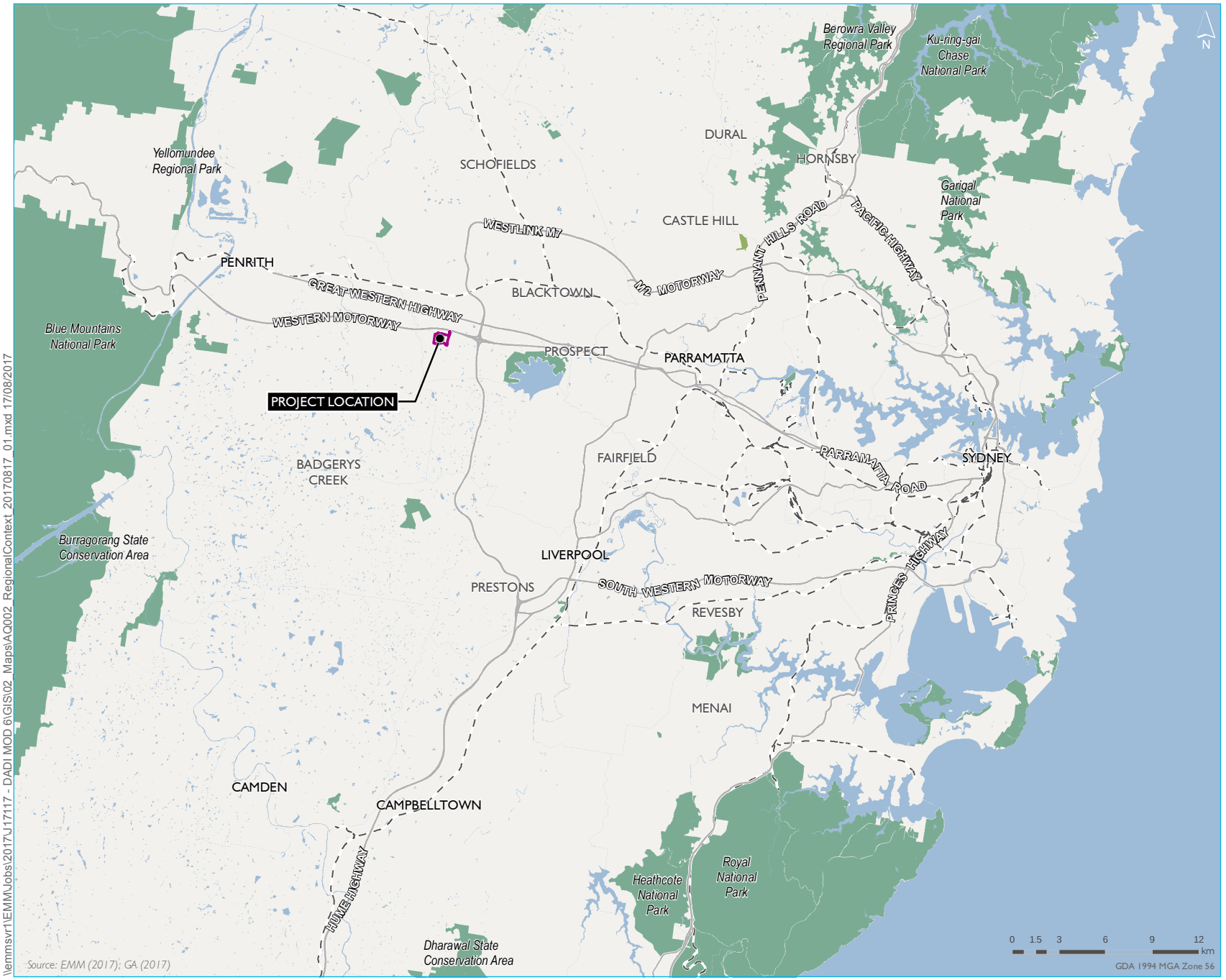
# APPENDIX 1
# FIGURES

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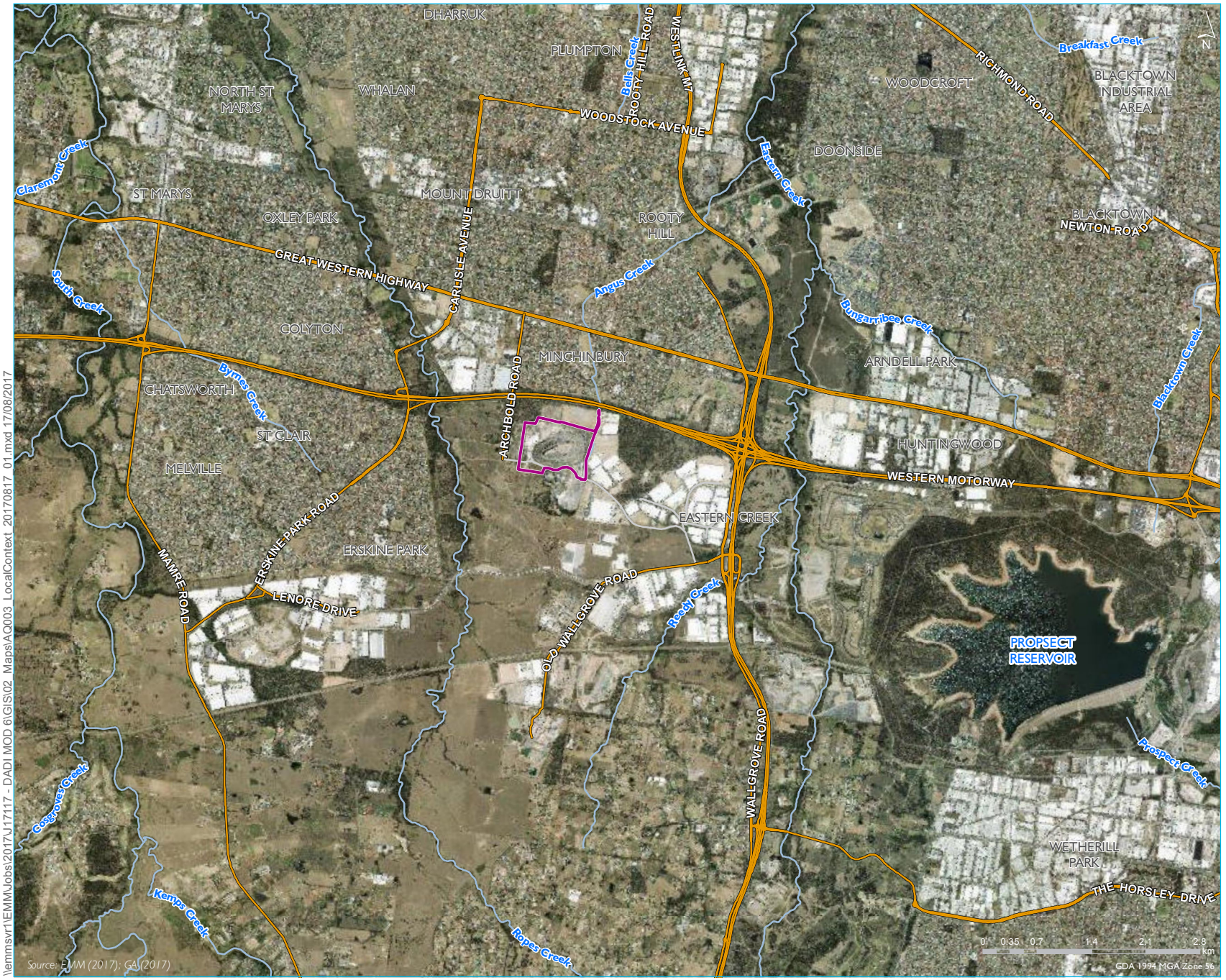
Regional context

Genesis Zero Waste
Modification 6
Air quality impact assessment
Figure 1.1

EMM




KEY

- Site location
- Main road
- Local road
- Watercourse

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Local context

Genesis Zero Waste
Modification 6
Air quality impact assessment
Figure 1.2

# APPENDIX 2
# MODEL SETTINGS

**Table A2-1: TAPM settings**

| Parameter | Setting |
|---|---|
| Model Version | TAPM v.4.0.5 |
| Number of grids (spacing) | 4 (30 km, 10 km, 3 km, 1 km) |
| Number of grid points | 25 x 25 |
| Vertical grids / vertical extent | 30 / 8000m (~400mb) |
| Centre of analysis | Lat 150.824997, long -33.7999992<br>Easting 298655, Northing 6257892S |
| Year of analysis | 2016 |
| Terrain and landuse | Terrain data using NASA SRTM3 database. Default TAPM values based on land-use and soils data sets from Geoscience Australia and the US Geological Survey, Earth Resources Observation Systems (EROS) Data Center Distributed Active Archive Center (EDC DAAC). |
| Assimilation sites | NSW OEH - St Marys<br>BoM - Horsley Park Equestrian Centre, Badgerys Creek AWS, Penrith Lakes AWS, Bankstown Airport, Holsworthy Control Range, Sydney Olympic Park, Richmond RAAF and Camden Airport. |

**Table A2-2: CALMET settings**

| Parameter | Setting |
|---|---|
| Grid domain | 60 km x 60 km |
| Grid resolution | 0.5 km |
| Number of grid points | 120 x 120 |
| Reference grid coordinate | 268.900, 6228.200 |
| Vertical grids / vertical extent | 10 cell heights / 4,000m |
| Upper air meteorology | Prognostic 3D.dat extracted from TAPM at 1 km grid |
| Surface observations | NSW OEH - St Marys<br>BoM - Horsley Park Equestrian Centre, Badgerys Creek AWS, Penrith Lakes AWS, Bankstown Airport, Holsworthy Control Range, Sydney Olympic Park, Richmond RAAF and Camden Airport. |

**Table A2-3: CALMET model options**

| Flag | Description | Recommended setting | Value used |
|---|---|---|---|
| NOOBS | Meteorological data options | 0,1,2 | 1 - combination of surface and prognostic data |
| ICLOUD | Cloud Data Options – Gridded Cloud Fields | 4 | 4 -Gridded cloud cover from Prognostic relative humidity at all levels (MM5toGrads algorithm) |
| IEXTRP | Extrapolate surface wind observations to upper layers | -4 | -4 - similarity theory used |
| IFRADJ | Compute Froude number adjustment effects | 1 | 1 - applied |
| IKINE | Compute kinematic effects | 0 | 0 - not computed |
| BIAS (NZ) | Relative weight given to vertically extrapolated surface observations vs. upper air data | NZ * 0 | NZ * 0 - layers in lower levels of model will have stronger weighting towards surface, higher levels will be have stronger weighting to upper air data |
| TERRAD | Radius of influence of terrain | No default (typically 5-15km) | 5 km |

**Table A2-3: CALMET model options**

| Flag | Description | Recommended setting | Value used |
|---|---|---|---|
| NOOBS | Meteorological data options | 0,1,2 | 1 - combination of surface and prognostic data |
| ICLOUD | Cloud Data Options – Gridded Cloud Fields | 4 | 4 -Gridded cloud cover from Prognostic relative humidity at all levels (MM5toGrads algorithm) |
| RMAX1 and RMAX2 | Maximum radius of influence over land for observations in layer 1 and aloft | No Default | 10 km, 20km |
| R1 and R2 | Distance from observations in layer 1 and aloft at which observations and Step 1 wind fields are weighted equally | No Default | R1 - 2 km, R2 – 5 km |

**Table A2-4: CALPUFF model options**

| Flag | Description | Value used | Description |
|---|---|---|---|
| MCHEM | Chemical Transformation | 0 | Not modelled |
| MDRY | Dry Deposition | 1 | Yes |
| MWET | Wet Deposition | 0 | Not modelled |
| MTRANS | Transitional plume rise allowed? | 1 | Yes |
| MTIP | Stack tip downwash? | 1 | Yes |
| MRISE | Method to compute plume rise | 1 | Briggs plume rise |
| MSHEAR | Vertical wind Shear | 0 | Vertical wind shear not modelled |
| MPARTL | Partial plume penetration of elevated inversion? | 1 | Yes |
| MSPLIT | Puff Splitting | 0 | No puff splitting |
| MSLUG | Near field modelled as slugs | 0 | Not used |
| MDISP | Dispersion Coefficients | 2 | Based on micrometeorology |
| MPDF | Probability density function used for dispersion under convective conditions | 1 | Yes |
| MROUGH | PG sigma y,z adjusted for z | 0 | No |
| MCTADJ | Terrain adjustment method | 3 | Partial Plume Adjustment |
| MBDW | Method for building downwash | 1 | ISC Method |

# APPENDIX 3
# WIND ROSES

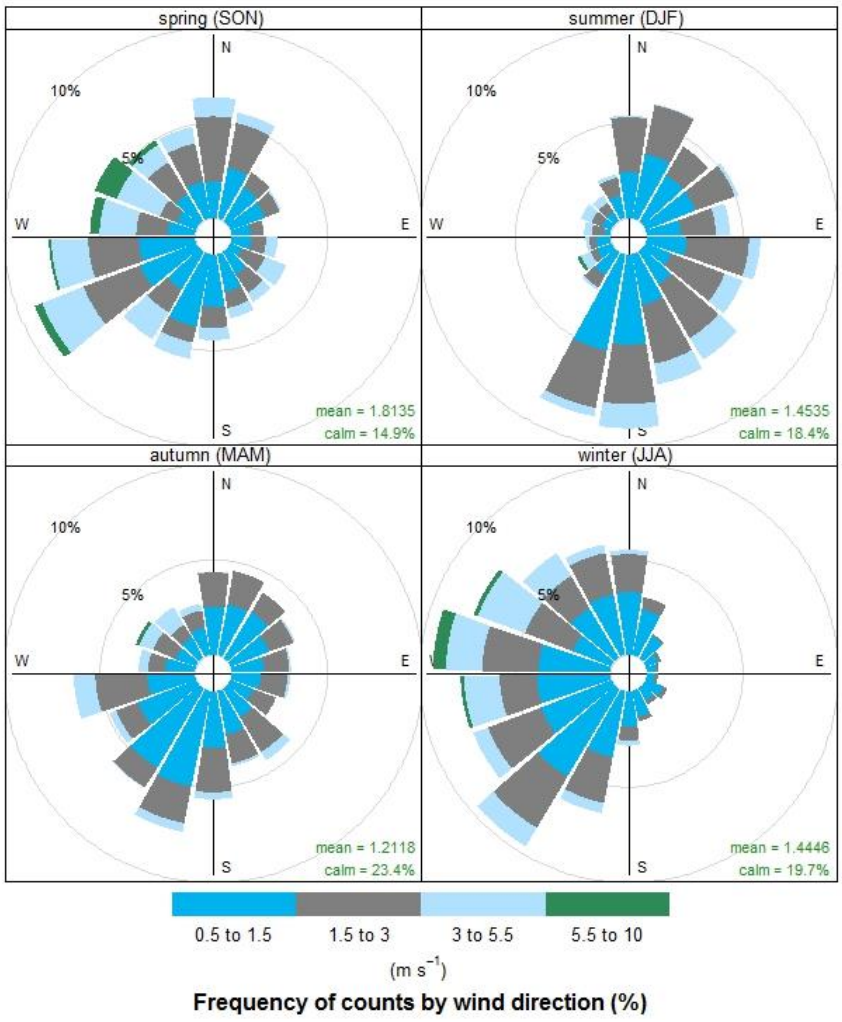


**Figure A3-1: Seasonal wind rose**

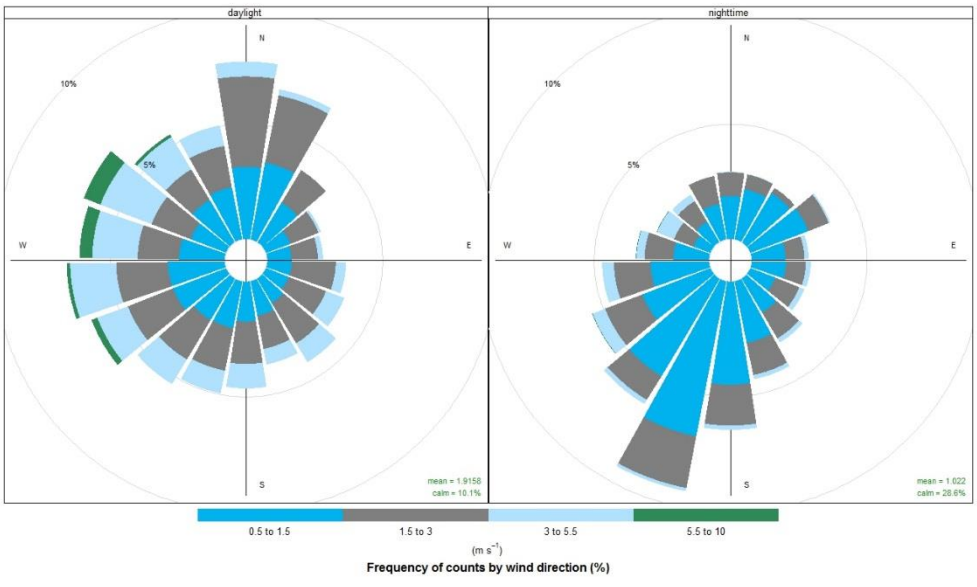


**Figure A3-2: Diurnal wind rose**

# APPENDIX 4
# EMISSIONS INVENTORY DEVELOPMENT

Dust emissions were estimated using US EPA AP-42 emission factors and predictive equations taken from the following chapters:

- Chapter 11.9 Western Surface Coal Mining.
- Chapter 13.2.2 Unpaved Roads.
- Chapter 13.2.1 Paved Roads
- Chapter 13.2.4 Aggregate Handling and Storage Piles.
- Chapter 11.19.2 Crushed Stone Processing and Pulverized Mineral Processing.
- Chapter 13.2.5 Industrial Wind Erosion.

The material properties listed in **Table A4-1** are used as input to the various emission factor equations listed in **Table A4-2** to derive site specific uncontrolled emission factors for each source.

**Table A4-1: Material properties**

| Properties | Value | Source of Information |
|---|---|---|
| Silt loading of paved surface<br><br><br><br>% silt content for unpaved roads | - 0.6 g/m2<br><br>- 7.4 g/m2<br><br>6.4% | AP42 13.2.1 Table 13.2.1-2<br>- for access road based on baseline for traffic less than 500 (average daily traffic)<br>- for other internal road based on value for municipal solid waste landfills<br>AP42 13.2.2 Table 13.2.2-1<br>based on value for municipal solid waste landfills |
| <u>Return travel distances</u><br>Site access to weighbridge/MPC<br>Rehandle to product storage<br>Product trucks leaving site<br>In pit unsealed road | <br>2.1 km<br>0.5 km<br>2.4 km<br>2.0 km | Estimated from aerial photography |
| Average truck load | 50 t | average for all trucks |
| Truck weight | 45 t | Average of loaded and unloaded vehicle mass |
| Moisture content of raw material and product | 2% | AP42 13.2.4 Table 13.2.4-1 – value for stone quarrying and processing – various limestone products |
| <u>Areas for wind erosion</u><br>Landfill<br>Greenwaste storage<br>Aggregate storage<br>Soil storage area | <br>5.0 ha<br>0.6 ha<br>3.0 ha<br>1.7 ha | Estimated from aerial photography |

Emissions were quantified for each particle size fraction, with the TSP size fraction also used to predict dust deposition rates. Fine particles ($PM_{10}$ and $PM_{2.5}$) were estimated using the fraction specific equations or ratios for the different particle size fractions available within the literature (shown in **Table A4-2**). Emissions from onsite diesel consumption are estimated as follows:

- For on-road trucks, we have assumed a truck fuel consumption of 56.9 litres per 100 km (based on the ABS survey of motor vehicle use) and emission factors of 1.2 kg/kl and 1.1 kg/kl for $PM_{10}$ and $PM_{2.5}$(based on NPI emission factor for heavy goods vehicle).
- For onsite equipment, (i.e. excavators, FELs, dozers, dump trucks, crushers, screens etc) a combined annual diesel consumption of 1007kL is assumed based on the reported consumption for NGERS reporting. US EPA Tier 2 emission factors (kg/kL) are assumed.

**Table A4-2: Equations and emission factors**

| Inventory activity | Units | TSP emission factor/equation | $PM_{10}$ emission factor/equation | $PM_{2.5}$ emission factor/equation | EF source |
|---|---|---|---|---|---|
| Material handling (loading trucks unloading trucks, loading screens etc) | kg/t | $0.74 \times 0.0016 \times \left(\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\right)$ | $0.35 \times 0.0016 \times \left(\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\right)$ | $0.053 \times 0.0016 \times \left(\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\right)$ | AP42 13.2.4 |
| Wind erosion | kg/ha/yr | $0.85 \times 1000$ | 0.5 * TSP | 0.075 * TSP | AP42 11.9 & 13.2.5 |
| Hauling on sealed surfaces | g/VKT | $3.23\ x\ sL^{0.91} \times\ W^{1.02}$ | $0.62\ x\ sL^{0.91} \times\ W^{1.02}$ | $0.15\ x\ sL^{0.91} \times\ W^{1.02}$ | AP43 13.2.1 |
| Hauling on unsealed roads | kg/VKT | $\left(\frac{0.4536}{1.6093}\right) \times 4.9 * \left(\frac{s}{12}\right)^{0.7} \times \left(\frac{W\ \times\ 1.1023}{3}\right)^{0.45}$ | $\left(\frac{0.4536}{1.6093}\right) \times 1.5 * \left(\frac{s}{12}\right)^{0.9} \times \left(\frac{W\ \times\ 1.1023}{3}\right)^{0.45}$ | $\left(\frac{0.4536}{1.6093}\right) \times 0.15 * \left(\frac{s}{12}\right)^{0.9} \times \left(\frac{W\ \times\ 1.1023}{3}\right)^{0.45}$ | AP42 13.2.2 |
| Screening | kg/t | 0.0125 | 0.0043 | 0.00043 | AP42 11.19.2 |
| Crushing | kg/t | 0.0027 | 0.0012 | 0.0001 | AP42 11.19.2 |
| Dozers | kg/hr | $2.6 \times \frac{s^{1.2}}{M^{1.3}}$ | $0.3375 \times \frac{s^{1.5}}{M^{1.4}}$ | 0.105 x TSP | AP42 11.9 |

Note: VKT = vehicle kilometre travelled; U = wind speed (m/s); M = moisture content (%); s = silt content (%); W = vehicle weight (t); S = speed (km/hr); ha = hectares, sL = silt loading

| Activity | TSP Emission estimate (kg/year) | Intensity | Units | Emission Factor | Units | Variable 1 | | Variable 2 | | Variable 3 | | Variable 4 | | Variable 5 | | Control % | Control |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Waste trucks entering site - site access to MPC (paved) | 2,483 | 2,000,000 | t/y | 0.00414 | kg/t | 50 | t/load | 45 | GVM (t) load/unload ave | 2.1 | km/return | 0.1 | kg/VKT | 0.6 | road surfa | 70 | water flushing |
| Trucks unloading at MPC | 92 | 800,000 | t/y | 0.0008 | kg/t | 2.0 | moisture | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 85 | 75% for enclosure plus 50% for water sprays |
| Ex/FEL sorting waste | 92 | 800,000 | t/y | 0.0008 | kg/t | 2.0 | moisture | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 85 | 75% for enclosure plus 50% for water sprays |
| FEL loading hopper | 64 | 560,000 | t/y | 0.0008 | kg/t | 2.0 | moisture | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 85 | 75% for enclosure plus 50% for water sprays |
| Screening in MPC | 154 | 560,000 | t/y | 0.0011 | kg/t | | | | | | | | | | | 75 | 75% for enclosure plus controlled emission factor |
| Transfer points | 387 | 560,000 | t/y | 0.0008 | kg/t | 2.0 | moisture | 0.6 | (wind speed/2.2)^1.3 | 6 | transfer points | | | | | 85 | 75% for enclosure plus 50% for water sprays |
| Unloading to product storage | 172 | 448,000 | t/y | 0.0008 | kg/t | 2.0 | moisture | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 50 | Sprinklers |
| Rehandle to product storage (loading trucks) | 172 | 448,000 | t/y | 0.0008 | kg/t | 2.0 | moisture | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 50 | Sprinklers |
| Rehandle to product storage (hauling) | 1,303 | 448,000 | t/y | 0.00969 | kg/t | 50 | t/load | 45 | GVM (t) load/unload ave | 0.5 | km/return | 1.0 | kg/VKT | 7.4 | road surfa | 70 | water flushing |
| Mobile crusher - concrete/brick for roadbase product | 306 | 510,000 | t/y | 0.0006 | kg/t | | | | | | | | | | | | Controlled emission factor for sprays and moisture content |
| Mobile screening - sand/soil | 187 | 170,000 | t/y | 0.0011 | kg/t | | | | | | | | | | | | Controlled emission factor for sprays and moisture content |
| Shredding greenwaste | 48 | 80,000 | t/y | 0.0006 | kg/t | | | | | | | | | | | | Controlled emission factor for sprays and moisture content |
| Loading product stockpiles | 291 | 760,000 | t/y | 0.0008 | kg/t | 2.0 | moisture | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 50 | Sprinklers |
| Loading product trucks | 291 | 760,000 | t/y | 0.0008 | kg/t | 2.0 | moisture | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 50 | Sprinklers |
| Product trucks leaving site - MPC to site access (paved) | 1,078 | 760,000 | t/y | 0.00473 | kg/t | 50 | t/load | 45 | GVM (t) load/unload ave | 2.4 | km/return | 0.1 | kg/VKT | 0.6 | road surfa | 70 | water flushing |
| Chute unload to landfill | 9 | 240,000 | t/y | 0.0001 | kg/t | 10.9 | moisture | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 50 | Sprinklers |
| Wheel generated dust - weighbridge to landfill (unpaved) | 12,569 | 1,000,000 | t/y | 0.128 | kg/t | 50 | t/load | 45 | Vehicle gross mass (t) | 2.0 | km/return | 3.1 | kg/VKT | 6 | % silt cont | 90 | water cart 75% + 40km/h speed limit 44% + wind breaks (30%) |
| Trucks unloading | 25 | 1,000,000 | t/y | 0.0001 | kg/t | 10.9 | moisture | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 65 | Sprinklers + wind breaks (30%) |
| Dozer pushing waste at landfill | 4,084 | 10,220 | h/y | 1.1 | kg/h | 10.9 | moisture | 7 | silt content in % | | | | | | | 65 | Sprinklers + wind breaks (30%) |
| Excavator/loader at landfill | 31 | 1,240,000 | t/y | 0.0001 | kg/t | 10.9 | moisture | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 65 | Sprinklers + wind breaks (30%) |
| Wind erosion - landfill | 1,488 | 5.0 | ha | 850 | kg/ha/yr | | | | | | | | | | | 65 | Sprinklers + wind breaks (30%) |
| Wind erosion - greenwaste storage bay | 255 | 0.6 | ha | 850 | kg/ha/yr | | | | | | | | | | | 50 | Sprinklers |
| Wind erosion - soil storage area | 701 | 1.7 | ha | 850 | kg/ha/yr | | | | | | | | | | | 50 | Sprinklers |
| Wind erosion - aggregate stockpile area | 1,275 | 3.0 | ha | 850 | kg/ha/yr | | | | | | | | | | | 50 | Sprinklers |
| Diesel combustion - off-road | 665 | | | | | | | | | | | | | | | | |
| Diesel combustion - on-road trucks | 151 | | | | | | | | | | | | | | | | |
| **Total** | **28,373** | | | | | | | | | | | | | | | | |

| Activity | PM10 Emission estimate (kg/year) | Intensity | Units | Emission Factor | Units | Variable 1 | | Variable 2 | | Variable 3 | | Variable 4 | | Variable 5 | | Control % | Control |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Waste trucks entering site - site access to MPC (paved) | 477 | 2,000,000 | t/y | 0.00079 | kg/t | 50 | t/load | 45 | GVM (t) load/unload ave | 2.1 | km/return | 0.02 | kg/VKT | 0.6 | road surfa | 70 | water flushing |
| Trucks unloading | 44 | 800,000 | t/y | 0.0004 | kg/t | 2.0 | moisture cor | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 85 | 75% for enclosure plus 50% for water sprays |
| Ex/FEL sorting waste | 44 | 800,000 | t/y | 0.0004 | kg/t | 2.0 | moisture cor | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 85 | 75% for enclosure plus 50% for water sprays |
| FEL loading hopper | 30 | 560,000 | t/y | 0.0004 | kg/t | 2.0 | moisture cor | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 85 | 75% for enclosure plus 50% for water sprays |
| Screening in MPC | 52 | 560,000 | t/y | 0.0004 | kg/t | | | | | | | | | | | 75 | 75% for enclosure plus controlled emission factor |
| Transfer points | 183 | 560,000 | t/y | 0.0004 | kg/t | 2.0 | moisture cor | 0.6 | (wind speed/2.2)^1.3 | 6 | transfer points | | | | | 85 | 75% for enclosure plus 50% for water sprays |
| Unloading to product storage | 81 | 448,000 | t/y | 0.0004 | kg/t | 2.0 | moisture cor | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 50 | Sprinklers |
| Rehandle to product storage (loading trucks) | 81 | 448,000 | t/y | 0.0004 | kg/t | 2.0 | moisture cor | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 50 | Sprinklers |
| Rehandle to product storage (hauling) | 250 | 448,000 | t/y | 0.00186 | kg/t | 50 | t/load | 45 | GVM (t) load/unload ave | 0.5 | km/return | 0.2 | kg/VKT | 7.4 | road surfa | 70 | water flushing |
| Mobile crusher - concrete/brick for roadbase product | 138 | 510,000 | t/y | 0.0003 | kg/t | | | | | | | | | | | | Controlled emission factor for sprays and moisture content |
| Mobile screening - sand/soil | 63 | 170,000 | t/y | 0.0004 | kg/t | | | | | | | | | | | | Controlled emission factor for sprays and moisture content |
| Shredding greenwaste | 22 | 80,000 | t/y | 0.0003 | kg/t | | | | | | | | | | | | Controlled emission factor for sprays and moisture content |
| Loading product stockpiles | 138 | 760,000 | t/y | 0.0004 | kg/t | 2.0 | moisture cor | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 50 | Sprinklers |
| Loading product trucks | 138 | 760,000 | t/y | 0.0004 | kg/t | 2.0 | moisture cor | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 50 | Sprinklers |
| Product trucks leaving site - MPC to site access (paved) | 207 | 760,000 | t/y | 0.00091 | kg/t | 50 | t/load | 45 | GVM (t) load/unload ave | 2.4 | km/return | 0.02 | kg/VKT | 0.6 | road surfa | 70 | water flushing |
| Chute unload to landfill | 4 | 240,000 | t/y | 0.0000 | kg/t | 10.9 | moisture cor | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 50 | Sprinklers |
| Wheel generated dust - weighbridge to landfill (unpaved) | 3,393 | 1,000,000 | t/y | 0.035 | kg/t | 50 | t/load | 45 | Vehicle gross mass (t) | 2.0 | km/return | 0.8 | kg/VKT | 6 | % silt cont | 90 | water cart 75% + 40km/h speed limit 44% + wind breaks (30%) |
| Trucks unloading | 12 | 1,000,000 | t/y | 0.0000 | kg/t | 10.9 | moisture cor | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 65 | Sprinklers + wind breaks (30%) |
| Dozer pushing waste at landfill | 739 | 10,220 | h/y | 0.2 | kg/h | 10.9 | moisture cor | 7 | silt content in % | | | | | | | 65 | Sprinklers + wind breaks (30%) |
| Excavator/loader at landfill | 15 | 1,240,000 | t/y | 0.0000 | kg/t | 10.9 | moisture cor | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 65 | Sprinklers + wind breaks (30%) |
| Wind erosion - landfill | 744 | 5.0 | ha | 425 | kg/ha/yr | | | | | | | | | | | 65 | Sprinklers + wind breaks (30%) |
| Wind erosion - greenwaste storage bay | 128 | 0.6 | ha | 425 | kg/ha/yr | | 15200 | 36480 | 207 | | | | | | | 50 | Sprinklers |
| Wind erosion - soil storage area | 351 | 1.7 | ha | 425 | kg/ha/yr | | | | | | | | | | | 50 | Sprinklers |
| Wind erosion - aggregate stockpile area | 638 | 3.0 | ha | 425 | kg/ha/yr | | | | | | | | | | | 50 | Sprinklers |
| Diesel combustion - off-road | 665 | | | | | | | | | | | | | | | | |
| Diesel combustion - on-road trucks | 151 | | | | | | | | | | | | | | | | |
| **Total** | **8,784** | | | | | | | | | | | | | | | | |

| Activity | PM2.5 Emission estimate (kg/year) | Intensity | Units | Emission Factor | Units | Variable 1 | | Variable 2 | | Variable 3 | | Variable 4 | | Variable 5 | | Control % | Control |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Waste trucks entering site - site access to MPC (paved) | 115 | 2,000,000 | t/y | 0.00019 | kg/t | 50 | t/load | 45 | GVM (t) load/unload ave | 2.1 | km/returr | 0.00 | kg/VKT | 0.6 | road surfa | 70 | water flushing |
| Trucks unloading | 7 | 800,000 | t/y | 0.0001 | kg/t | 2.0 | moisture ( | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 85 | 75% for enclosure plus 50% for water sprays |
| Ex/FEL sorting waste | 7 | 800,000 | t/y | 0.0001 | kg/t | 2.0 | moisture ( | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 85 | 75% for enclosure plus 50% for water sprays |
| FEL loading hopper | 5 | 560,000 | t/y | 0.0001 | kg/t | 2.0 | moisture ( | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 85 | 75% for enclosure plus 50% for water sprays |
| Screening in MPC | 4 | 560,000 | t/y | 0.0000 | kg/t | | | | | | | | | | | 75 | 75% for enclosure plus controlled emission factor |
| Transfer points | 28 | 560,000 | t/y | 0.0001 | kg/t | 2.0 | moisture ( | 0.6 | (wind speed/2.2)^1.3 | 6 | transfer points | | | | | 85 | 75% for enclosure plus 50% for water sprays |
| Unloading to product storage | 12 | 448,000 | t/y | 0.0001 | kg/t | 2.0 | moisture ( | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 50 | Sprinklers |
| Rehandle to product storage (loading trucks) | 12 | 448,000 | t/y | 0.0001 | kg/t | 2.0 | moisture ( | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 50 | Sprinklers |
| Rehandle to product storage (hauling) | 61 | 448,000 | t/y | 0.00045 | kg/t | 50 | t/load | 45 | GVM (t) load/unload ave | 0.5 | km/returr | 0.05 | kg/VKT | 7.4 | road surfa | 70 | water flushing |
| Mobile crusher - concrete/brick for roadbase product | 26 | 510,000 | t/y | 0.0001 | kg/t | | | | | | | | | | | | Controlled emission factor for sprays and moisture content |
| Mobile screening - sand/soil | 4 | 170,000 | t/y | 0.00003 | kg/t | | | | | | | | | | | | Controlled emission factor for sprays and moisture content |
| Shredding greenwaste | 4 | 80,000 | t/y | 0.0001 | kg/t | | | | | | | | | | | | Controlled emission factor for sprays and moisture content |
| Loading product stockpiles | 21 | 760,000 | t/y | 0.0001 | kg/t | 2.0 | moisture ( | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 50 | Sprinklers |
| Loading product trucks | 21 | 760,000 | t/y | 0.0001 | kg/t | 2.0 | moisture ( | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 50 | Sprinklers |
| Product trucks leaving site - MPC to site access (paved) | 50 | 760,000 | t/y | 0.00022 | kg/t | 50 | t/load | 45 | GVM (t) load/unload ave | 2.4 | km/returr | 0.00 | kg/VKT | 0.6 | road surfa | 70 | water flushing |
| Chute unload to landfill | 0.6 | 240,000 | t/y | 0.0000 | kg/t | 10.9 | moisture ( | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 50 | Sprinklers |
| Wheel generated dust - weighbridge to landfill (unpaved) | 339 | 1,000,000 | t/y | 0.003 | kg/t | 50 | t/load | 45 | Vehicle gross mass (t) | 2.0 | km/returr | 0.1 | kg/VKT | 6 | % silt con | 90 | water cart 75% + 40km/h speed limit 44% + wind breaks (30%) |
| Trucks unloading | 2 | 1,000,000 | t/y | 0.0000 | kg/t | 10.9 | moisture ( | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 65 | Sprinklers + wind breaks (30%) |
| Dozer pushing waste at landfill | 103 | 10,220 | h/y | 0.03 | kg/h | 10.9 | moisture ( | 7 | silt content in % | | | | | | | 65 | Sprinklers + wind breaks (30%) |
| Excavator/loader at landfill | 2 | 1,240,000 | t/y | 0.0000 | kg/t | 10.9 | moisture ( | 0.6 | (wind speed/2.2)^1.3 | | | | | | | 65 | Sprinklers + wind breaks (30%) |
| Wind erosion - landfill | 112 | 5.0 | ha | 64 | kg/ha/yr | | | | | | | | | | | 65 | Sprinklers + wind breaks (30%) |
| Wind erosion - greenwaste storage bay | 19 | 0.6 | ha | 64 | kg/ha/yr | | | | | | | | | | | 50 | Sprinklers |
| Wind erosion - soil storage area | 53 | 1.7 | ha | 64 | kg/ha/yr | | | | | | | | | | | 50 | Sprinklers |
| Wind erosion - aggregate stockpile area | 96 | 3.0 | ha | 64 | kg/ha/yr | | | | | | | | | | | 50 | Sprinklers |
| Diesel combustion - off-road | 645 | | | | | | | | | | | | | | | | |
| Diesel combustion - on-road trucks | 139 | | | | | | | | | | | | | | | | |
| **Total** | **1,884** | | | | | | | | | | | | | | | | |

# APPENDIX 5
# CONTOUR PLOTS

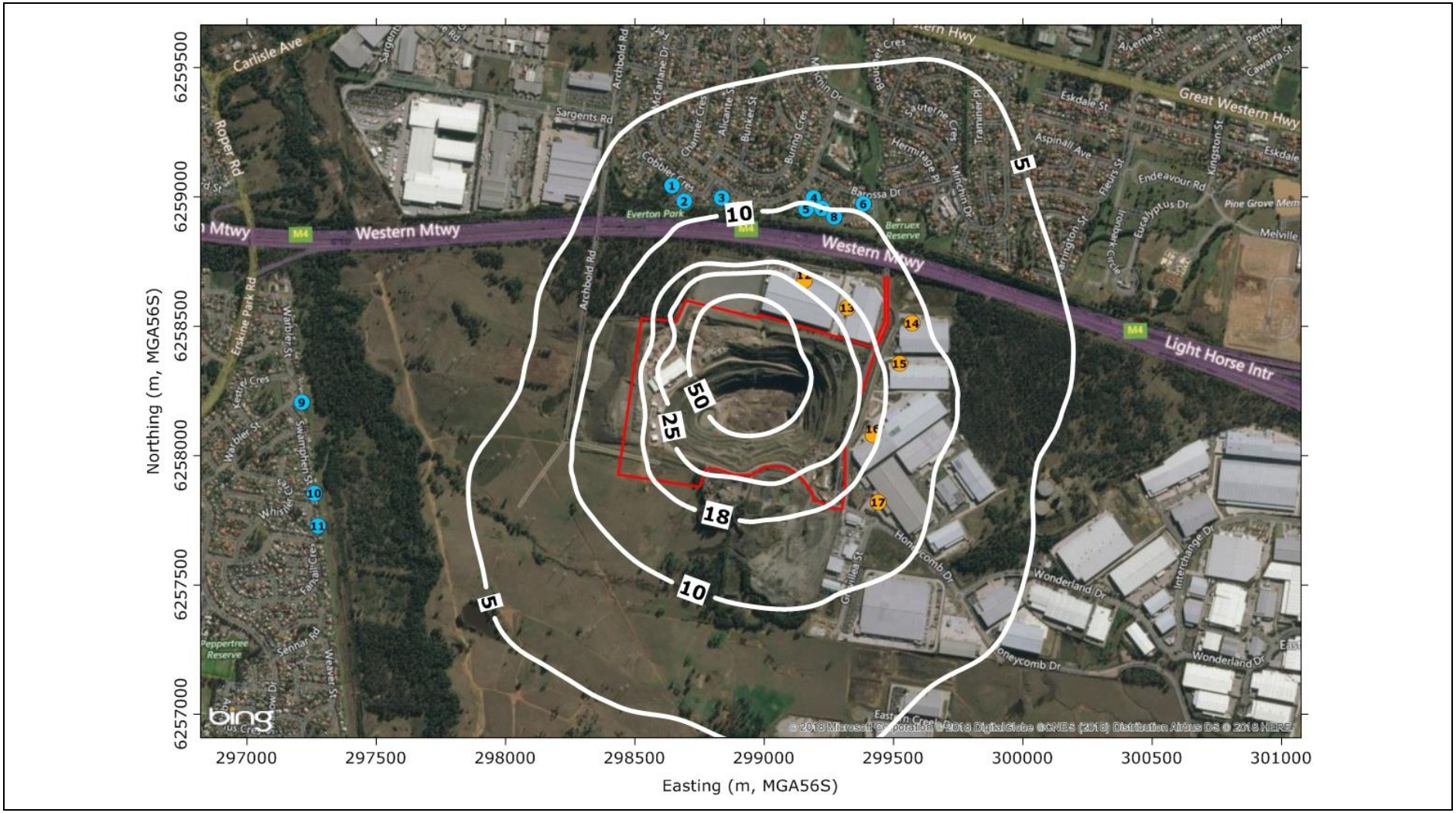


**Figure A5-1: Predicted Project-only 24-hour average $PM_{10}$ concentration ($\mu g/m^3$)**

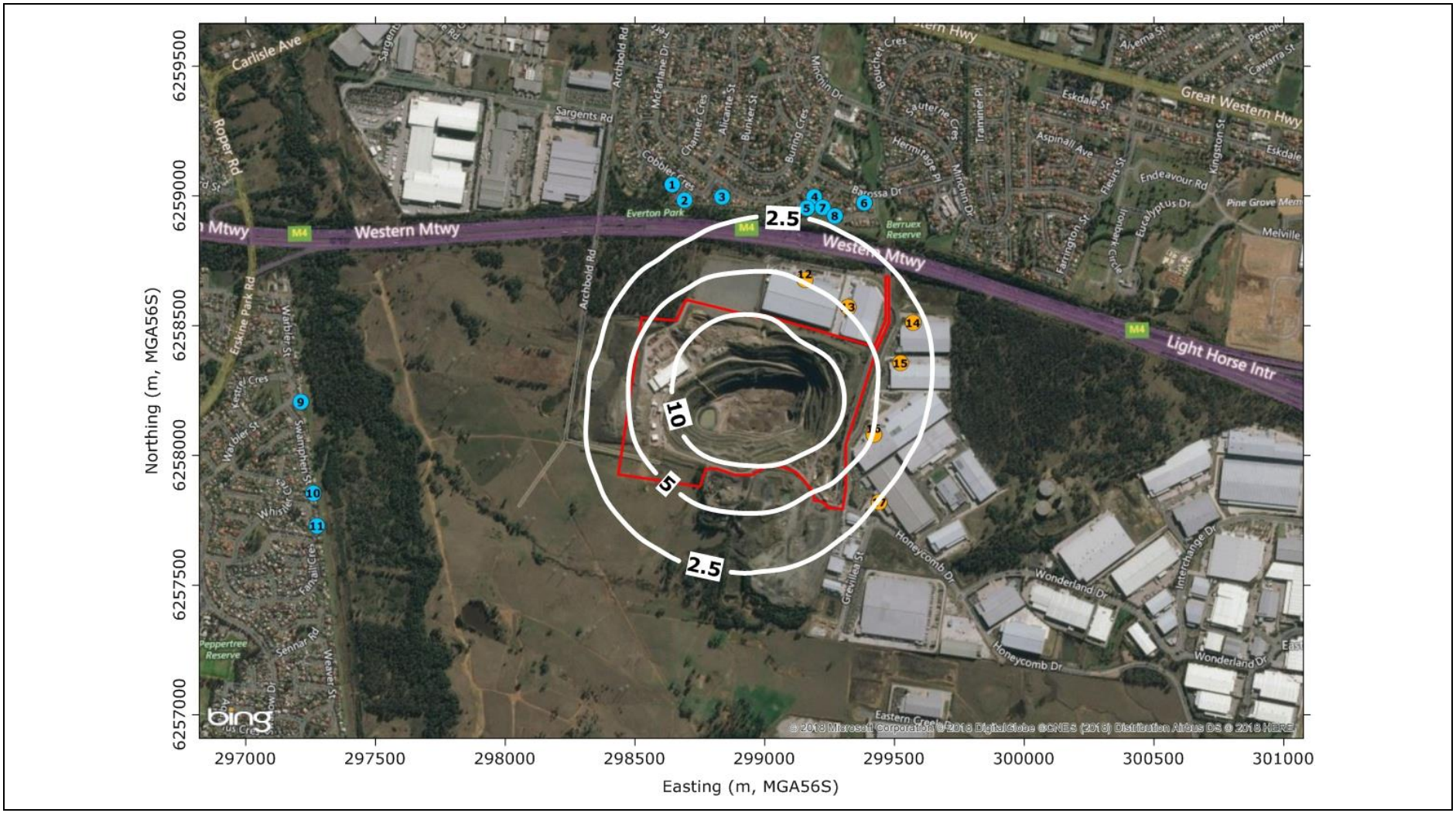


**Figure A5-2: Predicted Project-only annual average $PM_{10}$ concentration (µg/m$^3$)**


**Figure A5-3: Predicted Project-only 24-hour average $PM_{2.5}$ concentration ($\mu g/m^3$)**

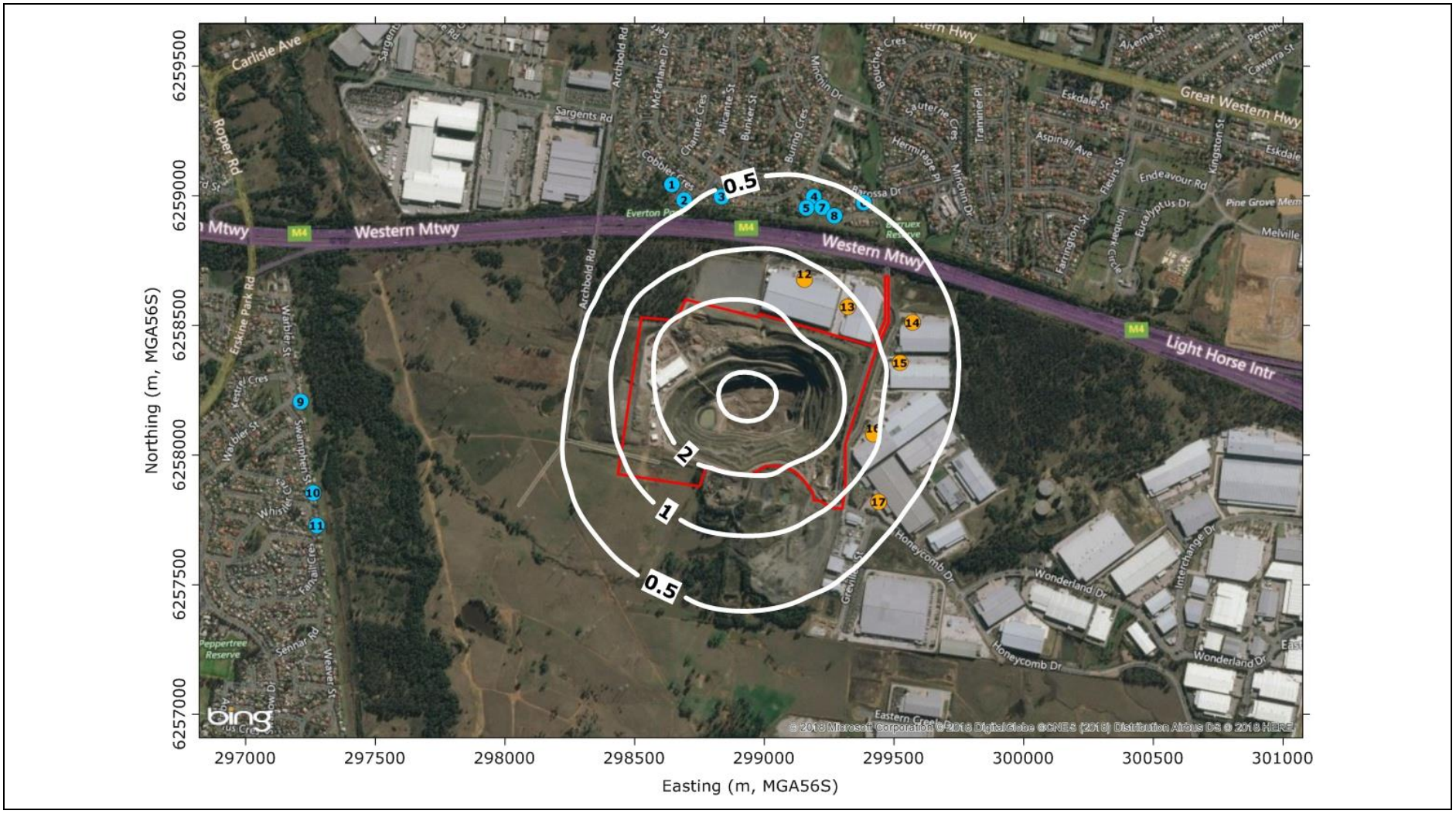


**Figure A5-4: Predicted Project-only annual average $PM_{2.5}$ concentration (µg/m³)**

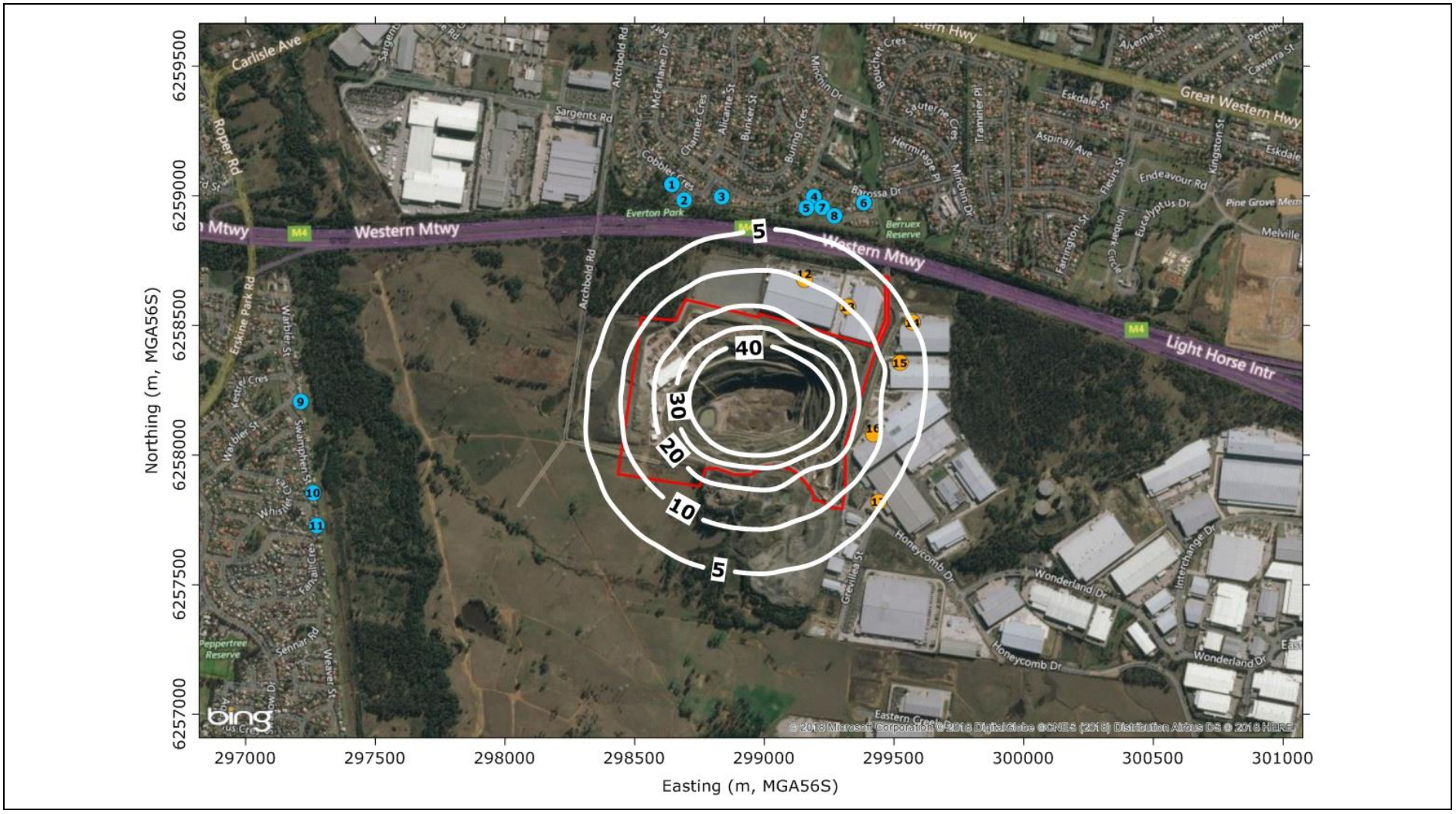


**Figure A5-5: Predicted Project-only annual average TSP concentration (µg/m$^3$)**

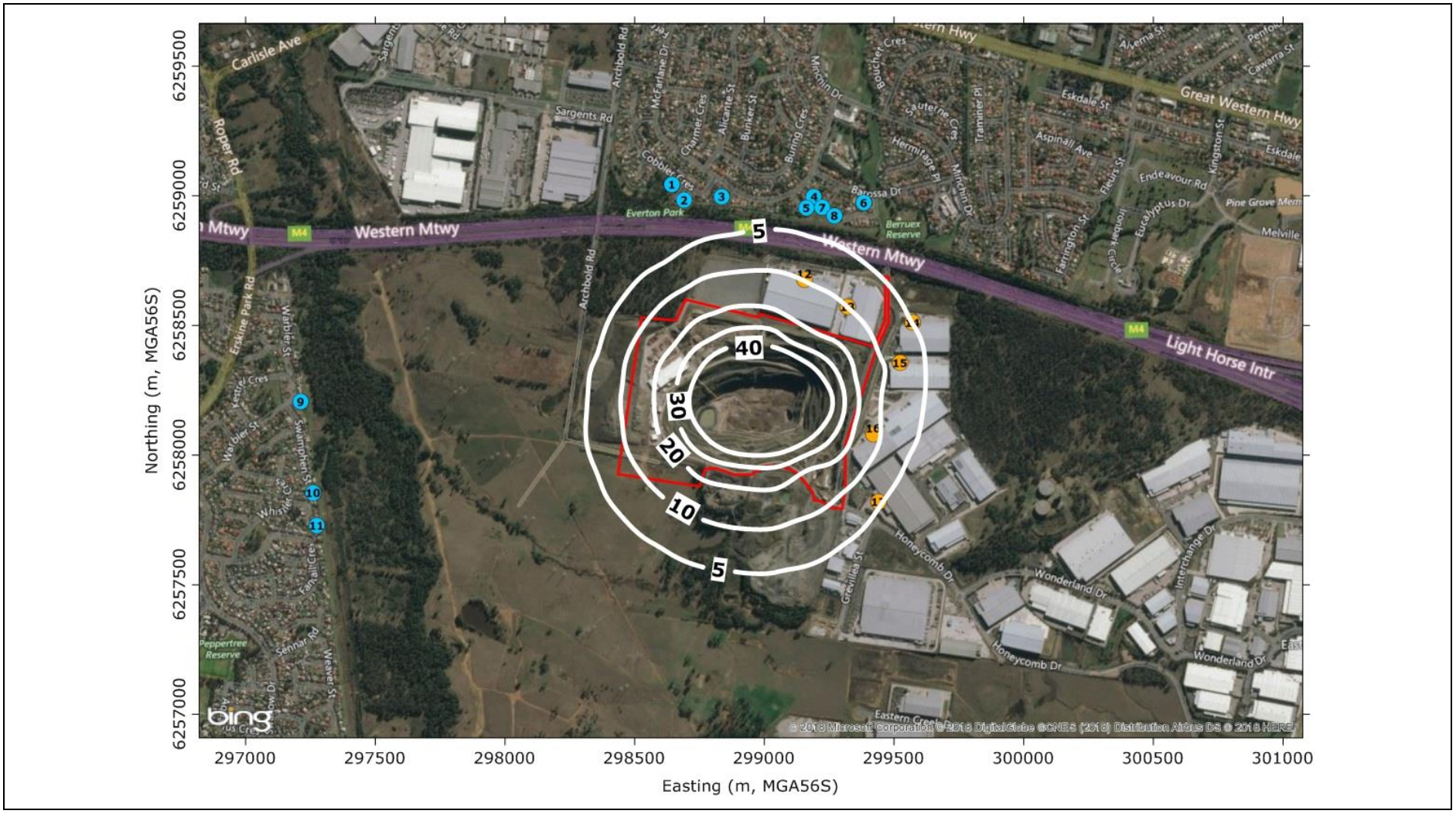


**Figure A5-6: Predicted Project-only annual average dust deposition (g/m$^2$/month)**

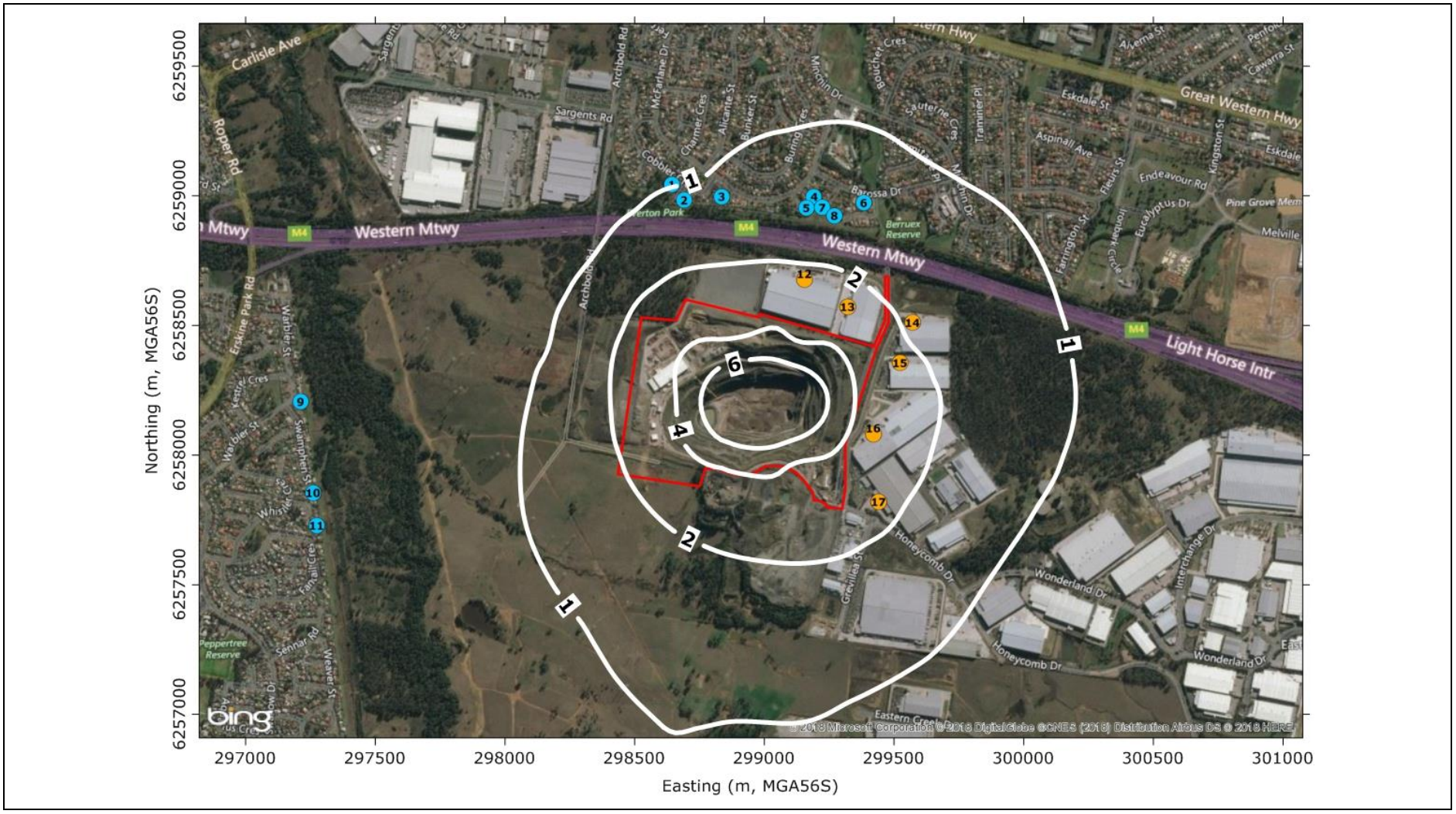


**Figure A5-7: Predicted ground level concentration of odour (OU 99th percentile, nose response average)**


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WHAT'S RIGHT
FOR YOU