Turning waste into a resource

Environmental Assessment – Modification Application (Project Approval 06_0239)

Woodlawn Mechanical Biological Treatment Facility

Veolia Environmental Services Australia Pty Ltd

December 2013

VEOLIA ENVIRONMENTAL SERVICES

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Quality Information

This Environmental Assessment has been prepared in accordance with Section 75W (Limited Environmental Consequences) of the *Environmental Planning and Assessment Act 1979*.

Environmental Assessment Prepared by	Name:	Veolia Environmental Services (Australia) Pty Ltd
	Address:	Cnr. Unwin & Shirley Streets, Granville NSW 2142
	In respect of:	Modification to Project Approval 06_0239 to construct and operate the Woodlawn Mechanical Biological Treatment Facility (formerly the Woodlawn Alternative Waste Technology Project)
Project Site and Location	Proposed Site Name:	Woodlawn Mechanical Biological Treatment Facility
	Address:	619 Collector Road, Tarago NSW 2580
	Lot and DP:	Lot 1, DP 241092; Lots 33, 34, 69 & 97, DP 754919; Lot 4, DP 830765.
Environmental Assessment	An Environmental Assessment is attached	
Certification	Veolia Environmental Services (Australia) Pty Ltd certifies that the contents of this Environmental Assessment has been prepared to the best of our knowledge, in that: ▪ It contains all information relevant to the environmental assessment of the proposed modification; and ▪ It is true in all material particulars and does not, by its presentation or omission of information, materially mislead. Signature: Name: Christine Hodgkiss Position: NSW Strategic Planning and Development Manager Date: 12 December 2013	

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Executive Summary

Introduction

Veolia was granted Project Approval (PA) 06_0239 for the '*Woodlawn Alternative Waste Technology Project*' (the Development) on 6 November 2007 under Part 3A of the NSW Environmental Planning and Assessment (EP&A) Act 1979.

Veolia now seeks a modification to the PA under Section 75W of the EP&A Act to utilise current best available technology and environmental controls for producing compost derived from mixed waste for use in mine rehabilitation.

The main components of the proposed modification to the Development comprise:

- Layout and site infrastructure
- Processing technology
- Operating hours

The proposed changes to the Development listed above are the principal subject of this Environmental Assessment (EA) and are intended to improve overall environmental performance of the proposed Development whilst also improving the processing efficiency of mixed waste.

The changes proposed do not alter the approved 30 hectare boundary and/or footprint of the Development. Furthermore, the proposed Development constitutes no additional quantities and/or type of waste to be received and processed at the facility from the current PA.

Woodlawn Eco Project Context

The proposed Development is located within the 6,000 hectare Woodlawn Eco Project Site which comprises of two equally sized properties (Woodlawn & Pylara). The Site is located in the Goulburn-Mulwaree Local Government Area near the township of Tarago.

The Eco Project Site comprises a number of operations including:

- Woodlawn Bioreactor (the Bioreactor), including the Power Station;
- Aquaculture and horticulture operations;
- Woodlawn and Pylara farms; and
- Woodlawn Wind Farm (the Wind Farm) operated by Infigen Energy.

In addition, TriAusMin has recently been granted planning approval for the Woodlawn Mine Project to commence mining operations within the Eco Project Site.

Both the Bioreactor and the proposed Development form part of Veolia's integrated waste management services and are augmented with the following existing and proposed transfer facilities:

- Clyde Transfer Terminal (CTT);
- (Proposed) Banksmeadow Transfer Terminal (BTT); and
- Crisps Creek Intermodal Facility (IMF).

Proposed Modification

The modification to the approved Development entails the following key changes:

i. Layout & Infrastructure – allow for the utilisation of existing site entrance and revised facility orientation, building footprint and elevation to accommodate mixed waste processing equipment;
ii. Processing Technology – involves additional biological refining and mechanical separation equipment to reflect best practice and meet current environmental controls for composting operations; and
iii. Operation hours - amend the operating hours to be consistent with other existing and adjacent Veolia operations.

Proposed changes to the Development site layout include utilisation of the existing Eco Project Site entrance and access road would avoid duplication of site infrastructure such as weighbridges and access roads as well as avoiding the need to create a new intersection Collector Road.

The changes to processing technology are based on changes to the waste input and the technology utilised to enable more efficient treatment of mixed waste with improved, processing time, environmental and safety controls.

Furthermore, confining all waste processing activities within enclosed buildings would enable better environmental controls in the management of air quality pollutants such as odour and particulate matter and will be consistent with Composting Guidelines (EPA, 2004).

Proposed changes to the operating hours for the Development are based on the approved operating hours for the Woodlawn Bioreactor and Crisps Creek IMF, that is, 6 am to 10 pm Mondays to Saturday.

Modification Justification

The proposed modification is based on refinements to the processing technology driven by Veolia's international experience in designing, constructing and operating Mechanical Biological Facilities (MBT) to treat mixed waste, SSROC residual waste stream profile and best practice environmental controls and guidelines.

These refinements have driven the processing technology changes to the Development, enabling the ability to process the specific inputs to this facility and produce outputs to meet regulatory and best practice requirements.

Moreover, the refinements have been designed to be modular to cater for flexibility within the process, cope with mixed waste feedstock and produce compost which meets stringent environmental criteria for application to land in accord with the current Resource Recovery Exemption.

Legislative Framework

The Development was approved (PA 06_0239) by the Minister for Planning on 6 November 2007 under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Part 3A of the EP&A Act has since been repealed by the *Environmental Planning and Assessment Amendment Act* (Part 3A Repeal Act). Under Schedule 6A of the EP&A Act, projects deemed a 'transitional Part 3A project' continue to be subject to the Part 3A provisions of the EP&A Act.

The Development is a 'transitional Part 3A project' under Clause 2 of Schedule 6A of the EP&A Act and therefore the Section 75W of the EP&A Act applies to the modification of this Development.

The proposed Development is permissible under the relevant local planning instruments, that is, the Goulburn Mulwaree Local Environmental Plan 2009.

Consultation

Veolia has consulted with a range of stakeholders regarding the proposed modification to ensure all relevant parties are aware of the proposed changes. Consultation has included government agencies, local Council, and the local community.

Issues raised through the consultation process included:

- Air quality (odour & dust),
- Noise,
- Greenhouse gas
- Waste management

- Soil, water and leachate management
- Environment Protection Licensing
- MBT outputs
- Visual and
- Traffic

Veolia is committed to maintaining regular contact with the local and government agencies and other interested parties during the assessment of the proposed modification and more generally regarding updates on the project.

Environmental Assessment

A preliminary environmental risk assessment was undertaken based on the proposed changes to the Development. The environmental risk for each of the issued assessed are considered moderate to low, however specialist studies have been undertaken on air quality, noise, traffic, greenhouse gas and visual impacts.

Air Quality

An assessment of the air quality impacts was undertaken for the proposed modification based on proposed changes to the processing technology, including enclosing the composting process and use of biofilters for odour control.

The modelling indicates that the identified air quality pollutant emissions shall be below the relevant air quality goals for the Development at all surrounding residences as a result of the proposed modification.

Impacts from odour are proposed to be controlled with the following changes that form part of this modification:

- Enclosing the fermentation process; and
- Addition of biofilters as an odour control system;

Additional odour control measures that have been proposed for the Development during the fermentation process, and listed below, shall provide supplementary mitigation.

- AeroControl® - Veolia's proprietary automated aeration technology for accelerating the process of fermentation to achieve stability of organic matter; and
- Biokap ® - Also a Veolia patented technology for enhancing fermentation and treating odour emissions from compost with the use of a cover system.

Traffic

An assessment of the traffic impacts was undertaken for the proposed modification based on proposed changes to the site access.

Assessments of traffic conditions in the main construction year (2015), year of opening (2016) and a 10-year horizon (2026) were compared to conditions in the current year (2013). An assessment on the mid-block capacities of the surrounding roads indicates they continue to operate at a good level of service.

The site access intersection was assessed with the construction and operational traffic from the proposed modification and Bioreactor operations and was shown to operate at a very good level of service in all assessment periods, demonstrating that the existing site access intersection can adequately cater for the proposed Development traffic as well as the Bioreactor traffic.

Noise

A Noise impact assessment was undertaken for the proposed modification based on proposed changes to processing equipment.

Noise levels associated with construction activities at potentially affected receivers were predicted to meet the ICNG and Project Approval (PA) construction criteria at all receiver locations.

Noise from the operation of the proposed modification is predicted to comply with the project specific noise levels (and PA criteria) under calm and prevailing conditions at all receiver locations. Night-time sleep disturbance noise goals are also predicted to be met at all receiver locations.

Cumulative amenity noise levels are predicted to be below the relevant INP acceptable amenity levels for rural receivers at all assessment locations during the daytime and evening period.

Noise levels on Bungendore Road and Collector Road during construction and operation of the Development are predicted to comply with RNP criteria and those contained in the current PA.

Greenhouse Gas

A Greenhouse Gas Assessment was undertaken for the proposed modification based on proposed changes to the processing equipment.

Results from the greenhouse gas assessment show a similar emissions profile between the approved and proposed Development.

An increase to the proposed Development's emissions can be attributed to a change in processing equipment and accounting for emissions from the composting process which was not part of the original EA.

Waste Management

An assessment of the waste management impacts was undertaken for the proposed modification based on current waste input data and regulatory framework for outputs.

Based on the expected waste composition the proposed modification (including the processing technology improvements based on the input profile and the revised mass balance) will have minimal impact on the quality of the outputs from the Development.

As per the Project Approval, compost will be applied at the Eco Project Site for mine site remediation, ferrous metals transferred off site for recycling and residual material disposed in the Bioreactor for further energy recovery.

Water Management

An assessment of the water demand was undertaken for the proposed modification based on enclosing the composting process, changing the water infrastructure capacity requirements for leachate and stormwater.

The analysis of the water demand for the proposed Development indicates that enclosing of the MBT processing areas has resulted in a reduction of leachate generation and therefore storage requirements

Tanks have been proposed to be installed to capture rainwater for use in the MBT processes; this additionally negates potable water usage and the need to have significantly large stormwater or leachate storage devices, although a marginal increase in the onsite stormwater dam has been proposed to allow for more clean water capture.

The revised water balance confirms this net benefit.

Visual

An assessment of the potential visual impacts was undertaken for the proposed modification based on changes to the building layout and elevations.

This assessment indicated that the visual impact will be moderate from Collector Road and low for all other viewpoints. The visual impact of the proposed modification on the surrounding receivers is not considered to be significant due to the relative distance of all surrounding receivers.

Statement of Commitments

An overview of the Statement of Commitments in the Project Approval (PA) was undertaken to determine applicability to the proposed development. The majority of the environmental and operational controls outlined in the PA apply to the proposed modification and would be implemented through Veolia's current Integrated Management System.

Additional measures have been identified as part of the specific environmental impact assessments and are provided as in a revised Statement of Commitments.

Conclusion

No significant environmental impacts have been identified in assessing the potential environmental impacts of the proposed modification.

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1. Introduction

Project Approval 06_0239 (PA) for the '*Woodlawn Alternative Waste Technology Project*' (the Development) was granted to Veolia Environmental Services (Australia) Pty Ltd (Veolia) by the Minister for Planning on 6 November 2007, under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Part 3A of the EP&A Act has since been repealed by the *Environmental Planning and Assessment Amendment Act* (Part 3A Repeal Act). Under Schedule 6A of the EP&A Act, projects deemed a 'transitional Part 3A project' continue to be subject to the Part 3A provisions of the EP&A Act.

The Development is a 'transitional Part 3A project' under Clause 2 of Schedule 6A of the EP&A Act and therefore the Section 75W of the EP&A Act applies to the modification of this Development.

In accordance with Clause 11 of Schedule 6A of the EP&A Act, the PA does not lapse until five years after the repeal of Part 3A, which is October 2016. Therefore the PA is still current.

Veolia is now seeking a modification to the PA under Section 75W of the EP&A Act to enable utilisation of the best available technology and environmental controls for producing compost derived from mixed waste. The proposed modification incorporates the following changes to the Development:

i. Site layout and infrastructure – utilisation of existing site entrance and revised facility orientation, building footprint and elevation (to accommodate mixed waste processing equipment);
ii. Processing technology – additional biological refining and mechanical separation equipment (to reflect best practice and meet current environmental controls for composting operations); and
iii. Operating hours – to be consistent with other existing and adjacent Veolia operations and PA conditions to reflect modification.

Conditions 4, 27, 30, 31 and 34 within Schedule 3 of the PA are the relevant conditions to which amendments are being sought as part of this proposed modification.

This Environmental Assessment (EA) has been prepared to detail the proposed modification based on design and process improvements and comprises:

- A background to and description of the Development, an overview of the proposed modification and existing site surrounds (Woodlawn Eco Project Site) context (refer Section 1);
- Details of the proposed modification and justification to the Development and the PA (refer Sections 0 and 0);
- The legislative framework relevant to the proposed modification and the consultation process (refer Sections 4 and 5);

- Assessment of any preliminary environmental risks and potential environment impacts associated with the proposed modification (refer Sections 6 and 7); and,
- Veolia's statement of commitments regarding the proposed modification and concluding statement (refer Sections 8 and 0).

A glossary of the terminology used in the EA is provided in Appendix A.

1.1 Background

Veolia is a global leader in waste management and resource recovery services, with major facilities across Australia and internationally. Since the Development was approved, Veolia has been reviewing mechanical biological treatment (MBT) technology, for mixed waste and its application, across their global operations for adaptation to Australian conditions. The review has indicated that a change to the approved processing technology would be necessary to improve the quality of outputs and adhere to best practice environmental controls.

As part of this process, Veolia has endeavoured to incorporate the environmental control elements prescribed in the 2004 '*Environmental Guidelines - Composting and Related Organics Processing* (the Composting Guidelines), published by NSW Environment Protection Authority (EPA), into the revised design of the Development. The Composting Guidelines (EPA, 2004) recommend that composting of high air quality impact organics such as ' *mix residual waste containing putrescible organics*', are '*best processed in enclosed facilities*' to '*prevent odour emissions and degradation of the local amenity*'.

Veolia is now proceeding with the Development as key drivers including regulatory certainty for the use of outputs and a secure source of mixed waste inputs have been obtained. Regulatory certainty, in the form of Resource Recovery Exemptions issued by the EPA, enables the use of compost at the Veolia owned and operated Woodlawn Eco Project Site (the Eco Project Site), where there is an immediate need for rehabilitation material. This has been a critical factor for the viability of the Development.

On the basis of this, Veolia bid for and was awarded the Southern Sydney Regional Organisation of Councils (SSROC) contract in 2013 to accept and process over 100,000 tonnes per annum (TPA) of mixed Municipal Solid Waste (MSW) from 8 of the 16 member councils. Securing volume has also been a critical factor for the Development has it has enabled further refinement of the MBT process, ensuring optimum recovery from the facility.

1.2 Description of Project Approval

The Development has been approved to be constructed and operated within the Eco Project Site, which is located in the Southern Highlands of NSW, approximately 250 kilometres (km) southwest of Sydney, as shown in Figure 1.2-1.

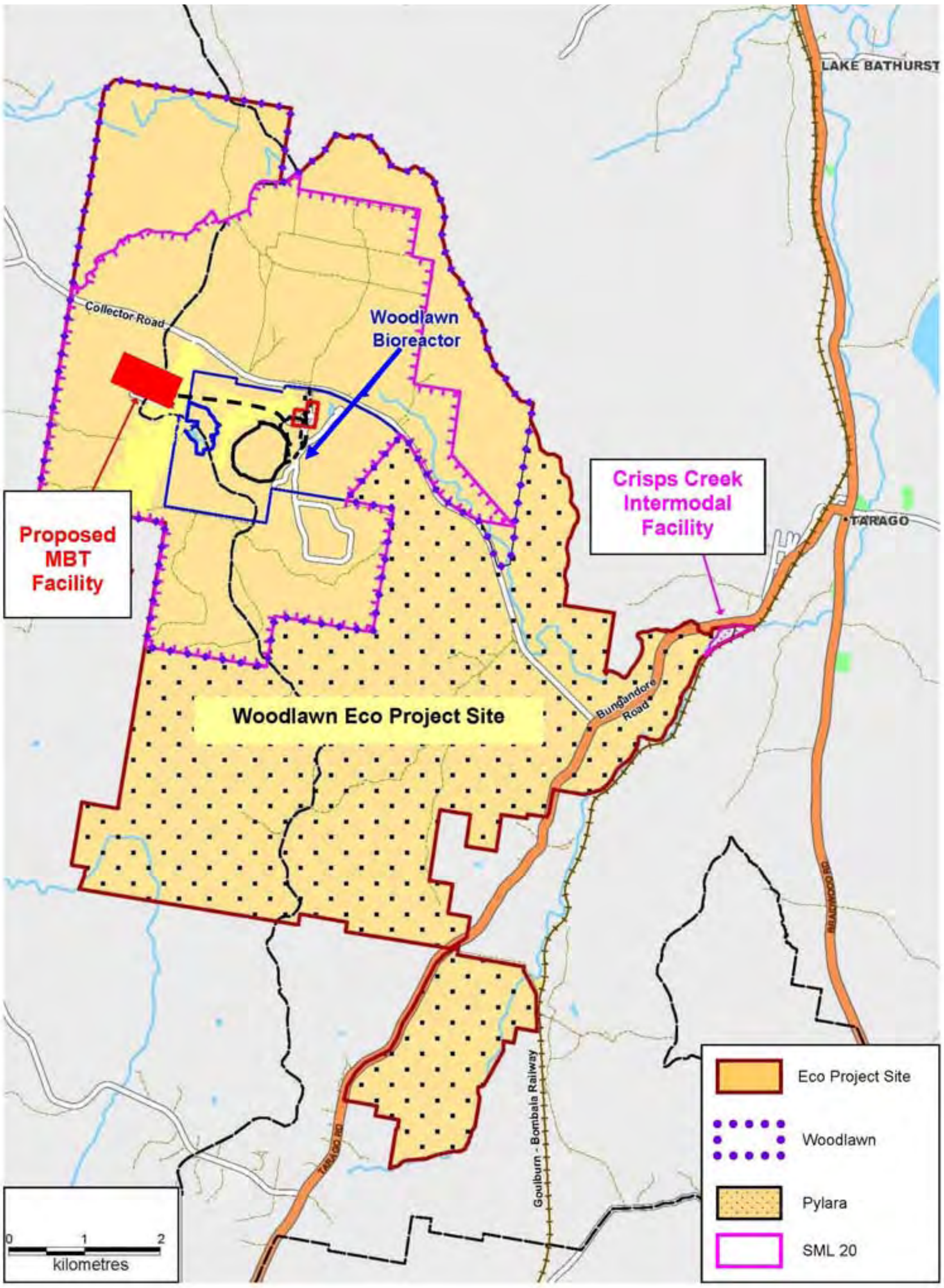

Figure 1.2-1: Eco Project Site Location Plan

The PA permits the receipt of up to 280,000 tonnes TPA of waste by rail from Sydney, comprising two separate processing areas:

- *Woodlawn Alternative Sorting and Processing (WASP) facility to receive up to 240,000 TPA of mixed waste from Sydney for processing to produce recyclable materials and compost; and,*
- *Woodlawn Composted Organics and Green waste (WOCOG) facility to receive up to 40,000 TPA of garden organics and other source separated organic material for processing to produce high quality compost.*

The PA also provides for the use of the compost produced by the Development in the rehabilitation of former mining impacted areas of the Eco Project Site (refer Section 1.4.8).

Any non compostable residual and recyclable materials removed during the treatment process have been approved under the PA to be deposited in the adjacent Woodlawn Bioreactor (refer Section 1.4.1) or taken offsite for reuse respectively.

1.3 Overview of Proposed Modification

The modification is sought to enable utilisation of the current best available technology and environmental controls for producing compost. These changes are based on the drivers referred to in Section 1.1.

Table 1.3-1 provides a summary of these changes, which are further detailed in Section 0.

Table 1.3-1: Summary of Proposed Modifications

Component	Approved	Proposed
Site Layout & Infrastructure		
Site access road	Entrance located on Collector Road, 2 km west from the Eco Project Site entrance	Shared access with the Eco Project Site entrance
Approved site boundary	30 ha	No change
Processing capacity ▪ Mixed waste o Stage 1 o Stage 2 ▪ Green waste	 120,000 TPA 240,000 TPA 40,000 TPA	 No change No change No change
Height of processing building	11 m	24 m (tallest building only)
Mixed waste processing building	5,400 m^2	▪ Reception Building – 2,400 m^2 ▪ Refining Towers – 1,300 m^2 ▪ Buffer Storage – 1,400 m^2 Total = 5,100 m^2
Mixed waste composting area	64,000 m^2 (open)	▪ Fermentation Buildings (enclosed) – 18,000 m^2 ▪ Compost Storage (open) – 47,000 m^2 Total = 65,000 m^2
Green waste processing area	22,400 m^2 (open)	Incorporated into the mixed waste composting area

Component	Approved	Proposed
Water infrastructure	▪ Leachate storage dams – 6.5ML ▪ Stormwater dam – 4.5ML	▪ Leachate aeration pond – 1.6 ML ▪ Stormwater dam – 5.0 ML ▪ Rainwater tanks – up to 1 ML ▪ Transfer of excess leachate to the Bioreactor
Processing Technology		
Delivery and screening;	Single building – processes described below	Multiple buildings – processes described below
Waste separation of primarily inert and organic waste streams;	▪ 2D Trommel (2 screen sizes) ▪ Drum (alternative technology option)	▪ Drums ▪ 3D Trommel (3 screen sizes)
Recovery of recyclable materials;	▪ Magnet ▪ Eddy current separator	▪ Magnet ▪ Ballistic separator
Production of alternative fuel (from inert stream);	(Potential future process)	(Potential future process)
Composting of organic material	Open windrows	Enclosed fermentation
Odour control system (OCS)	▪ Operational controls	▪ Operational controls ▪ Biofilters ▪ AeroControl® ▪ BioKap®
Operating Hours		
Construction	Monday – Friday 7 am - 6 pm	No change
	Saturday 7 am - 1 pm	No change
	Sunday & Public Holidays	No change
Waste Receipt	Monday – Saturday 6 am - 7 pm	6 am - 10 pm
Indoor Operations	Monday – Saturday 6 am - 10 pm	No change
Outdoor Operations & Product Dispatch	Monday – Friday 6 am - 10 pm	Monday – Saturday

Component	Approved	Proposed
Emergency	Monday – Sunday Anytime	No change

A preliminary risk assessment was undertaken to consider the key environmental parameters influenced by the proposed modification to the Development (refer Section 6).

Any potential environmental impacts identified have been considered in the EA (refer Section 7) and are supported with the following specialist assessments:

- Air Quality Impact Assessment *(SLR Consulting Australia Pty Ltd)* (SLR)
- Noise and Vibration Assessment *(SLR Consulting Australia Pty Ltd)*
- Greenhouse Gas Assessment *(SLR Consulting Australia Pty Ltd)*
- Traffic Impact Assessment *(AECOM Australia Pty Ltd)* (AEMCOM)
- Visual Amenity Modelling *(xD Visuals Pty Ltd)* (xD Visuals)
- Odour Control System Design *(The Odour Unit)* (TOU)
- Water Supply and Demand Balance Modelling (*Hatch Ltd*) (Hatch)

A comparison between the approved and proposed site layout for the Development is provided in Figure 1.3-1 and Appendix C.

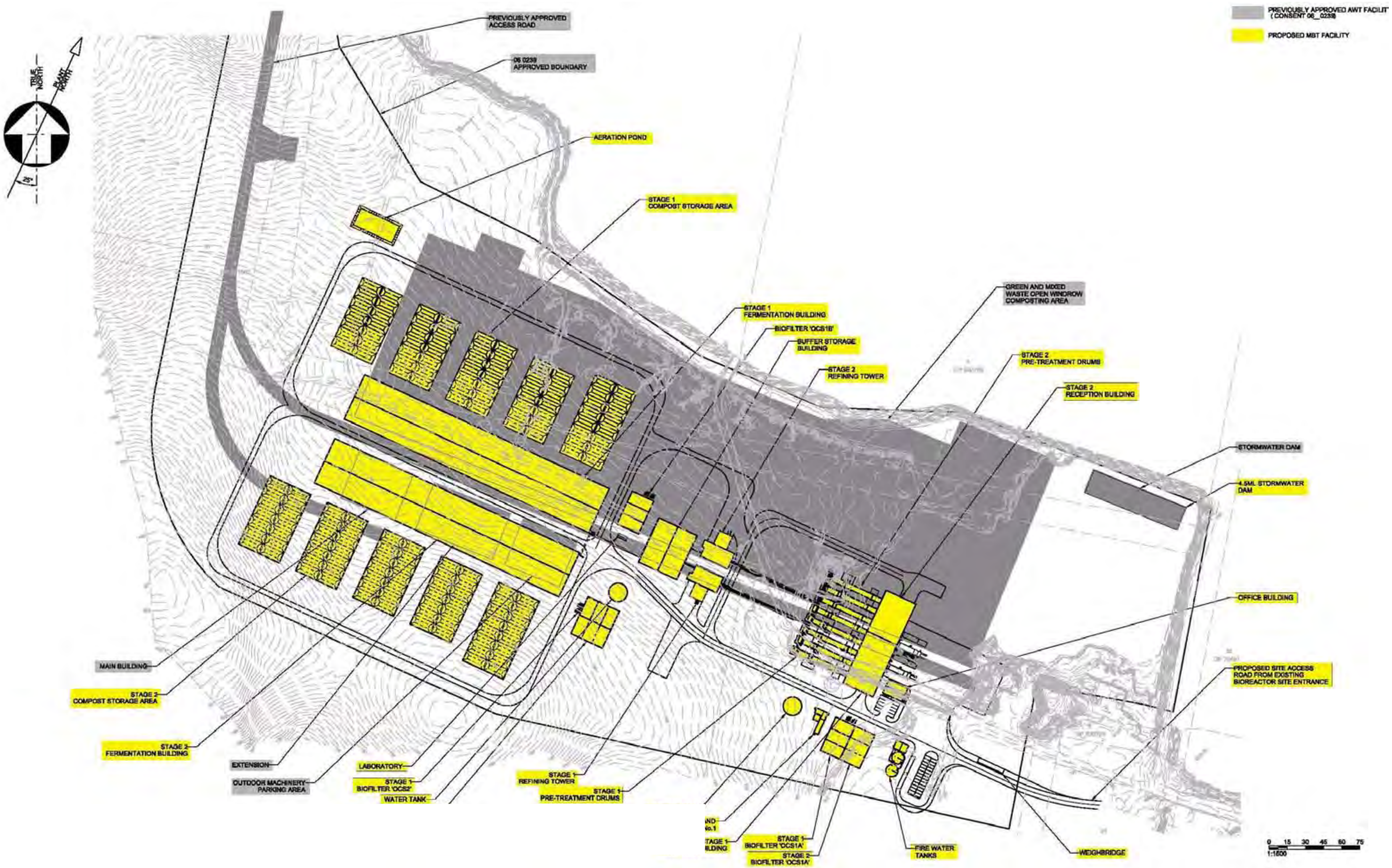

Figure 1.3-1: Comparison between approved and proposed site layout

1.4 Woodlawn Eco Project Context

The approved 30 hectare (ha) boundary of the Development is within the 6,000 ha Eco Project Site, which is made up of two equally sized properties, namely Woodlawn and Pylara.

The Eco Project Site has been developed in stages by Veolia to encompass innovative practices, supplemented with renewable energy. The following operations currently exist on the Eco Project Site and are depicted in Figure 1.4-1 below:

- Woodlawn Bioreactor (the Bioreactor), including the Power Station;
- Aquaculture and horticulture operations;
- Woodlawn and Pylara farms; and
- Woodlawn Wind Farm (the Wind Farm) operated by Infigen Energy.

The Bioreactor and the Development form part of Veolia's integrated waste management services and are augmented with the following existing and proposed transfer facilities:

- Clyde Transfer Terminal;
- Banksmeadow Transfer Terminal (proposed); and
- Crisps Creek Intermodal Facility

In addition to these Eco Project Site operations, TriAusMin Pty Ltd (TriAusMin) has been granted planning approval for the Woodlawn Mine Project (Application Number 07_0143).

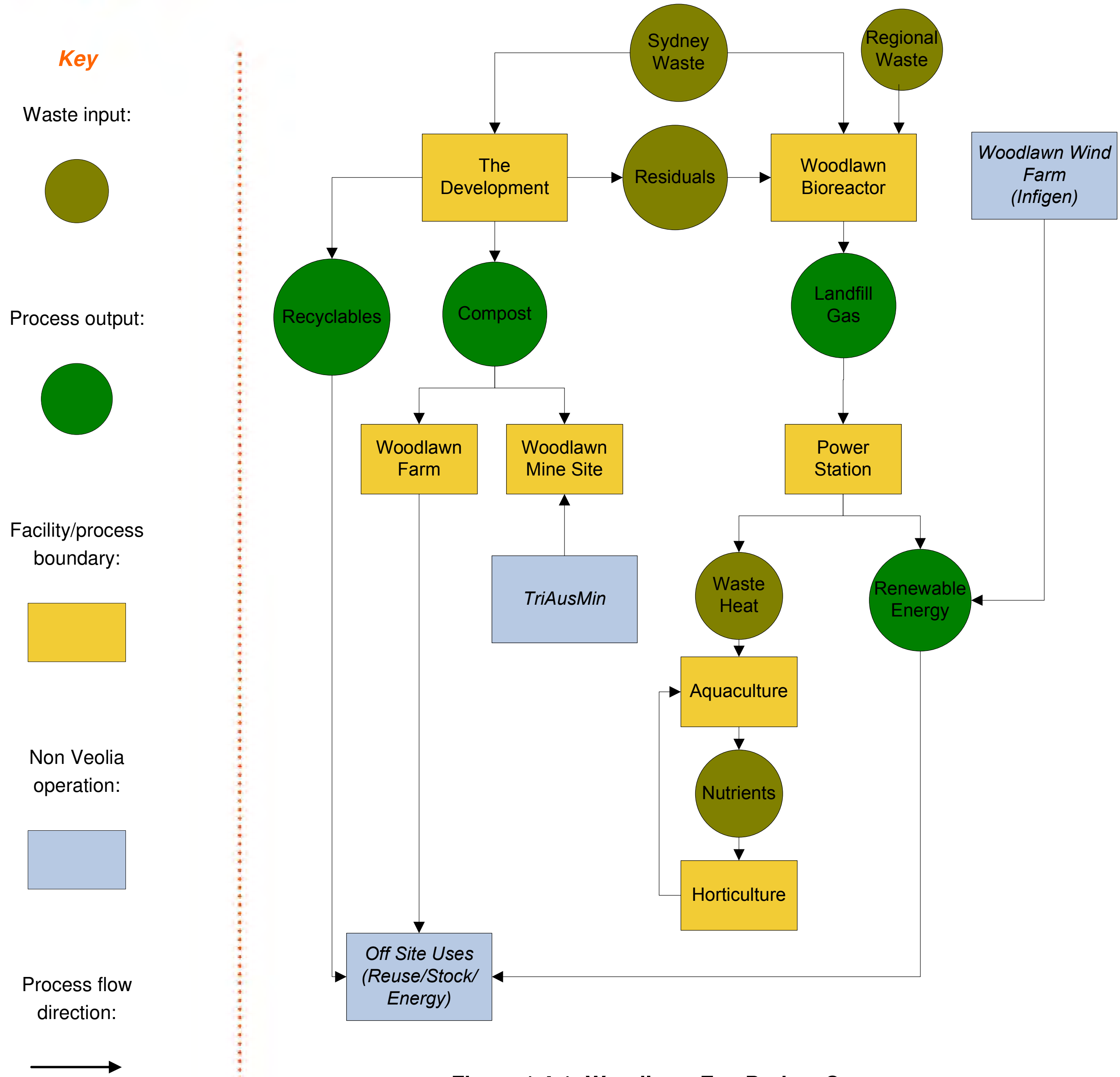

Figure 1.4-1: Woodlawn Eco Project Context

1.4.1 Woodlawn Bioreactor

The Bioreactor is located in a remnant, 30 million cubic metre, open-cut mine void and was the first stage of the Eco Project Site developed by Veolia. Commencing operations in September 2004, the Bioreactor is used for waste filling and collection of landfill gas, with an input limit rate of 1,130,000 TPA, encompassing:

- 900,000 TPA of putrescible waste received via rail from Sydney;
- 130,000 TPA of putrescible waste received via road from areas regional to the Eco Project Site; and
- 100,000 TPA of residual waste from the Development.

The Bioreactor is designed to decompose putrescible waste at a faster rate than traditional landfills through the recirculation of leachate. An extensive gas collection system captures and transfers the landfill gas produced to the onsite Power Station, where methane is extracted and combusted for generation of renewable energy. The Power Station has been exporting energy to the electricity grid since 2007 and is currently at 5 megawatt (MW) of the maximum proposed 24 MW capacity.

Any non compostable residuals removed during the Development's treatment process would be deposited in the Bioreactor, located approximately 3 km south east, for further energy generation.

1.4.2 Aquaculture and Horticulture Operations

Waste heat from the Power Station engines is utilised in aquaculture operations to cultivate fish, with a horticultural system operating to remove excess nutrients from the aquaculture set up.

1.4.3 Pylara and Woodlawn Farms

The surrounding land on the 3,000 ha Woodlawn property is utilised either for farming practices or requires rehabilitation from former mining activities. Adjacent to the south of the Woodlawn property is the 3,000 ha Pylara property which is a working farm utilising sustainable farming practices such as a sheep breeding program that includes genetic selection, nutrition and grazing rotation, to increase meat and wool productivity and reduce impacts on soils. Veolia envisage that the compost from the Development would confer agricultural benefits to these farms, in addition to the forestry and broad acre land within the Eco Project Site.

1.4.4 Woodlawn Wind Farm

The 48 MW Woodlawn Wind Farm comprises 23 turbines and is located along a ridgeline running through both the Woodlawn and Pylara properties. While on Veolia land, this operation commenced in 2011, is owned and operated by Infigen Energy, and supplements the Eco Project Site's renewable energy production (refer Figure 1.4-1).

1.4.5 Clyde Transfer Terminal

Waste collected in the Sydney Metropolitan Area for delivery to the Eco Project Site is currently brought to the Clyde Transfer Terminal (CTT), located in the geographic centre of Sydney. CTT is approved to receive up to 500,000 TPA of putrescible waste which is unloaded, screened, compacted and containerised into shipping containers for transport via rail to the Crisps Creek Intermodal Facility (IMF) located in the township of Tarago, NSW.

1.4.6 Banksmeadow Transfer Terminal (Proposed)

In order to facilitate the expansion of the Eco Project through the Development and increased waste receipt capability of the Bioreactor, Veolia is proposing to build an additional waste transfer station and associated rail infrastructure at an existing industrial site in Banksmeadow (southern Sydney). The proposed Banksmeadow

Transfer Terminal (BTT) shall operate similarly to the CTT, comprising the receipt of up to 400,000 TPA of putrescible waste from municipal, commercial and industrial sectors for containerisation and waste haulage to the Eco Project Site. Waste from the BTT shall be destined for either the Bioreactor or the Development, depending on Veolia's contractual obligations with its customers. The BTT also proposes to receive up to 100,000 TPA of non putrescible waste for transfer offsite, facilitating Veolia's resource recovery operations in Sydney.

1.4.7 Crisps Creek Intermodal Facility

Putrescible waste transported from Sydney either from the CTT or BTT (proposed) is via rail to the Crisps Creek IMF. The waste laden shipping containers are transferred from rail wagons to semi trailers and transported via road approximately 8 km to the Eco Project Site for disposal in the Bioreactor. Waste destined for the Development shall also be transported from Sydney in the same manner.

1.4.8 Mining Operations (Approved)

The Woodlawn property of the Eco Project Site also includes the mining lease area, Special (Crown and Private Lands) Lease (SML 20) for the remnant Woodlawn Mine (the Mine Site) which was a copper, lead and zinc mining operation that ceased activity in 1998. Future operations approved for the SML20 include TriAusMin's Woodlawn Mine Project, which will entails re-mining of the tailings dams and underground mining.

Requirements of the SML20 specify rehabilitation of the mining disturbed areas of the Mine Site. The PA provides for the use of compost generated from the Development to be used for the rehabilitation as shown in Figure 1.4-1. Agreements are in place between Veolia and TriAusMin to facilitate this process.

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2 Proposed Modification

Since the PA was granted in 2007, the processing technology has been refined by Veolia based on:

- international experience of successfully implementing a number of similar mixed waste treatment facilities throughout the world; and,
- best practice environmental controls, including consideration of EPA guidelines.

These improvements have driven the proposed processing technology changes to the Development based on known waste inputs to produce outputs that meet regulatory requirements. Further details on the justification of the modification to adapt to local conditions are provided in Section 0 of this EA.

The improvements proposed to the Development have been designed to be modular, hence allowing flexibility within the process to cope with a mixed waste feedstock, whilst producing compost to meet current environmental criteria for application to land. Resource Recovery Exemptions issued by the EPA now enable the application of the mixed waste derived compost within the Eco Project Site, and specify the physical and chemical limits that the organic outputs from the Development have to satisfy. The features of these exemptions are discussed in Section 0.

2.1 Proposed Changes to the Development

As highlighted in Section 1, changes proposed to the Development are to enable utilisation of current best available technology and environmental controls for producing compost, and consist of the following key components described below:

- Site layout and infrastructure;
- Processing technology; and
- Operating hours

2.1.1 Site Layout and Infrastructure

The original EA (Umwelt, 2006) described the Development infrastructure as follows:

- Access road;
- Weighbridge, car park and amenities;
- Waste processing building;
- Open windrow composting areas; and
- Water management infrastructure.

The modification proposed to the site layout is described below based on these infrastructure components.

Access Road, Weighbridge, Car Park and Amenities

Proposed changes to the Development site layout include utilisation of the existing Eco Project Site entrance and access road, as shown in Figure 2.1-1. This would avoid duplication of site infrastructure such as access roads and weighbridge as well as avoiding the need to create a new intersection Collector Road with associated traffic impacts (light and heavy vehicle movements).

This redesign has required a revised facility orientation facing east (towards the Bioreactor) and extension of the existing access road to the proposed entrance of the Development.

The existing weighbridge located at the entrance to the Eco Project Site shall be used for the weighing incoming waste vehicles from the IMF designated for the Development. A secondary weighbridge shall be installed at the as part of the Development to weigh outgoing residual material for disposal in the Bioreactor or recyclables being sent off site.

Consistent with current Veolia operations a waste classification and coding system devised from the EPA's material composition codes will be utilised for the Development.

A waste tracking system will also be implemented by Veolia from the transfer station in Sydney where the waste is received and containerised to the relevant destination at the Eco Project Site, to ensure that containers from the CTT and BTT designated for the Development are kept separate from the waste being sent to the Bioreactor.

Material leaving the Development (for disposal or recycling), will be recorded at the secondary weighbridge prior to being transported to the appropriate destination.

Waste inputs and outputs will be tracked and recorded in accordance with requirements of the *Protection of the Environment Operations Act 1997* and associated Regulations (refer Section 4).

The secondary weighbridge would also be available for use by incoming waste vehicles as an alternative to the existing weighbridge at the entrance to the Eco Project Site. Veolia will continue to liaise with the EPA on these requirements to ensure appropriate controls are in place to track the waste from.

A car park and an office housing amenities shall be constructed adjacent to the Reception Building of the Development.

A Traffic Impact Assessment has been undertaken by AECOM and a Noise and Vibration Impact Assessment has been undertaken by SLR to assess the potential impacts of the proposed modification including changes to the site access, results of which are discussed in Section 7.2 and 7.3 respectively. The corresponding assessment reports are appended to the EA in Appendix F.

Figure 2.1-1: Proposed Site Access

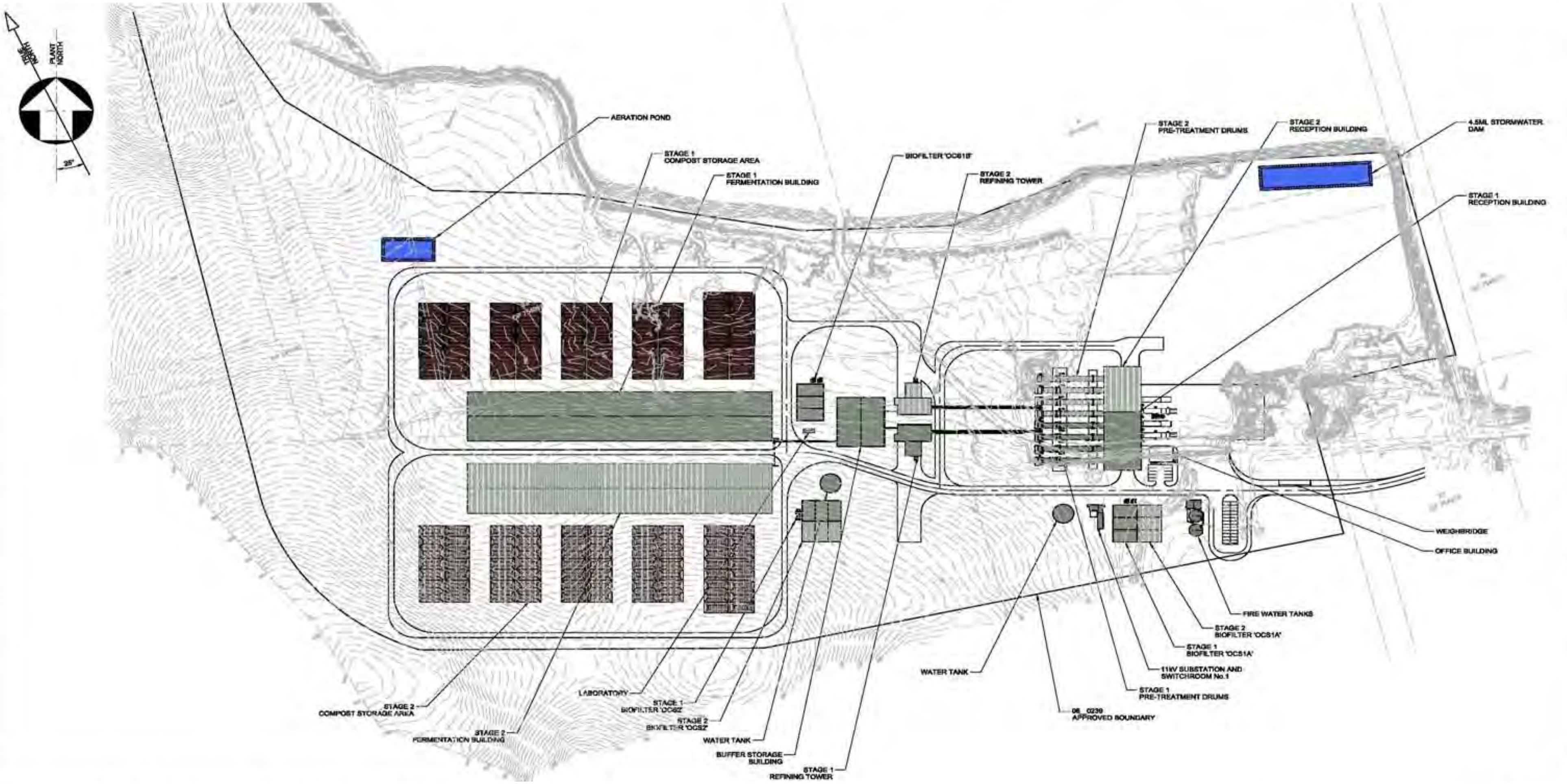
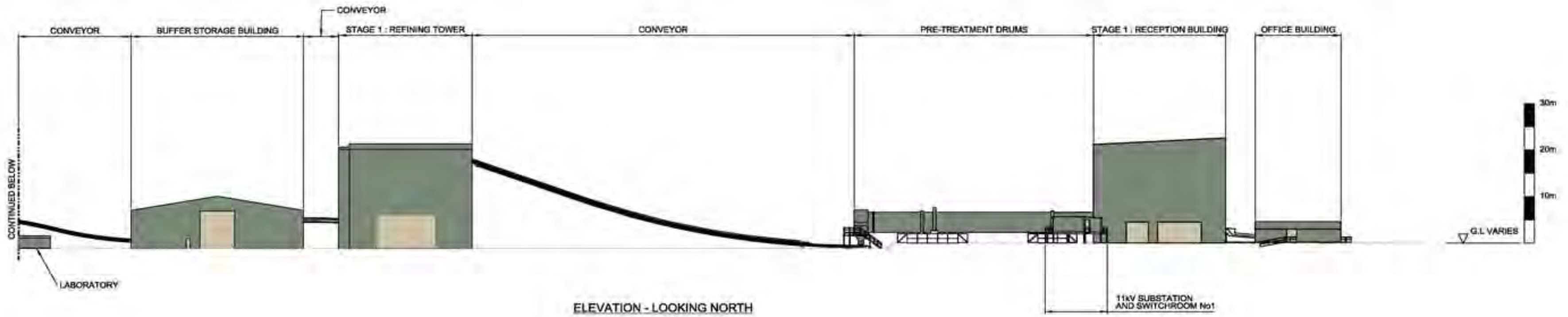
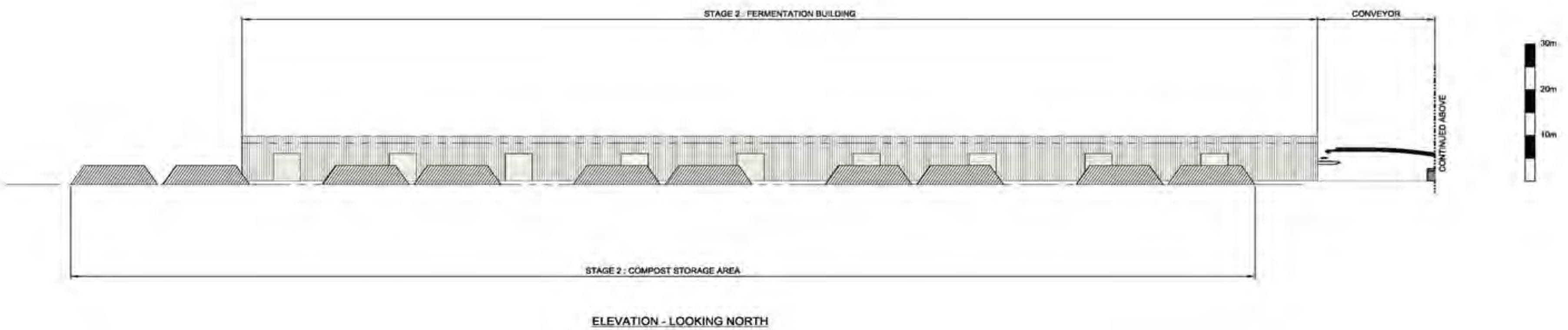


Figure 2.1-2: Proposed Site Layout





NOTE:
BIOFILTERS AND WATER TANKS OMITTED FOR CLARITY

Figure 2.1-3: Proposed Site Elevations

Waste Processing Building

As highlighted in Table 1.3-1, no change is proposed to the annual waste capacity of the Development; however some changes are being proposed to the waste processing building, including separation into three processing areas, based on changes to the waste input and the technology utilised. This will enable more efficient treatment of mixed waste with improved, processing time, environmental and safety controls.

These revised processing areas shall comprise the following buildings:

i. Reception Building (2,400 m^2) – for the receipt, unloading and screening of mixed putrescible waste; the initial pre-treatment phase shall commence from this location;

ii. Refining Towers (1,300 m^2) – mechanical separation for secondary pre-treatment of the waste shall occur in these buildings;

iii. Buffer Storage (1,400 m^2) – temporary storage of organic and non organic material (in appropriate containment not higher than 4 m) prior to the fermentation process or removal offsite for disposal/recycling respectively will be in this location.

The total area of these processing buildings (5,100 m^2) is consistent with the approved building area (5,400 m^2). However, the height of the tallest buildings (the Reception Building and Refining Towers) has been increased to 22.5 and 24 metres (m) respectively, as shown in Figure 2.1-3 and Appendix C, to allow the installation of relevant processing infrastructure. All other processing building heights remain consistent with the approved building height of 11 m. The processing technology proposed within these buildings is further discussed in Section 2.1.2.

A visual impact assessment, including visual representations by xD Visuals, has been carried out to ensure the local amenity is not impacted by the proposed building changes. The results of this assessment are discussed in Section 7.7 of this EA.

Open Windrow Composting Areas

The PA currently permits composting to occur in open windrows, with separate areas for the organic mixed waste fraction (64,000 m^2) and green waste (22,400 m^2).

Veolia is proposing to confine all waste processing activities within enclosed buildings, to be consistent with the Composting Guidelines (EPA, 2004), which refers to composting of mix residual waste containing putrescible organics as '*best processed in enclosed facilities*'. Enclosing these activities will also enable better environmental controls in the management of air quality pollutants such as odour and particulate matter.

Subsequently, the mixed waste composting and green waste composting areas are proposed to be incorporated into Fermentation Buildings (18,000 m^2) with adjacent

Compost Storage Areas (47,000 m^2), as shown in Figure 2.1-2 and Appendix C. This has significantly reduced the total composting areas' footprint of 86,400 m^2 down to 65,000 m^2, which is consistent with the approved mixed waste composting area alone, and hence results in an overall decrease in the operational areas for the Development.

These building changes should also minimise air quality and noise impacts from this stage of the Development. An Air Quality Impact Assessment and a Noise and Vibration Impact Assessment have been undertaken by SLR to assess the potential impacts of the proposed modification including enclosing the fermentation process, results of which are discussed in Sections 7.1 and 7.3 respectively. The corresponding assessment reports are appended to the EA in Appendix F.

Water Management Infrastructure

The water management infrastructure for the Development shall be established in accordance with the design limits stipulated in the PA, including appropriate resizing of surface water and leachate storage devices. The key element for modifying the capacity of the water storage devices is due to the enclosure of the composting process to satisfy environmental best practice.

The quantity of leachate generated from the Development shall be reduced as less processing areas will open and therefore impacted by rainfall. "Clean" rainfall and surface water that have not come into contact with waste shall be diverted to either rainwater tanks or an onsite stormwater dam for use as process water, where required.

Whilst maintaining the 1 in 10 year Average Recurrence Interval (ARI) 24 hour storm event capacity as per the PA, the two leachate aeration dams described in the original EA (Umwelt, 2006) shall be reduced from 4.5 and 2 mega litres (ML) to a 1.6 ML leachate aeration pond, due to the reduced catchment for processing areas.

In compensation, the onsite stormwater dam shall be extended marginally to 5 ML (from 4.5 ML) to allow for capture of stormwater from the increased catchment area of the process building roofs, for any excess volume not captured in the rainwater tanks. The revised stormwater dam has been designed to satisfy the storage of greater than 1 in 100 year Average Recurrence Interval (ARI) 24 hour storm event capacity as per the PA. The various rainwater tanks located strategically on site shall comprise up to 1 ML. Further details on the process water requirements and assessment of the water management impacts, as a result of the modification to the Development, are provided in Section 7.6.

2.1.2 Processing Technology

To reflect best practice technology for the waste inputs to this facility and meet current environmental controls for composting operations, the proposed modification includes some changes to the MBT processing equipment for the Development, including additional biological refining and mechanical separation.

The following flow diagram, Figure 2.1-4, depicts the proposed MBT processing technology.

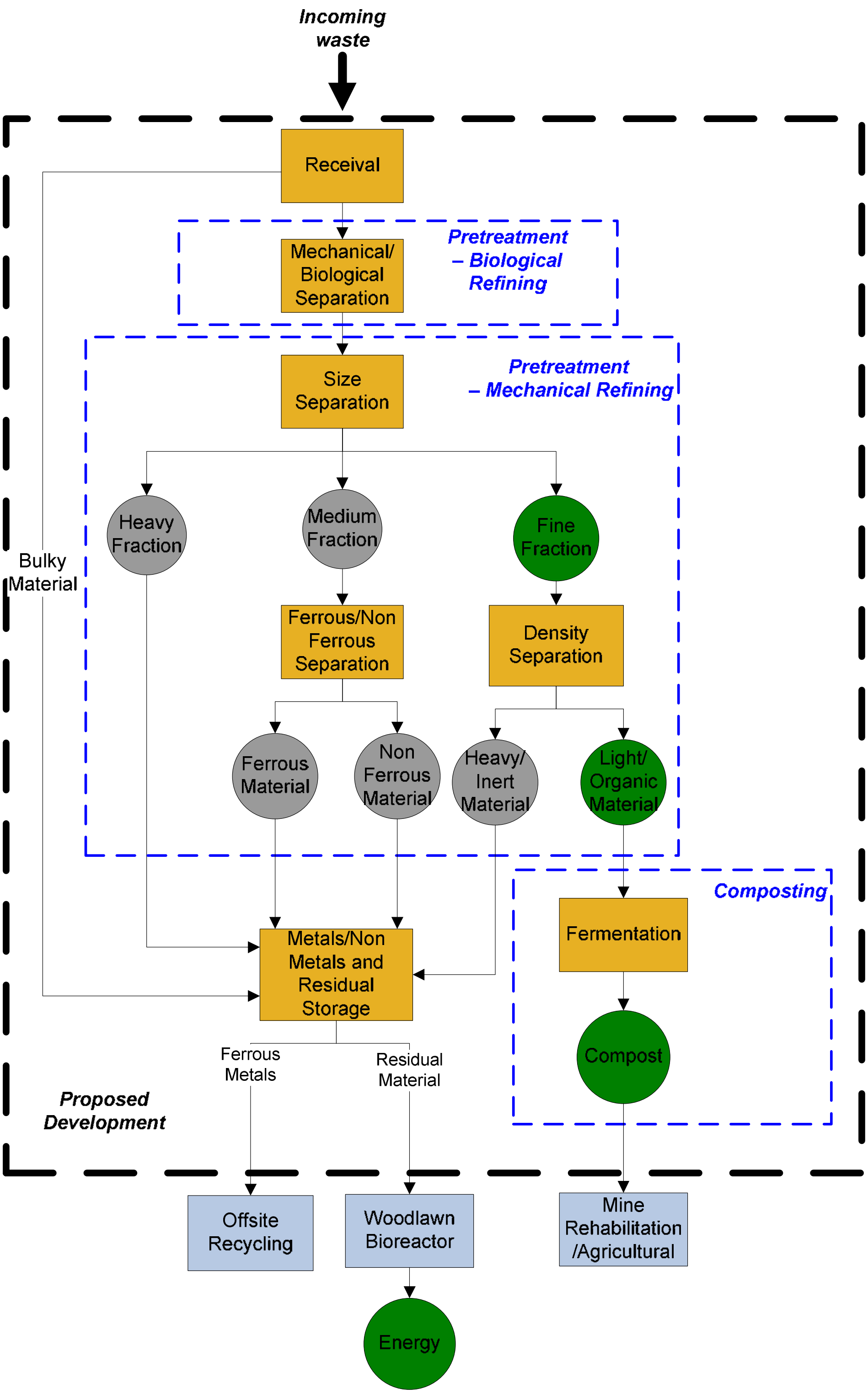


Figure 2.1-4: Processing Technology Overview

The original EA (Umwelt, 2006) described the following major processing stages for the Development:

- Delivery and screening;
- Waste separation into primarily inert and organic waste streams;
- Recovery of recyclable materials;
- Potential production of alternative fuel fro the primarily inert stream;
- Transfer of organic material to the open windrow area for composting

While the proposed modification is consistent with these stages, there have been some refinement to the processes within these stages, to reflect the MSW profile from SSROC and enable treatment to meet the Resource Recovery Exemptions' criteria (refer Section 0).

The proposed improvements to the processing technology for the Development are described below based on these processing stages.

Delivery and Screening

Consistent with the original EA (Unwelt, 2006), after receipt from Sydney via rail, containerised waste will be delivered to the Development on transfer trailers from the IMF, for processing within an enclosed area. The contents of the containers shall be unloaded in a bunker floor using a Columbia Tipper within the Reception Building.

From the bunker, a grab attached to overhead gantry cranes (on rails) shall be used to move the unloaded waste into elevated hoppers located in front of the Biological Refining System (BRS) Drums, which form the first, pre-treatment process of the waste separation stage. The use of overhead cranes enables the loading of the BRS Drums and also improves operational safety by preventing any large mobile plant interacting with the transfer trailer tipping process. The cranes can also be used to sort and/or remove any non conforming material manually by the crane operator, housed in the control room above the bunker. The control room shall also include a Supervisory Control and Data Acquisition (SCADA) system for operating several plant parameters.

Any bulky or non conforming, reject material removed from the waste here shall be designated for disposal.

Primarily Inert and Organic Waste Stream Separation;

The changes proposed to the Development's pre-treatment process are based on improvements in the quality of the organic material, which is a feedstock to the composting process, by maximising the efficiency of pre-treatment, environmental and safety controls.

The proposed modification to this pre-treatment stage is. In this initial pre-treatment stage, BRS Drums shall be used to separate the organic waste stream from the inert faction They shall be attached to the Reception Building and are large, rotating cylinders, that shall be loaded and unloaded in batches to ensure a maximum residence time of 3 – 4 days.

The use of drum technology was considered in the original EA (Umwelt, 2006) as an alternative pre-treatment technology to a 2D trommel, and has now been incorporated into the revised process for the Development. The BRS drums are designed to accelerate biological decomposition and separation of waste matter prior to composting, fulfilling a critical pre-treatment stage. Hence effective separation of the organic fraction within a mixed putrescible waste stream is achieved, optimising the quality and quantity of organics available for composting.

The quality of the input product is preserved as no grinding is utilised in this design, which is consistent with the Composting Guidelines (EPA, 2004) which suggests that processes that exert large forces on the waste mass (such as shredding or vigorous tumbling) may result in the breaking up of inert material that can contaminate the organic stream. On account of this, the BRS drums, operating under continuous slow rotation (approximately 1 turn per minute) assist with homogenising organic matter and are considered suited for this type of application.

Recovery of Recyclable Materials

Mechanical sorting equipment has been selected based on the anticipated MSW profile from available SSROC waste audit data and to remove the manual sorting component from the processing technology described in the original EA (Umwelt, 2006). Further information on the SSROC profile is presented in Section 7.5.

All processing activities shall occur in enclosed buildings as per the Composting Guidelines (EPA, 2004) to minimise fugitive emissions.

These proposed changes are designed to improve the quality of the final product by aligning the technology with the waste input profile and improve operational safety by reducing human interaction with the waste respectively.

In this stage, outputs from the BRS drums shall be transferred to the Refining Towers, which are equipped with sorting equipment such as trommels, magnets and ballistic separators.

Throughout the process, automated delivery systems such conveyors (which shall be covered to minimise odour emissions and wind blow litter) will used to transfer material between the processing areas improving safety controls.

The first part of the mechanical stage is comprised of 3D trommels, to separate waste into 3 fractions (large, medium and fine).

The large fraction which is deemed undesirable for either recovery or composting shall be relegated as residual. All residual material from this stage shall be sent to the Bioreactor for disposal and energy recovery.

The medium fraction material shall be passed below a magnet for the extraction of any ferrous metals and transferred off site for recycling.

The revised mechanical processing equipment is based on the SSROC residual MSW profile, which includes less recyclable material due to successful kerbside recycling services; results in a change to the recyclable material output (refer Section 0). Based on this and available markets, only ferrous metals are proposed to be recovered.

The Noise and Vibration Impact Assessment (NVIA) prepared by SLR assesses any potential noise impacts from the proposed modification, including additional mechanical sorting equipment, and results of this assessment are summarised in Section 7.3.The NVIA is appended to this EA (refer Appendix F3).

Greenhouse gas and energy impacts from fuel and electricity consumption, based on the proposed modification, have been assessed by SLR in the Greenhouse Gas Assessment (GHGA). A summary of the results from the GHGA is provided in Section 7.4 and the GHGA is appended to this EA (refer Appendix F4).

Waste management impacts including recovery rates for the Development, based on the proposed modification including improvements to the processing technology, waste input details and changes to output regulations, have been assessed and are presented in Section 7.5.

Alternative Fuel Production

Potential production of alternative fuels from the primarily inert stream was identified in the original EA (Umwelt, 2006) and shall be still considered as a future stage at the Development under the NSW Energy from Waste Draft Policy (EfW Draft Policy) regulatory framework for certainty of use (refer Section 7.5).

Composting of Organic Material

Fine fraction recovered from the Refining Towers/Buffer Storage area shall be conveyed to the Fermentation Buildings to undergo composting, the final processing stage.

Consistent with the recommendations of the Composting Guidelines (EPA, 2004), the proposed modification incorporates confining the fermentation process to enclosed building areas, improving the environmental controls for the Development, particularly with regard to noise and air quality, as well as minimising the quantity of leachate generated.

The formation of aerated stockpiles in specially designed cells shall be created through an automated delivery system. The height of the stockpiles is not proposed to exceed 4.5 m, inclusive of the Biokap® fermentation system (refer below). Oxygen, temperature and moisture levels shall be regulated through the SCADA system to ensure optimum and controlled conditions for composting to occur.

The process of fermentation will effectively create a biological stable product, at the end of which, the compost produced shall be moved into the Compost Storage Areas, located on either side of the Fermentation Buildings, until required for use around the Eco Project Site. The maximum height of storage shall be 4 m.

The proposed changes to the overall fermentation processing technology are to ensure the Development shall adhere to the composting principles of Australian Standard AS4454-2012: *Composts, soil conditioners and* mulches (AS 4454, 2012), generating a final compost product suitable to meet the output requirements of the General and Site Resource Recovery Exemptions (refer Section 0).

To address any potential air quality impacts from the proposed modification, including the enclosure of the fermentation process, an Air Quality Impact Assessment (AQIA) was undertaken by SLR. A summary of this report is provided in Section 7.1 and the AQIA is appended to this EA (refer Appendix F1).

Fugitive greenhouse gas emissions from the degradation of organic material during the composting process have been assessed by SLR in the Greenhouse Gas Assessment (GHGA). A summary of this report is provided in Section 7.4 and the GHGA is appended to this EA (refer Appendix F4).

The use of the supplementary technology in the fermentation part of the proposed MBT processes is described below:

- **AeroControl®**: The aeration system to be utilised is AeroControl®, which is Veolia's proprietary technology for accelerating the process of fermentation. Key technical, commercial and environmental benefits of the AeroControl® system include:
    - Reduction in fermentation phase to between 4 - 6 weeks;
    - Reduction in the footprint required for storing fresh compost;
    - No manual turning of windrows required;
    - Efficient degradation of organic matter to produce a more refined final product;
    - Optimised air delivery for electricity savings; and
    - Reduced greenhouse gas and odour emissions;
- **BioKap®:** A system called BioKap®, which is another Veolia patented technology, shall be used to enhance fermentation and treat odour emissions from the compost. BioKap® works by placement of a layer of mature compost, nominally 200 mm, on top of a fresh windrow.

Odour Control System

- **Biofilters:**

As odour is the one of the primary concerns of large scale composting operations, the management of odour emissions from each of the proposed processing stages will be via the use of biofilters, which are boxed infrastructure with moist material and biofilm lining, operating under negative pressure to filter odorous compounds. These pollutants are absorbed into the material and broken down by microorganisms, making this system of odour control best practice for composting facilities.

The Composting Guidelines (EPA, 2004) additionally endorse, to prevent atmospheric emissions, '*enclosed areas fitted with exhaust air biofilters*' should be used rather than traditional open air methods.

The biofilters to be used within the Development shall be effectively located adjacent to and servicing all the processing areas, as shown in Figure 2.1-2 and Appendix C.

The use of biofilters, which have been specified by The Odour Unit (TOU) for the Development as an effective odour control system for composting , is been included in the Air Quality Impact Assessment (AQIA) undertaken by SLR. Further information on the benefits of the odour control system to mitigate odour impacts from the Development are provided in Section 7.1 and the AQIA, which is appended to this EA (refer Appendix F1).

2.1.3 Operating Hours

Proposed changes to the operating hours for the Development are based on the approved operating hours for the Woodlawn Bioreactor and Crisps Creek IMF. As the IMF will service both the Bioreactor and the Development, Veolia seeks consistency across all these Eco Project facilities. Proposed changes to the operating hours only relate to waste receipt, outdoor operations and product dispatch and are summarised in Table 2.1-1.

Table 2.1-1: Proposed Changes to Operating Hours

Operations	Proposed Changes	Justification
Waste receipt	Extend the operating hours to 10pm	To allow waste delivery to the Development, consistent with IMF and Bioreactor operations from approved 2 daily trains, 6 days a week
Outdoor Operations and Product Despatch	Extended to include Saturday	To facilitate outdoor activities associated with recyclable and residual material logistics and service and maintenance of the Development

No changes to operating hours are proposed for construction, indoor or emergency operations.

While no mobile plant and equipment operations are proposed to occur after 10 pm, it should be noted that the fermentation process and associated infrastructure (BRS Drums, AeroControl®, and biofilters) would be operated on a continuous basis. Potential noise impacts therefore from indoor and outdoor operations have been assessed over a 24 hour period.

The potential noise impacts from the proposed modification, including the changes to operating hours were assessed in the Noise and Vibration Impact Assessment (NVIA) undertaken by SLR. A summary of the NVIA is provided in Section 7.3 and the NVIA is appended to this EA (refer Appendix F3).

2.2 Proposed Changes to PA Conditions

The relevant conditions pertaining to the proposed modification outlined above are 4, 27, 30, 31 and 34, as represented in Table 2.2-1. Proposed amendments to the existing conditions of consent stipulated in Schedule 3 of the PA are based on the proposed changes to the Development's site layout, processing technology and hours of operation as provided in Table 1.3-1.

Table 2.2-1: Proposed Changes to PA Conditions

No.	Relevant Condition	Proposed Amendments
4	Except for the following, the Proponent shall dispose of all outputs produced on site to the Woodlawn Landfill: (a) recyclables extracted and delivered off-site for resource recovery purposes; (b) industrial waste and hazardous waste extracted from the input waste stream and lawful disposed of off-site; and (c) compost output products: - approved for use under the POEO Act and Regulations: or - for use in mine rehabilitation at the adjoining Woodlawn mine that: ▪ have been composed in accordance with *Australian Standard AS4454:2003: Composts, Soils Conditioners and Mulch*: ▪ comply with the limits for physical contaminants set out in Table 3.1 of *Australian Standard AS4454:2003*; and ▪ comply with the chemical acceptance concentration thresholds for Restricted Use (Grade C) in the NSW Environmental Guidelines: *Use and Disposal of Biosolid Products* (1997)	Except for the following, the Proponent shall dispose of all outputs produced on site to the Woodlawn Landfill: (a) recyclables extracted and delivered off-site for resource recovery purposes; (b) industrial waste and hazardous waste extracted from the input waste stream and lawful disposed of off-site; and (c) compost output products: - approved for use under the POEO Act and Regulations*~~: or~~ ~~- for use in mine rehabilitation at the adjoining Woodlawn mine that:~~ ~~▪ have been composed in accordance with *Australian Standard AS4454:2003: Composts, Soils Conditioners and Mulch*:~~ ~~▪ comply with the limits for physical contaminants set out in Table 3.1 of *Australian Standard AS4454:2003*; and~~ ~~▪ comply with the chemical acceptance concentration thresholds for Restricted Use (Grade C) in the NSW Environmental Guidelines: *Use and Disposal of Biosolid Products* (1997)~~

<table>
<tr><th>No.</th><th>Relevant Condition</th><th>Proposed Amendments</th></tr>
<tr><td>27</td><td>The Proponent shall comply with the operating hours in Table 5.
Table 5: AWT Site Operating Hours
<table>
<tr><th>Activity</th><th>Day</th><th>Hours (Current)</th></tr>
<tr><td>Construction</td><td>Monday - Friday</td><td>7 am - 6 pm</td></tr>
<tr><td></td><td>Saturday</td><td>7 am - 1 pm</td></tr>
<tr><td></td><td>Sunday & Public Holidays</td><td>Nil</td></tr>
<tr><td>Waste Receipt</td><td>Monday - Saturday</td><td>6 am - 7 pm</td></tr>
<tr><td>Indoor Operations</td><td>Monday - Saturday</td><td>6 am - 10 pm</td></tr>
<tr><td>Outdoor Operations & Product Dispatch</td><td>Monday - Friday</td><td>6 am - 10 pm</td></tr>
<tr><td>Emergency</td><td>Monday - Sunday</td><td>Anytime</td></tr>
</table></td><td>The Proponent shall comply with the operating hours in Table 5.
Table 5: MBT Site Operating Hours
<table>
<tr><th>Activity</th><th>Day</th><th>Hours (Current)</th></tr>
<tr><td>Construction</td><td>Monday - Friday</td><td>7 am - 6 pm</td></tr>
<tr><td></td><td>Saturday</td><td>7 am - 1 pm</td></tr>
<tr><td></td><td>Sunday & Public Holidays</td><td>Nil</td></tr>
<tr><td>Waste Receipt</td><td>Monday - Saturday</td><td>6 am - 10 pm</td></tr>
<tr><td>Indoor Operations</td><td>Monday - Saturday</td><td>6 am - 10 pm</td></tr>
<tr><td>Outdoor Operations & Product Dispatch</td><td>Monday - Saturday</td><td>6 am - 10 pm</td></tr>
<tr><td>Emergency</td><td>Monday - Sunday</td><td>Anytime</td></tr>
</table></td></tr>
<tr><td>30</td><td>Prior to carrying out any development on site, the Proponent shall:
(a) construct an BAL/BAR type bitumen sealed intersection at the site entrance; and
(b) upgrade Collector Road from the site entrance to the entrance of the Woodlawn Landfill to provide a 9 metre sealed pavement and matching formation, to the satisfaction of Palerang Council</td><td>Delete condition - Eco Project Site entrance to be used</td></tr>
</table>

No.	Relevant Condition	Proposed Amendments
31	The Proponent shall: (a) provided sufficient car parking on site to accommodate the parking demand of the project; (b) construct a sealed road from Collector Road to the gatehouse/waste reception area; and (c) ensure that the: - car parking is constructed in accordance with the relevant requirements of *Australian Standard AS 2890.1-2004;* and - internal road network is constructed in accordance with the relevant requirements of *Australian Standard AS 2890.2-2002.*	The Proponent shall: (a) provided sufficient car parking on site to accommodate the parking demand of the project; ~~(b) construct a sealed road from Collector Road to the gatehouse/waste reception area;~~ and (c) ensure that the: - car parking is constructed in accordance with the relevant requirements of *Australian Standard AS 2890.1-2004;* and - internal road network is constructed in accordance with the relevant requirements of *Australian Standard AS 2890.2-2002.*
34	The Proponent shall prepare and implement a Transport Code of Conduct for the project to the satisfaction of the Director-General. This protocol must: (a) be submitted to the Director-General for approval prior to construction; (b) be prepared in consultation with PC and GMC; and (c) describe the measures that would be implemented to: - minimise the impacts of the development on the local and regional road network, including traffic noise; and- ensure that no heavy vehicles use the designated heavy vehicle route during school bus operations on the route.	*Delete condition – existing Transport Code of Conduct in place for Eco Project Site*

** The use of the compost output products are detailed in the General and Site Specific Resource Recovery Exemptions, which specify the physical and chemical criteria for application.*

2.3 Construction Phase

No changes have been proposed to construction activities described in the original EA (Umwelt, 2006).

The key construction related impact for the Development subject to the proposed modification has been identified arising from the revised staging and duration of construction and associated activities.

Typical construction environmental impacts relating to construction hours, movement of personnel, as well utilisation of typical plant and equipment have additional been assessed in this EA to ensure air quality, traffic and noise disturbances are minimal and do not attribute to the degradation of the local amenity.

It is anticipated that construction of the Development would commence by the middle of 2014 and conclude in the first quarter of 2106. Indicative construction stages and timeframes are show in Table 2.3-1.

Table 2.3-1: Indicative Construction Timeline

Construction Stage	Phase	Indicative Timing
Stage 1	Site mobilisation and establishment	April 2014
	Earthworks and civil infrastructure	May 2014 – March 2015
	Upgrade to access road	April 2014-Aug 2014
Stage 2	Construction of buildings	Sept 2014 - June 2015
Stage 3	Plant and services installation	March 2015-March 2016
	BRS Drums installation	April - December 2015
	Internal fit out and services installation	June 2015 – March 2016
Stage 4	Commissioning of facility	October 2015 – March 2016

The peak construction periods in terms of noise levels shall be staged to occur from March to July 2014 and September 2014 to March 2015 when the bulk earthworks are undertaken and the buildings are constructed respectively. The peak construction period in terms of traffic levels shall be between March to

December 2014 during site mobilisation, as well as intermittently during construction of major structural elements, concrete works and when equipment and services are installed.

Construction phase environmental impacts from the proposed modification, including traffic (light and heavy vehicles) movements, noise sources (plant and equipment), air quality (dust emissions) and greenhouse gas emissions arising from construction activities are further discussed in the Traffic Impact Assessment prepared by AECOM, and the Noise and Vibration Impact Assessment, Air Quality Impact Assessment and Greenhouse Gas Assessment undertaken by SLR, which are summarised in Sections 7.2, and 7.3, 7.1 and 7.4 respectively, and provided in Appendix F.

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3 Modification Justification

As highlighted in Section 1, Veolia has approval to develop a facility (the Development) under the current PA, and its associated conditions, to generate compost and recover recyclables from processing waste.

In order to satisfy the legislative requirements for outputs, the processes employed for the Development should have the capacity to handle the variability in inputs from a mixed waste source, as well uphold environmental and safety practices.

Consequently, Veolia has spent a significant amount of time and resources in investigating a range of processing technology options internationally suitable for adaptation to Australian conditions, particularly the Eco Project Site, where the Development shall be located. The review and development of a concept design indicated that modifications to the approved Development including the site layout and associated processing areas would be required in order to achieve the best practice environmental controls and outputs based on the waste input profile as well as output regulations.

A modification to the Development and therefore the PA is required based on the key drivers introduced in previous sections, which included securing viable inputs and regulatory certainty for the application of the outputs at the Eco Project Site. The justification for which is presented as follows.

3.1 Waste Inputs

Obtaining a secure source of waste that would instigate construction and operation of the Development has been a critical factor in its feasibility. In 2013, Veolia was awarded an advanced waste treatment contract with the Southern Sydney Regional Organisation of Councils (SSROC) for over 100,000 TPA of mixed residual household waste, making it feasible to progress the first stage of the Development.

This contract also resulted in a review and refinement of the processing technology based on the SSROC residual waste profile to ensure suitability for this contracted waste. The review of the waste inputs to the Development, resulted in some of the improvements to the processing technology that form part of this proposed modification.

It is important to note that variability in municipal solid waste (MSW) can occur over time or in different local government areas depending on the waste management practices of the regulating council, therefore there is a need for some flexibility in the process.

Changes in mixed MSW composition over time can be attributed to improved separation at source, reducing the quantities of recoverable material in the overall MSW residual stream. For example, kerbside recycling practices directly affect the composition of recyclable material in the residual MSW stream residual waste profile.

In order to understand the impact of such changes on the Development, a comparison of the MSW composition (%) presented in the original EA based on the EPA collated waste data of the Sydney Metropolitan Area (SMA), with an aggregate of the SSROC waste audit data was undertaken as part of an assessment of the waste management impacts of the proposed modification. This analysis highlights the variation in waste profile over a period of nearly 10 years, and the impact of these changes on the recovery rate of the Development. Details of this assessment are provided in Section 7.5.

Given this variability in waste inputs, the Development has been designed to be modular to handle a mixed waste feedstock and ability to expand over time with input growth.

This information, paired with relevant waste derived product reuse regulations and availability of markets for outputs and adaptability over time, has been a critical part of the selection criteria for the process technology proposed for the Development.

3.2 Process Technology

The term mechanical biological treatment (MBT) refers to several combinations of a hybrid process that combines mechanical techniques used to sort mixed waste with potential recovery of inert recyclable material, and biological techniques to stabilise the organic fraction. The MBT technology to be used at the Development will be a composting process to treat the residual fraction of MSW, which is generally consistent with the original EA.

Variability of mixed waste inputs is expected at the Development, based on review of various waste audit data as highlighted above. This has resulted in the utilisation of drum based biological pre-treatment (which was considered as part of the original EA) prior to the mechanical component. The applicability of this pre-treatment process is suitable for composting organics particularly from a mixed waste stream, allowing decomposition to be achieved earlier.

The proposed BRS Drum technology uses the combined action of rotation, rising temperature and slow wear on waste to reduce the organic material available for composting into a fine size. This fraction can then easily be separated from inert recyclable material and physical contaminants in the later mechanical stages before fermentation.

The efficacy of the sorting and preparation processes in the pre-treatment stages of the Development is essential to determine the efficiency of the organic material available for the fermentation stage.

Changes to the Development inputs, based on changing waste profile conditions presented in Section 3.1, necessitate the revised technology change described above. An adjustment to the indicative waste mass balance for the outputs (refer to Section 7.5) can be rationalised based on the revised quantity of incoming material from SSROC, both for composting and recycling in mixed MSW.

3.3 Outputs

As discussed in Section 0, the outputs from the Development shall be compost for application at the Eco Project Site, ferrous metals for recycling off site and residuals for disposal in the Bioreactor for further renewable energy generation.

Regulatory certainty for the application of the compost generated by the Development within the Eco Project Site has been another key factor in the development of the facility, including the selection of appropriate processing technology, and therefore a driver for this proposed modification.

The characterisation and application of compost derived from mixed waste is subject to the requirements of the Resource Recovery Exemptions, which came into effect from 2008. These exemptions are granted by the EPA (refer to Section 4.1.3) for the application of waste to land, if a reuse opportunity that causes no environmental or human health impacts can be realised.

While the compost produced from the Development is permitted to be land applied under the *General Resource Recovery Exemption 'The Organic Outputs Derived from Mixed Waste Exemption 2011'*, mine degraded areas of the Eco Project Site require a specific criteria pertaining to application rates, frequencies and maximum soil concentrations. Hence, Veolia applied for and was granted a *Site Specific Exemption 'The Woodlawn Organic Outputs Derived from Mixed Waste Exemption 2012'.*This also facilitates the rehabilitation under the SML 20 of the former mine site with the provision of a dependable source of restorative material.

Taking advantage of the Veolia global experience, data from 10 year studies undertaken in France in conjunction with the French agricultural department demonstrates that compost derived from mixed waste sources has suitable properties for conferring benefits to the receiving environment, particular the former mine site and adjacent farms on the Eco Project Site.

3.4 Environmental and Safety Considerations

The EPA stipulates that the '*operation of a composting facility is reliant upon being able to demonstrate at the planning and community consultation stage that the location, design, operating methodology and resources of the Development would prevent odour emissions and degradation of the local amenity*', Based on this, Veolia has incorporated several of the environmental control elements prescribed in the Composting Guidelines (EPA, 2004) into the revised design of the Development, which forms part of this proposed modification. As detailed in Section 0**,** these include:

- enclosing all processing areas of the Development;
- using biofilters as a best practice odour control system (OCS); and
- using Veolia patented aeration and compost maturation technology to additionally mitigate fugitive emissions from compost piles.

3.5 NSW Strategic Context

In addition to the justification provided above, the Development is of state significance to NSW as an opportunity to assist in achieving the objectives of *the Waste Avoidance and Resource Recovery Act 2001*(WARR Act), one of the major objectives of which is *'to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development'*.

The proposed modification is required to enable the development of a new and efficient piece of resource recovery infrastructure in NSW that fully supports the objectives of the WARR Act. Section 4 further discusses the legislative framework around the WARR Act.

4 Legislative Framework

A review of the planning and legislative requirements in the original EA was undertaken to assess the relevance to the proposed modification. Changes to relevant legislation since the PA have been identified and considered in this chapter.

4.1 NSW Legislation

4.1.1 Environmental Planning and Assessment Act 1979

The Development was approved by the NSW Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 6 November 2007, Project Approval (PA) 06_0239.

Part 3A was repealed by the *Environmental Planning and Assessment Amendment Act 2011* (Part 3A Repeal Act), which commenced on 1 October 2011. Under the Part 3A Repeal Act, projects deemed to be 'transitional Part 3A projects' as outlined in Schedule 6A of the EP&A Act, continue to be subject to Part 3A provisions of the EP&A Act (as in force immediately before the repeal and as modified by the Part 3A Repeal Act).

The Development is a 'transitional Part 3A project' under Clause 2 of Schedule 6A of the EP&A Act, as it is an approved project to which Part 3A applies.

Clause 11 of Schedule 6A provides for the lapsing of Part 3A approvals, and states:

> *"An approval for carrying out a transitional Part 3A project lapses on the day that is 5 years after the repeal of Part 3A unless:*
>
> *(a) the project is physically commenced (within the meaning of section 95) on or before that day on the land to which the approval relates, or*
>
> *(b) the approval of the project is subject to a condition in force under section 75Y that provides for the approval to lapse on an earlier or later day."*

Project Approval 06_0239 does not contain a lapsing condition under section 75Y. This means that the Project approval will lapse on the day, that is, 5 years after the repeal of Part 3A being 1 October 2016, and therefore this PA is still current.

As the Development was granted approval under Part 3A of the EP&A Act, the proposed modification is defined as a transitional Part 3A project and section 75W of the EP&A Act is the relevant modification process for this Project.

In determining whether changes to a Part 3A project can be modified under section 75W of the EP&A Act, consideration is given to the nature of the proposed modifications and any possible change in potential associated environmental impacts.

Section 75W states:

> *"(1) In this section:*
>
> > *Minister's approval means an approval to carry out a project under this Part, and includes an approval of a concept plan.*
> >
> > *Modification of approval means changing the terms of a Minister's approval, including:*
> >
> > > *(a) revoking or varying a condition of the approval or imposing an additional condition of the approval, and*
> > >
> > > *(b) changing the terms of any determination made by the Minister under Division 3 in connection with the approval.*
>
> *(2) The proponent may request the Minister to modify the Minister's approval for a project. The Minister's approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.*
>
> *(3) The request for the Minister's approval is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.*
>
> *(4) The Minister may modify the approval (with or without conditions) or disapprove of the modification."*

As detailed in this report, the proposed modification would enable best practice processing technology to be utilised at the facility, with a view to improving the overall environmental outcome of the facility. As such the environmental impacts are considered to be relatively minor in nature, and will not result in significant changes to the environmental impact considered as part of the original EA. Therefore s75W is the considered the appropriate pathway for this modification.

4.1.2 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) relates to the management of pollution and waste in NSW and is administered by the NSW Environment Protection Authority (EPA).

The POEO Act also provides an integrated system of licensing which contains a list of scheduled activities (under Schedule 1 of the POEO Act) requiring an Environment Protection Licence (EPL) from the EPA.

At the time of the original EA, the Development was considered a scheduled activity (composting and processing facilities). In April 2008, changes were made to the description of scheduled activities under Schedule 1 of the POEO Act. As such, the proposed Development now falls under the following scheduled activities:

- Clause 12 (Composting) as it involves receiving more than 200 tonnes of organics and/or putrescible organics from the regulated area.
- Clause 34 (Resource Recovery) as it would involve having on-site at any one time more than 2,500 tonnes or 2,500 m^3, whichever is the lesser, of waste; and
- Clause 42 (Waste Storage) as it involves receiving 30,000 tonnes of waste per annum from off-site.

The original EA addressed the all factors to be considered under Section 45 of the POEO Act and the relevant factors have not changed as part of the proposed modification. In accordance with Section 45, this EA assesses the environmental impacts associated with the proposed modification to enable the EPA to determine any revisions to appropriate limits for the Development based on the proposed modification.

Additionally, in accordance with Section 47 of the POEO Act, the construction of the proposed Development is considered to be "scheduled development work" which means that an EPL is required prior to undertaking any on-site works. Veolia will continue to liaise with the EPA during the development of the facility and make the necessary applications for the required licences.

The proposed modification includes the utilisation of the existing weighbridge at the entrance to the Eco Project Site, which is located on the Woodlawn Bioreactor premises (EPL 11436). Veolia has commenced discussions with the EPA regarding the requirements of Section 88 of the POEO Act and Clauses 12 and 15 of the Regulations under the proposed site access arrangements, and is committed to complying with these requirements. Further details regarding potential tracking arrangements are provided in Section 2.1.1.

4.1.3 Protection of the Environment Operations (Waste) Regulation 2005

Clause 51 and Clause 51A, of Part 6 of the *Protection of the Environment Operations (Waste) Regulation 2005* came into effect in 2008 and provide for the use of waste materials outside of certain requirements of the waste regulatory framework, in the form of resource recovery (RR) exemptions.

RR exemptions are granted by the EPA where the land application or use as fuel of a waste material is a reuse opportunity that causes no harm to the environment or human health, rather than a means of waste disposal.

In accordance with this RR exemption process, a General Exemption was initially granted for the land application of mixed waste organic outputs in 2010, and the current General Exemption is the "*the organic outputs derived from mixed waste exemption 2011*".

The compost to be produced at the Development is expected to meet the 'Chemical and Other Material Property Requirements' set out in the General Exemption. However, the mine degraded areas requires site specific criteria in relation to application rates and receiving environment concentrations.

Veolia applied for and was granted a Site Specific Exemption "*the Woodlawn organic outputs derived from mixed waste exemption 2012*" to enable the application of compost in mine degraded areas that currently do not satisfy the receiving environment requirements of the General Exemption.

The proposed modification complies with the requirements of the General Exemption and Site Specific Exemption.

4.1.4 Waste Avoidance and Resource Recovery Act 2001

At the time of the original EA, the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) was in place and the WARR Strategy 2003 was the relevant strategy. Around the time that the PA was granted, the WARR Strategy 2007 was released, which updated the targets for resource recover provided in the 2003 strategy. Further discussion relating to the WARR Strategy is provided in Section 4.3.

4.2 Local Planning Instruments

The relevant local planning controls that apply to the modification with regards to permissibility are discussed below.

At the time of the original EA, the Development site was located within both Goulburn Mulwaree Local Government Area (LGA) and Palerang LGA. These Councils were yet to develop Local Environmental Plans (LEP) and consequently, the *Mulwaree Local Environmental Plan 1995*, was the applicable LEP at the time.

Since then there has been a boundary adjustment such that the entire Development site is now within the Goulburn Mulwaree LGA and the *Goulburn Mulwaree Local Environmental Plan 2009* (Goulburn Mulwaree LEP) is the current relevant local planning instrument.

4.2.1 Goulburn Mulwaree Local Environmental Plan 2009

The Goulburn Mulwaree LEP covers the land that is the subject of this assessment. This land is zoned IN3 Heavy Industrial. The objectives of this zone are:

- *"To provide suitable areas for those industries that needs to be separated from other land uses.*
- *To encourage employment opportunities.*
- *To minimise any adverse effect of heavy industry on other land uses.*
- *To recognise and provide for the diverse demands and implications of industry, warehousing, transport and servicing activities and ancillary land uses."*

The PA and the proposed modification are consistent with these objectives and consistent with the provisions of the Goulburn Mulwaree LEP.

4.2.2 Goulburn Mulwaree Development Control Plan 2009

The *Goulburn Mulwaree Development Control Plan 2009* (Goulburn Mulwaree DCP) was created to support the Goulburn Mulwaree LEP and provide guidance for developments within the Goulburn Mulwaree LGA.

Section 2.5.4 of the Goulburn Mulwaree DCP notes the existence of the Woodlawn Bioreactor site, located near the township of Tarago. The DCP seeks to:

> "*reinforce Tarago's character as a rural town servicing surrounding rural areas and villages. This plan also seeks to enable a variety of land uses including commercial, employment, recreational and mixed uses. This plan aims to augment the transition of existing industrial uses in Tarago to large lot residential uses.*"

The PA and the proposed modification are consistent with the objectives of the DCP given the sufficient buffer around the Woodlawn Eco Project Site to ensure that residential uses are not compromised.

Section 3.17 of the DCP "Heavy Vehicle Generating Developments – Haulage Routes", relates to the modification in regards to traffic generation from the development. This general development control states that:

> "*A principal haulage route needs to be nominated when submitting a development application for a project such as a quarry, transport terminal, distribution centre or the like, which involves significant heavy vehicle movements. The applicant needs to justify selection of the haulage route based upon traffic engineering grounds, amenity considerations and availability of alternative options (i.e. rail). If the existing road network is unsatisfactory then upgrades will be required.*"

As detailed in Section 7.2 and the Traffic Impact Assessment (TIA) which is appended to this EA (refer to Appendix F2) the proposed modification will not generate additional traffic movements on the local road network. The key change relates to the use of the existing site intersection to access the proposed Development.

4.3 Strategic Framework

There are a number of government waste management policies and strategies that are relevant to the Development, which have either been updated or implemented since the PA, which are discussed in the following section.

National Waste Policy: Less Waste, More Resources

The *National Waste Policy: Less Waste, More Resources* (released November 2009) outlines the Australian Federal Government's direction for waste management in Australia to 2020. The outcomes intended to be achieved under the Policy include the following:

- Waste streams are routinely managed as a resource to achieve better environmental, social and economic outcomes
- Australia has increased the amount of products, goods and materials that can be readily and safely used for other purposes at end of life
- Opportunities to safely manage, reduce and recycle waste are available to all Australians.

The Development would help to achieve these outcomes by providing a vital piece of resource recovery infrastructure for the Sydney region, whereby valuable material can be recovered from material that would otherwise be disposed to landfill.

NSW Waste Avoidance and Resource Recovery Strategy

The *Waste Avoidance and Resource Recovery Strategy 2007* (WARR Strategy) underpins the WARR Act as a state wide strategy. A review of the WARR Strategy was undertaken in 2010, resulting in the *Reducing Waste: Implementation Strategy 2011-201*5 being released in 2011.

A *draft WARR Strategy 2013-21* has been released for public consultation, which further revises the resource recovery targets. The proposed modification is consistent with current and draft strategies, which promote integrated waste and resource management planning, programs and service delivery on a state-wide basis to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development.

The Development would assist in achieving the following objectives as outlined below:

- Increased recovery and use of secondary materials;

  The use of MBT technology and waste management practices shall divert volume from landfill and increase recovery of recyclable (ferrous metals) and organic material (compost) outputs for beneficial use.

  Compost generated from the processing of mixed waste in the Development shall be used to remediate the mining disturbed land within the Eco Project Site, additionally conferring benefit for an immediate onsite need, whilst replacing the use of natural resources.

- Reduction of toxicity in products and materials;

  The MBT process shall reduce physical and organic contaminants in the compost, which will be used to improve the receiving soil environment of the Eco Project Site.

The Development (and its proposed modification) would facilitate achieving an integrated NSW waste and resource management strategy, in conjunction with the existing and proposed Veolia operations in Sydney. Combined, these facilities would:

- Provide necessary infrastructure for part of Sydney's future waste and resource recovery requirements;
- Create synergies with local government as demonstrated by the SSROC contract;
- Demonstrate management of resources consistent with the waste hierarchy of avoidance, resource recovery then disposal;

- Recover outputs for beneficial use and promote sustainable waste reduction techniques, such as the waste derived compost that is produced by the Development will be used to confer beneficial properties to the mine degraded areas of the Eco Project Site;
- Divert waste from landfill; and
- Reduce environmental harm.

Veolia's Eco Project Site ensures that residual material from the Development, deposited in the Bioreactor, additionally facilitates the generation of renewable energy, further utilising waste resources.

The Development also aligns with the commitment the WARR Strategy makes to the Environmentally Sustainable Development (ESD), as follows:

- Inter-generational equity – the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.
- Shared responsibility – industry should share (with the community) the responsibility for reducing and dealing with waste.
- System integration – waste and resource management planning, programs and service delivery need to be integrated on a State-wide basis.

NSW Energy From Waste – Draft Policy Statement

A *NSW Energy from Waste Draft Policy Statement* (EfW Draft Policy) was released for public consultation earlier this year and at the time of preparing this EA, the EPA was in the process of reviewing the responses to this public consultation process.

The EfW Draft Policy outlines the policy framework and technical criteria that apply to facilities proposing to recover energy from waste in NSW. Therefore, the finalisation of this Policy should provide a regulatory framework for energy from waste initiatives, including the potential production of alternative fuels as part of the Development.

Veolia has provided feedback on the EfW Draft Policy and will continue to liaise with the EPA on this matter.

5 Consultation

This chapter outlines the consultation process that has been undertaken by Veolia with key government agencies and local community regarding the proposed Development.

Veolia has consulted with a range of stakeholders regarding the proposed modification to ensure all relevant parties are aware of the proposed changes. Consultation has included government agencies, local Council, and the local community.

5.1 Government Agencies

Veolia has met with the following relevant government agencies to discuss the proposed modification:

- Department of Planning and Infrastructure (DP&I);
- NSW Environment Protection Authority (NSW EPA); and
- Goulburn Mulwaree Council (GMC).

Veolia has existing relationships with all these stakeholders, through the development and operation of other facilities. This includes regular liaison with the NSW EPA in relation to existing licences for the Woodlawn Bioreactor and the Crisps Creek IMF, as well as GMC as the supervisory licence holder for the Woodlawn Bioreactor. GMC and Veolia also work in partnership through the Mulwaree Trust to provide funding for projects in the local community.

Veolia has worked in collaboration with DP&I, NSW EPA and GMC to identify and resolve issues that may impact on local environment in relation to the current Development and other operations within the Eco Project Site. This has included several meetings with representatives of DP&I, NSW EPA and GMC to discuss and consider potential issues to be addressed as part of the proposed modification.

Details relating to these consultation meetings are provided in Table 5.2-1 below.

5.2 Local Community

Veolia has met with the following local community groups to discuss the proposed modification:

- Woodlawn Community Liaison Committee (Woodlawn CLC); and
- Tarago and District Progress Association Incorporated (TADPAI).

In 2004, when the Woodlawn Bioreactor commenced operations, the Woodlawn Community Liaison Committee (CLC) was established. The purpose of the CLC is to provide a forum for open discussion between Veolia, the local community, Goulburn Mulwaree Council (GMC) and other stakeholders on issues relating to the Woodlawn Eco Project Site including operational and performance matters.

The CLC has been involved in all previous planning developments at the Site including the original Project Approval assessment process and this continues to be the case for any updates in relation to the proposed modification.

TADPAI is a local association which aims to support the development of the local community through a variety of projects. It is actively involved with the Site on a variety of issues which affect the local community and this includes the proposed modification.

Details relating to consultation with these local community groups are provided in Table 5.2-1 below.

5.2.1 Consultation Activities with Stakeholders

A summary of the consultation activity undertaken during the preparation of this Environmental Assessment of the proposed modification, including key issues raised and where they are addressed in the report is provided in Table 5.2-1.

Table 5.2-1: Consultation during preparation of the Environmental Assessment

Stakeholder	Form of Consultation	Key issues raised	Where issues are addressed in the EA
NSW Government Agency			
Department of Planning and Infrastructure (DP&I)	Meeting dates: 15/03/13, 30/07/13, 11/11/13	Planning pathway (S75W) Odour Site access Visual Consultation Waste management	Sections 1, 2.1, 4.1, 6.2, 7.1, 7.7, 5, and 7.5 and Appendix F
NSW EPA	Meetings dates: 03/09/13 & 12/11/13	Air quality (dust & odour)	Sections 7.1, 7.4, 2.1, 7.3,

Stakeholder	Form of Consultation	Key issues raised	Where issues are addressed in the EA
	Following the meeting on 12/11/13 Veolia received EPA's comments on the proposed modification. A copy of this letter is attached as Appendix E.	Greenhouse gas Noise Waste management Soil, water and leachate management Environment Protection Licence (construction & operations phases)	7.5, 7.6 and 4.1 and Appendix F
Local Council			
Goulburn - Mulwaree Council	Meeting date: 23/08/13	MBT process by products Noise Odour Traffic Visual	Sections 2.1, 3.1, 3.3, 7.5, 7.3, 7.1, 7.2 and 7.7 and Appendix F
Local Community			
Woodlawn Community Liaison Committee (CLC)	Quarterly meetings Open day event - 27/04/13 Distribution of the Development Community Brochure on the open day (27/04/13) and through the Veolia website – Woodlawn Community page.	CLC representatives primarily concerned with odour impacts from existing operations.	Section 7.1 and Appendix F

Stakeholder	Form of Consultation	Key issues raised	Where issues are addressed in the EA
Tarago and District Progress Association Incorporated (TADPAI)	Monthly meetings held by TADPAI – information related to the proposed MBT discussed in these meetings including the open day event. Meeting Minutes – 08/04/13 & 17/07/13	Concerned with odour impacts from existing operations.	Section 7.1and Appendix F

5.3 Ongoing Consultation

Veolia is committed to maintaining regular contact with the local and government agencies, the Woodlawn CLC, the Tarago community and other interested parties during the assessment of the proposed modification and more generally regarding updates on the project.

Veolia's website (http://www.veoliaes.com.au/community-and-environment/woodlawn-community) provides regular updates on the existing developments within the Eco-Project Site including the proposed modification. The local community can also sign up to email and SMS alerts regarding the status of current operations.

The website also provides access to relevant environmental and community information including compliance reports and monitoring data.

There is also a community enquiry line (1800 241 750) and email address (woodlawn@veolia.com.au) to allow local community to contact Veolia with enquiries or complaints.

In addition to the above, Veolia provides sponsorship to the Tarago Times community newspaper; supplies a regular column in the newspaper to keep residents informed of local activities within the Site.

6 Preliminary Environmental Risk Assessment

This chapter outlines the key findings of the preliminary environmental risk assessment undertaken for the proposed modification and details the methodology used to carry out the risk assessment.

6.1 Methodology

A preliminary environmental risk assessment was undertaken based on the proposed changes to the Project Approval. A likelihood and consequence rating was determined for each issue and these were used to determine a risk rating prior to management measures being implemented where required.

The risk matrix used to rate the environmental risks is provided in Table 6.1-1.

Table 6.1-1: Preliminary environmental assessment matrix

Likelihood	Consequence				
	1 – Insignificant	**2 – Minor**	**3 – Moderate**	**4 – Major**	**5 – Severe**
A – Almost certain	Moderate	Moderate	High	Very High	Very High
B – Likely	Low	Moderate	High	Very High	Very High
C – Possible	Low	Low	Moderate	High	High
D – Unlikely	Low	Low	Low	Moderate	Moderate
E – Rare	Low	Low	Low	Low	Moderate

Explanatory notes on the selection of the consequence and likelihood for each issue are presented in Table 6.1-2 below.

Table 6.1-2: Likelihood and consequence considerations

Likelihood			Consequence		
A	Almost certain	Is expected to occur in most circumstances	**1**	Insignificant	Insignificant impact; little or no environmental impact, little potential for fine and/or complaints, little disruption to normal operation; low increase in normal operation costs
B	Likely	Will probably occur in most circumstances	**2**	Minor	Minor impact for small population; minimal environmental harm, fine unlikely, potential for complaints, some manageable operation disruption; some increase in operating costs.
C	Possible	Might occur or should occur at some time	**3**	Moderate	Minor impact for large population, moderate environmental impact; possible fine, will cause complaints, significant modification to normal operation but manageable; operation costs increased; increased monitoring.
D	Unlikely	Could occur at some time	**4**	Major	Major impact for small population; long-term or serious environmental damage, potential for prosecution, numerous complaints, systems significantly compromised and abnormal operation, if at all; high level of monitoring required.
E	Rare	May occur only in exceptional circumstances	**5**	Severe	Major impact for large population; major environmental harm (fines and prosecution likely), complete failure of systems.

6.2 Potential Environmental Impacts

Table 6.2-1 summarises the results of the preliminary environmental risk assessment for the proposed modification.

Table 6.2-1: Preliminary Environmental Risk Assessment

Issue	Environmental Impacts	Comments	Environmental Risk	Further Assessment in EA
Air quality	Odour emissions escaping from the Development at levels that exceed odour limits and impact sensitive receptors.	Moderate level of risk due to the large buffer distance between the site and nearest non-project related residences and modelling from original EA. Odour impacts should be improved based on proposed modification due to additional control measures, and an assessment has been carried out to verify this.	Moderate	Section 7.1 and Appendix F1
Noise	Noise impacts (including traffic noise) from construction and operational activities resulting in noise that exceeds noise criteria at sensitive receptors.	Moderate level of risk due to large buffer distance between the site and nearest non-project related residences, and modelling from original EA. The proposed modification would increase the	Moderate	Section 7.3 and Appendix F3

Issue	**Environmental Impacts**	**Comments**	**Environmental Risk**	**Further Assessment in EA**
		equipment on site but impacts are not expected to be significant, and a noise impact assessment has been varied out to verify this.		
Traffic	Impact on main site access road and surrounding local road network.	Minimal impact on site access and local road network as no changes to traffic numbers from original EA. The proposed modification would utilise the existing site access and an assessment has been undertaken to verify capacity of this intersection.	Low	Section 7.2 and Appendix F2
Greenhouse gas	Increase in greenhouse gas emissions resulting from the construction and operation of the Development.	Moderate level of risk due to increase in processing equipment in the proposed modification. An increase in greenhouse gas emissions expected due to the proposed modifications and an assessment has been undertaken to quantify this.	Moderate	Section 7.4 and Appendix F4

Issue	Environmental Impacts	Comments	Environmental Risk	Further Assessment in EA
Visual	Decreased visual amenity of local area due to building height increase.	Low level of risk due to the location of the site well away from the local road network and from neighbouring properties. The proposed modification would include an increase to the building height, and an assessment has been undertaken to verify no visual amenity impact.	Low	Section 7.7
Water	Reduced leachate volumes due to less open areas.	Low (net benefit) risk due reduced leachate generation and therefore storage requirements. The proposed modification includes enclose of the composting process, and a revised water balance has been calculated to confirm reduced leachate storage requirements.	Low (Net Benefit)	Section 7.6
Waste	Potential change in recovery rate	Low risk due to expected waste composition based	Low	Section 7.5

Issue	Environmental Impacts	Comments	Environmental Risk	Further Assessment in EA
	based on waste inputs and processing technology.	on waste audit data. The proposed modification includes processing technology improvements based on the waste profile, and a revised mass balance has been used to assess the recovery rate.		
Cumulative impacts	Possible cumulative impacts include air quality (odour and dust), noise, traffic and greenhouse gas due to proposed modification.	Low level of risk due to the nature of the modifications; to enable best practice processing technology to be utilised at the facility along with adequate control measures and management plans. Assessments undertaken have considered cumulative impacts for key environmental aspects.	Low	Section 7 and Appendix F

As shown in the table above all environmental issues identified for this modification are considered moderate to low. Specialist studies have been undertaken on air quality, noise, traffic, greenhouse gas and visual impacts commensurate with their risk rating and assessments of waste and water management have also been considered further, all of which are presented in Section 7.

7 Environmental Assessment

7.1 Air Quality

7.1.1 Context and Rationale

An Air Quality Impact Assessment (AQIA) was undertaken by SLR to assess the potential air quality impacts, including odour, depositional dust and particulate matter arising from the modification to the Development proposed on sensitive receptors. The following sections provide a summary of the AQIA, which is provided in Appendix F1.

The key components of the proposed modification relevant to air quality, and meeting best practice environmental controls for composting, include:

- Enclosing the fermentation process; and
- Addition of biofilters as an odour control system;

The Composting Guidelines (EPA, 2004) recommend that composting of high air quality impact organics such as ‘ *mix residual waste containing putrescible organics*’, are ‘*best processed in enclosed facilities*’ to ‘*prevent odour emissions and degradation of the local amenity*’. This has been one of the primary drivers for the proposed modification to the Development.

The use of biofilters, which have been specified by The Odour Unit (TOU) for the Development as an effective odour control system (OCS) for composting, has been included in this assessment to demonstrate the suitability of biofilters to effectively treat odour emissions from the Development.

Other considerations relevant to the air quality assessment include the cumulative impacts from existing (IMF and Bioreactor) and approved (TriAusMin) operations at the Eco Project Site during the Development’s construction and operation stages.

Existing Operations

Transport of waste to the IMF and subsequently to the Bioreactor occurs in sealed containers. This shall result in negligible odour emissions resulting from operations occurring at the IMF and during transport to the Bioreactor and therefore has been excluded from the AQIA.

In the case of dust, roads at the IMF are all sealed, emissions of particulate will be limited to brake and tyre wear and diesel particulate matter contained in vehicle exhaust emissions. It is considered that emissions of particulate from these sources will be negligible and therefore has been excluded from the AQIA.

Waste decomposing in the Bioreactor produces landfill gas and leachate, which are potential sources of odour from existing operations. Landfill gas is collected and transferred to the Power Station for combustion of methane to generate renewable energy. Leachate is either recirculated within the Bioreactor void or, where in excess, transferred outside the void for treatment in the leachate aeration dam before storage in evaporation dams. Odour emissions from leachate have been considered in this assessment to assess cumulative impacts from the Eco Project Site.

Veolia is implementing operational solutions to reduce potential odour impacts from the Bioreactor, including reducing the amount of stored leachate, increasing landfill gas collection efficiency, improving leachate treatment and storage processes.

Veolia is working with the local community to further improve air quality management measures at the Eco Project Site, which will also include the Development.

TriAusMin Approval

TriAusMin has recently received approval for the Woodlawn Mining Project, which involves re-mining of the tailings dams and underground mining.

Impacts of the TriAusMin Woodlawn Project have been considered in this assessment and in particular particulate emissions from the Eco Project Site.

Potential odour impacts from the Development on the TriAusMin operations have been considered at the TriAusMin administration office.

7.1.2 Assessment Methodology

The methodology adopted for this assessment included a review of historical information and background data, undertaken to establish air quality assessment criteria for the proposed modification and predict air emissions resulting from associated construction and operational activities.

While construction activities are not expected to change as a result of the proposed modification, given the other approvals within the Eco Project Site since the PA was granted and for completeness, construction impacts have been considered as part of the AQIA.

The AQIA was undertaken in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (EPA, 2005) (the Approved Methods), and the key requirements are summarised follows:

- Identification of activities that would be carried out during the construction and operation of the Development, as part of the proposed modification likely to cause air emissions;
- Description of site conditions and sensitive receptors;

- Establishment of background air quality data, including meteorological data to enable dispersion modelling of relevant pollutants;
- Predict of ground level concentrations at all sensitive receivers;
- Detailed discussion of the methodology used and calculations of pollutant emission rates for each source of emission.

The air quality parameters considered as part of the AQIA were odour, depositional dust and particular matter (PM_{10} and TSP).

The properties specified in Table 7.1-1 and shown in Figure 7.1-1 are located in the vicinity of the Eco Project Site and were determined to be affected receptors based on being places of work or residence.

Table 7.1-1: Potentially Affected Air Quality Receptors

Property ID	Property Name	Distance from Development (km)
1	Woodlawn Farm*	1.6
2	Cowley Hills*	2
3	Pylara*	4
4	Torokina	3.7
5	Tarago Village	5.8
6	TriAusMin Administration Office	3

* Veolia owned residences

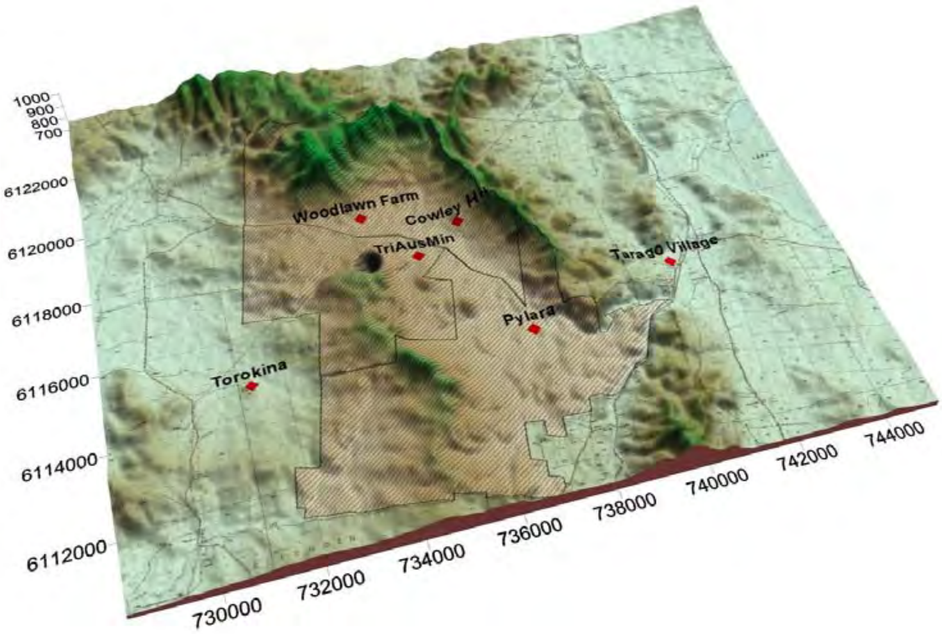


Figure 7.1-1: Location of Potentially Air Quality Affected Receptors

Odour Criteria

The ability to perceive an odour emission is a sensory property, referred to as the *theoretical minimum concentration,* producing an olfactory response or sensation of smell. This minimum concentration is called the *odour threshold* and is measured as 1 odour unit per cubic meter (OU/m^3). An odour of less than 1 OU/m^3, equivalent to 1 odour unit (OU) criterion used by the NSW EPA, would theoretically result in no odour impact.

The Approved Methods provide guidance on how to determine the appropriate impact assessment criteria for odorous air pollutants affecting populations from single residence sensitive receptors to communities greater than 2,000 people (refer Table 7.1-2).

Table 7.1-2: NSW EPA Odour Impact Assessment Criteria

Population of Affected Community	Impact Assessment Criteria for Odour (OU)
Urban area (greater than 2000)	2.0
300	3.0
125	4.0

Population of Affected Community	Impact Assessment Criteria for Odour (OU)
30	5.0
10	6.0
Single residence (less than 2)	7.0

Based on the information presented inTable 7.1-2, the low number of sensitive residential receptor locations within proximity of the Eco Project Site, a project goal of 6 OU was selected for the proposed modification.

It should be noted that there are no specific criteria for commercial / industrial receptors and the level at which an odour is perceived to be a nuisance can range from 2 OU to 10 OU, depending on a combination of factors, including intensity, frequency, timing and duration. Therefore, while the TriAusMin administration building has been considered in the odour assessment there are no relevant criteria for this location.

Depositional Dust

Depositional dust refers to the amount of dust particles that settle out of the air at a particular location and is measured in grams per square metre per month (g/m^2/month). The NSW EPA impact assessment goal for maximum deposited dust levels is 4 g/m^2/month, with an allowable increase in dust deposition level of up to 2 g/m^2/month over the established background level.

Dust deposition monitoring data collected from the Eco Project Site between January 2007 and June 2013 was used to determine the annual average for each sample location and is provided in Table 7.1-3.

Table 7.1-3: Background Dust Deposition – Eco Project Site

Sample No.	Sample Location	Annual Average Dust Deposition Level (g/m^2/month)
DG22	'East void' - located to the immediate east of the Bioreactor void	3.0
DG24	'West void' - located to the northwest of the Bioreactor	2.4
DG28	'Pylara' located on the Pylara property	2.1

The dust depositional background level for the site was determined using the maximum annual average from Table 7.1-3 and set as 3.0 g/m^2/month.

Particulate Matter (PM10 and TSP)

Particulate matter refers to a category of airborne particles, typically ranging from less than 50 micrometres (microns) to 0.1 microns (µm) in diameter.

Particles of less than 10 µm in diameter are referred to as PM_{10}, and have associated health impacts due to their ability to penetrate the respiratory system. The NSW EPA PM_{10} impact assessment goals in accordance with the Approved Methods are:

- a 24-hour maximum of 50 µm/ m^3 and;
- an annual average of 30 µm/ m^3

Using historical PM_{10} monitoring data obtained between August 2004 and November 2007 from the Pylara property, a statistical analysis was undertaken with the results shown in Table 7.1-4 below.

Table 7.1-4: Statistical Analysis of PM_{10} Monitoring – Eco Project Site

Parameter	Result (µm/ m^3)
Mean	9
Standard deviation	+/- 7.4
75^{th} percentile	5
90^{th} percentile	13
99^{th} percentile	36.6
Maximum	39

While the maximum recorded data was 39 µm/ m^3, the 90^{th} percentile indicates that values greater than 13 µm/ m^3 occurred only 10% of the historical monitoring period, therefore the 99^{th} percentile value of 36.6 µm/ m^3 was selected as a conservative background 24-hour average PM_{10} level for the Development.

The mean of 9 µm/ m^3 was selected for the annual average value for PM_{10} concentration.

Total suspended particulate (TSP) matter comprises the sum of the particle size fractions. The annual goal for TSP, adopted in the Approved Methods, is given as 50 µm/ m^3.

The US Environment Protection Agency (USEPA) notes that PM_{10} fraction typically comprises 50% of TSP concentration in regions where road traffic is not the dominant source of particulate source (USEPA, 2001). Hence the annual average background TSP for the Development was derived by multiplying the annual average by a factor of 2, resulting in a value of 18 µm/ m^3.

Modeling

Dispersion modeling was undertaken, using the background levels derived as per the previous section and estimates of odour and particulate emissions calculated either from monitoring data (odour) or using available appropriate emission factors (particulate matter).

These parameters were input into a dispersion model, along with modeled meteorological data which was obtained from the Eco Project Site and any available air quality monitoring data. The results of which would be used to predict the potential impacts of the identified air quality pollutants, as a result of the proposed modification, during the construction and operation phases of the Development on surrounding receptors. Details of the dispersion modeling approach and configuration, as well as the assumptions utilised are further described in the AQIA in Appendix F1.

Modeling was undertaken for particulate matter during construction and operation and odour during operations based on the following scenarios:

1 Development only;

2 Bioreactor only (odour);

3 Development and Bioreactor combined; and

4 Development, Bioreactor and TriAusMin (particulates).

It was assumed that the Bioreactor was operating at maximum capacity (i.e. 1.13M TPA, compared with the current annual input rate of 500,000 TPA).

The results from these scenarios were then compared against the results of the original EA (Umwelt, 2006) to identify any impacts as a result of the proposed modification. The original EA was undertaken prior to the approval of the tonnage increase at the Bioreactor or the TriAusMin project, and therefore neither of these were considered at the time.

Odour emission rates from Bioreactor sources were based on the results of the most recent odour monitoring campaign undertaken in 2013 being used to derive odour emission rates for the site.

For the Development, The Odour Unit provided design criteria for the operation of the proposed odour control system (biofilters) based on predicted fugitive emissions from buildings, with odour emissions from the compost storage area being derived from monitored data.

Particulate matter emission rates were derived from the *Commonwealth Department of Sustainability, Environment, Water, Population and Communities National Pollutant Inventory Emission Estimation Technique Manual for Mining, Version 3.1* (DSEWPC, 2012).

Refinements in the adopted methodology, including the use of meteorological data, dispersion models and the approach to emissions estimation are discussed in the AQIA.

7.1.3 Results & Discussion

The results from the modelling scenarios outline the estimation of impacts of odour and particulate matter from the proposed modification during the construction and operation stages of the Development.

As provided in Table 7.1-5, these results show that the predicted particulate matter impacts from the proposed modification are either less than the original EA prediction (for operational phase) or below the project goal (for construction phase), as the original EA did not considered construction impacts. While details regarding particulate matter for both construction and operation phases of the Development are provided in the AQIA (refer Appendix F1), the results have not been provided in this section. No odour sources from the Development in its construction stage are anticipated.

Table 7.1-5: Predicted Particulate Matter Results

Receptor ID	Predicted Results
Predicted Particulate Matter Impacts - Operations	
Maximum 24hr PM_{10} (µg/m^3) – Criterion 50 µg/m^3	
1. "Woodlawn Farm"	40.4
2. "Cowley Hills"	45.6
3. "Pylara"	38.2
4. "Torokina"	37.9
5. "Tarago Village"	37.9
Annual Average PM_{10}[1] (µg/m^3) – Criterion 30 µg/m^3	
1. "Woodlawn Farm"	9.3
2. "Cowley Hills"	9.7
3. "Pylara"	9.2
4. "Torokina"	9.1
5. "Tarago Village"	9.2
Annual Average TSP (µg/m^3) -Criterion 90 µg/m^3	
1. "Woodlawn Farm"	18.6
2. "Cowley Hills"	19.5
3. "Pylara"	18.4
4. "Torokina"	18.2
5. "Tarago Village"	18.5
Annual Average Dust Deposition (g/m^2/month)– Criterion 4 g/m^2/month	
1. "Woodlawn Farm"	<3.1
2. "Cowley Hills"	<3.1
3. "Pylara"	<3.1
4. "Torokina"	<3.1
5. "Tarago Village"	<3.1

Odour

Table 7.1-6 presents the 99th percentile 1 second average odour concentrations at the surrounding sensitive receptor locations, as predicted by CALPUFF under worst case conditions, for the three modelling scenarios, namely the Bioreactor only, the Development only and the cumulative impacts from both sources.

As noted in Section 7.1.2, six potentially affected receptors were considered, including 3 Veolia own properties and the TriAusMin administration office, which while not a residential receptors has also been included in this assessment.

Cumulative odour concentrations are predicted to range between 0.4 OU and 5.5 OU at all residential receptors, with non Veolia resident receptors ranging from 0.4OU to 0.7OU. The predicted odour concentrations at the TriAusMin administration office range from 1.7OU (for the Development only) to 8.5OU (for the Development and the Bioreactor).

Table 7.1-6: Predicted 99th Percentile 1 Second Average Odour Concentration – Development Operation

Receptor	Predicted Odour Concentration (OU/m³)			
	Bioreactor Only	Development Only	All Sources	Project Goal
1. "Woodlawn Farm"	3.9	1.7	5.5	6
2. "Cowley Hills"	2.1	0.8	2.9	6
3. "Pylara"	0.3	0.2	0.5	6
4. "Torokina"	0.5	0.3	0.7	6
5. "Tarago Village"	0.3	0.1	0.4	6
6. "TriAusMin Admin" *	7.3	1.7	8.5	N/A

* Industrial receptor – no specific odour criteria applies

Development

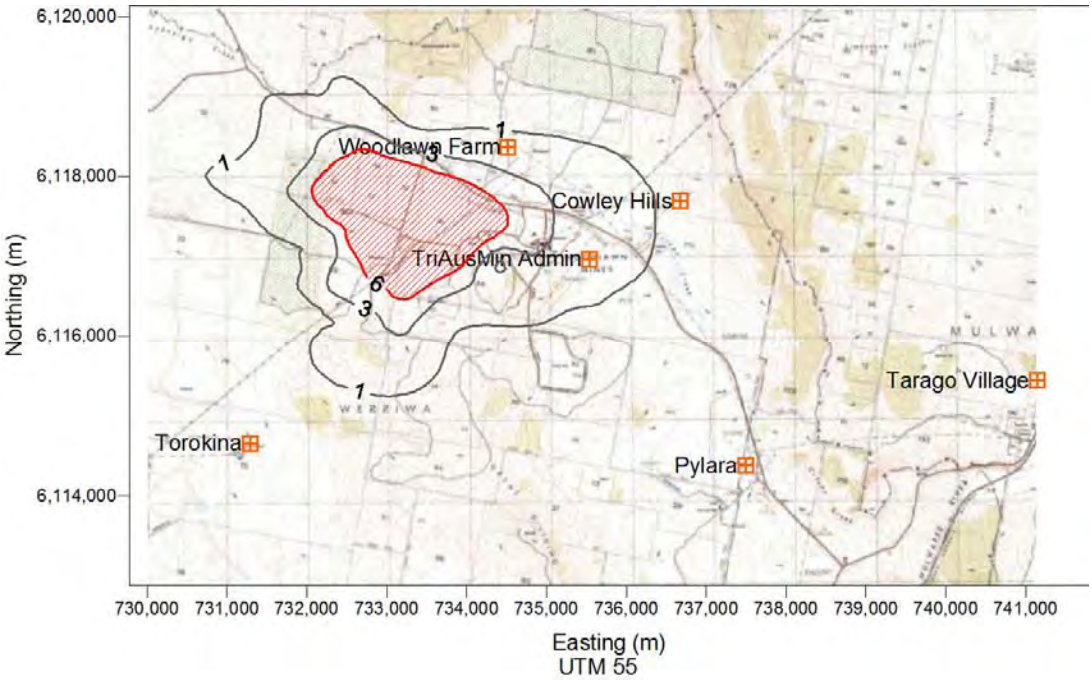
These results indicate that under worst case operating conditions, odour concentrations will satisfy the Project odour criterion of 6 OU at all surrounding receptors for the Development only scenario. The compliance with the criterion of 6 OU indicates that the Development can operate up to the required 240,000 TPA of mixed waste, plus the 40,000 TPA of green waste without any exceedance of the criterion.

The isopleth plot for this modelling scenario is presented Figure 7.1-2.

Although these predictions indicate that the NSW EPA criterion is not exceeded, they do not purport to show that *no odour* will be experienced at the receptors assessed within this report. As previously discussed in 7.1.2, the odour criterion is designed to take into account the likelihood of sensitive individuals being present within a population, based on the population size. Additionally, the criterion is not designed to achieve *no odour.*

The detectability of an odour is a sensory property that refers to the theoretical minimum concentration that produces an olfactory response or sensation. This point is called the *odour threshold* and defines one odour unit per cubic metre (OU/m^3). An odour goal of less than 1 OU/m^3 would theoretically result in no odour impact being experienced.

Figure 7.1-2: 99th Percentile 1 Second Average Odour Concentration – Development Only



2005 Meteorology, Emission Rates adopted from7.1.2; Adopted Criterion – 6 OU

Cumulative Scenario

For the cumulative impacts scenario, the results indicate that under worst case operating conditions, odour concentrations will satisfy the Development odour criterion of 6 OU at all residential. Although the predicted odour concentration at the TriAusMin administration building is higher than 6 OU, no specific criteria apply to industrial receptors. The Development is predicted to contribute a minor amount to this cumulative scenario. It is considered that the capture of fugitive emissions within the fermentation building and receival hall and use of biofilters to reduce odour emissions acts to reduce the odour impacts at all surrounding receptors.

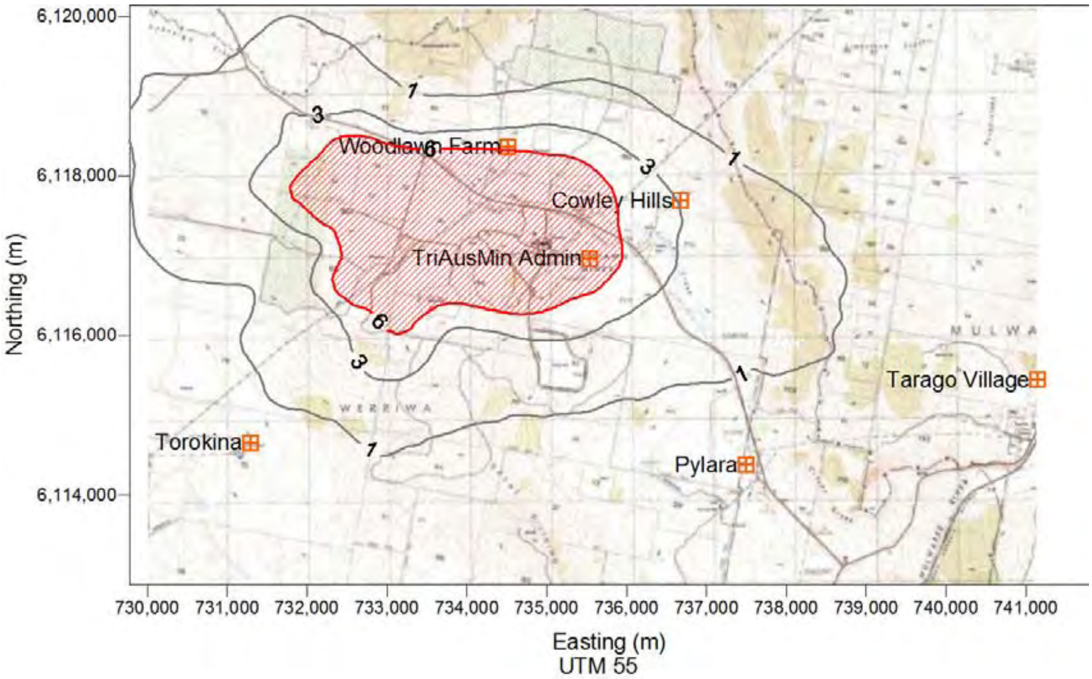
The isopleth plot for this dispersion modelling is presented in Figure 7.1-3.

As shown in Table 7.1-6, the main source of odour for this scenario is the operation of the Bioreactor with only a minor contribution from the Development. As noted in 7.1.2, the level at which an odour is perceived to be a nuisance can range from 2 OU to 10 OU, depending on a combination of factors, including intensity, frequency, timing and duration, and the predicted concentrations at this locations are within this range.

Further to this, the TriAusMin project was granted approval after the Bioreactor has been operating for several years and after the Bioreactor was granted approval to increase its volume, staff at the administration building would only be present during working hours, and the modelling predicts worst case operating conditions. Veolia and

TriAusMin also have an agreement, which acknowledges the industrial nature of both operations, and therefore the potential for respective activities to cause impacts.

Figure 7.1-3: 99th Percentile 1 Second Average Odour Concentration – Bioreactor and Development Sources (All Sources)



7.1.4 Summary

The modelling indicates that the identified air quality pollutant emissions shall be below the relevant air quality goals for the Development at all surrounding residences as a result of the proposed modification.

Impacts from odour are proposed to be controlled with the following changes that form part of this modification:

- Enclosing the fermentation process; and
- Addition of biofilters as an odour control system;

Furthermore, additional odour control measures that have been proposed for the Development during the fermentation process, and listed below, shall provide supplementary mitigation.

- AeroControl® - Veolia's proprietary automated aeration technology for accelerating the process of fermentation to achieve stability of organic matter; and
- Biokap ® - Also a Veolia patented technology for enhancing fermentation and treating odour emissions from compost with the use of a cover system.

7.2 Traffic

7.2.1 Context and Rationale

A Traffic Impact Assessment (TIA) was undertaken by AECOM to assess the potential traffic impacts associated with the proposed modification. The following section provides a summary of the TIA, which is provided in Appendix F2.

The key components of the proposed modification relevant to traffic include:

- waste receipt, outdoor operation and product dispatch operational hours changes to be consistent with the Woodlawn Bioreactor and IMF operating hours, that is, Monday to Saturdays 6 am to 10 pm; and
- access to the site via the existing Woodlawn Bioreactor site entrance rather than a separate, new intersection.

The proposed modification will not result in an increase to heavy and/or light vehicles movements. Operational efficiencies since the original Environmental Assessment have improved container payloads and therefore the number of containers required to transport the same volume of waste.

Other traffic sources considered as part of the traffic assessment included current volumes and growth on the local road network, incorporating existing and approved expanded operations at the Bioreactor, and the approved, but yet to be constructed, TriAusMin Woodlawn Project, which involves mining operations within the Eco Project Site.

7.2.2 Assessment Methodology

A desktop analysis using traffic count data, Annual Average Daily Traffic (AADT) obtained from Roads and Maritime Services (RMS) database was used to determine the historical traffic growth and mid-block traffic flows for the surrounding roads.

Historical traffic growth was quantified from the earliest possible to latest available traffic data for each traffic count station ranging between 1984 and 2006. This data is subsequently used to estimate existing and future AADT's for surrounding roads.

The existing background traffic flows for 2013 and the future background traffic flows on the surrounding roads for 2015 and 2016 were derived from the background AADT and the annual growth rate for each road.

The TIA considered potential traffic impacts resulting from the proposed modification on the local road network and the Site intersection with the following scenarios:

- Existing traffic flows for 2013 which include the current operational traffic from the Bioreactor (at 500,000 tpa);
- Predicted traffic flows for 2015 include the construction of the Development and TriAusMin Woodlawn Project, Windfarm operations and Bioreactor (at 1.13 M tpa maximum approved capacity); and
- Predicted traffic flows for 2016 (first year of operations) and 2026 include the operation of the MBT, TriAusMin Woodlawn Project, Bioreactor at maximum approved capacity and Windfarm operations.

It should be noted that for the intersection performance the traffic flows from the TriAusMin Woodlawn mine project were not included given that the project will have a separate access road off Collector Road, approximately 760 metres to the east of the Eco Project access road.

Intersection performance was evaluated using SIDRA Intersection 5.1, a computer based modelling package designed for estimating operational traffic performance of an intersection. The main performance indicators include:

- Degree of Saturation (DoS) – measure of the ratio between traffic volumes and capacity of an intersection; is used to measure the performance of isolated intersections. As DoS approaches 1.0, both queue length and delays increase rapidly. Satisfactory operations usually occur in a DoS range between 0.7 and 0.8, or below.
- Average Delay – duration, in seconds, of the average vehicle waiting at an intersection.
- Level of Service (LOS) – a measure of the overall performance of the intersection (Refer to Table 7.2-1 below).

Table 7.2-1: Performance criteria for Intersections

Level of Service (LOS)	Average Delay (secs/veh)	Traffic Signals, Roundabouts	Give Way and Stop Signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required

Level of Service (LOS)	Average Delay (secs/veh)	Traffic Signals, Roundabouts	Give Way and Stop Signs
E	57 to 70	At capacity; at signals incidents will cause excessive delays	At capacity; requires other control mode
F	>70	Roundabouts require other control mode	At capacity; requires other control mode

Performance of the existing Woodlawn Bioreactor access intersection was assessed for all four scenarios: existing (2013), construction (2015) and operations (2016 & 2026).

An indicative level of service (LOS) for the surrounding roads has been assessed based on the existing and future year AADTs. The assessment criteria were taken from Table 3.9 of the Guide to Traffic Engineering Practice – Part 2: Roadway Capacity (AUSTROADS, 1999). The level of service relative to AADT for two-lane, two-way rural roads is used to give an overall appreciation for planning purposes.

LOS A and LOS B are defined by AUSTROADS,1999 in the following way:

- LOS A is a condition of free flow in which individual drivers are virtually unaffected by the presence of others in a traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent; and
- LOS B is in the zone of stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream, although the general level of comfort and convenience is a little less than level of service A.
- LOS C is also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.

7.2.3 Results & Discussion

Existing and Future Traffic Flows

Table 7.2-2 shows the existing and future AADT for assessment years (includes Bioreactor operations and other committed developments).

Table 7.2-2: Existing and future AADT for assessment years

Road	Location	2013 AADT	2015 AADT	2016 AADT	2026 AADT
Tarago Road	Tarago, at railway crossing	1,450	1,530	1,697	2,104
Bungendore Road	South of Mt Fairy	879	928	1,121	2,081
Collector Road	West of Tarago Road	375	554	846	746

Based on the existing and future AADT for assessment years (table above) the mid-block level of service on the surrounding roads as shown in Figure 7.2-1 is presented in Table 7.2-3.

Table 7.2-3: Levels of Service based AADT for assessed years

Road	Location	MAX AADT at LOS A*	2013 AADT (LOS)	2015 AADT (LOS)	2016 AADT (LOS)	2026 AADT (LOS)
Bungendore Road	Tarago, at railway crossing	2,400	1,450 (A)	1,530 (A)	1,697 (A)	2,104 (A)
Bungendore Road	South of Mt Fairy	2,400	879 (A)	928 (A)	1,121 (A)	2,081 (A)
Collector Road	West of Tarago Road	2,400	375 (A)	554 (A)	846 (A)	746 (A)

** Maximum AADT defined by the Guide to Traffic Engineering Practice – Part 2: Roadway Capacity (AUSTROADS, 1999)*

As indicated in the table above, the Level of Service for the surrounding local road network was assessed for each scenario and concluded that the roads in the vicinity of the Woodlawn Eco Project Site are operating well within capacity and at a good operational level of service i.e. LOS A.

Figure 7.2-1: Surrounding road network

Intersection Level of Service

The Level of Service at the existing Site access intersection was assessed during the morning (AM) and evening (PM) peak hours i.e. the busiest traffic conditions. Traffic flows assessed included the approved developments which travel through this intersection only i.e. Woodlawn Bioreactor and proposed MBT (construction and operational) traffic flows.

The intersection performance at the site access intersection indicates that the site access intersection performs at LOS A (good operation) in both the AM and PM peak hours for all the assessment years as shown in Table 7.2-4.

Table 7.2-4: Peak hour intersection performances for assessed years

Assessment Year	AM Peak				PM Peak			
	Vehicle (veh/hr)	DoS	Average Delay (secs)*	LoS	Vehicle (veh/hr)	DoS	Average Delay (secs)*	LoS
2013 (Existing)	47	0.016	13.6	A	47	0.034	13.5	A
2015 (Construction)	139	0.06	13.9	A	139	0.12	13.7	A

Assessment Year	AM Peak				PM Peak			
	Vehicle (veh/hr)	DoS	Average Delay (secs)*	LoS	Vehicle (veh/hr)	DoS	Average Delay (secs)*	LoS
2016 (Operation)	142	0.061	13.9	A	141	0.121	13.7	A
2026 (Operation)	147	0.062	13.9	A	146	0.122	13.7	A

7.2.4 Summary

An assessment of traffic conditions in 2015 (construction year), 2016 (MBT operation) and 2026 (10-year horizon) were compared to conditions in the current year. The assessment on the mid-block capacities of the surrounding roads indicates they continue to operate at a good level of service.

The site access intersection was assessed with the construction and operational traffic from the proposed modification and Bioreactor operations (excluding TriAusMin Woodlawn Mine Project) and was shown to operate at a very good level of service in all assessment periods, demonstrating that the existing site access intersection can adequately cater for the Development traffic as well as the Bioreactor traffic.

Therefore, it can be concluded the Development will cause no significant traffic impacts on the site access and/or local road network and as such there will be no need for further mitigation measures for traffic as a result of the proposed modification.

7.3 Noise and Vibration

7.3.1 Context and Rationale

A Noise and Vibration Impact Assessment (NVIA) was undertaken by SLR to assess the potential noise impacts associated with the proposed modification. The following section provides a summary of the NVIA, which is provided in Appendix F3.

The key components of the proposed modification relevant to noise include:

- manual sorting replaced with mechanical sorting processing, increasing the processing equipment in the facility; and,
- waste receipt and outdoor operations & product dispatch operational hours changes to be consistent with the Woodlawn Bioreactor and IMF operating hours, that is, from 6 am to 10 pm Mondays to Saturdays.

Other likely sources of noise that have been considered as part of this assessment are existing and approved expanded operations at the Bioreactor, and the approved, but yet to be constructed TriAusMin Woodlawn Project, which involves mining operations within the Eco Project Site.

7.3.2 Assessment Methodology

The NVIA has been prepared with reference to Australian Standard AS 1055:1997 *Description and Measurement of Environmental Noise* Parts 1, 2 and 3 and in general accordance with the Environment Protection Authority's (EPA) *NSW Industrial Noise Policy* (INP) (EPA, 2000) and *Interim Construction Noise Guideline* (ICNG) (DECC, 2009).

Where issues relating to noise are not addressed in the INP or ICNG, such as sleep disturbance, reference has been made to the INP Application notes (last updated June 2013) and the *NSW Road Noise Policy* (RNP) (DECCW, 2011).

The noise impacts associated with the proposed modifications were assessed for construction and operational activities as well as road traffic. Construction noise was assessed for the proposed modification as it was not part of the original EA. Noise impacts associated with road traffic was assessed in accordance with the current NSW Road Noise Policy (RNP) 2011. Operational noise was assessed against the Project Approval criteria based on the proposed hours of operation and changes to the processing equipment at full capacity.

Two methods have been used to assess noise emission from the Development. The methods are outlined as follows:

- Industrial Noise Policy (INP) Assessment - The determination and application of noise limits in accordance with the INP are typically triggered by new developments or modifications to existing developments/approvals (INP Section 10).

- Existing Project Approval – the Development was assessed against existing noise conditions contained in Project Approval 06_0239.

INP Assessment Process

The Industrial Noise Policy (INP) provides a framework and process for deriving noise criteria for consents and licences that will enable the relevant authority to regulate premises that are scheduled under the Protection of the Environment Operations Act, 1997.

The policy sets two separate noise criteria to meet environmental noise objectives; one to account for intrusive noise and the other to protect the amenity of particular land uses.

i. Assessing Intrusiveness

For assessing intrusiveness, the background noise level must be measured. The intrusiveness criterion essentially means that the equivalent continuous noise level (L_{Aeq}) of the source should not be more than 5 decibels (dBA) above the measured background level (L_{A90}).

ii. Assessing Amenity

The amenity assessment is based on noise criteria specific to land use and associated activities. The criteria relate only to industrial-type noise and do not include road, rail or community noise. The existing noise level from industry is measured. If it approaches the criterion value, then noise levels from new industries need to be designed so that the cumulative effect does not produce noise levels that would significantly exceed the criterion.

Project Approval

The Project Approval for the Development stipulates the noise impact assessment criteria as follows:

- 40 dBA LAeq(15minute) at residences on privately owned land during construction;

- 35 dBA LAeq(15minute) at residences on privately owned land during operations; and

- 60 dBA LAeq(1hour) at any residence on privately owned land for road traffic.

Cumulative Noise Assessment

Aside from meeting the required intrusive and amenity criteria at potentially affected receivers, the INP prescribes potential cumulative noise impacts from existing and successive developments to ensure the appropriate noise emission criteria and consent limits are established.

The anticipated operating noise levels from each of the approved and/or proposed developments have been obtained by reviewing the project approvals or environmental assessments and utilised for the purposes of the cumulative noise amenity assessment.

The potential for the simultaneous operation of the proposed facility and other approved and proposed developments can be assessed on a worst case scenario basis by adding the predicted noise levels from the proposed and approved operations together. The cumulative intrusive level is then adjusted (by -3 dBA) to the equivalent amenity level for comparison with the relevant amenity criteria, that is, rural receivers for each location.

Construction Noise Assessment

The EPA has prepared an interim guideline covering construction noise. The ICNG sets out noise criteria applicable to construction site noise for the purpose of defining intrusive noise impacts as follows Noise affected RBL plus 10 dBA during the recommended standard construction hours, that is, Monday to Friday 7:00am to 6:00pm, Saturday 8:00am to 1:00pm and no work on Sundays or public holidays.

Road Traffic Noise Assessment

The Road Noise Policy (RNP) presents guidelines for road traffic noise assessment. The policy document provides road traffic noise criteria for proposed road, residential and industrial developments, as well as criteria for other sensitive land uses.

Sensitive Receptors

The nearest potentially affected noise sensitive receivers to the Development are summarised in Table 7.3-1 and shown in Figure 7.3-1 below.

Table 7.3-1 Nearest Potentially Affected Noise-sensitive Receptors

Property ID	Property Name	Receiver Type	Distance to Development (km)
1	Woodlawn Farm *	Residential	1.6
2	Cowley Hills *	Residential	2
3	Pylara *	Residential	4
4	Torokina	Residential	3.7
5	Willeroo	Residential	4

Property ID	Property Name	Receiver Type	Distance to Development (km)
6	TriAusMin Administration Office	Industrial Premises	3

Note *: Veolia owned residences

It should be noted that noise impacts of the Development have been predicted at the proposed TriAusMin administration office in accordance with the amenity criteria from industrial sources.

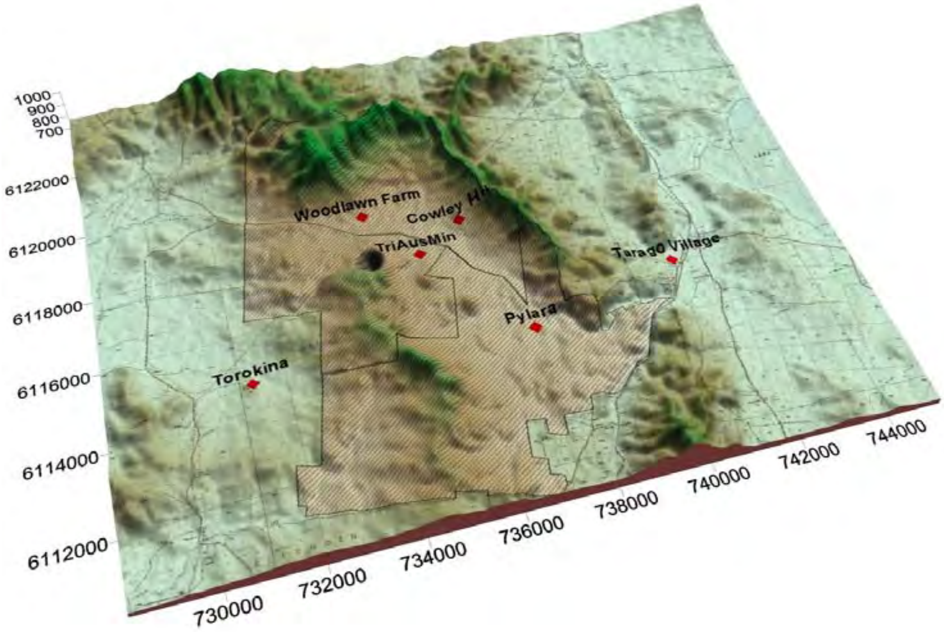


Figure 7.3-1: Location of Potentially Noise Affected Receptors

Noise Modelling

Noise modelling was conducted as part of the assessment using SoundPLAN 7.1 noise modelling software package. A three-dimensional digital terrain map giving all relevant topographic information was used in the modelling process.

Additionally the model used relevant noise source data, ground type, shielding such as barriers and/or adjacent buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers.

The operational noise sources used in the modelled included:

- Reception Building - Waste Receipt

- Pre-Treatment – BRS Drums
- Pre-Treatment – Refining/Mechanical Separation
- Buffer Building
- Fermentation Building
- Compost Storage Area - FEL
- Compost Storage Area - Despatch Truck
- Aeration Pond Aerators
- Biofilters
- Workshop
- Pump Room

It has been assumed that all plant and equipment is operational during the day, evening and night-time periods given that waste receipt and outdoor activities would occur from 6:00 am to 10:00 pm.

Modelling Criteria

Ambient Background Noise Monitoring

With the exception of Woodlawn Farm (Veolia owned property), background noise levels measured at the nearest surrounding receivers (Table 7.3-1) during all periods were determined to be below the INP minimum RBL noise level of 30 dBA.

Project Specific Noise Emission Criteria

Noise emission design criteria for the Development have been established with reference to the INP as shown in Table 7.3-2 below.

Table 7.3-2: Operational Project Specific Noise Criteria

Location	Period	Adopted RBL	Intrusiveness Criteria $L_{Aeq(15minute)}$	Amenity Criteria $L_{Aeq(Period)}$	Project Specific Noise Criteria
Woodlawn Farm	Day	33 dBA	38 dBA	50 dBA	**38 dBA $L_{Aeq(15minute)}$**
	Evening	33 dBA*	38 dBA	45 dBA	**38 dBA $L_{Aeq(15minute)}$**
	Night	30 dBA	35 dBA	40 dBA	**35 dBA $L_{Aeq(15minute)}$**

Location	Period	Adopted RBL	Intrusiveness Criteria $L_{Aeq(15minute)}$	Amenity Criteria $L_{Aeq(Period)}$	Project Specific Noise Criteria
Cowley Hills	Day	30 dBA	35 dBA	50 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Evening	30 dBA	35 dBA	45 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Night	30 dBA	35 dBA	40 dBA	**35 dBA $L_{Aeq(15minute)}$**
Pylara	Day	30 dBA	35 dBA	50 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Evening	30 dBA	35 dBA	45 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Night	30 dBA	35 dBA	40 dBA	**35 dBA $L_{Aeq(15minute)}$**
Torokina	Day	30 dBA	35 dBA	50 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Evening	30 dBA	35 dBA	45 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Night	30 dBA	35 dBA	40 dBA	**35 dBA $L_{Aeq(15minute)}$**
Willeroo	Day	30 dBA	35 dBA	50 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Evening	30 dBA	35 dBA	45 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Night	30 dBA	35 dBA	40 dBA	**35 dBA $L_{Aeq(15minute)}$**
TriAusMin Administration Area	When in use		N/A	70 dBA	**70 dBA (Period)****

* Adopted RBL criteria based on previous baseline noise survey and in accordance with the INP Application Notes (Refer to Section 4.1 of the NIVA).

** Based on INP project specific noise criteria for assessing amenity from industrial noise sources.

Project Approval Noise Emission Criteria

Operational

The approved operational noise criteria contained in PA 06_0239 are shown in Table 7.3-3 below.

Table 7.3-3: Consented Operational Noise Levels

Location	Period	Consented Operational Noise Criteria $L_{Aeq(15minute)}$
Torokina, Willeroo	Day	**35 dBA**
	Evening	**35 dBA**
	Night	**35 dBA**

Consented noise criteria are not applicable at Veolia owned residences i.e. Woodlawn Farm, Cowley Hills and Pylara. For privately owned residences, the INP project specific noise criteria (Table 7.3-2**)** are the same as consented criteria.

Construction

Construction noise criteria for the Development have been set with reference to the ICNG and PA 06_0239 as shown in Table 7.3-4 below.

Table 7.3-4: Consented Construction Noise Levels

Location	Period	Construction Noise Criteria $L_{Aeq(15minute)}$
Torokina, Willeroo	Day/Evening/Night	40 dBA

Construction noise criteria apply for privately owned residences during recommended standard construction hours.

Road Traffic

The consented road traffic noise criteria contained in PA 06_0239 is shown in Table 7.3-5 below.

Table 7.3-5: Consented Road Traffic Noise Levels

Location	Period	Road Traffic Noise Criteria
Privately Owned Residence	Anytime	60 dBA $L_{Aeq(1hour)}$

7.3.3 Results & Discussion

Operations

The predicted noise emission levels from the modelled operational scenario at the nearest most potentially affected receivers are provided in Table 7.3-6 below.

Table 7.3-6: Noise Modelling Results

Receiver Location	Period	Predicted Noise Level LAeq(15minute) (dBA)			Project Specific Noise Level
		Calm	Prevailing Wind*	Temperature Inversion	
Woodlawn Farm	Day	<30	N/A	N/A	38 dBA LAeq(15minute)
	Evening	<30	N/A	N/A	38 dBA LAeq(15minute)
	Night	<30	<30	32	35 dBA LAeq(15minute)
Cowley Hills	Day	<30	N/A	N/A	35 dBA LAeq(15minute)
	Evening	<30	N/A	N/A	35 dBA LAeq(15minute)
	Night	<30	<30	<30	35 dBA LAeq(15minute)
Pylara	Day	<30	N/A	N/A	35 dBA LAeq(15minute)
	Evening	<30	N/A	N/A	35 dBA LAeq(15minute)
	Night	<30	<30	<30	35 dBA LAeq(15minute)
Torokina	Day	<30	N/A	N/A	35 dBA LAeq(15minute)
	Evening	<30	N/A	N/A	35 dBA LAeq(15minute)
	Night	<30	<30	<30	35 dBA LAeq(15minute)
Willeroo	Day	<30	N/A	N/A	35 dBA LAeq(15minute)
	Evening	<30	N/A	N/A	35 dBA LAeq(15minute)
	Night	<30	<30	<30	35 dBA LAeq(15minute)
TriAusMin Administration Area	Day	<30	N/A	N/A	70 dBA (period)
	Evening	<30	N/A	N/A	
	Night	<30	<30	32	

The results indicate that noise emissions from the proposed modification would comply with project specific noise criteria and Project Approval noise criteria for operation during the day, evening and night periods for calm and prevailing weather conditions.

Construction

The sound power levels of acoustically significant plant and equipment to be used during construction of the Development have been obtained from a SLR database. The results of the construction noise modelling are provided in Table 7.3-7.

Table 7.3-7: Predicted Construction Noise Levels

Receiver Location	Period	Predicted Noise Level LAeq(15minute) (dBA)		Noise Affected Construction Noise Goal LAeq(15minute)
		Preparation works	Building works	
"Woodlawn Farm"	Day	32	<30	43 dBA
"Cowley Hills"	Day	<30	<30	40 dBA
"Pylara"	Day	<30	<30	40 dBA
"Torokina"	Day	<30	<30	40 dBA
"Willeroo"	Day	<30	<30	40 dBA
TriAusMin Administration Block	Day	<30	<30	75 dBA (When in Use)

Noise predictions indicate that noise emissions during construction of the Development would comply with the relevant noise criteria set by ICNG at all receivers during the standard construction hours.

Cumulative

The potential sources of noise surrounding the Development were identified as the Woodlawn Bioreactor, Wind Farm and proposed TriAusMin operations. Cumulative noise levels for the daytime, evening, and night-time, together with the acceptable and maximum $L_{Aeq(period)}$ noise amenity criteria for the nearest receivers are shown in Table 7.3-8 to Table 7.3-10.

It should be noted that where the predicted contribution is < 30 dBA, the contributed noise level is assumed to be 30 dBA.

Table 7.3-8: Cumulative Daytime Noise Amenity Levels

Location	Development	Wind Farm	Bioreactor	TriAusMin	Cumulative Intrusive Noise Level	Cumulative Amenity	Acceptable Max Range
Woodlawn Farm	<30	<30	35	40	42	39	50 to 55
Cowley Hills	<30	<30	34	44	45	42	
Pylara	<30	<30	<30	32	37	34	
Torokina	<30	<30	<30	<30	36	33	
Willeroo	<30	<30	<30	<30	36	33	

* Intrusiveness Noise Level minus 3 dBA

Table 7.3-9: Cumulative Evening Noise Amenity Levels

Location	Development	Wind Farm	BioReactor	TriAusMin	Cumulative Intrusive Noise Level	Cumulative Amenity	Acceptable Maximum Range
Woodlawn Farm	<30	<30	35	40	42	39	45 to 50
Cowley Hills	<30	<30	34	44	45	42	
Pylara	<30	<30	<30	32	37	34	
Torokina	<30	<30	<30	<30	36	33	
Willeroo	<30	<30	<30	<30	36	33	

* Intrusiveness Noise Level minus 3 dBA

Table 7.3-10: Cumulative Night Noise Amenity Levels

Location	Development	Wind Farm	BioReactor	TriAusMin	Cumulative Intrusive Noise Level	Cumulative Amenity	Acceptable Maximum Range
Woodlawn Farm	32	<30	34	40	42	39	40 to 45
Cowley Hills	<30	<30	33	44	45	**42**	
Pylara	<30	<30	<30	32	37	34	
Torokina	<30	<30	<30	<30	36	33	
Willeroo	<30	<30	<30	<30	36	33	

* Intrusiveness Noise Level minus 3 dBA

The predicted cumulative amenity noise from existing, approved and proposed industrial sources and the Development are below the relevant acceptable amenity levels for rural receivers at all locations during the daytime and evening period.

It is noted that during the night period the cumulative noise amenity level is 42 dBA however, this is not classed as an exceedance given that it is still within the acceptable maximum range and the property is owned by Veolia and as such it is considered project related.

Road Traffic

The predicted hourly road traffic noise levels from construction and operation of the proposed modification are predicted to be below the relevant criteria provided in PA_06_0239 as shown in Table 7.3-11.

Table 7.3-11: Hourly Road Traffic Noise

Road	Predicted LAeq(1hour) Noise Level		PA 06_0239 Criteria
	Construction	Operation	
Collector Road	54 dBA	48 dBA	60 dBA LAeq(1hour)
Bungendore Road	36 dBA	31 dBA	60 dBA LAeq(1hour)

Traffic movements for light and heavy vehicles along the transport route were used for traffic noise predictions during construction and operation stages. As shown in Table 7.3-12 below the road traffic noise levels from both stages are below the relevant criteria provided in the current RNP.

The predicted road traffic noise levels from construction and operation of the Development are predicted to be below the relevant criteria provided in the RNP for both Bungendore Road and Collector Road.

Table 7.3-12: Daily and Night Road Traffic Noise

Road	Scenario	Predicted Noise Level		RNP Criteria
		Day LAeq(15hour)	Night LAeq(9hour)	
Collector Road	Construction	54 dBA	47 dBA	Day - 60 dBA LAeq(15hour) Night – 55 dBA LAeq(9hour)
	Operation	54 dBA	47 dBA	
Bungendore Road	Construction	39 dBA	32 dBA	
	Operation	40 dBA	33 dBA	

7.3.4 Summary

Noise levels associated with construction activities at potentially affected receivers were predicted to meet the ICNG and Project Approval construction criteria at all receiver locations.

Noise from the operation of the proposed modification is predicted to comply with the project specific noise levels (Project Approval criteria) under calm and prevailing conditions at all receiver locations.

Cumulative amenity noise levels are predicted to be below the relevant INP acceptable amenity levels for rural receivers at all assessment locations during the daytime and evening period. During the night-time period cumulative noise levels are predicted to be below the relevant maximum amenity levels for all privately owned residences.

Noise levels on Bungendore Road and Collector Road during construction and operation of the Development are predicted to comply with RNP criteria and those contained in the current Project Approval.

Accordingly, based on the results of the NVIA, it can be concluded the noise impacts on the privately owned residences prior to and consequent to the construction and operation of the Development would meet the relevant noise criteria. Therefore no additional mitigation measures would be required as a result of the proposed modification.

7.4 Greenhouse Gas and Energy

7.4.1 Context and Rationale

A Greenhouse Gas Assessment (GHGA) was undertaken by SLR to assess the potential greenhouse gas impacts associated with the proposed modification. The following section provides a summary of the GHGA, which is provided in Appendix F4.

The key component of the proposed modification relevant to the greenhouse gas impacts is:

- manual sorting replaced with mechanical sorting processing, increasing the processing equipment in the facility and therefore energy demand.

7.4.2 Assessment Methodology

The GHGA addressed Scope 1 and 2 emissions for the construction and operation of the proposed modification to allow a comparison against the Project Approval. Scope 1 & 2 are defined in Table 7.4-1 below.

Table 7.4-1: Greenhouse Gas Scope 1 & 2 Definition

Scope	Definition
Scope 1	Direct (or point-source) emission factors give the kilograms of carbon dioxide equivalent (CO_2-e) emitted per unit of activity at the point of emission release (i.e. fuel use, energy use, manufacturing process activity, mining activity, on-site waste disposal, etc.). These factors are used to calculate scope 1 emissions.
Scope 2	Indirect emission factors are used to calculate scope 2 emissions from the generation of the electricity purchased and consumed by an organisation as kilograms of CO_2-e per unit of electricity consumed. Scope 2 emissions are physically produced by the burning of fuels (coal, natural gas, etc.) at the power station.

The operational greenhouse gas emissions were calculated based on a staged approach; at an initial input rate and the maximum approved input rate. This section presents the GHG emissions based on the maximum capacity.

A review of background information and data was undertaken to understand the nature of the proposed modification compared with the outcomes of the original EA.

The methodology for the GHGA included the following key stages:

- Source identification and boundary definition generally consistent with the original EA.
- Calculate source data and emission factors / coefficients. Estimations for source-level data (e.g. fuel quantities) were based on proposed modification details and original EA. Where possible, emissions factors were taken from the National Greenhouse Accounts Factors.
- Establish an emissions inventory. Collation and management of all relevant activity data (e.g. MWh/year, tonnes/year, km/year, etc.) for all sources identified for the Development. Estimations were made where data was not available. Source data was aggregated to major activity types (e.g. early works, main works).
- Quantitative GHG emissions assessment. Quantitative assessment of GHG emissions using the most current emissions factors from the National Greenhouse Accounts Factors.
- GHG management, mitigation and offsets. Identification of possible measures to minimise, mitigate or offset these emissions formed an important component of this study.

The key assumptions used in the assessment are listed below for the construction and operations stages.

Construction stage

- Site clearing will be required before construction can begin as part of the early works, emission estimates for site clearance have been developed based on comparative project (based on the relative footprint of the projects).
- Expected list of construction machinery based on construction program and phasing and each piece of machinery assumed to operate 25% of the time
- Typical construction hours – 7am and 6pm, Monday – Friday and 7am-1pm on Saturday
- Construction to commence in July 2014 and continue to the end of the first quarter of 2016 (including the commissioning stage).

Operations stage

- Development of the facility in two stages: Stage 1 – 120,000 tpa mixed waste & 40,000 greenwaste and Stage 2 – 240,000 tpa of mixed waste & 40,000 greenwaste.

- 60% of MSW all MSW sent to landfill is mixed organics – based on composition data from two key sources (Review of Waste Strategy and Policy in NSW (2010), DECCW and National Waste Report (2010) DEWHA).

- Organics fed through the pre-treatment stage (i.e. drums) will be mixed MSW organics and garden waste will be added to the fermentation/composting process.

- Facility outputs based on the revised mass balance figures.

- All plant & equipment within the Development operating 100% of the time irrespective of the annual input rate.

- All waste will be transported by rail from each transfer station to the intermodal facility based on the GHG Assessment in the original EA.

- The three outputs of the Development includes: Recycled materials, mixed waste compost and residual waste. The end-points for all three products are considered outside the project boundary.

7.4.3 Results & Discussion

Construction Emissions

GHG emissions for the construction of the facility did not form part of the scope of the original EA.

Despite this, the results from other comparable projects have been used to develop greenhouse gas emission estimates for various construction activities (including, the transport of materials on and around site and movement of staff around site).

Based on these assumptions, the total estimated Scope 1 and 2 emissions for the construction of the development are approximately 1,094 tCO_2-e. These estimated construction emissions are considered to be small compared with operational emissions and/or other much larger developments.

Operational Emissions

Operational emissions include Scope 1 and 2 emissions (generally consistent with the original EA) from the following activities:

- operating the plant and equipment of the proposed modification,

- transfer and transport of the waste from the Sydney transfer facilities, through the Crisps Creek Intermodal facility, and to the Development for processing

- composting process. It should be noted that emissions from composting process were not included in the original EA.

Results presented in Table 7.4-2 below are based on the maximum approved annual input.

Table 7.4-2: Operations Greenhouse Gas emissions (maximum capacity)

Activity	Quantity	Units	t CO_2-e	
			Scope 1	Scope 2
Transport by rail (diesel)	741	kL diesel p/a	1999.3	
Transport by road (diesel)	140.18	kL diesel p/a	378.2	
Stationary equipment operation (diesel)	431.79	kL diesel p/a	1158.9	
Organic waste (biological processes)	116,320	Tonnes of wet waste	9305.6	
Transfer Stations operation (electricity	1,235040	kWh p/a		1074.5
Intermodal Facility operation (electricity)	31,200	kWh p/a		27.5
Plant operation (electricity)	25,003,884	kWh p/a		21,753
Total			**12,842**	**22,855**

The total estimated greenhouse gas emissions for the Development operating at maximum capacity are 35,697 tCO_2-e pear annum and 0.13 t CO_2-e per tonnes of waste.

By comparison the original EA estimated the emissions of 24,797 t CO_2-e per annum and 0.10 t CO2-e per tonnes of waste.

The slightly higher emissions profile for the proposed modification can be attributed to an increase in processing equipment as well as the inclusion of the emissions from the composting process.

Despite this, the estimated increase in greenhouse gas emissions resulting from the proposed modification are not considered to be significant, in particular with respect to the NSW state context given that the proposed modification represents approximately 0.02% of the total state emissions.

7.4.4 Summary

The original EA assessment and the proposed modification calculations show a similar emissions profile. The slight increase to the Development's emissions based on the proposed modification can be attributed to a change in processing equipment and accounting for emissions from the composting process which was not part of the original EA.

The GHGA highlights a number of emission mitigation measures relating to electricity usage, vehicles & plant and equipment and material selection that should be considered when developing the project specifications and detail design, including:

- Regularly serving all stationary plant and machinery within the Development.

- Purchasing green power to offset electricity usage for the site.
- Using sensor lighting and high efficiency lighting.
- Turing off vehicles and/or plant and machinery when not in use.
- Using B5 and E10 fuels (where possible) within onsite vehicles and B5 blended diesel for stationary plant and equipment.
- Selecting construction materials which contain recycled or reused products e.g. concrete and steel.

7.5 Waste Management

7.5.1 Context and Rationale

An assessment of the waste management impacts for the Development was undertaken to identify any changes as a result of the proposed modification, including consideration of the drivers for change.

The key component of the proposed modification relevant to waste management is:

- Improvements to the processing technology based on waste input and output requirements.

As discussed in Sections 0 and 3, the technology has been refined to improve the quality of outputs and adhere to best practice environmental and safety controls. This includes consideration of the composting principles of AS4454 to meet the output requirements of the General and Site Specific Resource Recovery Exemptions

As discussed in Section 0, there are potential changes in recovery rates, due to changes in the waste inputs. The SSROC waste profile has necessitated a modification to the Development to ensure the processing technology is suitable for this waste stream (while incorporating best environmental practice measures for processing waste) and producing and improved quality of outputs.

Variations in the MSW stream can occur over time depending on the waste management practices of the regulating council, such as kerbside recycling practices. These can have direct effects on the composition of residual waste found in the MSW stream.

To ensure the quality of outputs from the Development, the processing technology has to be flexible and modular to be able to handle such variations. The proposed modification to the site layout and processing equipment is to improve the mixed waste processing capability of the Development.

7.5.2 Assessment Methodology

Mixed MSW will be accepted at the Development, proposed to be classified as General Solid Waste (Putrescible) in accordance with the *Waste Classification Guidelines* (EPA, 2008) to allow the processing of organic material. According to the National Waste Report (2010), commissioned by Department of Environment, Water, Heritage and the Arts (DEWHA), while up to 62% of organics are available in all waste streams, the amount of recovery is lower. In the MSW stream, generally up to 23% of organics are recycled (DEWHA, 2010).

A desktop study to compare the waste variability between the description in the original EA (Unwelt, 2006) and the SSROC profile has been carried out. Consideration has also been given to any impacts on the Development outputs as a result in changes to the processing technology. The methodology for which and the results are discussed below.

- MSW composition data from the original EA (Unwelt, 2006) and aggregated waste audit data from SSROC member councils (refer Figure 7.5-1) that will be utilising the Development was collated. This represents the variation of waste stream over a period of nearly 10 years (refer Table 7.5-1).

- A mass balance was calculated based on the anticipated outputs from the revised input feedstock for the proposed modification, which is presented in Figure 7.5-2. This was used to compare against the expected outputs described in the original EA (Unwelt, 2006). Other than the waste stream the only other input into the MBT process would be water, representing approximately 10 percent (%) of the input quantity.

7.5.3 Results and Discussion

All the waste audit data from the 8 participating member councils of the SSROC were collated and the percentage compositions of all the material types aggregated into one representative average. Figure 7.5-1 shows the constituents of the mixed MSW stream that will comprise the input feedstock to the Development.

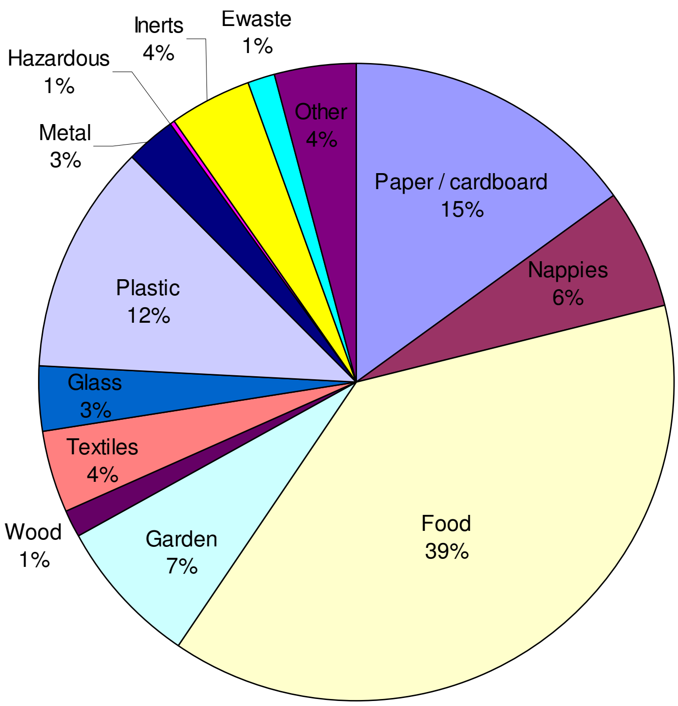


Figure 7.5-1: SSROC Aggregate Waste Composition

Changes to the MSW stream composition between 2003 and 2012 are presented in Table 7.5-1 below. As per the original EA, the material types have been grouped based on the materials constituting the category.

- Organic – food and green waste
- Metal – ferrous and non ferrous metals
- Residual – all remaining waste

Table 7.5-1: MSW Composition Changes

Material Type	MSW (%)	
	2003	2012
Organic	58.9	45.8
Metal	2.1	2.5
Residual	39.0	51.7

Revisions of the waste mass balance for the Development, as a result of the proposed modification, considered the addition of paper and cardboard, nappies and textiles to the organics for composting. Paper and cardboard, which is the most readily degradable of these additional waste types was consequently included as the input feedstock, besides food and green waste.

Increasing residual composition in the mixed MSW stream over time can be attributed to improved kerbside recycling practices, with less quantities of potentially recoverable material in the overall volume.

While a slight increase in the composition of metals is observed (0.4 %), it should be noted only ferrous metals are proposed to be recovered from the inert component of the SSROC waste profile, based on available recycling markets within the local region and the operational feasibility of recovering additional materials.

These changes are reflected in the revised waste mass balance in Figure 7.5-2 below, which shows that for every 100 T of mixed waste input at the front of the Development, including 10 T of process water added, it is estimated that up to 31.8% of compost will be produced out of the proposed MBT process.

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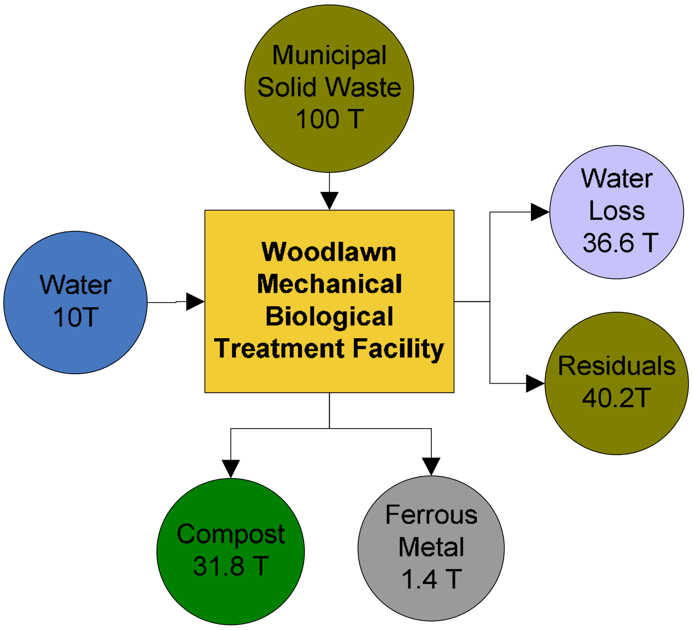

Figure 7.5-2: Proposed Modification Mass Balance

For every 100 T of MSW input, the proposed outputs from the Development are 31.8 T *(45.9 T)* of compost, 1.4 T *(2.7 T)* of ferrous metals and 40.2 T *(37.1 T)* of residuals.

The data above in brackets represents the expected outputs described in the original EA; in comparison the overall recovery rate from the Development is generally consistent, particularly with the changed waste input profile.

Compared to the DEWHA (2010) Report, the proposed MBT technology for the Development is able to demonstrate a higher MSW recovery than the national average.

A significant proportion of the residuals, in future, may additionally be diverted for energy recovery. Potential production of alternative fuels from the primarily inert stream was identified in the original EA (Umwelt, 2006) and shall be considered as a future stage at the Development. Currently the NSW Energy from Waste Draft Policy (EfW Draft Policy) is being reviewed by the EPA. Veolia has commented and provided feedback on the EfW Draft Policy and will continue to liaise with the EPA on this matter. Once this regulatory framework has been established, further consideration of the potential production of alternative fuels will be possible.

It should be noted that drivers influencing the level of product recovery from the MBT processes are:

- Viability with increasing number of sorting equipment for primarily inert material (such as eddy current separators or water baths to remove less than 4% of non ferrous or wood material respectively);

- Available markets for distribution of recycling materials;
- Regulatory restrictions for improvements to the quality of compost, under the Resource Recovery Exemptions (screening of final compost product, to satisfy the physical contaminant limits prior to land application, significantly loses compost volume) and meet the receiving environment at the Eco Project Site.

7.5.4 Summary

Based on the expected waste composition from the SSROC, the proposed modification (including the processing technology improvements based on the input profile and the revised mass balance) will have minimal impact on the quality of the outputs from the Development.

As per the PA, compost will be applied at the Eco Project Site for mine site remediation, ferrous metals transferred off site for recycling and residual material disposed in the Bioreactor for further energy recovery.

7.6 Water Management

7.6.1 Context and Rationale

An assessment of the water demand for the operation of the Development has been undertaken to identify any impacts based on the site layout and processing technology changes in the proposed modification.

The key components of the proposed modification relevant to water management include:

- Enclosing the composting process to meet best practice composting guidelines, reducing the quantity of leachate produced from the MBT operations; and
- Changes to water management infrastructure based on changes to the site layout in terms of processing areas, increasing storage capacity for surface water that has not come into contact with waste and reducing the leachate storage capacity.

The proposed water management infrastructure will need to be appropriately sized to achieve storage capacity in line with the design limits specified in the PA.

The proposed water management infrastructure, as highlighted in Table 1.3-1, shall comprise a leachate aeration pond, a stormwater dam and various rainwater tanks (and associated pipe work) located strategically around the Development. Refer to the Figure 2.1-2 and Appendix C for locations of the water storage devices.

The following supply and outputs describe the flow of water into and out of the Development.

Supply

Two sources of water will be used to supply the Development; potable and non-potable water.

Potable water, sourced from the Willeroo Borefield will be reticulated to sanitary and safety facilities for operational employees to utilise. Veolia has a licence to draw water from the Willeroo Borefield for operational purposes. Under an agreement with TriAusMin, an allocation of up to 100ML per annum is available for use by Veolia for the Development, with the remaining water allocation being available for TriAusmin to use for the Woodlawn Mine Project.

Non potable water shall be sourced from the Woodlawn Dam, a raw water dam, also located at the Eco Project Site (approximately 500 metres south), for use as process water at the Development, such as water addition, wash down, dust suppression and biofilter moisture maintenance.

Where possible, recycled water or wastewater generated as part of onsite activities shall be utilised in some of the processes to supplement process water supply. The fire fighting system will also be supplied from the process water.

In addition, incident rainfall run-off from the building roofs of the proposed processing areas shall be collected in rainwater tanks to supplement the process water system.

Outputs

Two types of wastewater shall be generated from the Development, namely sewage and process wastewater / leachate.

As per the original EA, sewage generated from the sanitary facilities shall be transferred to a sewage treatment plant, while wastewater generated from the MBT processes, including drainage from waste processing and storage areas, shall be collected in the leachate aeration pond.

The process wastewater includes water additions into the system, washdown waters, process losses, contaminated rainfall run-off and discharge from the biofilters.

The current PA allows for open compost processing areas, which contribute to the volume of leachate generated through rainfall runoff in these areas. A significant reduction in leachate generation would be achieved through the proposed modification by enclosing the compost processing area. This additionally should minimise water loss due to the high evaporation rates experienced annually at the Eco Project Site.

The collected process wastewater will be available for reuse in specific process applications such as addition into the BRS drums. Any excess leachate generated from the Development, shall be stored in the onsite leachate aeration pond, or if required, is proposed to be transferred into the Bioreactor's leachate treatment system as a contingency.

Consistent with the original EA, any 'clean' stormwater that has not come into contact with any waste operation areas shall be diverted to an onsite stormwater dam, while surface water contaminated by contact with waste or compost stockpiles shall be incorporated into the process wastewater as leachate.

Rainfall onto the remaining non processing facilities such as the hardstand, car park, roadways shall drain to the Development's stormwater system.

No change to the construction measures as part of the modification to the Development, such as erosion and sedimentation control requirements, under the PA is proposed.

7.6.2 Assessment Methodology

A water balance was prepared to identify the Development's water demand based on the proposed modification and calculate the revised capacity for water storage.

Design limits referenced in the PA have been used in as a basis for proposed modification to ensure adequate storage capacity of stormwater and leachate generated by onsite. In addition, based on environmental best practice, rain water tanks have also been proposed to be added to the Development for use in the MBT processes, as required.

The water demand assessment method used for this EA is based on the following design criteria:

Potable Water Usage

As per the original EA, up to 25 personnel are proposed to be employed in the operational stage of the Development. Requirements for potable water have been estimated based upon the number of personnel on site and the range of activities that they undertake, including the need for most personnel to shower prior to leaving site.

An allowance of 50 litres (L) per shower and 25 L per person per day for all other potable water usage (hand washing, kitchen usage, drinking and sanitary facilities) was assumed.

Non Potable Water Usage

For each stage of the Development, the waste mass balance provided in Section 7.5 indicates 10% of the mass of the waste is required as water addition into the MBT process. This would be added to the BRS Drums based on 120,000 TPA or a daily input of 385 T.

For all other equipment uptake and processing area requirements such as wash down water, dust suppression, and biofilter moisture maintenance assumptions have been made based on hours of operation, site demands, and local meteorological conditions (temperature, rainfall, evaporation and relative humidity) to provide modelling input parameters.

Roof Rainwater Run Off

A number of rainwater tanks have been proposed for the Development. Based on the increased catchment area provided by the proposed enclosed processing buildings, a daily average maximum rainfall run off across the roof for each building was calculated. It was assumed that only 50% of rainwater captured from the roof would be collected in the rainwater tanks.

Stormwater Retention

In the original EA (Unwelt, 2006), a stormwater dam of 4.5 ML was approved in the eastern corner of the Development site, which was sized to maintain the ability for the dam to store run off from a storm of greater magnitude than a 24-hour duration, 1 in 100 year Average Recurrence Interval (ARI) rainfall event as stipulated in the PA. These design parameters have been adopted for changes to the waste management infrastructure that forms part of the proposed modification.

Leachate Aeration Pond

Leachate shall be recirculated within the MBT processes, where possible, to reduce the water demand for the Development. Enclosed processing buildings significantly reduce the open area for surface water to come in contact with waste, hence reducing the quantity of leachate generated by the Development.

Based on the Development's water demand and supply, a water balance has been prepared and is provided in Appendix D (Hatch, 2013). The net flow is described in the following section.

7.6.3 Results & Discussion

The daily average flow rates from the MBT process inputs, processes and outputs were calculated from the design criteria, the results of which are show in Table 7.6.1.

Potable Water Usage

Based on the sanitary and safety requirements at the Development, an average total potable water demand and usage was calculated to be 2.1 m^3/day or 0.8 ML per year.

Non Potable Water Usage

The process water addition to the BRS Drums would comprise 10% of the daily waste input of 385 T, hence an average water addition of 38.5 m^3/d was calculated.

Using the modelling input parameters, daily averages of the site water demand for wash down waters, biofilter moisture maintenance and dust suppression (including BRS addition) were calculated and are presented in Table 7.6-1.

Table 7.6-1 Development Water Balance

Process inputs	Demand	Usage/ process loss	Output
Washdown	26.5	0	26.5
BRS Process	38.5	38.5	0
Biofilter	11.3	7.6	3.7

Process inputs	Demand	Usage/ process loss	Output
Dust suppression	20.3	20.3	0
Total (m^3/day)	**96.6**	**66.4**	**30.2**

The local meteorological conditions at the Eco Project Site experience an annual evaporation rate exceeding the rainfall rate. This was used to calculate a daily average water demand of 98.7 m^3 or 36 ML per year required for potable and non potable water based on the proposed modification. In the original EA, the water demand was predicted to be 72 ML in an annual average evaporation year. This immediately shows the reduced water demand footprint for onsite usage. The 100ML per year allocation from the Willeroo Borefield is sufficient water meet the Development's water demands.

Roof Rainwater Run Off

Based on the available catchment area from the roofs of the processing buildings and the capture efficiency, the maximum daily rate of 23 m^3 was calculated, 50% of which would be used to size the rainwater collection tanks proposed for the Development. The heights have been limited to 6 m to remain below building roof heights, with a maximum combined capacity of up to 1 ML.

In any large stormwater events, excess rain fall run off shall be directed to the onsite stormwater dam.

The captured rainwater stored in tanks shall have the potential to supplement the MBT processes as required.

Stormwater Retention

As part of the modification to the Development, the approved 4.5 ML stormwater dam has been expanded to 5 ML, to manage additional catchment areas created by the roofs of the proposed processing buildings. This design maintains the PA specified storage capacity for a 24-hour duration, 1 in 100 year Average Recurrence Interval (ARI) rainfall event.

Leachate Aeration Pond

Based on the reuse of leachate within the MBT processes, where possible, and the capture of rainwater from roofs of enclosed processing areas rather than as contaminated run off, the total leachate storage capacity for the Development has been reduced from two leachate dams with a total capacity of 6.5 ML to one aeration pond with a capacity of 1.6 ML.

Enclosed processing buildings significantly reduce the open area for surface water to come in contact with waste, hence reducing the quantity of leachate generated by the

Development, hence it should be noted that leachate generation from enclosed processing areas compared to exposed areas, subject to weather conditions has a large variability, therefore the maximum capacity for the leachate aeration pond has been designed for a 1 in 10 year ARI 24-hour event stipulated in the PA.

7.6.4 Summary

The analysis of the water demand for the Development indicates that enclosing of the MBT processing areas has resulted in a reduction of leachate generation and therefore storage requirements

Tanks have been proposed to be installed to capture rainwater for use in the MBT processes; this additionally negates potable water usage and the need to have significantly large stormwater or leachate storage devices, although a marginal increase in the onsite stormwater dam has been proposed to allow for more clean water capture.

The revised water balance confirms this net benefit.

7.7 Visual Amenity

7.7.1 Context and Rationale

This chapter provides an assessment of the potential visual impacts of the proposed modifications on the surrounding area and sensitive receivers. A visual representation of the Development and selected viewpoints was undertaken by xD Visuals that forms the basis of this assessment.

To ensure consistency and ease of comparison between the visual assessments of the original EA and the proposed modification, this assessment considered the same viewpoints, with the exception of two receivers that are Veolia owned properties.

The key component of the proposed modification relevant to visual amenity is:

- a change to the layout and height of the processing buildings.

The original EA assumed an 11 metre tall processing building and a single story administration building. The proposed modification involves the construction of multi processing buildings, with one up to 24 metres tall, and the others remaining consistent with the original building height, as shown in Figure 2.1-3 and Appendix C. The reason for the changed site layout and height of the processing buildings was to reflect the revised site access, enclose the composting process and house the additional processing equipment.

Despite changes to the height of the buildings, the overall footprint and boundary of the Approved Project will remain the same (Appendix C).

7.7.2 Assessment Methodology

The visual impact assessment was based on a qualitative analysis involving the following key tasks:

- A review of the previous visual assessment report
- Selection of viewpoints considered relevant with regards to the proposed modification
- An assessment of the significance of the visual impact of the proposed modification from each of the identified viewpoints; and
- A review of current Project Approval condition 35 (Schedule 3) relating to Visual Amenity.

Viewpoints

It was determined from the visual survey that two of the previously assessed viewpoints (Woodlawn Farm and Cowley Hills) were not relevant to the proposed modification. However, an additional 2 viewpoints located on Taylors Creek Road and an additional viewpoint on Collector Road were selected for this assessment due to their potential for visual and lighting impacts from the proposed modification. The revised viewpoints are identified in Table 7.7-1 below and also shown in Appendix B.

Table 7.7-1: Viewpoints

ID No.	Viewpoint Name & Location	Approximate distance from facility (km)
A	Collector Road (directly to the north of the Development)	1.2
B	Somerset Property on Collector Road (Top of ridge North, North West of the Development)	5.9
C	Collector Road (North West of the Development)	4.7
D	Nardoo Property on Taylors Creek Road (South East of the Development)	9.4
E	Dowling on Taylors Creek Road (South East of the Development)	9.2

For each viewpoint, the following aspects were considered as part of the assessment of the visual impacts of the proposed modification:

- type and context consistency with the original EA; and
- evaluation of the significance of the impacts were completed for each viewpoint.

Visual Representations

Visual representations were created by xD Visuals Pty Ltd by overlaying simulated views of the Development onto actual photos taken from the selected viewpoints.

The simulated views were created by rendering 3D scenes that included, a 3D model of the Development placed upon a digital terrain of the surrounding district.

Cameras were placed in the 3D scene at the same location where the actual photos were taken. Camera matching was made more accurate by matching features in the photos (eg trees, wind turbines and surrounding terrain) with their simulated counterparts in the 3D scene. By matching the views of the actual photos to the views of the simulated environment it was possible to create simulated views of the Development. These were then composited into the actual photos as presented in Figure 7.7-1 to Figure 7.7-5.

Evaluation Tool

The visual modification on the landscape is an important factor in determining the significance of the visual impacts from the proposed modification. Using the visual modification and sensitivity criteria the assessment considered the extent of visual changes on the visual landscape for each of the 5 viewpoints as a result of the proposed modification. Table 7.7-2 shows how the visual modification in the landscape is assessed and its significance rated against the sensitivity of a receiver.

Table 7.7-2: Visual impact matrix

Visual Sensitivity	Visual Modification			
	Negligible	Low	Moderate	High
Negligible	N	N	N	N
Low	N	L	L	M
Moderate	N	L	M	H
High	L	M	H	H

Visual modification refers to the visual changes that occur as a result the development when compared with the existing visual landscape. As shown in Table 7.7-2, visual modification has been ranked as Negligible, Low, Moderate or High and defined as:

- Negligible – only minor or negligible changes or the visual modification incorporates an improvement to the surrounding landscape.
- Low – minimal contrast occurs in the shape, pattern and colours between the development and the landscape.
- Moderate – a component of the development is visible and contrasts with the landscape, while at the same time achieving some integration where intervening topography or vegetation provides visual screening or integration.
- High – high visual contrast to the surrounding landscape and there is little or no natural screening or integration created by vegetation or topography.

Visual sensitivity is a function of both land use type and level of visibility. The level of visibility is dependent on the distance from the Development and also the proportion of the viewscape that the development occupies. As distance from disturbance increases, the visual impacts associated with development decrease. This is due to the reduced clarity of the disturbance area when viewed from a distance and the reduced proportion the disturbance area represents of the overall vista with increased distance.

The visual sensitivity of the Development has been assessed using four different categories Negligible, Low, Moderate and High and described below.

- Negligible – the development is distant and only a minor component of the overall vista.
- Low – visible areas of the development are distant (greater than 2 kilometres) and the proportion of viewscape to be impacted upon is minor.
- Moderate – visible areas of the development are of medium distance (less than 2 kilometres and greater than 1 kilometre) and the proportion of viewscape able to be impacted upon is moderate.
- High – visible areas of the development are close (less than 1 kilometre) and the proportion of viewscape able to be impacted upon is high.

7.7.3 Results & Discussion

Table 7.7-3 below provides a summary of the visual impact of each viewpoint as a result of the proposed modification.

Table 7.7-3: Assessment of significance

ID No.	Viewpoint Name and Location	Visual Modification	Visual Sensitivity	Visual Impact
A	Collector Road (directly to the north of the Development)	Moderate	Moderate	Moderate
B	Somerset Property on Collector Road (Top of ridge North, North West of the Development)	Moderate	Low	Low
C	Collector Road (North West of the Development)	Moderate	Low	Low

ID No.	Viewpoint Name and Location	Visual Modification	Visual Sensitivity	Visual Impact
D	Nardoo on Taylors Creek Road (South East of the Development)	Moderate	Low	Low
E	Dowling on Taylors Creek Road (South East of the Development)	Moderate	Low	Low

Overall based on the visual representations shown in Figure 7.7-1 to Figure 7.7-5 and the analysis set out in Table 7.7-3 above, it is expected that the visual modification of the landscape in the vicinity of the Development will be moderate to low.

Moreover, the visual impacts of the proposed modification on the surrounding receivers are not considered to be significant due to the relative distance of all surrounding receivers, that is, ranging from 1.2 to 9 kilometres and the additional screening provided by intervening vegetation.

Figure 7.7-1 View from Collector Road to the North (A)

Figure 7.7-2: View from top of the ridge on Collector Road near Somerset Property to the North-West (B)

Figure 7.7-3: View from Collector Road to the North-West (C)

Figure 7.7-4: View from Taylors Creek Road Nardoo Property South-East (D)

Figure 7.7-5: View from Taylors Creek Road Dowling Property South-East (E)

7.7.4 Summary

The analysis undertaken for the proposed modification indicates that the visual impact will be moderate for the Collector Road viewpoint (A) and low for all remaining viewpoints.

As shown in Figure 7.7-1 to Figure 7.7-5, the visual impact of the proposed modification on the surrounding receivers is not considered to be significant due to the relative distance of all surrounding receivers.

The assessment has identified two design criteria to address impacts both generally and from the identified viewpoints surrounding the Development. These measures are listed below and are considered to be consistent with the requirements and commitment associated with the current Project Approval:

- Construct new buildings using material and colours that complement the surrounding rural landscape.
- External lighting associated with the development will not create nuisance to surrounding receivers and/or roadways which complies with 'Control of Obstructive Effects of Outdoor Lighting' in accordance with the Project Approval visual amenity condition.

8 Statement of Commitments

8.1 Proposed Modification

The Environmental Assessment undertaken for the proposed modification has highlighted that potential environmental impacts under the proposed modification are largely similar to those associated with the existing Project Approval.

Table 8.1-1 provides a review of the Statement of Commitments from Appendix 2 of the Project Approval against the proposed modification for applicability.

While Table 8.1-1 reviews the current Statement of Commitments in the PA, Table 8.1-2 considers commitments additional to those made in the original EA and consolidates the commitments made throughout this EA, where applicable, to prevent, reduce and/or offset potential adverse impacts form the implementation of the proposed modification.

The commitments will be implemented through project specific management plans which form part of Veolia's accredited IMS.

Table 8.1-1: Review of Project Approval Statement of Commitments

Reference No.	Original EA – Environmental and Operational Controls	Applicability (Yes) / (N/A)	Comments
Waste Received at AWT Facility			
3.1.1	The AWT facility will only receive Municipal Solid Waste, commercial waste and green waste. Each container of waste delivered to the AWT facility will be weighed, recorded and tipped onto the facility floor where it will be visually inspected prior to being processed in the AWT facility. Any material that is not suitable for recycling, composting or other reuse will be separated from the remainder of the waste stream and stored for subsequent disposal at a suitably approved waste handling facility. The remaining material that is not recycled, composted or otherwise reused will be transported to the Woodlawn Bioreactor for disposal.	Yes	The Development would generally comply with this operational control.
3.1.2	An approval for the transport of green waste from Sydney to WOCOG facility will be obtained under the Plant Diseases Act 1924 prior to green waste from Sydney being received at the WOCOG facility.	Yes	Veolia has a current permit (OUT 11/5415) valid until 20 December 2016. The permit issued by DPI under Section 16 of the Plant Disease Act allows the movement of solid waste (including sourced green waste) from Sydney to the Woodlawn Bioreactor and Development. The permit acknowledges the Development and the use of compost for mine rehabilitation.
3.1.3	Prior to applying any compost output from the WASP facility to		In addition to the General Exemption *'The*

Reference No.	Original EA – Environmental and Operational Controls	Applicability (Yes) / (N/A)	Comments
	land: Veolia will seek the approval of the DPI through an amendment of the Woodlawn MOP for the application of WASP compost to land as a part of the rehabilitation of Woodlawn mine site, and Veolia will seek an exemption from the landfill levy under the *Protection of the Environment Operations Act* 1997 for the application of WASP compost to land as a part of the rehabilitation of Woodlawn mine site. If an exemption cannot be obtained, compost will be applied to land in accordance with the provisions of the *Protection of the Environment Operations Act* 1997, or compost will be landfilled in the Woodlawn Bioreactor.	Yes	*Organic Outputs Derived from Mixed Waste Exemption 2011'*, Veolia has been granted a Site Specific Exemption *'The Woodlawn Organic Outputs Derived From Mixed Waste Exemption 2012'*, in accordance with Clause 51 and 51A of the POEO (Waste) Regulations. Veolia has an agreement with TriAusMin regarding the use of compost for mine site rehabilitation and will continue to work with TriAusMin and DPI to ensure relevant amendments are made to the MOP with respect to the use of compost for mine rehabilitation.
3.1.4	Residual from the WASP facility will not be used as daily cover in the Woodlawn Bioreactor without prior approval from the DEC.	Yes	
3.1.5	Alternative fuel will not be used at any offsite facility without prior approval from the DEC. If approval cannot be granted for the use of alternative fuel, this product will be disposed of in the Woodlawn Bioreactor.	Yes	RDF would only be utilised if approved by EPA, and pending finalisation of the NSW Energy from Waste Draft Policy Statement.
3.1.6	Disposal of material from the AWT facility in the Woodlawn Bioreactor will be carried out in accordance with the consent for the Woodlawn Bioreactor.	Yes	Current approval for Woodlawn Bioreactor permits the disposal of residual waste from the Development.

Reference No.	Original EA – Environmental and Operational Controls	Applicability (Yes) / (N/A)	Comments
Soil and Water Management			
3.6.1	Prior to commencement of construction, sediment and erosion controls as set out in Section 6.2.1.3 of the EA will be implemented.	Yes	
3.6.2	Clean water diversion drains will be constructed upslope of the AWT facility as shown on Figure 6.4 of the EA.	Yes	Clean water diversion drains will be constructed to achieve the revised drainage requirements for the Development, as shown in Figure 2.1-2 of this EA.
3.6.3	Culverts with sufficient capacity to convey peak discharge from a 1 in 100 year Average Recurrence Interval storm event will be constructed under the access road at location shown on Figure 6.1 of the EA.	N/A	Proposed changes to the site access avoid the need to construct a new access road and therefore a culvert will no longer be required.
3.6.4	The stormwater dam to be constructed at the eastern end of the facility will be designed to accept runoff from the 1 in 100 year 24 hour duration Average Recurrence Interval event. The dam will be constructed to discharge to ED 2 as shown Figure 6.1 of the EA during storm events of greater magnitude.	Yes	A stormwater dam will be constructed to accept runoff from the 1 in 100 year 24 hour duration Average Recurrence Interval event. , as shown in Figure 2.1-2 of this EA.
3.6.5	Leachate dams will be located as shown on Figure 6.2 of the EA and will be lined with a suitable leachate barrier system. The system will utilise compacted clay, modified soil or other approved liners. If compacted clay or modified soil is used, liners will be a minimum of 900 mm thick and will have a	Yes	A single leachate aeration pond will be located as shown in Figure 2.1-2 of this EA.

Reference No.	Original EA – Environmental and Operational Controls	Applicability (Yes) / (N/A)	Comments
	maximum permeability of $1*10^{-9}$ m/s.		
Site Rehabilitation after Decommissioning			
3.7.1	At the end of the life of the operation, infrastructure will be removed from the site and the site will be regraded and planted with pasture species unless an alternate and approved use is identified.		
Traffic and Road Management			
3.8.2	A new access road will be constructed connecting the AWT facility to Collector Road in approximately the location shown on Figure 2.1 of the EA. The road will be surfaced with a two coat seal.	N/A	The Development would utilise the existing Eco Project Site access, as shown in Figure 2.1-1 of this EA.
3.8.3	The intersection of the AWT facility access road and Collector Road will be constructed to comply with the requirements of a RTA's Road Design Guide Type BA intersection as described in Section 6.7.3 of the EA. These works will be undertaken prior to the commencement of haulage of waste from Crisps Creek Intermodal facility to the AWT facility.	N/A	
Reporting			
3.9.4	Veolia will prepare and circulate an annual community newsletter providing an overview of the AWT facility operation and the Company's performance against its commitments as	Yes	

Reference No.	Original EA – Environmental and Operational Controls	Applicability (Yes) / (N/A)	Comments
	stated in the EA.		

Table 8.1-2: Proposed Modification Environmental and Operational Controls

Environmental Issue	Modification EA – Proposed Environmental and Operational Controls
Air Quality	▪ Enclosed processing areas ▪ Odour control system (biofilters) Additional odour control measures: ▪ AeroControl® - Veolia's proprietary automated aeration technology for accelerating the process of fermentation to achieve stability of organic matter; and ▪ Biokap ® - Also a Veolia patented technology for enhancing fermentation and treating odour emissions from compost with the use of a cover system.
Greenhouse Gas	▪ Regularly serving all stationary plant and machinery within the Development. ▪ Purchasing green power to offset electricity usage for the site. ▪ Using sensor lighting and high efficiency lighting. ▪ Turing off vehicles and/or plant and machinery when not in use. ▪ Using B5 and E10 fuels (where possible) within onsite vehicles and B5 blended diesel for stationary plant and equipment. ▪ Selecting construction materials which contain recycled or reused products e.g. concrete and steel.

Environmental Issue	Modification EA – Proposed Environmental and Operational Controls
Waste	▪ Compost derived from mix waste will be produced to satisfy the physical and chemical contaminant thresholds specified in the General and Site Specific Resource Recovery Exemptions.
Water	▪ Stormwater dam sized to store run off from a storm of greater magnitude than a 24-hour duration, 1 in 100 year Average Recurrence Interval (ARI) rainfall event. ▪ Leachate aeration pond sized to store run off from a storm of magnitude 1 in 10 year Average Recurrence Interval (ARI) 24-hour duration rainfall event.
Visual	▪ Construct new buildings using material and colours that complement the surrounding rural landscape. ▪ External lighting associated with the development will not create nuisance to surrounding receivers and/or roadways and which complies with 'Control of Obstructive Effects of Outdoor Lighting' in accordance with the existing Project Approval visual amenity condition.

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9 Conclusion

Veolia seeks to modify the current Project Approval 06_0239 under Section 75W of the EP&A Act to enable the utilisation of the best available technology and environmental controls for producing compost derived from mixed waste.

The proposed modification remains predominantly the same as the approved Development, with minor operational changes and improvements to the processing technology including:

- utilisation of existing site entrance and revised facility orientation, building footprint and elevation to accommodate mixed waste processing equipment;
- additional biological refining and mechanical separation equipment to reflect best practice and meet current environmental controls for composting operations; and
- operation hours to be consistent with other existing and adjacent Veolia operations and PA conditions to reflect modification.

The proposed modification is in response to a review undertaken by Veolia of mechanical biological treatment (MBT) technology for mixed waste across their global operations for adaptation to Australian conditions. This review indicated that a change to the approved processing technology would be necessary to improve the quality of outputs and adhere to best practice environmental controls.

This EA presents the potential environmental impacts associated with of the Development. It considers both potential positive and negative aspects and recommends control measures where required.

A number of specialists' environmental assessments relating to air quality, traffic, noise, greenhouse gas, and visual amenity were undertaken to verify the potential environmental impacts of the proposed modification.

The findings of these specialists' assessments indicate that the proposed modification will not have significant adverse environmental impacts. The proposed adoption of the measures outlined in the Statement of Commitments will result in improvements to operations and environmental outcomes.

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10 References

AS 4454:2012, Australian Standard AS AS4454-2012: *Composts, soil conditioners and mulches*

DECCW, 2010; *Review of Waste Strategy and Policy in NSW,* Department of Environment, Climate Change and Water (now NSW EPA), 2010

DEWHA, 2010; *National Waste Report,* Department of Environment, Water, Heritage and the Arts

EPA, 2011; *'The Organic Outputs Derived From Mixed Waste Exemption 2011'*, NSW EPA

EPA, 2012; *'The Woodlawn Organic Outputs Derived From Mixed Waste Exemption 2012'*, NSW EPA

Jenkins, 1996; Soil Landscapes of the Braidwood… (Department of land and water conservation DLWC

Umwelt, 2006; *EA for Woodlawn AWT Project*; November 2006

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Appendices

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Appendix A Glossary

Acoustic	Sound and its characteristics
Aerobic	In the presence of oxygen
AeroControl®	Veolia patented compost aeration system
AHD	Australian Height Datum
Alternative Fuel	Solid fuel recovered from the treatment of waste used for energy as a substitute for fossil fuels
AS	Australian Standard
AWT	Alternative Waste Technology (method of processing waste that recovers resources from the waste stream and diverts material from landfill)
BioKap®	Veolia patented process of applying a 200 – 500 mm layer of mature compost over a windrow of fresh compost in order to control odour
Bioreactor	The Woodlawn Bioreactor (landfill technology where biological reactors occur to generate landfill gas from decomposing waste)
BRS Drums	Biological Refining System drums
BTT	Banksmeadow Transfer Terminal (proposed)
C&I	Commercial and Industrial
C&D	Construction and Demolition
Columbia Tipper	A portable hydraulic lifting unit for unloading contents of shipping containers from transfer trailers (with the Eco Project Site) using gravity
Compost	Organic matter that has been physically and biologically stabilised to be used as a soil amendment or fertiliser
Compost Storage Areas	Located on either side of the Fermentation Building for storage of compost material on pads made from compacted clays. The pads include a leachate control system.
CTT	Clyde Transfer Terminal
Cumulative effect	The accumulation of effects over time (relating to environmental impacts)
DA	Development Application
Development	The approved Woodlawn AWT Project, under PA 06_0239, proposed to be modified to the Woodlawn Mechanical Biological Treatment Facility and associated infrastructure
DP&I	Department of Planning and Infrastructure

EA	Environmental Assessment (the orderly and systematic evaluation of a proposal including its effects on the environment, mitigation and management of these effects)
Eco Project Site	The entire Woodlawn Eco Project Site containing all existing and proposed operations such as the Bioreactor, Bio Energy Power Station, Aquaculture, Horticulture, Wind Farm and proposed Development.
EP&A Act	Environment Planning and Assessment Act 1979
EPA	Environment Protection Authority (NSW)
EPL	Environment Protection Licence
Facility, the	The proposed Development
Fermentation Building	Fully enclosed building for aerobic composting containing a fully automated aeration and control system
GHG	Greenhouse Gas (a gas which has an effect on the radioactive properties of the earth's atmosphere and its ability to absorb temperature)
GMC	Goulburn Mulwaree Council
Ha	Hectare
IMF	Intermodal Facility
km	Kilometre
LA10	The LA10 level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the LA10 level for 90% of the time.
LA90	The LA90 level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the LA90 level for 10% of the time. This measure is commonly referred to as the background noise level.
LAeq	The equivalent continuous sound level (LAeq) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment.
LEP	Local Environment Plan
LGA	Local Government Area
MBT	Mechanical Biological Treatment
ML	Mega litre (unit of volume)
m^2	Metres square (unit of area)
mm	Millimetre
MSDS	Materials Safety Data Sheet

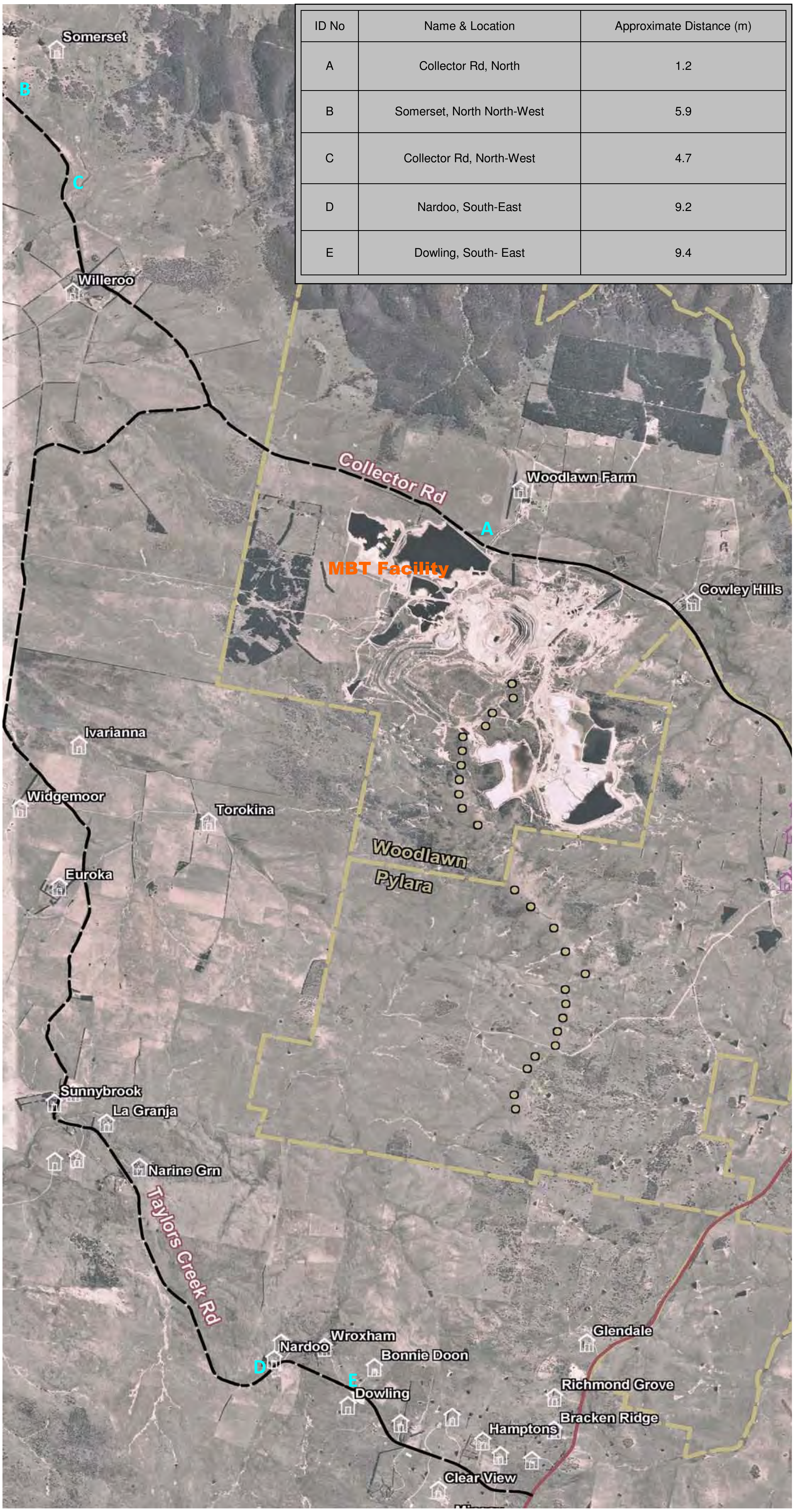
MSW	Municipal Solid Waste
MW	Megawatts
NATA	National Association of Testing Authorities
Non Putrescible	Waste that does not have the properties to undergo significant biological degradation
Organic	A substance of animal or vegetable origin
PA	Project Approval 06_0239 for the Development, granted 6 November 2006
POEO Act	Protection of the Environment Operations Act 1997
Putrescible	Waste that is capable of undergoing significant biological degradation
Pylara	Southern property of the Woodlawn Eco Project Site, approximately 3000 ha, comprising mainly working farms and Veolia owned residences
RBL	The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period: daytime, evening and night time.
Refining Tower	A fully enclosed building with vertical gravity based mechanical sorting capacity for treatment of waste to recover recyclables and remove contaminants prior to composting
RL	Relative or reduced level
RMS	Roads and Maritime Services
LOS	Level of Services (as referred to in the Traffic Impact Assessment)
SEPP	State Environmental Planning Policy
SSROC	Southern Sydney Regional Organisation of Councils
T	Tonne
TCO2-e	Tonnes of carbon dioxide equivalent (the carbon dioxide equivalent relates to the greenhouse warming potential (GWP) of a certain gas compared to that of carbon dioxide (GWP = 1).
TPA	Tonnes per annum
TSSD	Technical Scientific and Sustainable Development Department of Veolia France
Veolia	Veolia Environmental Services (Australia) Pty Ltd
Wind Farm	The 48 MW Woodlawn Wind Farm running on the ridgeline between the Woodlawn and Pylara properties, operated by Infigen Energy

WARR Act	Waste Avoidance and Resource Recovery Act 2001
Woodlawn	Northern property of the Woodlawn Eco Project Site, approximately 3000 ha, comprising most of the waste management and renewable energy generation operations of Veolia
%	Percent

Appendix B Location of Selected Viewpoints

Location of Selected Viewpoints – Visual Impact Assessment

ID No	Name & Location	Approximate Distance (m)
A	Collector Rd, North	1.2
B	Somerset, North North-West	5.9
C	Collector Rd, North-West	4.7
D	Nardoo, South-East	9.2
E	Dowling, South- East	9.4



Appendix C Proposed Site Layout and Elevation Plans

PRELIMINARY

FOR INFORMATION ONLY

REFERENCE DRAWINGS

DRAWING No.	DRAWING TITLE
H345190-0000-00-014-0007	SITE LAYOUT - PHOTO OVERLAY
H345190-0000-00-014-0004	SITE LAYOUT - ELEVATION LOOKING EAST AND WEST
H345190-0000-00-014-0003	SITE LAYOUT - ELEVATION LOOKING SOUTH
H345190-0000-00-014-0002	SITE LAYOUT - ELEVATION LOOKING NORTH
H345190-0000-00-014-0001	SITE LAYOUT - PLAN

REGISTERED PROFESSIONAL

REVISIONS

No.	DESCRIPTION	BY	CHK'D	DATE
E	PRELIMINARY - RE ISSUED FOR PLANNING APPROVAL	B.B	S.B	2013/12/04
D	PRELIMINARY - RE ISSUED FOR PLANNING APPROVAL	E.I		2013/11/11
C	PRELIMINARY - ISSUED FOR PLANNING APPROVAL	C.M	S.B	2013/11/08
B	PLANT LAYOUT CHANGED	C.M	S.B	2013/11/05
A	PRELIMINARY	C.M	S.B	2013/10/23

HATCH™

VEOLIA ENVIRONMENTAL SERVICES

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	C MCDERMOTT		
DESIGNER	S BALL		
CHECKER	E. ITIMAT		
DESIGN COORD.	C MCDERMOTT		
RESP. ENG.			
LEAD DISC. ENG.	S BALL		
ENG. MANAGER	M ROSS		
PROJ. MANAGER	M ROSS		

DRAWING APPROVAL STATUS: Preliminary

WOODLAWN MBT FACILITY

PROJECT WIDE COMPARISON WITH APPROVED LAYOUT PLAN

SCALE 1:1500 OR AS NOTED

DWG. No. H345190-0000-00-014-0006

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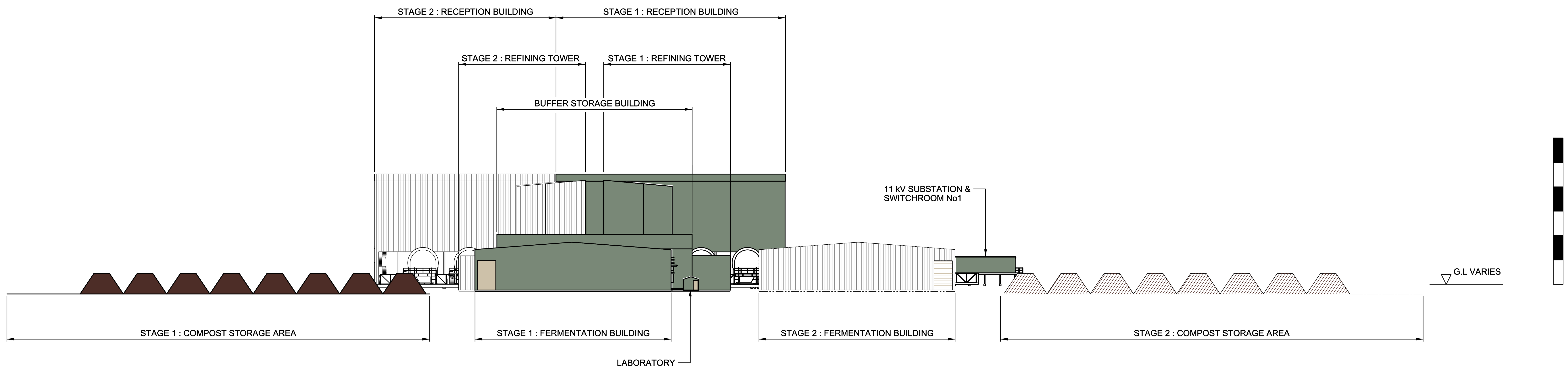
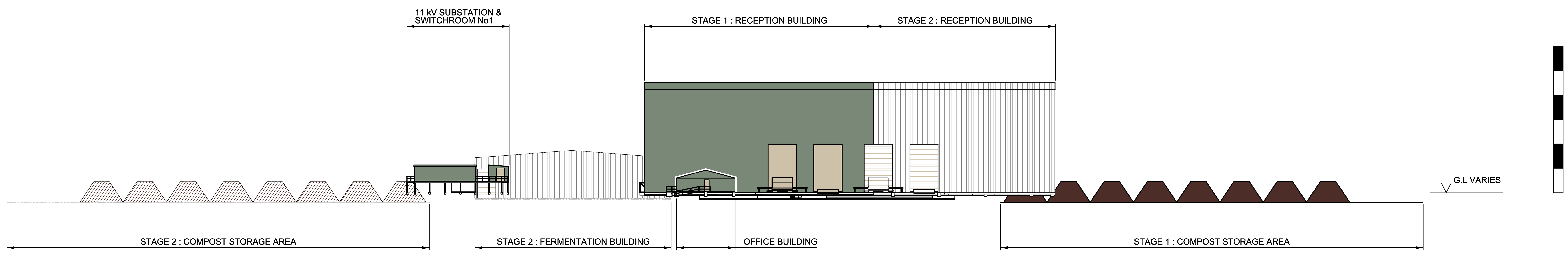
DWG. No. H345190-0000-00-014-0004



ELEVATION - LOOKING EAST



ELEVATION - LOOKING WEST

0 5 10 15 20 25
1:500 SCALE IN METRES

PRELIMINARY **FOR INFORMATION ONLY**

HATCH

VEOLIA ENVIRONMENTAL SERVICES

DRAWING No.	DRAWING TITLE
H345190-0000-00-014-0001	PROJECT WIDE SITE LAYOUT PLAN

REFERENCE DRAWINGS

REGISTERED PROFESSIONAL

No.	DESCRIPTION	BY	CHK'D	DATE
D	PRELIMINARY - RE ISSUED FOR PLANNING APPROVAL	EI		11/11/2013
C	PRELIMINARY - ISSUED FOR PLANNING APPROVAL	EI		07/11/2013
B	CHECK PRINT	EI		07/11/2013
A	PRELIMINARY - INTERNAL REVIEW	EI		06/11/2013

REVISIONS

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	E ITIMAT		
DESIGNER	S BALL		
CHECKER	B BOYD		
DESIGN COORD.	C MCDERMOTT		
RESP. ENG.			
LEAD DISC. ENG.	S BALL		
ENG. MANAGER	M ROSS		
PROJ. MANAGER	M ROSS		

DRAWING APPROVAL STATUS: Preliminary

WOODLAWN MBT FACILITY

PROJECT WIDE
SITE LAYOUT
ELEVATION LOOKING EAST AND WEST

SCALE 1:500 OR AS NOTED | DWG. No. H345190-0000-00-014-0004 | REV D

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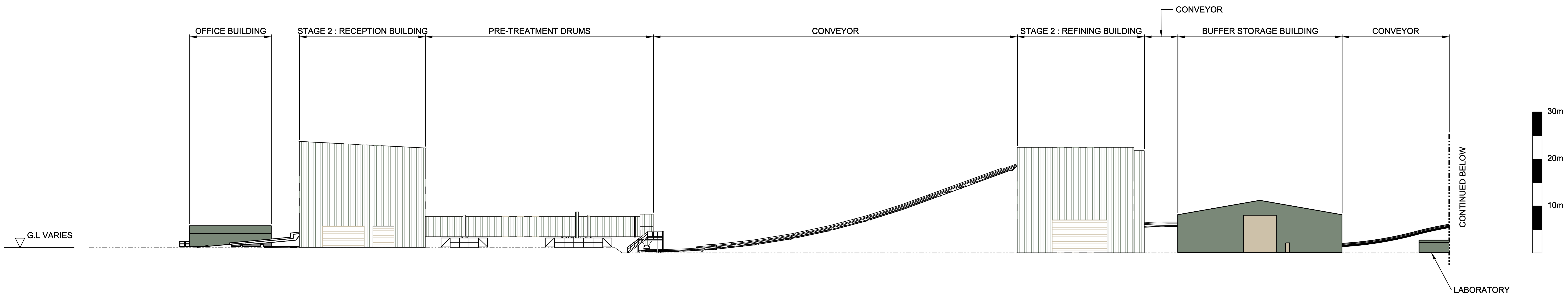
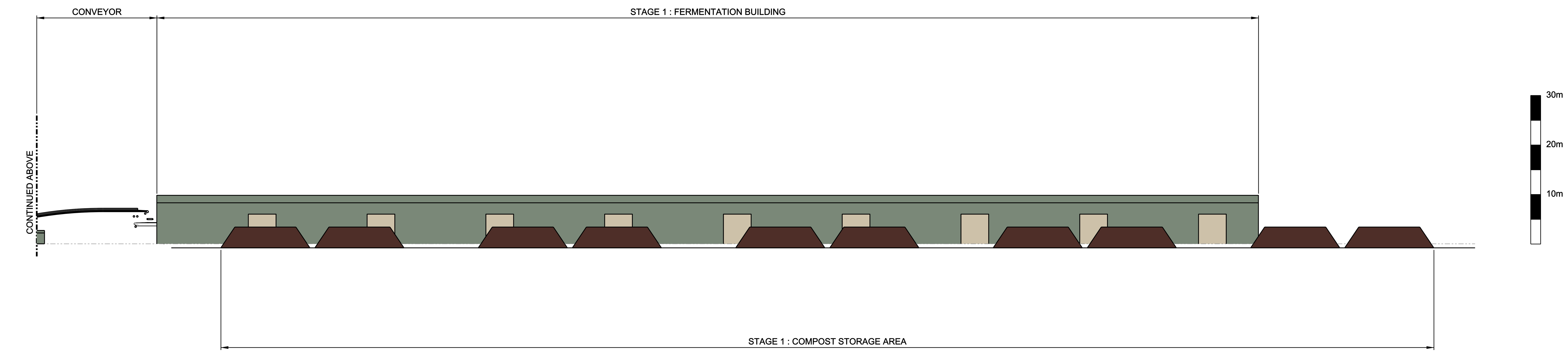
DWG. No. H345190-0000-00-014-0003



ELEVATION - LOOKING SOUTH



ELEVATION - LOOKING SOUTH

NOTE:
BIOFILTERS AND WATER TANKS OMITTED FOR CLARITY

0 5 10 15 20 25
1:500 SCALE IN METRES

PRELIMINARY **FOR INFORMATION ONLY**

DRAWING No.	DRAWING TITLE
H345190-0000-00-014-0001	PROJECT WIDE SITE LAYOUT PLAN

REFERENCE DRAWINGS

REGISTERED PROFESSIONAL

No.	DESCRIPTION	BY	CHK'D	DATE
C	PRELIMINARY - RE ISSUED FOR PLANNING APPROVAL	BB		2013/11/11
B	PRELIMINARY - ISSUED FOR PLANNING APPROVAL	BB		2013/11/07
A	INTRA DISCIPLINE REVIEW	BB		2013/11/06

REVISIONS

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ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	B BOYD		
DESIGNER	S BALL		
CHECKER	E ITIMAT		
DESIGN COORD.	C MCDERMOTT		
RESP. ENG.			
LEAD DISC. ENG.	S BALL		
ENG. MANAGER	M ROSS		
PROJ. MANAGER	M ROSS		

DRAWING APPROVAL STATUS: Preliminary

VEOLIA ENVIRONMENTAL SERVICES

WOODLAWN MBT FACILITY

PROJECT WIDE
SITE LAYOUT
ELEVATION LOOKING SOUTH

SCALE 1:500 OR AS NOTED | DWG. No. H345190-0000-00-014-0003 | REV C

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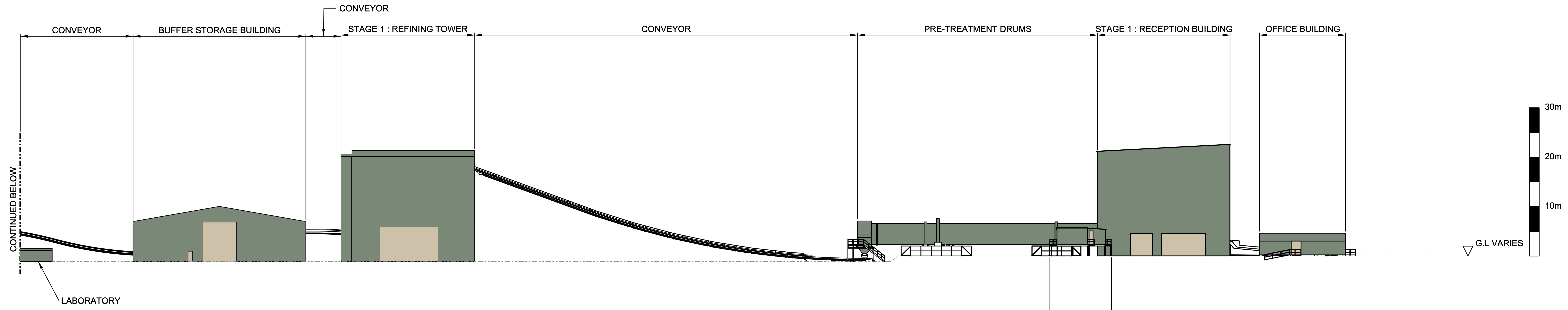
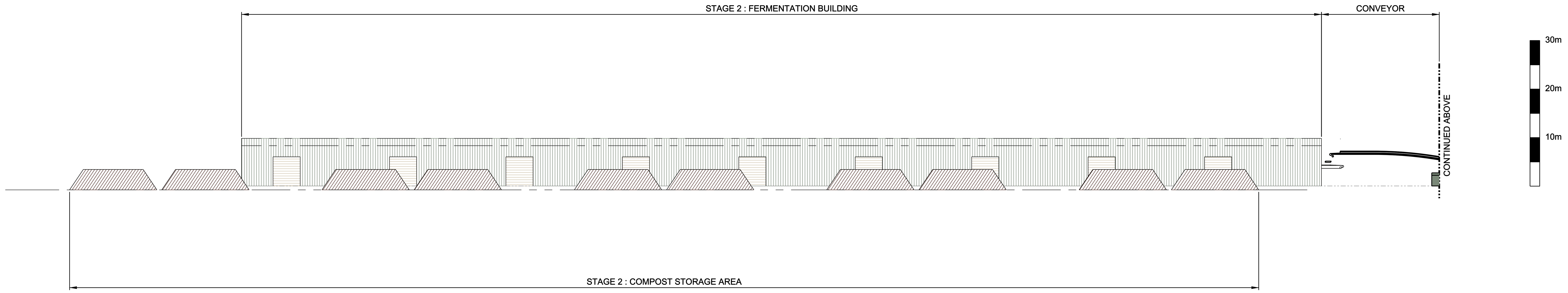
DWG. No.
H345190-0000-00-014-0002



ELEVATION - LOOKING NORTH



ELEVATION - LOOKING NORTH

NOTE:
BIOFILTERS AND WATER TANKS OMITTED FOR CLARITY

0 5 10 15 20 25
1:500 SCALE IN METRES

PRELIMINARY **FOR INFORMATION ONLY**

DRAWING No.	DRAWING TITLE
H345190-0000-00-014-0001	PROJECT WIDE SITE LAYOUT PLAN

REFERENCE DRAWINGS

REGISTERED PROFESSIONAL

No.	DESCRIPTION	BY	CHK'D	DATE
E	PRELIMINARY - RE ISSUED FOR PLANNING APPROVAL	BB		2013/11/11
D	PRELIMINARY - ISSUED FOR PLANNING APPROVAL	BB		2013/11/07
C	INTRA DISCIPLINE REVIEW - DESIGN CHANGE	BB		2013/11/06
B	CHECKPRINT	BB		2013/10/29
A	PRELIMINARY - INTERNAL REVIEW	BB		2013/10/28

REVISIONS

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ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	B BOYD		
DESIGNER	S BALL		
CHECKER	E ITIMAT		
DESIGN COORD.	C MCDERMOTT		
RESP. ENG.			
LEAD DISC. ENG.	S BALL		
ENG. MANAGER	M ROSS		
PROJ. MANAGER	M ROSS		

DRAWING APPROVAL STATUS: Preliminary

VEOLIA ENVIRONMENTAL SERVICES

WOODLAWN MBT FACILITY

PROJECT WIDE
SITE LAYOUT
ELEVATION LOOKING NORTH

SCALE	DWG. No.	REV
1:500 OR AS NOTED	H345190-0000-00-014-0002	E

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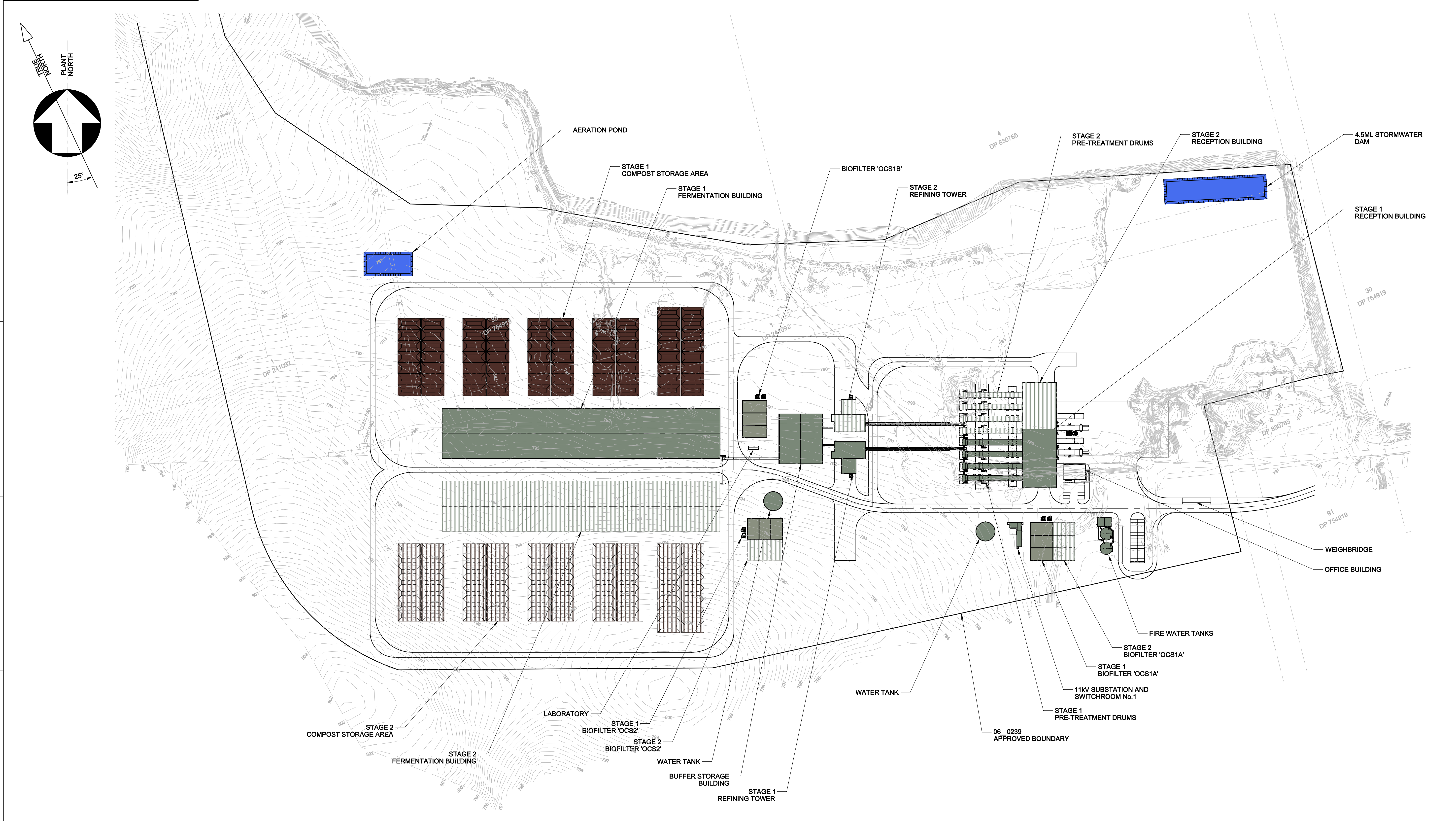
DWG. No. H345190-0000-00-014-0001



PRELIMINARY

FOR INFORMATION ONLY

0 15 30 45 60 75
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VEOLIA ENVIRONMENTAL SERVICES

WOODLAWN MBT FACILITY

PROJECT WIDE SITE LAYOUT PLAN

REFERENCE DRAWINGS

DRAWING No.	DRAWING TITLE
H345190-0000-00-014-0007	SITE LAYOUT - PHOTO OVERLAY
H345190-0000-00-014-0006	COMPARISON WITH APPROVED LAYOUT - PLAN
H345190-0000-00-014-0004	SITE LAYOUT - ELEVATIONS LOOKING EAST AND WEST
H345190-0000-00-014-0003	SITE LAYOUT - ELEVATION LOOKING SOUTH
H345190-0000-00-014-0002	SITE LAYOUT - ELEVATION LOOKING NORTH

REGISTERED PROFESSIONAL

REVISIONS

No.	DESCRIPTION	BY	CHK'D	DATE
F	PRELIMINARY - RE ISSUED FOR PLANNING APPROVAL	B.B	S.B	2013/12/04
E	PRELIMINARY - RE ISSUED FOR PLANNING APPROVAL	C.M	S.B	2013/11/12
D	PRELIMINARY - RE ISSUED FOR PLANNING APPROVAL	C.M	S.B	2013/11/11
C	PRELIMINARY - ISSUED FOR PLANNING APPROVAL	C.M	S.B	2013/11/08
B	PLANT LAYOUT CHANGED	C.M	S.B	2013/11/07
A	PRELIMINARY	C.M	S.B	2013/10/23

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	C MCDERMOTT		
DESIGNER	S BALL		
CHECKER	E. ITIMAT		
DESIGN COORD.	C MCDERMOTT		
RESP. ENG.			
LEAD DISC. ENG.	S BALL		
ENG. MANAGER	M ROSS		
PROJ. MANAGER	M ROSS		

DRAWING APPROVAL STATUS: Preliminary

SCALE	DWG. No.	REV
1:1500 OR AS NOTED	H345190-0000-00-014-0001	F

$USERNAME$ $DATE$ $TIME$ $FILE$

DWG. No. H345190-0000-00-014-0007

PRELIMINARY **FOR INFORMATION ONLY**

0 50 100 150 200 250
1:4000 SCALE IN METRES

DRAWING No.	DRAWING TITLE
H345190-0000-00-014-0006	COMPARISON WITH APPROVED LAYOUT - PLAN
H345190-0000-00-014-0004	SITE LAYOUT - ELEVATION LOOKING EAST AND WEST
H345190-0000-00-014-0003	SITE LAYOUT - ELEVATION LOOKING SOUTH
H345190-0000-00-014-0002	SITE LAYOUT - ELEVATION LOOKING NORTH
H345190-0000-00-014-0001	SITE LAYOUT - PLAN

REFERENCE DRAWINGS

REGISTERED PROFESSIONAL

No.	DESCRIPTION	BY	CHK'D	DATE
E	PRELIMINARY - RE ISSUED FOR PLANNING APPROVAL	B.B	S.B	2013/12/04
D	PRELIMINARY - RE ISSUED FOR PLANNING APPROVAL	C.M	S.B	2013/11/12
C	PRELIMINARY - ISSUED FOR PLANNING APPROVAL	C.M	S.B	2013/11/08
B	PLANT LAYOUT CHANGED	C.M	S.B	2013/11/05
A	PRELIMINARY	C.M	S.B	2013/10/23

REVISIONS

HATCH

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	C MCDERMOTT		
DESIGNER	S BALL		
CHECKER	E ITIMAT		
DESIGN COORD.	C MCDERMOTT		
RESP. ENG.			
LEAD DISC. ENG.	S BALL		
ENG. MANAGER	M ROSS		
PROJ. MANAGER	M ROSS		

DRAWING APPROVAL STATUS: Preliminary

VEOLIA ENVIRONMENTAL SERVICES

WOODLAWN MBT FACILITY

PROJECT WIDE
SITE LAYOUT - PHOTO OVERLAY
PLAN

SCALE 1:4000 OR AS NOTED | DWG. No. H345190-0000-00-014-0007 | REV E

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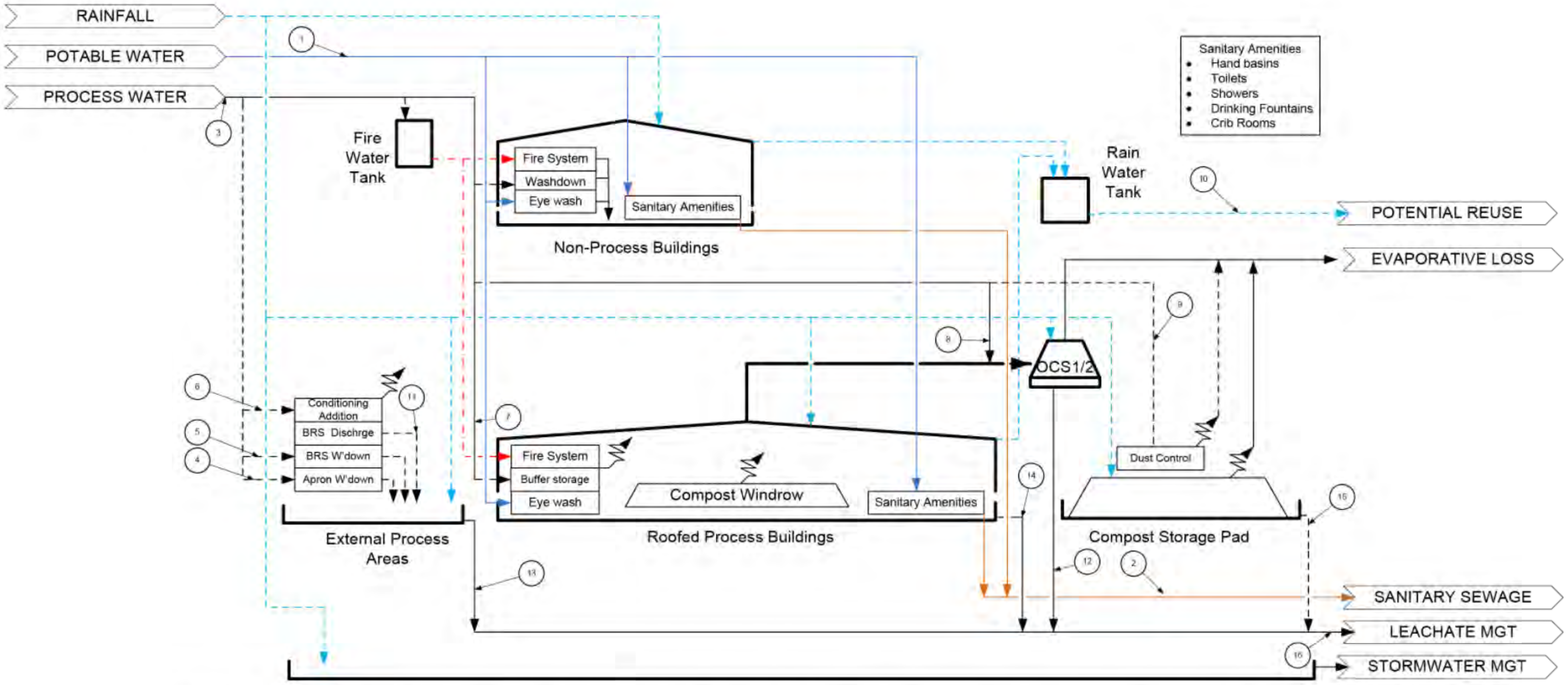
Appendix D Water Balance



Stream No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Description	Potable Supply (NOTE C)	Sanitary Sewage	Non-Potable Supply	Waste Receival W'down	BRS W'down	Conditioning Addition to BRS Feed	Addition to Organic Buffer	Biofilter Inlet Saturation	Dust Suppression	Captured Roof Run-off	BRS Discharge Leachate	OCS Bleed & Drainage	External Process Area Drainage	Process Bld Leachate	Compost Storage Pad Drainage	Total Leachate Flow
Average	2.1	2.1	96.6	21.2	5.3	38.5	0.0	11.3	20.3	11.5 (Note D)	0.0	3.7	27.9	0.0	2.8	34.5
Dry Day	2.1	2.1	179.4	21.2	5.3	38.5	0.0	38.9	75.6	0.0	0.0	0.6	26.5	0.0	0.0	27.1
Design	2.1	2.1	210.2	21.2	5.3	57.7	11.5	38.9	75.6	NA	76.9	251.6	213.0	TBA (NOTE G)	1109.8	1574.4

NOTES:

A All flowrate expressed in stream table have units of m3/d

B Refer to Project Memo (Doc No H345190-0000-05-220-0001) for basis of flow quantification

C Bottled water, proposed for drinking, is represented as a component of the reticulated potable water.

D Average annual rainfall run-off collected from the building roofs assuming 100% capture efficiency is 23 m3/d. Tabulated value represents 50% capture efficiency consistent with assumed economic tank capacity.

E For simplicity all process buildings have been represented schematically as a single structure.

F For simplicity all non-process buildings have been represented as a single structure.

G Inside process buildings all drainage (excepting sanitary sewage) is assumed to report to leachate management system. The drainage system will need to consider fire fighting flows.

PRELIMINARY

FOR INFORMATION ONLY

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VEOLIA ENVIRONMENTAL SERVICES

No.	DESCRIPTION	BY	CHK'D	DATE
C	UPDATED STREAM TABLE AND NOTES	B.B	M.R	2013/12/11
B	UPDATED STREAM TABLE AND NOTES	C.M	M.R	2013/10/30

REVISIONS

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	C MCDERMOTT	NR	2013-10-18
DESIGNER	R THEW	NR	
CHECKER			
DESIGN COORD.	B BOYD		
RESP. ENG.			
LEAD DISC. ENG.	R THEW		
ENG. MANAGER	STEVE BALL		
PROJ. MANAGER	MICHAEL ROSS		

DRAWING APPROVAL STATUS: Preliminary

WOODLAWN MBT FACILITY

PROJECT WIDE WATER BALANCE BLOCK DIAGRAM

SCALE OR AS NOTED

DWG. No. H345190-0000-05-002-0001 REV C

DRAWING No.	DRAWING TITLE

REFERENCE DRAWINGS

REGISTERED PROFESSIONAL

DWG. No. H345190-0000-05-002-0001

$USERNAME$ $DATE$ $FILE$ $TIME$

Appendix E Consultation Documentation

Our reference: DOC13/87506

Ms Ramona Bachu
Project Manager – Resource Recovery
Veolia Environmental Services (Australia) Pty Ltd
PO Box 171
GRANVILLE NSW 2142

STANDARD POST & EMAIL
9 December 2013

Dear Ms Bachu

**Veolia Environmental Services (Australia) Pty Ltd – Woodlawn Biological Treatment Facility
Proposed Modification to Project Approval**

I refer to our meeting of 12 November 2013 regarding the Woodlawn Alternative Waste Technology Project. At the meeting, Veolia Environmental Services (Australia) Pty Ltd ("VES") advised the Environment Protection Authority ("EPA") of its intentions to seek a modification to the Project Approval (Approval No. 06/0239) to allow for a number of changes, including:

- Changing the name of the facility from Alternative Waste Technology (AWT) to Mechanical Biological Treatment (MBT) facility;
- Modifying access to the site;
- Modifying the layout and orientation of buildings; and
- Upgrading the processing technology and environmental controls.

The EPA understands that VES is currently preparing an Environmental Assessment (EA) to accompany its modification application and is seeking the EPA's comments with regard to issues that should be addressed in the EA.

Issues that the EPA considers critical to the modification are provided as an attachment to this letter (refer **Attachment 1)**.

The EPA expects that the EA will be referred to it for review once received by the Department of Planning and Infrastructure. The EPA will provide more detailed comment on the proposed modifications at that stage.

If you have any questions or wish to discuss this matter, please contact Nick Feneley on (02) 4224 4144.

Yours sincerely

CATE WOODS
Unit Head – Waste Compliance
Environment Protection Authority

PO Box 513 Wollongong NSW 2520
Block D, Level 3, 84 Crown Street
Wollongong NSW 2500
Tel: (02) 4224 4100 Fax: (02) 4224 4110
ABN 43 692 285 758
www.environment.nsw.gov.au

Attachment 1

EPA's Recommended Environmental Assessment Requirements (EARs)

Modification to Project Approval 06/0239

Woodlawn Alternative Waste Technology Project

TABLE OF CONTENTS

1 Environmental impacts of the project

Impacts related to the following environmental issues need to be assessed, quantified and reported on:

- Air Quality
- Noise
- Waste
- Water

The environmental assessment (EA) submitted with the modification application should address the specific requirements outlined under each heading below and assess impacts in accordance with the relevant guidelines mentioned. A full list of guidelines is at Appendix 1.

2 Licensing requirements

1. On the basis of the information submitted to date, it appears the proposal involves undertaking a number of scheduled activities (Composting, Resource Recovery and Waste Storage) under the *Protection of the Environment Operations Act 1997* (POEO Act) and will therefore require an Environment Protection Licence (EPL) if approval is granted. The EA should address the requirements of Section 45 of the POEO Act determining the extent of each impact and providing sufficient information to enable EPA to determine appropriate limits for the EPL.

2. Should project approval be granted, the proponent will need to make a separate application to the EPA for an EPL for the proposed facility **prior to undertaking any on site works**.

Please note, section 47 of the POEO Act requires a person to hold a licence for Scheduled Development Work. Scheduled Development Work is work undertaken at a premises at which Scheduled Activities are not carried on that is designed to enable Scheduled Activities to be carried on at the premises (e.g. construction of the MBT facility and associated site infrastructure).

Additional information is available through EPA's *Guide to Licensing* document (www.environment.nsw.gov.au/licensing/licenceguide.htm).

3 Air Quality

The EA must include an assessment of the air quality implications of the modified proposal, particularly odour impacts from the waste management and composting processes at the site.

The assessment should:

1. Assess the risk associated with potential discharges of fugitive and point source emissions for <u>all stages</u> of the proposal. Assessment of risk relates to environmental harm, risk to human heath and amenity.

2. Justify the level of assessment undertaken on the basis of risk factors, including but not limited to:
    a. proposal location;
    b. characteristics of the receiving environment; and
    c. type and quantity of pollutants emitted.

3. Describe the receiving environment in detail. The proposal must be contextualised within the receiving environment (local, regional and inter-regional as appropriate). The description must include but need not be limited to:
    a. meteorology and climate;
    b. topography;
    c. surrounding land-use; receptors; and
    d. ambient air quality.

4. Include a detailed description of the proposal. All processes that could result in air emissions must be identified and described. Sufficient detail to accurately communicate the characteristics and quantity of <u>all emissions</u> must be provided. As a minimum, odour emissions from all stages of waste handling must be accounted for, including receipt, pre-treatment, composting, maturation and storage, loading product for offsite transport, storage and handling of residual waste. Odour emissions from leachate drains and leachate storage ponds should also be considered.

5. Include a consideration of 'worst case' emission scenarios and impacts at proposed emission limits.

6. Account for cumulative impacts associated with existing emission sources as well as any currently approved developments linked to the receiving environment.

7. Include air dispersion modelling conducted in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2005) http://www.environment.nsw.gov.au/resources/air/ammodelling05361.pdf.

8. Demonstrate the proposal's ability to comply with the relevant regulatory framework, specifically the *Protection of the Environment Operations (POEO) Act (1997)* and the *POEO (Clean Air) Regulation (2010)*.

9. Provide an assessment of the project in terms of the priorities and targets adopted under the NSW State Plan 2010 and its implementation plan Action for Air.

10. Detail emission control techniques/practices that will be employed by the proposal.

11. Be prepared in accordance with the requirements for an Air Quality Impact Assessment report as specified in section 9 of *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2005).

4 Noise

The EA must include an assessment of the noise implications of the modified proposal. The following matters should be addressed as part of the assessment:

1. Construction noise associated with the modified proposal should be assessed using the *Interim Construction Noise Guideline (*DECC, 2009). http://www.environment.nsw.gov.au/noise/constructnoise.htm

2. Operational noise from all activities to be undertaken on the premises should be assessed using the guidelines contained in the *NSW Industrial Noise Policy* (EPA, 2000) and *Industrial Noise Policy Application Notes.* http://www.environment.nsw.gov.au/noise/industrial.htm

5 Waste

The EA should include:

1. Details of the layout of the waste facility, the treatment process and the environmental controls at the facility.

2. Details of the quantity and type of waste(s) to be received, generated, handled, processed or disposed of at, and / or from, the premises. A prediction should be included of the proportion of waste received at the premises that will be recovered and the proportion that will require disposal to landfill. Waste must be classified according to EPA's *Waste Classification Guidelines 2008.*

3. Details of waste management at the facility, including:
   - the transportation, assessment and handling of waste arriving at or generated at the site;
   - any stockpiling of wastes or recovered materials at the site, including proposed stockpile height limits to reduce the potential for fire, dust and odour;
   - the method for disposing of all wastes or recovered materials at the facility;
   - the emissions arising from the handling, storage, and processing of waste at the facility;
   - the proposed controls for managing the environmental impacts of these activities.

4. Details of the quantity, type and specifications for all **output products** proposed to be produced from the facility. The description should include the physical, chemical and biological characteristics (including contaminant concentrations) of those output products as well as relevant accredited standards against which the products would comply. In documenting or describing the composition of output products and/or wastes generated from the proposed facility reference should be made to the relevant EPA *resource recovery exemption (http://www.environment.nsw.gov.au/waste/RRecoveryExemptions.htm)* or the *Waste Classification Guidelines 2008 (*http://www.environment.nsw.gov.au/waste/envguidlns/index.htm).

5. Details of intended (or potential) end uses for output products from the facility and the relevant product standards which would be used to assess those products against.

6. Details of proposed site access and record keeping arrangements. The EPA understands that VES intends on modifying the approved site access arrangements to the premises. It is understood that VES proposes to use the existing entrance and weighbridge facilities for the Woodlawn Bioreactor premises (Environment Protection Licence 14436) to receive waste at the MBT facility. The application to modify the Project Approval will need to demonstrate that VES will be able to comply with the requirements of Section 88 of the POEO Act and Regulations 12 and 15 of the *Protection of the Environment (Waste) Regulation 2005* under the modified site access arrangements. It is recommended that VES consult the EPA on the details of the modified site access arrangements prior to submitting its application to the Department of Planning and Infrastructure.

6. Details of all procedures and protocols to be implemented to ensure that any waste leaving the site is transported and disposed of lawfully and does not pose a risk to human health or the environment.

7. A statement demonstrating that the Proponent is aware of the EPA's requirements with respect to notification and tracking of waste.

8. A statement demonstrating that the Proponent is aware of the relevant legislative requirements for disposal of the waste, including any relevant Resource Recovery Exemptions, as gazetted by EPA from time to time.

9. An outline of contingency plans for any event that affects operations at the site that may result in environmental harm, including: excessive stockpiling of waste, volume of leachate generated exceeds the storage capacity available on-site etc.

6 Soil, Water and Leachate Management

The existing Project Approval requires the proponent to submit a Soil, Water and Leachate Management Plan to the Director-General of the Department of Planning and Infrastructure prior to commencing any development on site.

The plan must include:

- A site water balance;
- An erosion and sediment control plan;
- A stormwater management scheme;
- A surface water, groundwater and leachate monitoring program; and
- A surface water, groundwater and leachate response plan.

It is understood that VES is not seeking to modify this condition of the Project Approval.

VES should consult the EPA during the preparation of this plan and submit the plan with its application for an Environment Protection Licence for the premises.

Appendix 1 – Guidance Material

Title	Web address
Relevant Legislation	
Contaminated Land Management Act 1997	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+140+1997+cd+0+N
Environmentally Hazardous Chemicals Act 1985	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+14+1985+cd+0+N
Environmental Planning and Assessment Act 1979	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N
Protection of the Environment Operations Act 1997	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+156+1997+cd+0+N
Water Management Act 2000	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+92+2000+cd+0+N
Licensing	
Guide to Licensing	www.environment.nsw.gov.au/licensing/licenceguide.htm
Air Issues	
Air Quality	
Approved methods for modelling and assessment of air pollutants in NSW (2005)	http://www.environment.nsw.gov.au/resources/air/ammodelling05361.pdf
POEO (Clean Air) Regulation 2010	http://www.legislation.nsw.gov.au/maintop/view/inforce/subordleg+428+2010+cd+0+N
Greenhouse Gas	
The Greenhouse Gas Protocol: Corporate Standard, World Council for Sustainable Business Development & World Resources Institute	http://www.ghgprotocol.org/standards/corporate-standard
National Greenhouse Accounts (NGA) Factors, Australian Department of Climate Change (Latest release),	http://www.climatechange.gov.au/publications/greenhouse-acctg/national-greenhouse-factors.aspx
National Greenhouse and Energy Reporting System, Technical Guidelines (latest release)	http://www.climatechange.gov.au/en/government/initiatives/national-greenhouse-energy-reporting/tools-resources.aspx
National Carbon Accounting Toolbox	http://www.climatechange.gov.au/government/initiatives/ncat.aspx
Australian Greenhouse Emissions Information System (AGEIS)	http://ageis.climatechange.gov.au/

Title	Web address
Noise and Vibration	
Interim Construction Noise Guideline (DECC, 2009)	http://www.environment.nsw.gov.au/noise/constructnoise.htm
Assessing Vibration: a technical guideline (DEC, 2006)	http://www.environment.nsw.gov.au/noise/vibrationguide.htm
Australian and New Zealand Environment Council – Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZEC, 1990)	http://www.environment.nsw.gov.au/noise/blasting.htm
Industrial Noise Policy Application Notes	http://www.environment.nsw.gov.au/noise/traffic.htm
Environmental Criteria for Road Traffic Noise (EPA, 1999)	http://www.environment.nsw.gov.au/noise/traffic.htm
Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects (DECC, 2007)	http://www.environment.nsw.gov.au/noise/railinfranoise.htm
Environmental assessment requirements for rail traffic-generating developments	http://www.environment.nsw.gov.au/noise/railnoise.htm
Waste, Chemicals and Hazardous Materials and Radiation	
Waste	
Environmental Guidelines: Solid Waste Landfills (EPA, 1996)	http://www.environment.nsw.gov.au/resources/waste/envguidlns/solidlandfill.pdf
Draft Environmental Guidelines - Industrial Waste Landfilling (April 1998)	http://www.environment.nsw.gov.au/resources/waste/envguidlns/industrialfill.pdf
Environmental Guidelines: Composting and Related Organics Processing Facilities (DEC, 2004)	http://www.epa.nsw.gov.au/waste/envguidlns/contents.htm
Waste Classification Guidelines (DECC, 2008)	http://www.environment.nsw.gov.au/waste/envguidlns/index.htm
Resource recovery exemption	http://www.environment.nsw.gov.au/waste/RRecoveryExemptions.htm
Chemicals subject to Chemical Control Orders	
Chemical Control Orders (regulated through the EHC Act)	http://www.environment.nsw.gov.au/pesticides/CCOs.htm
National Protocol - Approval/Licensing of Trials of Technologies for the Treatment/Disposal of Schedule X Wastes - July 1994	Available in libraries
National Protocol for Approval/Licensing of Commercial Scale Facilities for the Treatment/Disposal of Schedule X Wastes - July 1994	Available in libraries

Title	Web address
Water and Soils	
Acid sulphate soils	
Acid Sulfate Soils Planning Maps	http://canri.nsw.gov.au/download/
Acid Sulfate Soils Manual (Stone et al. 1998)	Manual available for purchase from: http://www.landcom.com.au/whats-new/the-blue-book.aspx Chapters 1 and 2 are on DP&I's Guidelines Register at: Chapter 1 Acid Sulfate Soils Planning Guidelines: http://www.planning.nsw.gov.au/rdaguidelines/documents/NSW%20Acid%20Sulfate%20Soils%20Planning%20Guidelines.pdf Chapter 2 Acid Sulfate Soils Assessment Guidelines: http://www.planning.nsw.gov.au/rdaguidelines/documents/NSW%20Acid%20Sulfate%20Soils%20Assessment%20Guidelines.pdf
Acid Sulfate Soils Laboratory Methods Guidelines (Ahern et al. 2004)	http://www.derm.qld.gov.au/land/ass/pdfs/lmg.pdf This replaces Chapter 4 of the Acid Sulfate Soils Manual above.
Contaminated Sites Assessment and Remediation	
Managing land contamination: Planning Guidelines – SEPP 55 Remediation of Land	http://www.planning.nsw.gov.au/DevelopmentAssessments/RegisterofDevelopmentAssessmentGuidelines/tabid/207/language/en-US/Default.aspx
Guidelines for Consultants Reporting on Contaminated Sites (EPA, 2000)	http://www.environment.nsw.gov.au/resources/clm/97104consultantsglines.pdf
Guidelines for the NSW Site Auditor Scheme - 2nd edition (DEC, 2006)	http://www.environment.nsw.gov.au/resources/clm/auditorglines06121.pdf
Sampling Design Guidelines (EPA, 1995)	Available by request from EPA's Environment Line
National Environment Protection (Assessment of Site Contamination) Measure 1999 (or update)	http://www.ephc.gov.au/taxonomy/term/44
Soils – general	
Soil and Landscape Issues in Environmental Impact Assessment (DLWC 2000)	http://www.dnr.nsw.gov.au/care/soil/soil_pubs/pdfs/tech_rep_34_new.pdf
Managing urban stormwater: soils and construction, vol. 1 (Landcom 2004) and vol. 2 (A. Installation of services; B Waste landfills; C. Unsealed roads; D. Main Roads; E. Mines and quarries) (DECC 2008)	Vol 1 - Available for purchase at http://www.landcom.com.au/whats-new/publications-reports/the-blue-book.aspx Vol 2 - http://www.environment.nsw.gov.au/stormwater/publications.htm
Landslide risk management guidelines	http://www.australiangeomechanics.org/resources/downloads/
Site Investigations for Urban Salinity (DLWC, 2002)	http://www.environment.nsw.gov.au/resources/salinity/booklet3siteinvestigationsforurbansalinity.pdf
Local Government Salinity Initiative Booklets	http://www.environment.nsw.gov.au/salinity/solutions/urban.htm
Water	
Water Quality Objectives	http://www.environment.nsw.gov.au/ieo/index.htm
ANZECC (2000) Guidelines for Fresh	http://www.mincos.gov.au/publications/australian_and_new_zeala

Title	Web address
and Marine Water Quality	nd_guidelines_for_fresh_and_marine_water_quality
Applying Goals for Ambient Water Quality Guidance for Operations Officers – Mixing Zones	http://deccnet/water/resources/AWQGuidance7.pdf
Approved Methods for the Sampling and Analysis of Water Pollutant in NSW (2004)	http://www.environment.nsw.gov.au/resources/legislation/approvedmethods-water.pdf

Appendix F1: Air Quality Impact Assessment

Woodlawn Mechanical Biological Treatment Facility

Air Quality Impact Assessment

Report Number 610.12876-R1

6 December 2013

Veolia Environmental Services (Australia) Pty Ltd
619 Collector Road
TARAGO NSW 2580

Version: Revision 0

Woodlawn Mechanical Biological Treatment Facility

Air Quality Impact Assessment

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
610.12876-R1	Revision 0	2 December 2013	Martin Doyle	Fardausur Rahaman	Martin Doyle

Executive Summary

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Veolia Environmental Services (Australia) Pty Ltd (Veolia) to undertake an Air Quality Impact Assessment (AQIA) of the proposed Woodlawn Alternative Waste Technology Project (the Development) located within the Woodlawn Eco Project Site, near Tarago, in the Southern Highlands of NSW.

OBJECTIVES

The objective of this report was to perform a comprehensive AQIA that addressed odour and particulate matter impacts during the construction and operation of the MBT Facility. It is noted that the Facility is to be capable of processing up to 240,000 tonnes per annum of mixed waste with an additional 40,000 tonnes per annum of green waste.

APPROACH TO ASSESSMENT

A dispersion modelling exercise was performed to identify the potential impacts of the construction and operation phases of the proposed MBT Facility on surrounding receptors. In addition to the predicted impacts from the MBT Facility, impacts were also predicted resulting from the operation of the Woodlawn Bioreactor landfill and operations at the recently approved TriAusMin Woodlawn Project.

Background air quality was determined using available air quality monitoring data for the immediate area, monitored by Veolia in and around the Eco Project Site.

Estimates of odour and particulate emissions were calculated from monitored data (odour) and using available and appropriate emission factors (for particulate matter). These were then used as input to a dispersion model, along with modelled meteorological data which used measured data collected at the Eco Project Site.

FINDINGS OF THE ASSESSMENT

Particulate Matter

PM_{10}

Maximum 24-hour PM_{10} concentrations resulting from the construction of the proposed MBT Facility have been predicted to be less than 4.4 µg/m^3 at all surrounding receptor locations. The addition of predicted impacts due to the Bioreactor operation, and the TriAusMin Woodlawn Project, plus a background, regional particulate matter component indicate that the NSW EPA criterion of 50 µg/m^3 will be achieved at all receptor locations.

Annual average concentrations of PM_{10} during MBT Facility construction are predicted to meet the relevant criterion at all surrounding receptors locations even with the addition of the Bioreactor operations and the TriAusMin Woodlawn Project. Maximum annual average PM_{10} concentrations resulting from MBT Facility construction are predicted to be 0.1 µg/m^3.

During MBT Facility operation, maximum 24-hour PM_{10} concentrations resulting from the MBT Facility operation are predicted to be less than 7.7 µg/m^3 at all receptors. Once again, the addition of predicted impacts due to the Bioreactor operation, and the TriAusMin Woodlawn Project, plus a background, regional particulate matter component indicate that the NSW EPA criterion of 50 µg/m^3 will be achieved at all receptor locations.

Executive Summary

Predicted annual average PM_{10} concentrations are anticipated to easily meet the EPA criterion of 30 µg/m^3 when considering all sources during operation of the MBT Facility, with the MBT Facility itself providing a minor contribution of up to 1.6 µg/m^3.

TSP

Annual average TSP concentrations are predicted to easily meet the EPA criterion of 90 µg/m^3 during both the construction and operation of the MBT Facility. Construction activities contribute only 0.2 µg/m^3 to the annual average TSP concentration, with MBT Facility operations contributing only up to 3.9 µg/m^3 at any modelled receptor.

Dust Deposition

Dust deposition impacts resulting from both the construction and the operation of the MBT Facility are shown to meet the EPA criterion of 4 g/m^2/month at all receptors, with the addition of a 3.0 g/m^2/month background concentration dominating the cumulative predictions.

Odour

The adopted odour criterion of 6 OU is achieved at all receptors with the exception of the TriAusMin administration building which is predicted to experience a 99th percentile odour concentration of 8.5 OU. This concentration is predicted to be dominated by the existing source of the Bioreactor, rather than the operation of the MBT Facility which is predicted to result in a 99th percentile concentration of 1.7 OU when modelled alone.

COMPARISON WITH PREVIOUS APPROVALS

Comparison has been made between the original AQIA for the approved Development, the AQIA performed for the Woodlawn Expansion Project and the current assessment. The Woodlawn Expansion Project has been used for comparison purposes as the impacts of the waste receival operations at the Bioreactor were not included within the original AQIA, but were included at currently approved receival rates in the Woodlawn Expansion Project AQIA. It is considered that comparison of the Woodlawn Expansion Project with the current assessment provides a “like-for-like” comparison and provides additional information when examining the predicted impacts within the original and current assessments alone.

In summary, although the methodology for emissions estimation and dispersion modelling has been refined over recent years, it is important to note that impacts of odour and particulate matter emissions are predicted to be below the relevant criteria in all assessments at all receptor locations (with the exception of odour at the TriAusMin administration building), including for the current MBT Facility.

Although an exceedance of the odour criterion is predicted at the TriAusMin administration building, the MBT Facility is predicted to contribute a minor amount to this exceedance. It is considered that the capture of fugitive emissions within the fermentation building and receival hall and use of biofilters to reduce odour emissions acts to reduce the odour impacts at all surrounding receptors.

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APPENDICES

1 INTRODUCTION

1.1 Background

Veolia Environmental Services (Australia) Pty Ltd (Veolia) are seeking a modification to Project Approval 06_0239 (the Project Approval), which relates to the construction and operation of the Woodlawn Alternative Waste Technology Project (the Development), forthwith referred to as the proposed Woodlawn Mechanical Biological Treatment (MBT) Facility.

Subject to the provisions of Section 75W of the Environmental Planning and Assessment Act 1979 (EP&A Act), an Environmental Assessment (EA) has been prepared by Veolia to detail modifications sought to the Project Approval, which will enable utilisation of the best available technology at the proposed MBT Facility for processing mixed waste to produce compost.

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Veolia to undertake an Air Quality Impact Assessment (AQIA) to support the EA.

1.2 Woodlawn Eco Project Site

The proposed MBT Facility shall be developed within the 6000 hectare (ha) Woodlawn Eco Project Site (the Eco Project Site), owned and operated by Veolia and located in the Southern Highlands of NSW, approximately 250 kilometres (km) southwest of Sydney

The Eco Project Site comprises of two equally sized properties, Woodlawn and Pylara on which the following operations exist or are being developed:

- the former Woodlawn Mine (the Mine Site);
- the Woodlawn Bioreactor (the Bioreactor);
- the Woodlawn Bio Energy Power Station (the Power Station);
- the Woodlawn Bio Energy Aquaculture (the Fish Farm)
- the Woodlawn and Pylara farms;
- the Pylara Wind Farm (the Wind Farm); and
- the proposed MBT Facility.

1.3 Proposed Facility

The MBT Facility was granted Project Approval on 6 November 2007. Veolia has since been involved in the inception of the revised concept design for the proposed MBT Facility. The proposed MBT Facility will be sited on an area of approximately 30 ha, within the Project Approval boundary, of the Eco Project Site.

The waste received at the Eco Project Site for processing in the MBT Facility shall be sourced from the Sydney Metropolitan Area (SMA), which shall be brought to the Clyde Transfer Terminal (CTT), located in the geographic centre of Sydney. As part of the expansion to the Eco Project and increased waste receipt capability of the Bioreactor, Veolia is proposing to build an additional waste transfer station and associated rail infrastructure at an existing industrial site in Banksmeadow (eastern Sydney). The proposed Banksmeadow Transfer Terminal (BTT) shall operate similarly to the CTT, with waste destined for both the Bioreactor and the proposed MBT Facility.

Waste collected from the SMA and brought to the CTT (and the BTT in the future) is containerised into shipping containers for transport via rail to the Crisps Creek Intermodal Facility (IMF) located in the township of Tarago, NSW. The containers are unloaded and transferred via road on semi-trailers to the Eco Project Site, some 11 km away.

The compost produced will be used to rehabilitate the areas of the Eco Project Site degraded by former mining activities. It is also envisaged by Veolia that the compost product will confer agricultural benefits to the surrounding farms operated by Veolia, forestry and broad acre land.

Any non-compostable residuals and recyclable materials will be removed during the MBT process and deposited in the adjacent Bioreactor for further energy generation or taken offsite for reuse respectively.

The MBT process concept design was developed by Veolia's engineering division Technical Scientific and Sustainable Development Department (TSSDD) in France and has been successfully implemented overseas. The treatment process involves a number of stages including separation, fermentation and storage, utilising specialist equipment sourced locally and from overseas.

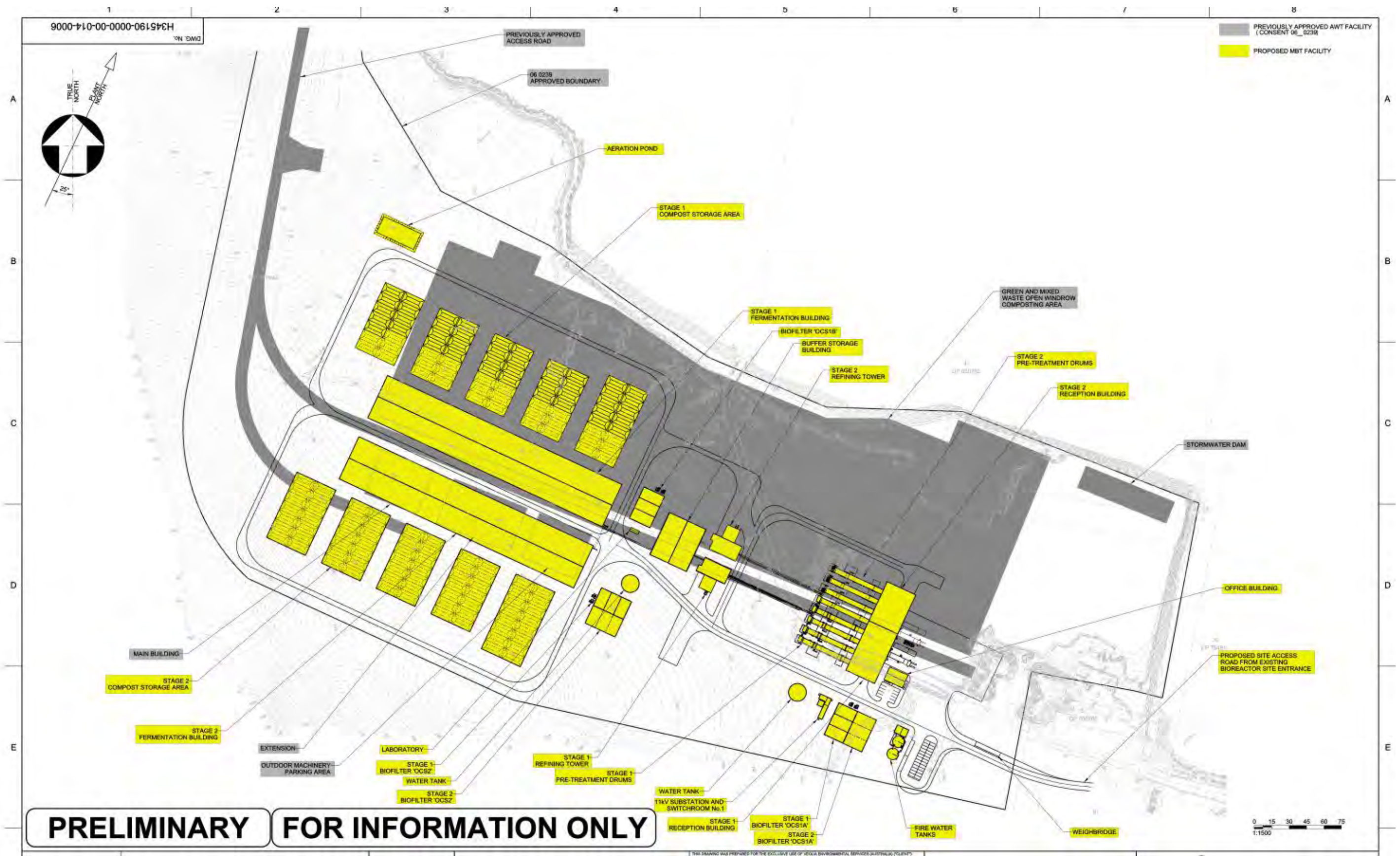
Development of the MBT Facility has been proposed as a multi-staged approach; initially processing 120,000 tonnes per annum of mixed waste and up to a maximum approved 240,000 tonnes per annum. On top of the accepted mixed waste, 40,000 tonnes per annum of green waste will also be accepted and received, as per the original project approval.

The MBT Facility processes will comprise:

- Receipt of mixed waste;
- Pre-treatment including biological refining and mechanical separation;
- Recovery of recyclable material; and
- Fermentation of organic material into compost;

The proposed layout of the MBT Facility is presented in **Figure 1**, along with the design of the approved AWT.

Figure 1 Previously Approved AWT and Proposed MBT



1.4 Assessment objectives

The purpose of this report is to undertake a comprehensive AQIA that addresses odour and particulate matter impacts during the construction and operation of the MBT Facility. It is noted that the facility is to be capable of processing 120,000 tonnes per annum of waste (Stage 1) with the ability to expand the capacity to 240,000 tonnes per annum (Stage 2) in the future, with an additional 40,000 tonnes per annum of green waste in all stages of operation. The Stage 2 operations have been assessed within this report given that the impacts will be in excess of those for Stage 1 operations.

1.5 Description of Site Operations

1.5.1 Crisps Creek Intermodal Facility

The IMF is located approximately 11 km to the southeast of the Eco Project Site. Trucks delivering waste are driven from the IMF along sealed local roads, before arriving at the Eco Project site. The main haul road on site with the majority of the secondary roads unsealed. A water cart is used to control dust and protect the unsealed road surfaces.

Transport of waste to the IMF and subsequently to the Bioreactor occurs in sealed containers. This results in negligible odour emissions resulting from operations occurring at the IMF and during transport to the Bioreactor.

In the case of dust, roads at the IMF are all sealed and therefore, assuming all roads are free of material, emissions of particulate will be limited to brake and tyre wear and diesel particulate matter contained in vehicle exhaust emissions. It is considered that emissions of particulate from these sources will be negligible when compared to emissions from surrounding sources such as agricultural areas, or vehicles using the main road itself.

It is not considered that emissions of odour or dust from the IMF would form a material consideration in determining the impacts of the proposed MBT Facility, and that a quantitative assessment of odour or dust from the IMF would not provide any meaningful information and is therefore not warranted. Given the above, the impacts of odour or dust from the IMF have not been considered further within this study.

1.5.2 Bioreactor Landfill

Waste disposed in the Bioreactor degrades to produce landfill gas, which is collected and transferred to the onsite generators at the Power Station, where methane is extracted and combusted to produce power (refer to **Section 7.2** for further information on the Power Station). Waste is disposed in the Bioreactor (refer **Figure 2**) with the daily tipping face currently occupying an area of approximately 0.6 ha.

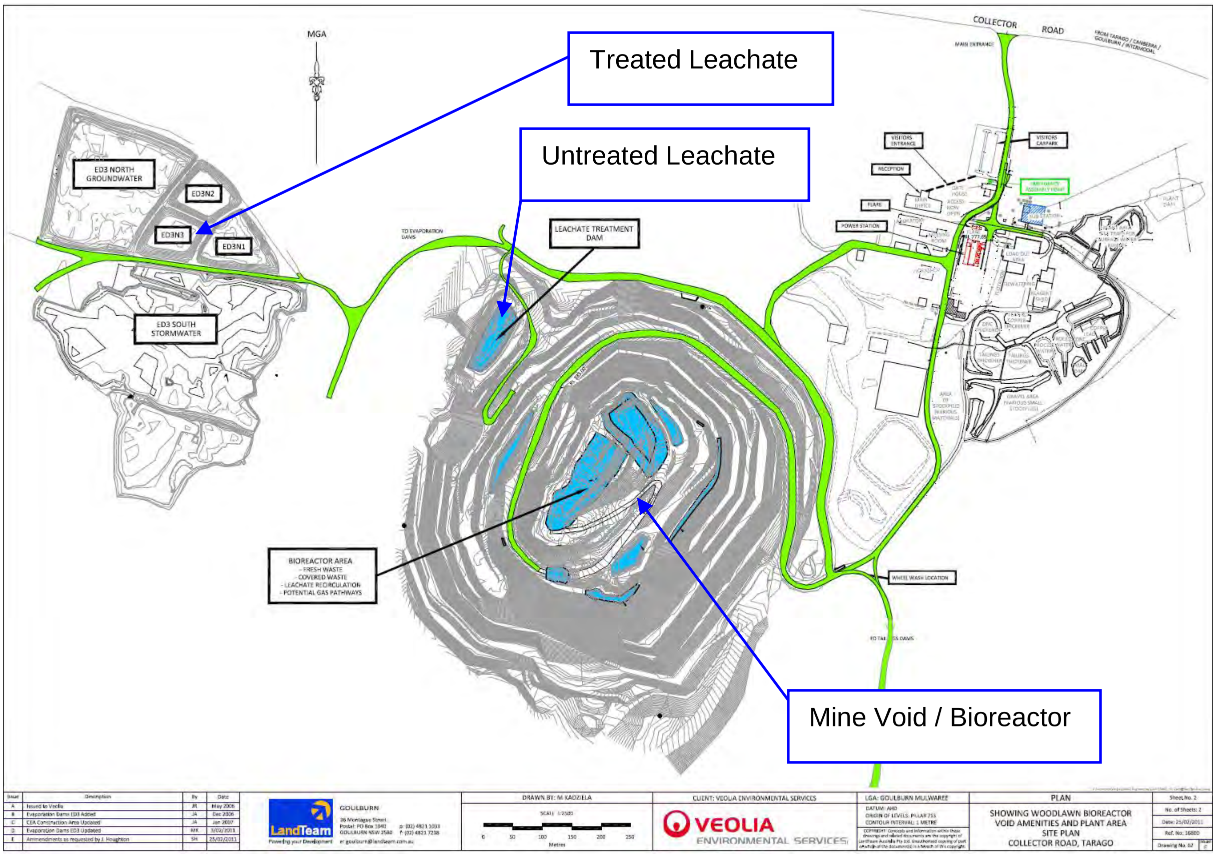
Leachate produced during the waste degradation process is recirculated within the waste to further encourage biological activity and optimise Bioreactor performance. Leachate is a source of odour and has been considered within the quantitative modelling assessment. As part of the Bioreactor operation, excess volume of leachate is treated as required and stored outside the void in the onsite Evaporation Dams for evaporation (refer **Table 1** and **Figure 2**).

Table 1 Description of Liquid Storage

Pond/Dam	Contents	Area (ha)	Location
Leachate Dam	Untreated Leachate	0.32	Immediate East of Main Void
ED3N-1	Treated Leachate	0.8	Refer **Figure 2**
ED3N-2 & 3	Treated Leachate	1.4	

As part of the Eco Project Site operations, Veolia is implementing operational solutions regarding air and water quality management to reduce potential odour impacts from these sources including reducing the amount of stored leachate, increasing landfill gas collection efficiency, improving leachate treatment and storage processes.

Figure 2 Layout of Woodlawn Bioreactor and Liquid Storage / Management System



Source: Veolia Woodlawn, 2011

1.5.3 Mechanical Biological Treatment (MBT) Facility

Since approval of the Development, Veolia has undertaken detailed concept design and further investigation of technology alternatives suitable for composting. The proposed MBT Facility incorporates the following infrastructure:

- Access road from main Eco Project Site entrance;
- Reception building;

- Pre-treatment – Refining drums;
- Pre-treatment - Refining towers;
- Fermentation building; and,
- Compost storage area.

The MBT Facility would produce:

- Compost: to be used to rehabilitate the degraded areas of the former Woodlawn mine, as well as other areas of the Eco Project Site, as required;
- Recyclable materials: to be transported offsite; and,
- Residual waste: to be transported to the Bioreactor for disposal.

Where the majority of the currently approved Development is an external process, the MBT Facility is proposed to be enclosed, with the exception of the compost storage area. Odorous air is proposed to be treated by three biofilters with all buildings under negative pressure to avoid fugitive emissions of odour. This is considered to represent best practice as required within the NSW EPA Environmental Guidelines (Composting and Related Organics) (EPA, 2003).

Development of the MBT Facility is proposed in stages, an initial stage designed to process 120,000 tonnes of mixed waste each year (Stage 1) and a future stage designed to process 240,000 tonnes of mixed waste each year (Stage 2). Both design stages incorporate the ability to incorporate an additional 40,000 tonnes of green waste each year into the fermentation stage of the MBT Facility.

The proposed layout of the MBT Facility is presented in **Figure 1**, overlaying the currently approved Development.

1.5.4 Hours of Operation

The proposed (and currently approved) hours of operation of the MBT Facility are provided in **Table 2**.

Table 2 Proposed MBT Facility Operating Hours

Activity	Day	Proposed Hours
Construction	Monday - Friday	7:00 am to 6:00 pm
	Saturday	7:00 am to 1:00 pm
	Sunday and Public Holidays	Nil
Waste Receipt	Monday - Saturday	6:00 am to 10:00 pm
Indoor Operations	Monday - Saturday	6:00 am to 10:00 pm
Outdoor Operations and Product Dispatch	Monday - Saturday	6:00 am to 10:00 pm
Emergency	Monday to Sunday	Anytime

1.5.5 Waste and Odour Management Strategies

A range of waste management and odour control measures have been trialled since the commencement of operations at the Eco Project site. These measures have been initiated based on understanding the odour generating activities or as a response to community complaints.

The history of odour management at the Bioreactor is complex. Veolia has been made aware that odour has been detected from time to time by residents along Taylors Creek Road and within Tarago Village. This feedback has been used in assessing the performance of site operations and waste management measures. Details of the history of odour issues can be found within the AQIA for the Woodlawn Expansion Project (SLR, 2011).

Veolia will continue to work with the local community to further improve waste management measures at the facility and relating operational updates as a function of the Woodlawn Community Liaison Committee. The community are invaluable in providing feedback to the operational staff at the Eco Project Site.

2 ASSESSMENT METHODOLOGY

2.1.1 Document review

A review of background information and data supplied by Veolia was performed. The review sought to understand the nature of the proposed works, and the outcomes of any previously completed assessments. The review of previously completed assessments was also undertaken to allow a comparison of the findings of this assessment with previous assessments. Documents reviewed included:

- *Woodlawn MBT Facility Concept Design Report* (July 2013), prepared by Mott MacDonald
    - Information on site layout and design extracted
- *Environmental Assessment,* 'Woodlawn Bioreactor Air Quality Impact Assessment Woodlawn Expansion Project' (2010), prepared by SLR Consulting Australia Pty Ltd
    - Information on previous assessment findings, and dispersion model set-ups extracted
- *Project Approval 06_0239*, signed by the Minister of Planning
- *Woodlawn MBT, FEL2 Load List* (2013), prepared by Hatch
    - Equipment information used in dispersion modelling assessment extracted
- Various WMBT Site Plans and Drawings
- *Woodlawn Community Brochure* VES
    - General information on Project consultation with community obtained
- *Environmental Assessment, Woodlawn Alternative Waste Technology Project* (2006), prepared by VES and Umwelt
    - General information on the previously approved AWT obtained
- *Woodlawn Bioreactor Expansion Project, Independent Odour Audit* (November 2013), prepared by The Odour Unit
    - Updated odour emission rates for all existing sources on site extracted
- *Woodlawn MBT Facility, Odour Control System, Preliminary Concept Design V2* (July 2013), prepared by The Odour Unit
    - Information on biofilter and fugitive emission rates for use in dispersion modelling extracted

2.1.2 Assessment of Impacts

The New South Wales Environmental Protection Authority (NSW EPA) "*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*" (EPA, 2005) (the Approved Methods) outline the requirements for conducting an AQIA (and the Sections of this report where the requirements are met), as follows:

- Description of activities carried out on site including location, a detailed discussion of all unit operations carried out on the site and a description of all aspects of the air emission control system (**Section 1**).
- Site Plan including a description of local topographic features and sensitive receptor locations (**Section 3**).
- Establishment of air quality assessment criteria (**Section 4**).
- Background air quality data used including a detailed discussion of the methodology used to calculate the background concentrations for each pollutant (**Section 5**).

- Meteorological data including a detailed discussion of the prevailing dispersion meteorology, wind roses, stability class and mixing height and demonstration that the site representative data adequately describes the expected meteorological patterns (**Section 6**).
- Emission inventory including detailed discussion of methodology used and detailed calculation of pollutant emission rates for each source (**Section 7**).
- Dispersion modelling including a detailed discussion of air quality impacts for all relevant pollutants based on predicted ground level concentrations at all sensitive receivers (**Section 8**).

3 STUDY AREA

3.1 Sensitive Receptors

The nearest potentially affected receptors to the proposed MBT Facility are summarised in **Table 3**.

Table 3 Potentially Affected Receptors

Property ID	Property Name	Distance to Project Site (m)	Easting (m)	Northing (m)	Elevation (m AHD)
1	"Woodlawn Farm"	1,600	734,518	6,118,363	796
2	"Cowley Hills"	2,000	736,673	6,117,689	794
3	"Pylara"	4,000	737,493	6,114,373	742
4	"Torokina"	3,700	731,287	6,114,653	720
5	Tarago Village	5,800	741,148	6,115,437	699
6	TriAusMin Administration Office	3,000	735,535	6,116,967	769

The properties of "Woodlawn", "Cowley Hills" and "Pylara" are all Veolia-owned residences and as such, could be considered to be 'Project-related' residences. However, in the interests of minimising odour and dust impacts on the surrounding area, the odour and dust impact from proposed construction and operation of the MBT Facility have been assessed at *all* nearest surrounding residences, project-related or not.

TriAusMin has recently gained approval to retreat tailings material within existing tailings dams at the Woodlawn site, referred to as the Woodlawn Retreatment Project (WRP). In addition, TriAusMin has gained approval to extract further material using underground mining techniques, termed the Woodlawn Underground Project (WUP). The operations are collectively referred to as the TriAusMin Woodlawn Project. Potential air quality impacts due to these operations on surrounding receptors were assessed in an AQIA prepared by PAEHolmes in February 2012 (PAEHolmes, 2012). Further information on the findings of the TriAusMin WRP/WUP Project is provided in **Section 5**.

Impacts of particulate matter have not been considered at the TriAusMin administration office given that the receptor is related to industrial operations. Workers at the TriAusMin operations will work for an 8 hour day and therefore the ambient air quality criteria averaging periods of 24 hours and above are not relevant in this context. In terms of odour impacts, the shorter (1-second nose response time) averaging periods are relevant in the context of an 8 hour working day and these impacts have therefore been assessed at the TriAusMin administration office.

Due to the significant distances between the MBT Facility and the identified sensitive receptors numbered 1 to 6, results for the receptors noted in **Table 3** can be considered to represent the odour and dust impacts across a wider area than at the individual receptor points themselves (e.g. at neighbouring properties within 100 m to 200 m). Examination of the individual pollutant contour plots provided in **Section 8** can be examined to obtain more refined information on the spatial distributions of predicted pollutant impacts if required.

3.2 Site Topography

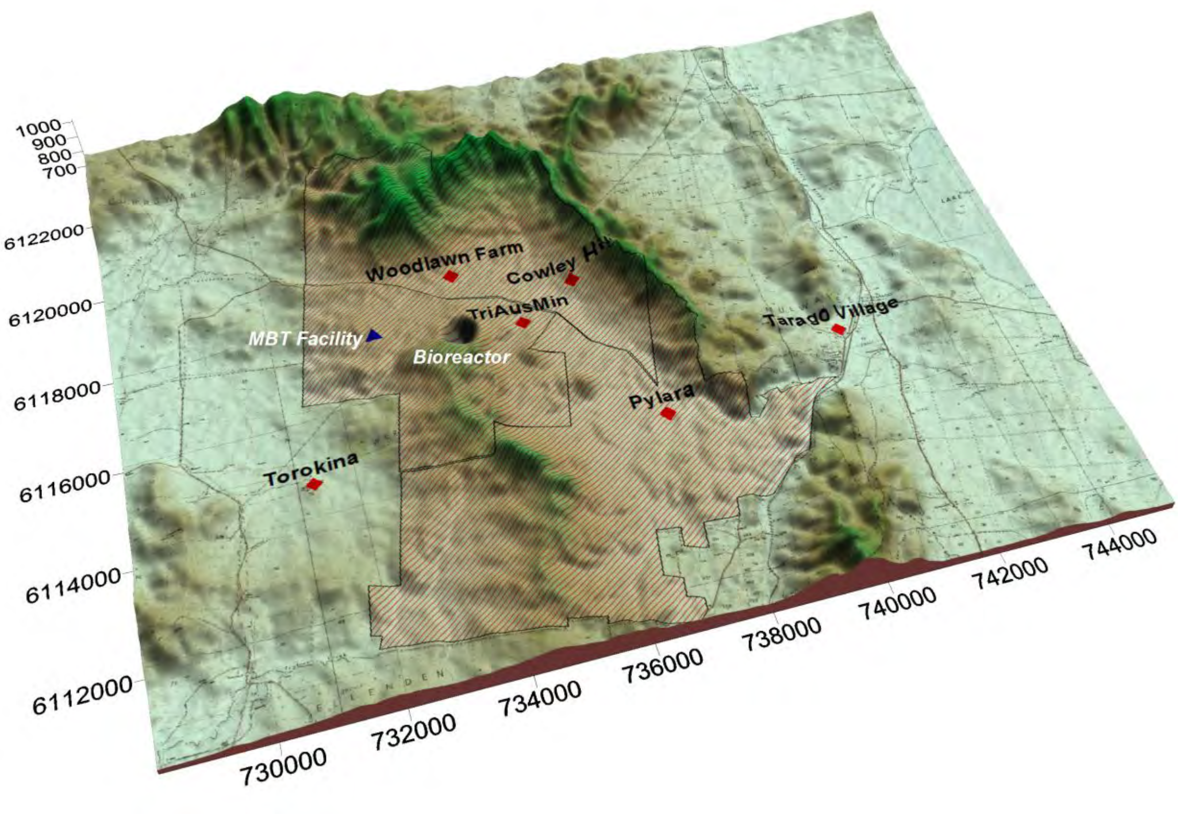
The MBT Facility and surrounding residences are located in undulating terrain. To the northeast of the site the topography rises to a high point of 1000 metres (m) AHD falling away to a height of 690 m AHD to the southwest. To the southeast of the proposed MBT Facility and directly south of the mine void, a topographic ridge extends to a height of 880 m AHD. Beyond this, the land falls away to a height of 740 m AHD.

The residences to the east of the proposed MBT Facility ("Woodlawn Farm" and "Cowley Hills") are on a similar elevation to the proposed MBT Facility with no significant topographical features in-between. To the northwest and west of the proposed MBT Facility, the land falls away to a height of 700 m AHD.

Local atmospheric dispersion could be influenced by night-time katabatic drainage flows from elevated terrain or channelling effects in valleys or gullies around the site.

A three dimensional representation of the area is given in **Figure 3**, with a vertical exaggeration of four applied to emphasise terrain features.

Figure 3 3-Dimensional Regional Topography Surrounding MBT Facility Site (Vertical Exaggeration 4)



NOTE: Topography shown with vertical exaggeration of 4. Eco Project Site Boundary indicated by hatched area.

4 IMPACT ASSESSMENT CRITERIA

4.1 Odour

Impacts from odorous air contaminants are often nuisance-related rather than health-related. Odour performance goals guide decisions on odour management, but are generally not intended to achieve "no odour".

The detectability of an odour is a sensory property that refers to the theoretical minimum concentration that produces an olfactory response or sensation. This point is called the *odour threshold* and defines one odour unit per cubic metre (OU/m^3). An odour goal of less than 1 OU/m^3 would theoretically result in no odour impact being experienced. The terms OU/m^3 references odour concentration. Although the NSW EPA goals are referenced as an odour concentration, the nomenclature is for the /m^3 to be dropped from the odour goal. Hence, a criterion of 2 OU/m^3 is equivalent to 2 OU.

In practice, the character of a particular odour can only be judged by the receiver's reaction to it, and preferably only compared to another odour under similar social and regional conditions. Based on the literature available, the level at which an odour is perceived to be a nuisance can range from 2 OU/m^3 to 10 OU/m^3 depending on a combination of the following factors:

- *Odour Quality*: whether an odour results from a pure compound or from a mixture of compounds. Pure compounds tend to have a higher threshold (lower offensiveness) than a mixture of compounds.
- *Population sensitivity:* any given population contains individuals with a range of sensitivities to odour. The larger a population, the greater the number of sensitive individuals it may contain.
- *Background level:* whether a given odour source, because of its location, is likely to contribute to a cumulative odour impact. In areas with more closely-located sources it may be necessary to apply a lower threshold to prevent offensive odour.
- *Public expectation:* whether a given community is tolerant of a particular type of odour and does not find it offensive, even at relatively high concentrations. For example, background agricultural odours may not be considered offensive until a higher threshold is reached than for odours from a landfill facility.
- *Source characteristics:* whether the odour is emitted from a stack (point source) or from an area (diffuse source). Generally, the components of point source emissions can be identified and treated more easily than diffuse sources. Emissions from point sources can be more easily controlled using control equipment. Point sources tend to be located in urban areas, while diffuse sources are more often located in rural locations.
- *Health Effects:* whether a particular odour is likely to be associated with adverse health effects. In general, odours from agricultural activities are less likely to present a health risk than emissions from industrial facilities.

Experience gained through odour assessments from proposed and existing facilities in NSW indicates that an odour performance goal of 7 OU/m^3 is likely to represent the level below which "offensive" odours should not occur (for an individual with a 'standard sensitivity' to odours). The NSW EPA recommends within the Odour Framework that, as design goal, no individual be exposed to ambient odour levels of greater than 7 OU/m^3. This is expressed as the 99th percentile value, as a nose response time average (approximately one second).

Odour performance goals need to be designed to take into account the range in sensitivities to odours within the community, and provide additional protection for individuals with a heightened response to odours, using a statistical approach which depends on the size of the affected population. As the affected population size increases, the number of sensitive individuals is also likely to increase, which suggests that more stringent goals are necessary in these situations. In addition, the potential for cumulative odour impacts in relatively sparsely populated areas can be more easily defined and assessed than in highly populated urban areas. It is often not possible or practical to determine and assess the cumulative odour impacts of all odour sources that may impact on a receptor in an urban environment. Therefore, the proposed odour performance goals allow for population density, cumulative impacts, and anticipated odour levels during adverse meteorological conditions and community expectations of amenity.

Where a number of the factors above simultaneously contribute to making an odour "offensive", an odour goal of 2 OU/m^3 at the nearest residence (existing or any likely future residences) is appropriate, which generally occurs for affected populations equal or above 2000 people.

The equation used by the NSW EPA to determine the appropriate impact assessment criteria for complex mixtures of odorous air pollutants, as specified in the Approved Methods, is expressed as follows:

$$\text{Impact assessment criterion (OU)} = (\log_{10}(\text{population})-4.5)/-0.6$$

A summary of the impact assessment criteria given for various population densities, as drawn from the Approved Methods, is given in **Table 4**

Table 4 NSW EPA Impact Assessment Criteria for Complex Mixtures of Odorous Air Pollutants (nose-response-time average, 99th percentile)

Population of Affected Community	Impact Assessment Criteria for Complex Mixtures of Odours (OU)
Urban area ($\geq$ 2000)	2.0
~300	3.0
~125	4.0
~30	5.0
~10	6.0
Single residence ($\leq$ 2)	7.0

Source: The Approved Methods (DEC, 2005)

The Approved Methods states that the impact assessment criteria for complex mixtures of odorous air pollutants must be applied at the nearest existing or likely future off-site sensitive receptor(s).

The incremental impact (predicted impact due to the pollutant source alone) must be reported in units consistent with the impact assessment criteria (OU), as peak concentrations (i.e. approximately 1 second average) and as the:

- 100^{th} percentile of dispersion model predictions for Level 1 impact assessments, or
- 99^{th} percentile of dispersion model predictions for Level 2 impact assessments.

Given the low number of sensitive residential receptor locations in the immediate vicinity of the Woodlawn site (**Table 3**) it is expected that an odour impact assessment criteria of 6 OU (expressed as the 99th percentile for a nose response average, i.e. 1-second average) would appropriately assess the odour performance of the proposed MBT Facility.

In addition to the criteria discussed above, Condition 22 of Project Approval 06_0239 requires that "*The Proponent shall not cause or permit the emission of offensive odours at any residence on privately owned land*". For the purposes of this Condition, offensive odour is as defined under Section 129 of the Protection of the Environment Operations (POEO) Act.

4.2 Particulate Matter

The term *"particulate matter"* refers to a category of airborne particles typically less than 50 microns (μm) in diameter and ranging down to 0.1 μm in size.

Total particulate matter, often called *total suspended particulate* (TSP) comprises the sum of the particle size fractions.

Particles less than 10 microns (μm) in diameter are referred to in this report as PM_{10}.

4.2.1 Particulate Matter as PM_{10}

PM_{10} is considered to be an important pollutant in terms of potential impact to human health due to its ability to penetrate into the respiratory system.

The NSW EPA PM_{10} assessment goals as expressed in the Approved Methods are:

- a 24-hour maximum of 50 micrograms per cubic metre (μg/m^3) (Project and other sources); and,
- an annual average of 30 μg/m^3 (Project and other sources).

The 24-hour PM_{10} reporting standard of 50 μg/m^3 is numerically identical to the "*Ambient Air Quality National Environment Protection Measure"* (NEPM) (National Environmental Protection Council, 1998) reporting standard except that the NEPM reporting standard allows for five exceedances per year. The NSW EPA standard is applied within this assessment.

In addition to the criteria discussed above, Condition 23 of Project Approval 06_0239 contains conditions relevant to PM_{10} which are numerically equivalent to those outlined above. For the purposes of PA 06_0239, the criteria are not to be exceeded at any residence on, or on more than 25 percent of any privately owned land.

4.2.2 Particulate Matter as TSP

The annual goal for particulate matter (as TSP) is given as 90 μg/m^3 (relating to a cumulative measure of Project and other sources), as recommended by the National Health and Medical Research Council (NHMRC) at their 92nd session in October 1981. This goal has also been adopted in the Approved Methods.

In addition to the NHMRC TSP criterion, Condition 23 of Project Approval 06_0239 contains conditions relevant to the long term TSP concentration which is numerically equivalent to that outlined above. For the purposes of PA 06_0239, the criteria are not to be exceeded at any residence on, or on more than 25 percent of any privately owned land.

4.2.3 Particulate Matter as Nuisance Dust

The preceding sections are concerned with the health impacts of particulate matter. Nuisance impacts need also to be considered, mainly in relation to dust. In NSW, accepted practice regarding the nuisance impact of dust is that dust-related nuisance can be expected to impact on residential areas when annual average dust deposition rate exceeds 4 g/m^2/month.

Table 5 presents the EPA impact assessment goals for dust deposition, showing the allowable increase in dust deposition rate over the ambient (background) level which would be acceptable so that dust nuisance could be avoided.

Table 5 EPA Goals for Allowable Dust Deposition

Averaging Period	Maximum Increase in Deposited Dust Level	Maximum Total Deposited Dust Level
Annual	2g/m^2/month	4g/m^2/month

Source: Approved Methods (EPA 2005).

In addition to the EPA dust deposition goal, Condition 23 of Project Approval 06_0239 contains conditions relevant to dust deposition which is numerically equivalent to that outlined above. For the purposes of PA 06_0239, the criteria are not to be exceeded at any residence on, or on more than 25 percent of any privately owned land.

5 EXISTING AIR QUALITY ENVIRONMENT

5.1 Background Odour Environment

The Bioreactor is the only source of similar odorous emissions in the local region. It is not considered likely that cumulative impacts between emissions from this and any other site in the surrounding region would occur.

Only odour generating activities occurring as part of the waste processing and management process have been assessed within this report.

5.2 Background Particulate Matter Environment

5.2.1 Background Dust Deposition

Background dust deposition monitoring has been conducted at the Eco Project Site at a number of locations since 2002 (i.e. before the Bioreactor was operational):

- DG18 "Chinnery", located to the east of the Eco Project Site on Bungendore Road;
- DG22 "East Void", located to the immediate east of the Bioreactor;
- DG24 "West Void", located to the northwest of the Bioreactor; and,
- DG28 "Pylara", located on the Pylara residence (refer **Figure 3**).

To determine the likely background dust levels under current operations of the Eco Project Site, dust deposition monitoring data from January 2007 to June 2013 is used in this assessment.

Background dust deposition monitoring conducted at three representative locations between January 2007 and June 2013 is presented in **Table 6**.

Dust deposition gauge DG18 "Chinnery" was decommissioned in March 2007 on NSW EPA advice due to consistently low readings. Annual average total insoluble solids at this location were of the order of 2.2 g/m^2/month between August 2004 and February 2007.

Table 6 Background Dust Deposition, Eco Project Site

Date	Annual Average Insoluble Matter (g/m^2/month)		
	DG22 "*East Void*"	**DG24 "*West Void*"**	**DG28 "*Pylara*"**
2007	2.0	1.2	1.3
2008	3.2	2.4	2.2
2009	5.1	5.1	4.5
2010	2.1	2.5	4.1
2011	1.6	1.7	1.4
2012	5.2	1.8	0.9
2013 (to June 2013)	1.7	1.8	0.7
Average	***3.0***	***2.4***	***2.1***

A conservatively high estimate of the background dust deposition rate (insoluble solids) in the vicinity of the Eco Project Site for assessment purposes is assumed to be of the order of 3.0 g/m^2/month expressed as an annual average. This is the average of all the annual average deposition rates obtained from the three monitoring sites between 2007 and June 2013.

5.2.2 Background Particulate Matter

Background monitoring of PM_{10} has been conducted on a regular basis at the Pylara property (Pylara) site since August 2004. Sampling was conducted using a High Volume Air Sampler (HVAS) in accordance with the NSW EPA's "*Approved methods for the sampling and analysis of air pollutants in New South Wales*" 2005, specifically, AM-18 (AS 3580.9.6-1990 "*Particulate Matter* - PM_{10} - *high volume sampler with size-selective inlet*"). Sampling was conducted to coincide with the NSW EPA standard one-day-in-six run cycle.

The results of the PM_{10} monitoring conducted at "*Pylara*" from 16 August 2004 to 18 November 2007 are given in **Table 7**. Data has only been collected up to 18 November 2007 as the requirement for monitoring PM_{10} and TSP at this location was removed from the Environment Protection Licence following a number of consistently low readings.

Table 7 PM_{10} Monitoring Results – "Pylara"

Date	PM_{10} ($\mu g/m^3$)	Date	PM_{10} ($\mu g/m^3$)	Date	PM_{10} ($\mu g/m^3$)
18/11/07	<1	16/07/05	<1	29/01/05	2
03/11/07	<1	10/07/05	<1	23/01/05	<1
26/10/07	<1	04/07/05	<1	17/01/05	11
18/10/07	<1	28/06/05	<1	11/01/05	4
12/10/07	<1	22/06/05	<1	05/01/05	5
02/10/07	<1	16/06/05	<1	30/12/04	1
24/09/07	<1	10/06/05	13	24/12/04	5
16/09/07	<1	04/06/05	23	18/12/04	7
13/02/06	<1	29/05/05	3	12/12/04	<1
07/02/06	<1	23/05/05	4	06/12/04	11
01/02/06	4	17/05/05	<1	01/12/04	39
23/01/06	4	11/05/05	16	25/11/04	<1
17/01/06	11	05/05/05	11	19/11/04	1
11/01/05	<1	29/04/05	<1	13/11/04	1
03/01/06	1	23/04/05	25	07/11/04	<1
19/12/05	1	17/04/05	2	01/11/04	5
13/12/05	1	11/04/05	5	26/10/04	3
26/09/05	<1	05/04/05	<1	20/10/04	5
20/09/05	<1	30/03/05	No Results	14/10/04	12
14/09/05	<1	24/03/05	No Results	08/10/04	5
08/09/05	<1	24/03/05	No Results	02/10/04	<1
02/09/05	<1	18/03/05	No Results	27/09/04	36
27/08/05	<1	12/03/05	No Results	21/09/04	8
21/08/05	<1	06/03/05	No Results	15/09/04	13
15/08/05	3	28/02/05	5	09/09/04	19

Date	PM_{10} (µg/m³)	Date	PM_{10} (µg/m³)	Date	PM_{10} (µg/m³)
09/08/05	<1	22/02/05	<1	03/09/04	2
03/08/05	<1	16/02/05	7	28/08/04	10
28/07/05	<1	10/02/05	2	22/08/04	14
22/07/05	2	04/02/05	4	16/08/04	3
				Average	**9**

The above results indicate that PM_{10} monitoring conducted at the "*Pylara*" site yielded 24-hour average PM_{10} concentrations below the NSW EPA goal of 50 µg/m³ expressed as a 24-hour average. The maximum 24-hour average was 39 µg/m³ recorded on 1 December 2004. The results provide an indication of the background concentration of PM_{10} in the area surrounding the Eco Project Site.

Examination of the NEPM Ambient Air Quality Report for NSW and the ACT for 2004 identifies that high PM_{10} and $PM_{2.5}$ concentrations were recorded at Monash (ACT) and within Sydney between 30 November 2004 and 1 December 2004. The NEPM report for the ACT identifies that ongoing drought conditions within this month resulted in exceedances of the NEPM Standard for PM_{10}. This is supported by the NSW NEPM report which identifies exceedances at Wagga Wagga on 30 November 2004 which were also attributed to "the continuing drought conditions experienced across NSW". Exceedances in the Sydney area were partially attributed to bushfire conditions.

It is clear that the unusually high PM_{10} concentration readings at the 'Pylara' monitoring station on 1 December 2004 were due to regional particulate events and driven by the continuing drought conditions. Using this PM_{10} concentration as a background concentration for assessment purposes would be highly conservative and does not reflect the usual distribution of particulate concentrations over the three year period of monitoring. Further analysis of the collected PM_{10} data shows the following statistics (assuming all <1 µg/m³ readings are at the limit of detection of 1 µg/m³):

- Mean: 9 µg/m³
- Standard deviation: ±7.4 µg/m³
- 75th Percentile: 5 µg/m³
- 90th Percentile: 13 µg/m³
- 99th Percentile 36.6 µg/m³
- Maximum: 39 µg/m³

Comparison of the above statistics indicates that the recorded data predominantly shows low recorded 24-hour PM_{10} concentrations, e.g. the 90th percentile of the recorded data is 13 µg/m³. This demonstrates that values in excess of 13 µg/m³ are recorded on only 10% of the duration of the monitoring exercise.

Further statistical analysis of the collated 24-hour PM_{10} monitoring data reports a skew value of +2.8 and a kurtosis of +8.8.

Skew is a statistical function that reports how evenly a population is distributed around the mean of that population. A positive skew represents a population that "tails off" towards the upper extents, and a negative skew represents a distribution tailing off towards the lower extents. Skew is dimensionless. The reported skew value of +2.8 value of indicates that the recorded data is typically low, but dominated by a small number of higher readings (i.e. representative of PM_{10} episodes, with much lower "standard" conditions).

Similarly, kurtosis is a statistical function that describes how flat or peaked a population is compared to a normal distribution. A positive value represents a distribution that is more peaked, and a negative value represents a distribution that is flatter than a normal distribution. The reported kurtosis value of +8.8 describes a distribution dominated by higher readings (i.e. representative of PM_{10} episodes).

These statistical functions support the assumption that the site typically experiences low 24-hour PM_{10} concentrations, with sporadic higher readings, which are typical of short-duration PM_{10} episodes.

Section 5.2 of the Approved Methods states that for Level 2 assessments, ambient monitoring data for at least one year of continuous measurements should be used in dispersion modelling.

However, in the absence of continuous hourly PM_{10} readings for a full year, the 99th percentile PM_{10} concentration recorded at the Eco Project Site between 16 August 2004 and November 2007 (36.6 µg/m^3) has been taken as the background concentration of PM_{10} at Woodlawn.

This is considered highly conservative given the average PM_{10} concentration at the *"Pylara"* monitoring site is of the order of 9 µg/m^3 (excluding the most recent results at the site which indicated PM_{10} concentrations were below the laboratory limit of detection).

It is noted that the PM_{10} fraction is typically 50% of the total suspended particulate (TSP) concentration in the ambient air of regions where road traffic is not the dominant particulate source, such as rural environments (US EPA, 2001). In the absence of monitoring data for TSP, the annual average TSP concentration for the region may therefore be derived by multiplying the annual average PM_{10} concentration by a factor of two.

To predict a conservatively high background concentration of annual TSP, the annual average PM_{10} records at Woodlawn for the period August 2004 to September 2005 (9 µg/m^3) were multiplied by two to derive the annual average TSP concentration. This corresponds to an annual average background TSP concentration of 18 µg/m^3.

5.3 Background Air Quality Environment for Assessment Purposes

Based on the data and discussion in **Section 5.1** and **Section 5.2** the site specific background air quality levels adopted for the assessment of the Project are presented in **Table 8**.

Table 8 Background Air Quality Environment for Assessment Purposes

Air Quality Parameter	Averaging Period	Assumed Background Level
TSP	Annual	18 µg/m^3
PM_{10}	24-Hour	36.6 µg/m^3
	Annual	9 µg/m^3
Dust	Annual	3.0 g/m^2/month
Odour	Nose-Response Time (1s)	Negligible

5.4 Additional Particulate Sources

As previously discussed in **Section 3.1**, the TriAusMin WRP/WUP Project has recently gained approval to re-mine tailings material within existing tailings dams and to extract further material using underground mining techniques as part of the TriAusMin Woodlawn Project. The AQIA for the TriAusMin Woodlawn Project was prepared by PAEHolmes (2012). A summary of the findings of this AQIA are presented in **Table 9** for the receptors associated with the current Development only (refer **Section 3.1**).

Table 9 Predictions of Particulate Impacts due to the TriAusMin Woodlawn Project – Project Only

Receptor[1]	24-Hour PM_{10} ($\mu g/m^3$)	Annual Average PM_{10} ($\mu g/m^3$)	Annual Average TSP ($\mu g/m^3$)	Annual Average Dust Deposition (g/m^2/month)
6 - Torokina	0.9	0.1	0.3	<0.1
14 – Woodlawn Farm	9.1	0.7	1.8	<0.1
16 – Cowley Hills	6.0	0.9	2.4	0.2
17 – Pylara	1.4	0.2	0.4	<0.1
25- Tarago	ND[2]	ND	ND	ND

Note 1: Receptor Number from TriAusMin Woodlawn Project AQIA (PAEHolmes, 2012)
Note 2: ND = No data presented for this receptor within the AQIA

Maximum 24-hour PM_{10} impacts are predicted at Woodlawn Farm, with increments due to the TriAusMin Woodlawn Project predicted to be 9.1 $\mu g/m^3$. Annual average PM_{10} and TSP concentrations and dust deposition levels are predicted to be greatest at Cowley Hills (0.9 $\mu g/m^3$, 2.4 $\mu g/m^3$ and 0.19 g/m^2/month, respectively).

Impacts of the TriAusMin Woodlawn Projects were assessed in the AQIA (PAEHolmes, 2012) by adding the highest measured background concentrations to these model predictions.

Within this current assessment for the MBT Facility, information relating to the particulate emissions associated with operations forming the TriAusMin Woodlawn Project has been extracted from the AQIA (source locations and particulate emission rates). This information has then been included within the dispersion modelling exercise for the MBT Facility, such that impacts are predicted on a day to day basis, rather than by simply extracting the maximum predicted impacts and conservatively summing all, irrespective of the days on which the maximum impacts occurred.

Although less conservative, it is considered to more closely represent reality and is therefore considered to be a more appropriate level of assessment. Further details on the dispersion model set up are provided in **Section 7**.

6 CLIMATE AND DISPERSION METEOROLOGY

6.1 Local Meteorology

An assessment of wind conditions at the Woodlawn site has been undertaken using on-site weather data from 2005, 2008, 2011 and 2012. Wind speed and direction were recorded at two Wind Power prospecting weather stations during 2005, known as Woodlawn 13 Mast, at heights of 30 m and 45 m, and Veolia (formerly Collex) Mast, at heights of 40 m and 65 m. In addition, a Veolia operated weather station recorded wind speed and direction at 10 m at the Eco Project Site. This station changed location in 2008 and data for 14 February 2008 to 14 February 2009 (hereafter, '2008 data') and 2011 and 2012 has been obtained to compare to that from 2005.

A summary of the annual wind behaviour for 2005, 2008, 2011 and 2012 at each location is presented as wind roses in **Appendix A**. The wind roses display the general dominant easterly / westerly components in all years for which monitoring data has been examined.

Given that comparison of all collected meteorological data indicates that 2005 data is consistent with all years obtained (refer **Section 6.3**) and given that data from 2005 has been used to assess air quality impacts at the Eco Project Site over many years and Project Modifications, the ongoing use of this consistent dataset is justified within this current assessment. The advantages of using the 2005 data over other years are that meteorological observations were taken at a number of heights above ground (rather than at just 10 m) and additionally, the greater availability of meteorological observations at varying locations during 2005 allows greater confidence to be placed in any generated meteorological dataset to be used in dispersion modelling of odour and particulate.

A meteorological input file was generated for incorporation into the atmospheric dispersion model using 2005 site specific monitoring data.

6.2 Modelling Approach

Gaussian plume dispersion models such as Ausplume assume that meteorological conditions are uniform spatially over the entire modelling domain for any given hour. While this may be valid for some applications, in complex topographical situations illustrated in **Figure 3**, the meteorological conditions may be complex and be more accurately simulated using a wind field and puff model.

The Eco Project Site is situated amongst significant topography, particularly to the north, east and southeast, where separate ridgelines dominate the region. It can be assumed that this topography will influence regional meteorology, particularly the generation of night-time katabatic drainage flows into the valley and the channelling of larger scale synoptic flows by regional terrain.

This phenomenon is displayed in the CALMET wind field presented in **Figure 4**, where channelling and intensifying of regional winds can be viewed through the surrounding valley.

In view of the foregoing, the topography of the area has been considered in the atmospheric dispersion model.

The current assessment utilises the CALPUFF (Version 6.2) modelling system. The CALPUFF modelling system comprises of three main components: CALMET, CALPUFF and CALPOST and a large set of pre-processing programs designed to interface the model to standard routinely available meteorological and geophysical databases.

In the simplest terms, CALMET is a meteorological model that develops ***hourly*** wind and other meteorological fields on a three-dimensional gridded modelling domain. Associated two dimensional fields such as mixing height, surface characteristics, and dispersion properties are also included in the file produced by CALMET. The interpolated wind field is then modified within the model to account for the influences of topography, as well as differential heating and surface roughness associated with different land uses across the modelling domain. These modifications are applied to the winds at each grid point to develop a final wind field. The final hourly varying wind field thus reflects the influences of local topography and land uses.

An example of the spatially varying surface flows generated by the CALMET meteorological model is presented in **Figure 4**.

Figure 4 Example of Spatially Varying Surface Flows Generated by CALMET for the Eco Project Site

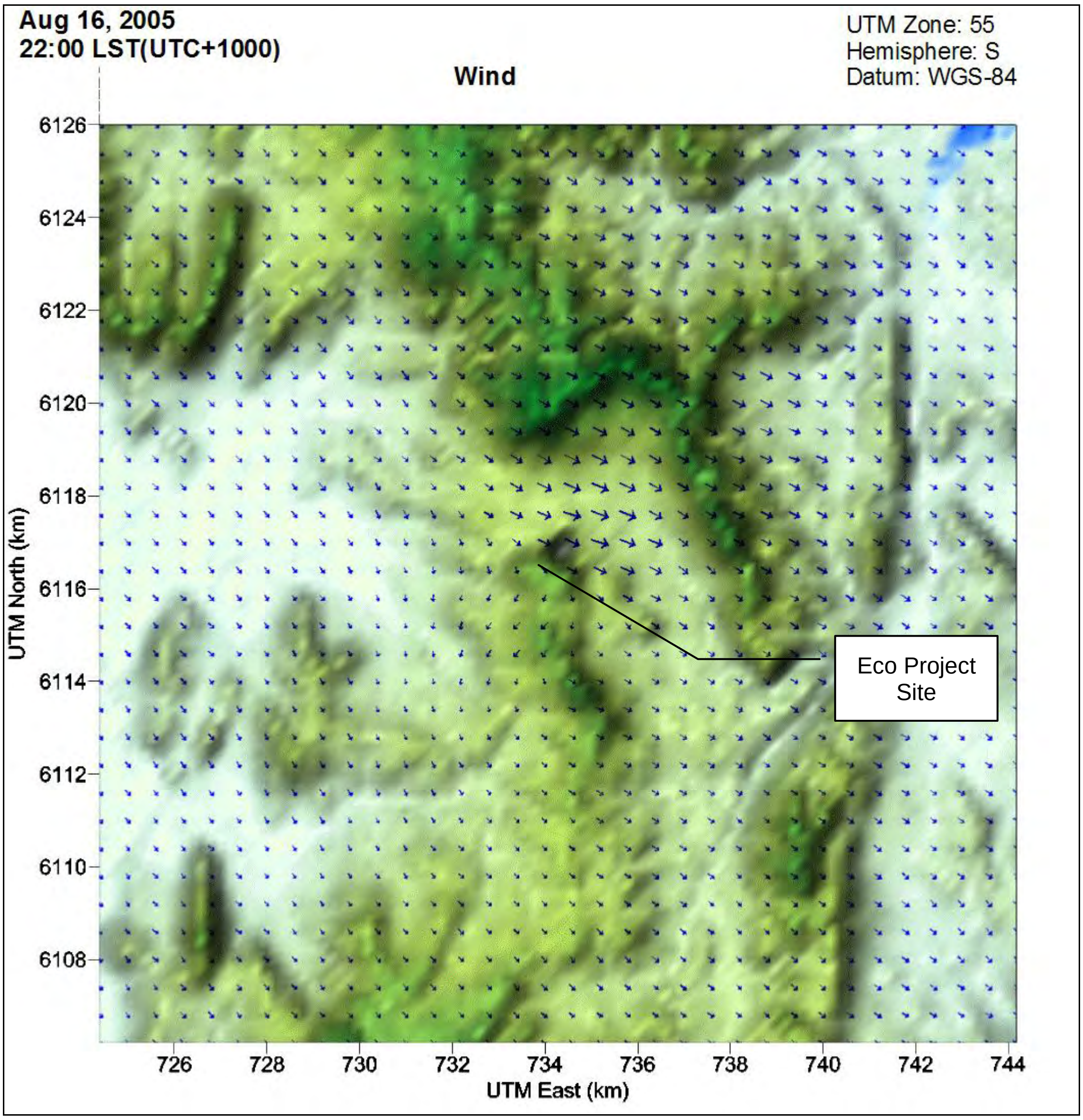


Figure 4 shows a wind field simulated by the CALMET model for one hour of stable night-time conditions during winter.

The CALPUFF model makes use of wind fields generated by the CALMET model, and is discussed further in **Section 6.3**.

The Air Pollution Model (TAPM) meteorological model Version 3 was used to generate upper air observations, which were subsequently used as input for the CALMET meteorological model.

TAPM software, developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) is a prognostic model which may be used to predict three-dimensional meteorological data and air pollution concentrations, with no local data inputs required.

The model predicts wind speed and direction, temperature, pressure, water vapour, cloud, rain water and turbulence. The program allows the user to generate synthetic observations by referencing databases (covering terrain, vegetation and soil type, sea surface temperature and synoptic scale meteorological analyses) which are subsequently used in the model input to generate site-specific hourly meteorological observations.

Additionally, the TAPM model may assimilate actual local wind observations so that they can optionally be included in a model solution. The wind speed and direction observations are used to realign the predicted solution towards the observation values. This function of accounting for actual meteorological observations within the region of interest is referred to as “data assimilation”.

Thus, direct measurements for 2005 of hourly average wind speed, wind direction and temperature, obtained at 10 m, 30 m, 40 m, 45 m and 65 m at the Eco Project Site weather stations, and TAPM generated upper air data have been used in creating a meteorological input file for modelling purposes.

The prevailing wind directions and average wind speeds for each Eco Project Site weather station are summarised in **Table 10**.

Table 10 Summary of Annual Wind Behaviour at Eco Project Site, 2005

	Woodlawn Bioreactor	Woodlawn 13 Mast		Collex Mast	
Observation Height	**10 m**	**30 m**	**45 m**	**40 m**	**65 m**
Frequency of Calms (%)	3.1	0.4	0.3	0.1	0.1
Average Wind Speed (m/s)	3.2	7.6	7.9	9.0	8.7
Dominant Wind Direction	WNW and W	WNW	WNW	WNW	WNW

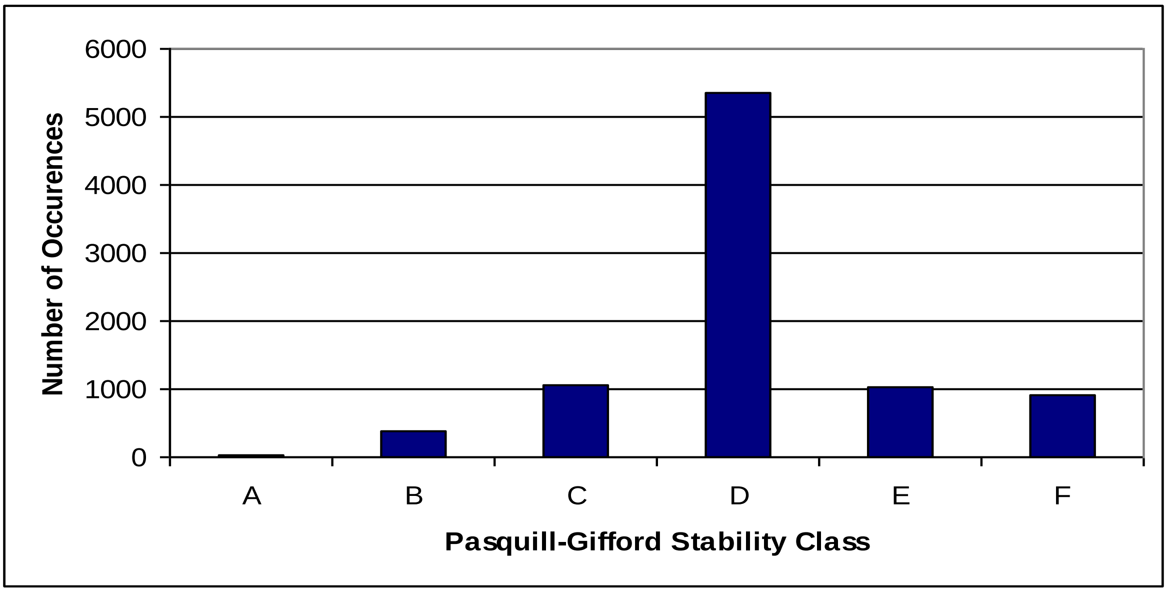
It is noted that typically the change in wind velocity with height (velocity profile) will be positive (i.e. wind speed increases with height). It is noted that the wind speeds recorded at the Veolia Mast show a marginally lower average wind speed at 65 m than at 40 m. This anomaly may be explained due to the influence of the adjacent complex terrain on the velocity profile.

Atmospheric stability refers to the tendency of the atmosphere to resist or enhance vertical motion. The Pasquill-Gifford-Turner assignment scheme identifies six Stability Classes, “A” to “F”, to categorise the degree of atmospheric stability. These classes indicate the characteristics of the prevailing meteorological conditions.

Stability Class "A" represents highly unstable conditions that are typically found during summer, categorised by strong winds and convective conditions. Conversely, Stability Class "F" relates to highly stable conditions, typically associated with night-time clear skies, light winds and the presence of a temperature inversion. Classes "B" through to "E" represent conditions intermediate to these extremes.

The frequency of occurrence of each Stability Class for the year 2005, as predicted by the CALMET model, is presented in **Figure 5**. The results indicate a high frequency of conditions typical to Stability Class "D" throughout the year at the Eco Project Site. This is indicative of neutral conditions, which will neither enhance nor impede atmospheric dispersion.

Figure 5 Annual Stability Class Distribution for the Eco Project Site.



Appendix B illustrates the seasonal variation in atmospheric stability class at the Eco Project Site. This data indicates that Stability Class "D" dominates in all seasons.

6.3 Meteorological Model Configuration

Table 11 details the parameters used in the meteorological modelling to drive the CALPUFF model.

Table 11 Meteorological Parameters used for this Study

TAPM (v 3.0)	
Number of grids (spacing)	5 (30 km, 10 km, 3 km, 1 km, 300 m)
Number of grids point	20 x 20 x 20
Year of analysis	2005
Centre of analysis	Woodlawn Bioreactor, Eco Project Site (35°4' S, 149°34' E)
Data assimilation	Meteorological data assimilation using wind data from 5 onsite monitoring locations

CALMET (v 6.1)	
Meteorological grid domain	20 km x 20 km
Meteorological grid resolution	0.2 km
Surface meteorological stations	Woodlawn Weather Station (10 m) Woodlawn 13 Mast (30 m) Veolia Mast (40 m)
Upper air meteorological stations	Data extracted from TAPM for Veolia Mast weather station

In summary, meteorological data collected during 2005 at three locations at the Eco Project Site was used in the odour impact assessment. Data from 2008/2009 and 2011 and 2012 was also obtained from a meteorological monitoring station at the site to identify whether the data from 2005 was representative of the longer term wind environment. Data provided in **Appendix A** demonstrates that the 2005 data is indeed representative with westerly winds dominating across the year (25%). Easterly and north-easterly winds are important components of the wind environment at the site with observed frequencies of approximately 15% and 8% respectively. These components of the wind are more dominant in the summer months with frequencies of approximately 20% and 15% respectively.

Observed meteorological data from three locations for a full calendar year (2005) has been included within the CALMET model. The CALMET model has been used to derive a **spatially** (3-dimensional) and **hourly** varying meteorological input file which has taken into account the topography and land use between the elements under assessment at the Eco Project site and all surrounding receptor locations.

7 DISPERSION MODELLING CONFIGURATION

CALPUFF is a transport and dispersion model that advects "puffs" of material emitted from modelled sources, simulating dispersion and transformation processes along the way. In doing so it typically uses the fields generated by CALMET, discussed in **Section 6**. Temporal and spatial variations in the meteorological fields selected are explicitly incorporated in the resulting distribution of puffs throughout a simulation period. The primary output files from CALPUFF contain either hourly concentration or hourly deposition fluxes evaluated at selected receptor locations. CALPOST is then used to process these files, producing tabulations that summarise results of the simulation (Scire et al, 2006).

Air pollutant concentrations were simulated for a regular Cartesian receptor grid covering a nested 5 km by 5 km computational domain, set within the CALMET modelling domain and centred on the Bioreactor, with a grid resolution of 200 m. Concentrations were also predicted at the receptors identified in **Table 3**.

7.1 Modelling Scenarios

The modelling scenarios developed for this assessment include:

1 Assessment of particulate impacts anticipated as a result of the construction of the MBT Facility, including the existing operations at the Bioreactor and predicted impacts due to the approved TriAusMin Woodlawn Project (refer **Section 5.4**).

2 Assessment of particulate impacts anticipated as a result of the operation of the MBT Facility, in conjunction with existing operations at the Bioreactor and predicted impacts due to the approved TriAusMin Woodlawn Project (refer **Section 5.4**).

3 Assessment of odour impacts anticipated as a result of the MBT Facility operation, including the existing operations at the Bioreactor.

The following sections outline the estimation of emissions of odour and particulate matter from the construction and operation of the MBT Facility.

7.1.1 Construction Particulate Matter Emissions

A number of uncertainties regarding the methods, staging and duration of MBT Facility construction currently exist, and although not assessed within the original AQIA, it is considered to be important to address the potential air quality impacts which may arise due to the construction of the MBT Facility. In this assessment, the US EPA AP42 emission factor for "Heavy Construction" has been adopted (Chapter 13, Section 13.2.3 Heavy Construction Operations). This emission factor is based on field measurements of TSP concentrations around apartment and shopping centre construction projects and in the absence of any other appropriate emission factor, or without the adoption of a number of assumptions, is considered to be appropriate in assessing particulate emissions resulting from the construction of the MBT Facility.

The emission factor provided in Chapter 13.2.3 of AP42 (US EPA, 1995) is 2,690 kg/ha/month of construction. PM_{10} has been assumed to account for 40% of TSP emissions.

It has been assumed that Level 1 watering controls (< 2 l/m^2/hr of watering, adopted from Table 3 of the "*Emission Estimation Technique Manual for Mining, Version 3.1*", [National Pollutant Inventory, 2012]) are applied to the construction activities and a 50% control factor has been applied accordingly.

Emissions have been assessed in conjunction with existing activities occurring at the Eco Project Site (existing Bioreactor operations) and those proposed (Power Station, as previously described in **Section 1.5.2**) as well as those resulting from approved TriAusMin Woodlawn Project operations.

7.1.2 Operational Particulate Matter Emissions

A review has been carried out of the potential for particulate generation during the operation of the MBT Facility (including the existing Bioreactor operations, the approved 24 MW landfill gas combustion facility (of which 5 MW has been installed and is operational) and the TriAusMin Woodlawn Project).

A significant proportion of activities associated with the MBT Facility are proposed to be performed indoors and therefore, given the negative pressure design of the MBT Facility, particulates will not be emitted to the ambient environment. The activities which may give rise to emissions into the ambient environment include:

- Proposed MBT Facility Sources:
  - Waste trucks travelling to and from the MBT Facility
  - Material Transfer from MBT to Compost Storage Area (CSA)
  - Wind erosion from CSA
- Bioreactor Sources:
  - Mixed waste trucks/containers travelling to the void from the main road
  - Wind erosion from covered waste
- Landfill Gas Combustion
  - Combustion of landfill gas in the proposed 24 x 1 MW JE Genbacher Gas Engines
- TriAusMin Woodlawn Project
  - Operations occurring as part of the WRP/WUP Projects as defined within the AQIA (PAEHolmes, 2012)

Table 12 presents the emission factors for the key atmospheric pollutants used in the dispersion modelling carried out for this assessment. These estimate the emissions expected under normal operating conditions.

In general, emission factor equations and the proportion of the PM_{10} fraction have been used as contained in Table 1 of "*Emission Estimation Technique Manual for Mining, Version 3.1*", (National Pollutant Inventory (NPI), 2012).

Emission factors contained within the NPI for Mining have been adopted in the absence of industry specific factors relating to compost and waste handling. The resulting emissions will be a conservative representation of actual emissions resulting from all activities.

Table 12 Particulate Emission Factors for Air Quality Dispersion Modelling

Activity	Total Particulate Emission Factor [1]	PM_{10} Emission Factor	Emission Factor Units
Waste Truck Unloading	0.00004	0.00002	kg/t
Wind Erosion	0.40	0.20	kg/ha/hr
Dozer (in Bioreactor)	0.117	0.015	kg/hr
Material Transfer	0.00004	0.00002	kg/t

Note 1: Total Particulate emission factor is used to derive the rate of dust deposition

Emissions resulting from heavy vehicles travelling on unpaved roads have been derived using the USEPA AP42 emission factors (Wheel Generated Dust from Unpaved Roads [2006]) as outlined in **Equation 1.**

$$EF = k \times \left(\frac{s}{12}\right)^a \times \left(\frac{W}{3}\right)^b \times \left(\frac{281.9}{1000}\right) \quad \text{(kg/VKT)} \qquad \textbf{Equation 1}$$

where
k = 4.9 (TSP)
k = 1.5 (PM_{10})
a = 0.7 (TSP)
a = 0.9 (PM_{10})
b = 0.45
s = silt content (%), W = vehicle gross mass (tonnes)
p = number of days in year with rainfall greater than 0.25mm

VKT = Vehicle Kilometre Travelled

Emissions from the combustion of landfill gas have been derived using the NPI Emission Estimation Technique for Combustion Engines Version 3 June 2008 (National Pollutant Inventory, 2008). Emission factors for PM_{10} are provided for uncontrolled landfill gas fired turbines either as kg/kWh, or kg/m^3. Emissions (g/s) based on both gas combustion (12,750 m^3/hr) and kWh capacity (24,000 kWh) have been calculated to be 0.67 g/s and 0.65 g/s, respectively. In the interests of conservatism, the higher emission rate has been used, and divided between all 24 proposed units. Stack parameters (exit velocity, temperature etc have been sourced from monitoring reports for the existing engines). Details are provided within the emissions inventory provided as **Appendix D**.

Potential particulate emissions from the proposed TriAusMin project were estimated based on the Air Quality Impact Assessment report for the TriAusMin Woodlawn Project, prepared by PAEHolmes (PAEHolmes 2012). Emissions from this operation were included in the model for cumulative impact assessment purposes.

Particulate Emission Inventory

The following assumptions have been made in deriving the emission inventory for the modelling exercise.

General

- To represent a worst case scenario for existing operation, the haul road is assumed to originate at the main road and travel into the pit - a distance of approximately 2.6 km.
- To represent a worst case scenario for the proposed MBT Facility operation, the haul road is assumed to originate at the main road and travel to the MBT Facility - a distance of approximately 3.0 km.
- It has been assumed that Level 1 watering controls (< 2 l/m^2/hr) are applied to the road and a 50% control factor has been applied accordingly.
- The silt content of the roads is assumed to be 5%.
- The particulate emission factors for the unloading of organic waste onto the Compost Storage Area were derived from Table 2 of *"Emission Estimation Technique Manual for Mining Version 3.1*". The factors correspond to miscellaneous transfer points (including conveying).
- The particulate emission factors for wind erosion from covered waste, windrows and final product storage were derived from Table 2 of *"Emission Estimation Technique Manual for Mining Version 3.1*". The factors correspond to Wind Erosion.

- The background PM_{10} used in dispersion modelling was derived from PM_{10} concentrations recorded at the Woodlawn monitoring station at Pylara (refer **Section 5.2.2**).
- The entire Compost Storage Area is assumed to be at full capacity at all times.
- The MBT Facility throughput is assumed to be 240,000 tpa of mixed waste plus 40,000 tpa of green waste.
- The modelling assessment assumes the facility is in operation for 312 days per annum.

A particulate emissions inventory is provided in **Appendix D**.

7.1.3 Operational Odour Emissions

Odour Definitions

Odour concentration is measured in terms of odour units (OU). One OU is the concentration of odour-containing air that can just be detected by 50% of members of an odour panel (persons chosen as representative of the average population sensitivity to odour). This process is defined within Australian Standard AS4323.3 (2001) *Stationary Source Emissions – Part 3: Determination of Odour Concentration by Dynamic Olfactometry.*

An Odour Emission Rate (OER) is the product of the odour concentration (OU/m^3) and the volumetric flow rate (m^3/s or m^3/min), and is often annotated as $OU.m^3/s$, or $OU.m^3/min$. Alternatively, an odour emission rate can be thought of as the volume of clean air that would be required to dilute the concentration of odorous gas emitted per unit time down to 1 OU.

The Specific Odour Emission Rate (SOER) may be defined as the quantity of odour emitted per unit time from a unit surface area. The quantity of odour emitted is not determined directly by olfactometry, but is calculated from the concentration of odour (as measured by olfactometry) which is then multiplied by the volume of air passing through the measurement system per unit time. SOERs are often annotated as $OU.m^3/m^2/s$, or $OU.m^3/m^2/min$.

Woodlawn Bioreactor Odour Emissions

Odour emissions resulting from Bioreactor operations have the potential to impact cumulatively with the emissions from the MBT Facility, given the characteristics of the odour likely to be generated. Cumulative impacts of the MBT Facility and Bioreactor have therefore been assessed within this report. Several AQIA have been submitted for operaions occurring at the Eco Project Site, the most recent of which was concerned with the Woodlawn Expansion Project (2011). The Woodlawn Expansion Project assessed the cumulative impacts of the approved Development and Bioreactor using site specific odour monitoring data.

Since the submission of the AQIA for the Woodlawn Expansion Project (SLR, 2011), an odour audit was performed by The Odour Unit (TOU, 2013) which performed odour monitoring of a number of sources at the Eco Project site. In preparing the odour emissions inventory for this current assessment, emission rates have been adopted from this audit report, in preference to the SLR AQIA (2011) given the more up to date nature of monitoring.

Information has been extracted from the following document:

- *Woodlawn Bioreactor Expansion Project, Independent Odour Audit* (November 2013), prepared by The Odour Unit

The following sources have been included in the dispersion modelling assessment of current operations at the Bioreactor:

- Fresh waste tipping face.
- Covered waste.
- Leachate aeration dam.
- ED3N-1 and ED3N-3 treated leachate storage ponds.
- ED3N-2 storage pond of leachate in treatment.

Since the submission of the AQIA for the Woodlawn Expansion Project (SLR, 2011) sources have changed in nature. These changes are summarised below.

- ED3N-4 was previously used for storing untreated leachate, although EPA required that no untreated leachate was located outside of the void. ED3N-4 is now empty and any untreated leachate is stored within the leachate aeration dam.

A summary of the odour emission rates and other details used within dispersion modelling are presented in **Table 13**.

Table 13 Odour Emission Sources – Woodlawn Bioreactor

Source	Modelled Area (m^2)	Source Type	SOER (OU.m3/m^2/s)	Comments
Fresh waste tipping face	5,754	Solid waste	3.64	SOER from TOU, 2013, taken as the average of 3 samples on the active tipping face
Covered waste	102,457	Covered waste	0.25	SOER from TOU, 2013, taken as the average of 2 samples taken on representative covered waste area
Leachate aeration dam	3,185	Mix of treated and untreated leachate	0.32	SOER from TOU, 2013, taken as the average of 2 samples
ED3N-1	7,656	Treated leachate	0.3	SOER from TOU, 2013
ED3-N2	1: 2,012 2: 2,329 3: 1,390 4: 1,767	Leachate in Treatment	1: 46.1 2: 14.2 3: 15.8 4: 4.4	SOER from TOU, 2013, source split into 4 areas, given the wide variation in SOER across the source
ED3N-3	6,891	Treated leachate	0.155	SOER from TOU, 2013, taken as the average of 3 samples

MBT Facility

Information on the emissions of odour anticipated to be released from the MBT Facility has been obtained from The Odour Unit who has designed the Odour Control System (OCS) for the MBT. Information has been extracted from the following document which is included as **Appendix C** to this report.

- *Woodlawn MBT Facility, Odour Control System, Preliminary Concept Design V2* (July 2013), prepared by The Odour Unit

Information on the odour emission rates for the compost maturation area and aeration ponds has been derived from emission rates for similar source types already existing at the site. A summary of the odour emission rates and other details used within dispersion modelling are presented in **Table 14**. All emission characteristics relate to Stage 2 operations (240,000 tonnes of mixed waste plus 40,000 tonnes of green waste per annum).

Emissions of odour associated with the tipping of waste in the receival hall, loading of drums, material handling in conveyors and fermentation are assumed to be captured by the OCS and are therefore accounted for within the emission rates for either the biofilters, or through the calculation of fugitive emissions as presented in **Table 14**.

Table 14 Odour Emission Sources – MBT Facility

Source	**Modelled Area (m^2)**	**Flowrate (m^3/hr)**	**SOER (OU.m3/m^2/s)**	**Comments**
OCS1a Biofilter[1]	980	177,000	25.1	Information from TOU, 2013
OCS1b Biofilter[1]	560	100,000	24.8	Information from TOU, 2013
OCS2 Biofilter[1]	890	160,000	25.0	Information from TOU, 2013
Compost Maturation Area	22,320	-	0.36	Information on emission rate from TOU, 2013 Information on area supplied by VES
Aeration Pond	525	-	0.3	SOER assumed to be as per existing Leachate aeration dam (refer **Table 13**)
Source	**Percentage of odour emissions escaping (%)**	**Total OER from Building (OU.m^3/s)**	**Modelled OER (OU.m^3/s)**	**Comments**
Fermentation building (fugitive emissions)	5	720,000	36,000	Information from TOU, 2013

Note 1: Biofilter odour emissions based on an odour concentration at the biofilter surface of 500 OU (TOU, 2013)

Odour Peak-to-Mean Ratios

The NSW EPA document "*Technical Notes - Assessment and Management of Odour from Stationary Sources in New South Wales"*, (EPA, 2006b – the Odour Notes) states that Peak-to-Mean ratios should be incorporated when conducting atmospheric dispersion modelling of odour.

It is commonly recognised that dispersion models such as CALPUFF need to be supplemented to accurately simulate atmospheric dispersion of odours. This is because the instantaneous perception of odours by the human nose typically occurs over a time scale of approximately one second but dispersion model predictions are typically valid for time scales equivalent to ten minutes to one hour averaging periods.

To estimate the effects of plume meandering and concentration fluctuations perceived by the human nose, it is possible to multiply dispersion model predictions by a correction factor called a "peak-to-mean ratio".

The peak to mean ratio (P/M60) is defined as the ratio of peak 1-second average concentrations to mean 1-hour average concentrations.

To estimate peak concentrations, this assessment has used data presented in Table 10.1 of the Odour Notes. Specifically, to establish a conservatively high estimate of peak odour concentrations, the following peak to mean ratio (P/M60) has been adopted, corresponding to near-field receptors for area sources:

- A Peak-to-Mean Ratio (P/M60) of 2.5 has been applied to the emission rate during periods where atmospheric stability class is between A and D.
- A Peak-to-Mean Ratio (P/M60) of 2.3 has been applied to the emission rate during periods where atmospheric stability class are E or F.

7.2 Other Pollutant Emissions

The Woodlawn Expansion Project included the requirement for up to 24 Landfill Gas Engines, of which five have been installed to date. Emissions of particulate matter from all 24 approved engines have been quantitatively assessed within this report. These engines also have the capacity to emit quantities of nitrogen oxides (NO_X), carbon monoxide (CO) and volatile organic compounds (VOCs). A quantitative modelling assessment has not been performed for these pollutants however, an assessment of how these emissions compare with requirements stipulated in the Protection of the Environment Operations (Clean Air) Regulations 2010 (the POEO regulations) has been undertaken.

Mandatory annual monitoring is undertaken at the existing five landfill gas engines. The maximum monitored emissions for VOCs, CO and NO_X for all five engines, along with the relevant emission limits, taken from the POEO regulations are presented in **Table 15**.

Table 15 Emission Limits applicable to Landfill Gas Engines (POEO, 2010)

Air Impurity	100 Percentile Concentration Limit	Maximum from Existing Engines
Volatile Organic Compounds (VOCs) as n-propane	40 mg/m^3 VOCs or 125 mg/m^3 CO	4.2 mg/m^3 (VOCs) 1073 mg/m^3 (CO)
Nitrogen Dioxide (NO_2) or Nitric Oxide (NO) or both, as NO_2 equivalent	450 mg/m^3	449 mg/m^3

Clause 38 (2) of the POEO regulations states that the requirement for a standard of concentration for volatile organic compounds or carbon monoxide is deemed to be met if either of those standards is achieved. Therefore, even though the standard of concentration for carbon monoxide is exceeded, the standard of concentration of VOCs is met and therefore, all emissions from the landfill gas engines are in compliance with the POEO regulations.

8 AIR QUALITY IMPACT ASSESSMENT

8.1 Particulate Matter Impact Assessment – MBT Facility Construction

8.1.1 Particulate Matter as PM_{10}

Table 16 shows the results of the CALPUFF predictions for the 24-hour average PM_{10} concentrations resulting from construction of the MBT Facility. The results show the maximum 24-hour average PM_{10} concentrations predicted at the nearest receptor locations surrounding the Eco Project site over a one year time frame.

The background PM_{10} concentration has been taken to be 36.6 µg/m^3 as a 24 hour maximum as discussed in **Section 5.2.2**. The contribution from the existing Bioreactor operations and TriAusMin operations have been modelled and reported separately in **Table 16** to allow examination of the main contributors to predicted cumulative concentrations at each receptor location.

A contour plot of the maximum incremental 24-hour average PM_{10} concentrations is presented in **Figure 6** (MBT sources only), **Figure 7** (MBT plus Bioreactor) and **Figure 8** (MBT plus Bioreactor plus TriAusMin). The contour plots do not represent the dispersion pattern at any particular instant in time, but show the predicted maximum 24-hour average PM_{10} concentrations that occurred at each location. They therefore represent the concentrations that can possibly be reached under the conditions modelled.

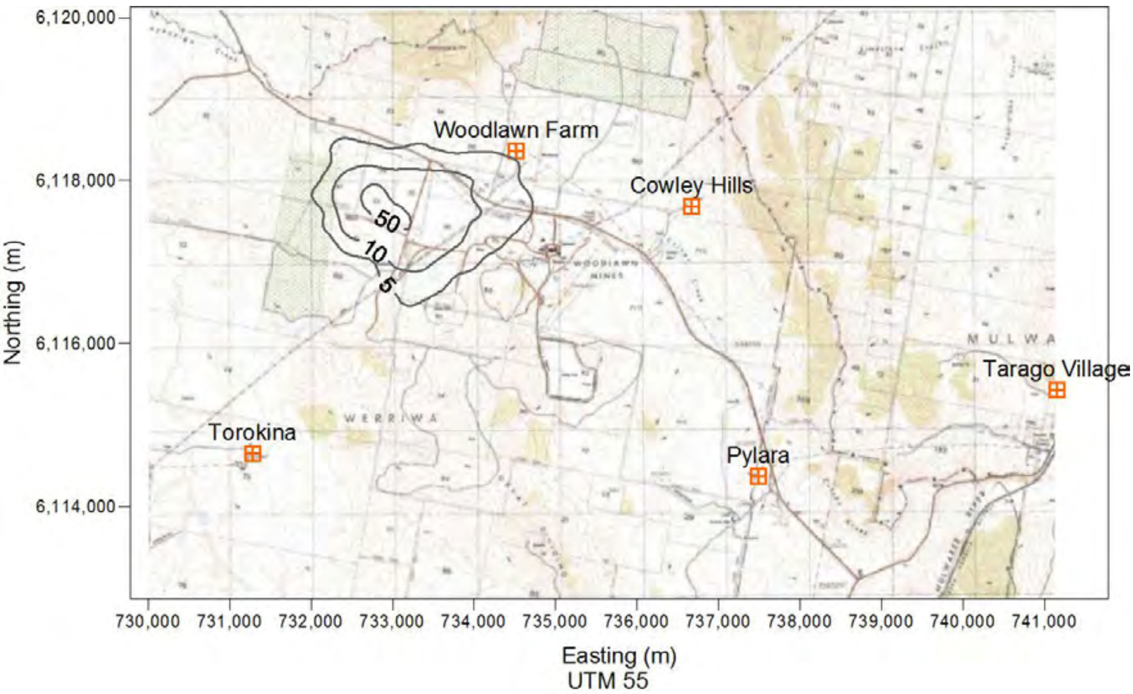
Table 16 Background and Predicted 24-Hour Average PM_{10} Concentrations – MBT Facility Construction

Receptor	Maximum 24-Hour PM_{10} Concentrations (µg/m^3)						
	Background	MBT Const.	Bioreactor Operation	TriAusMin Operation	All Operations	Cumulative	Project Goal
1. “Woodlawn Farm”	36.6	4.4	1.3	1.9	9.3	45.9	50
2. “Cowley Hills”	36.6	1.1	4.1	3.1	8.2	44.8	50
3. “Pylara”	36.6	0.2	0.6	0.6	1.4	38.0	50
4. “Torokina”	36.6	0.5	0.7	0.3	1.3	37.9	50
5. “Tarago Village”	36.6	0.1	0.5	0.4	1.2	37.8	50

Note: Maximum impacts from each modelled element (MBT, Bioreactor and TriAusMin) will not sum to “All Operations” as maximum impacts from each may be experienced during varying 24-hour periods.

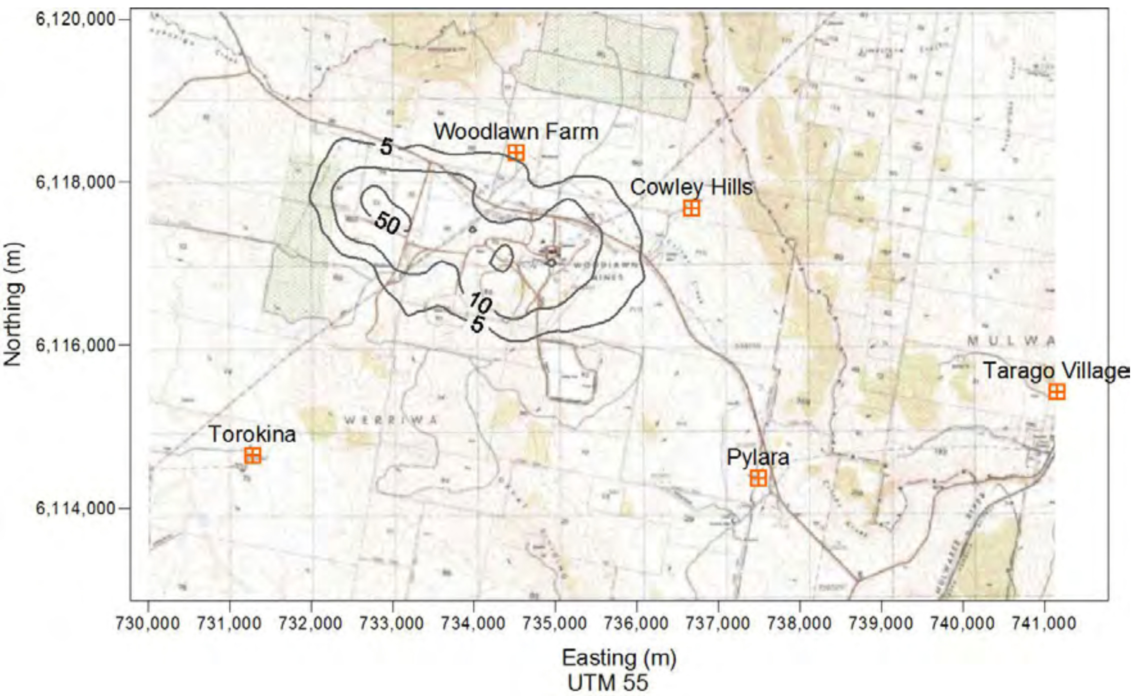
The predictions show that the construction of the MBT Facility will not result in any exceedances of the 24-hour PM_{10} criterion at any receptor location. Maximum incremental impacts due to the construction of the MBT Facility are predicted at Woodlawn Farm, although this represents less than 10% of the relevant criterion of 50 µg/m^3 and with the addition of Bioreactor operation and TriAusMin Project operation, the criterion is still achieved.

Figure 6 Predicted Maximum 24-hour Incremental PM_{10} Concentration ($\mu g/m^3$) – MBT Facility Construction Only



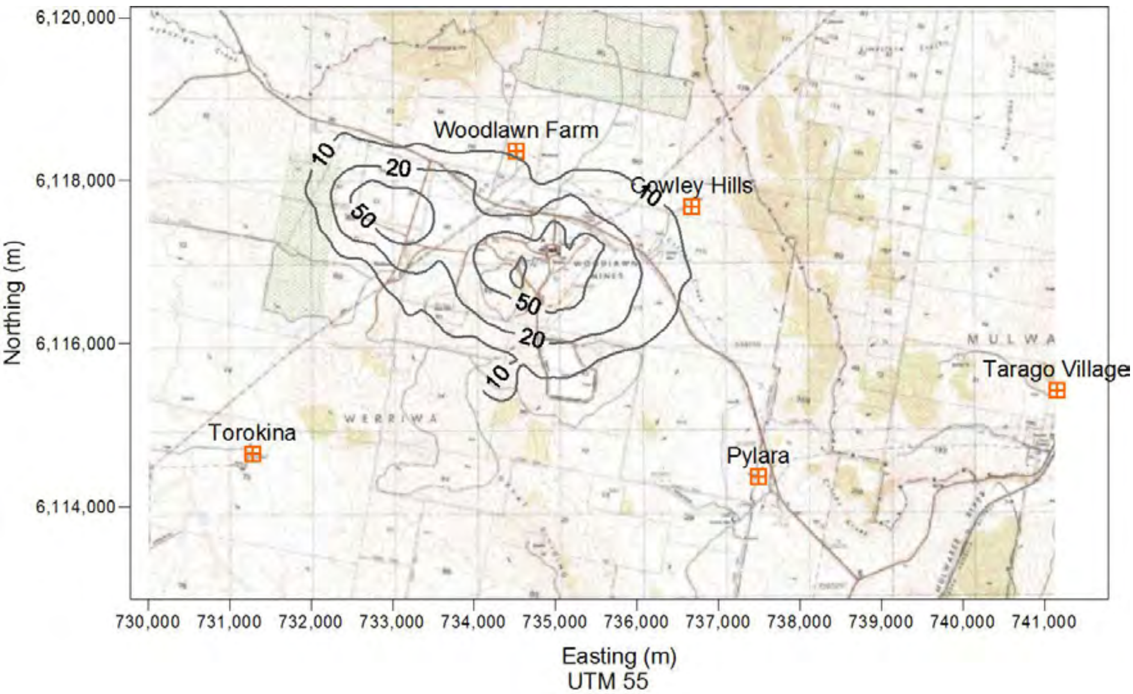
2005 Meteorology, Emission Rates adopted from **Section 7.1.1** Adopted Criterion – 50 µg/m³

Figure 7 Predicted Maximum 24-hour Incremental PM_{10} Concentration ($\mu g/m^3$) – MBT Facility Construction plus Bioreactor Only



2005 Meteorology, Emission Rates adopted from **Section 7.1.1** Adopted Criterion – 50 µg/m³

Figure 8 Predicted Maximum 24-hour Incremental PM_{10} Concentration ($\mu g/m^3$) – MBT Facility Construction plus Bioreactor plus TriAusMin



2005 Meteorology, Emission Rates adopted from **Section 7.1.1** Adopted Criterion – 50 $\mu g/m^3$

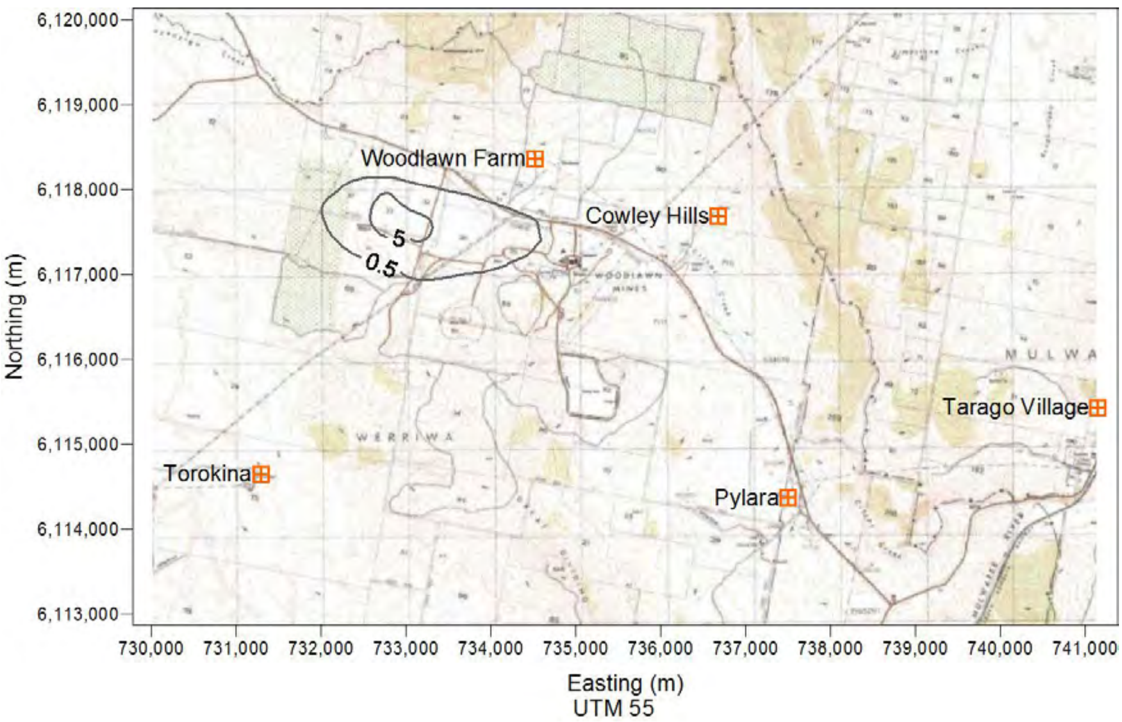
Table 17 shows the results of the CALPUFF predictions for annual average PM_{10} resulting from the construction of the MBT Facility. The results show the predicted annual average PM_{10} concentration at the nearest receptor locations surrounding the MBT Facility over a one-year time frame.

A contour plot of the annual average PM_{10} concentrations is presented in **Figure 9** (MBT sources only), **Figure 10** (MBT plus Bioreactor) and **Figure 11** (MBT plus Bioreactor plus TriAusMin).

Table 17 Background and Predicted Annual Average PM_{10} Concentrations – MBT Facility Construction

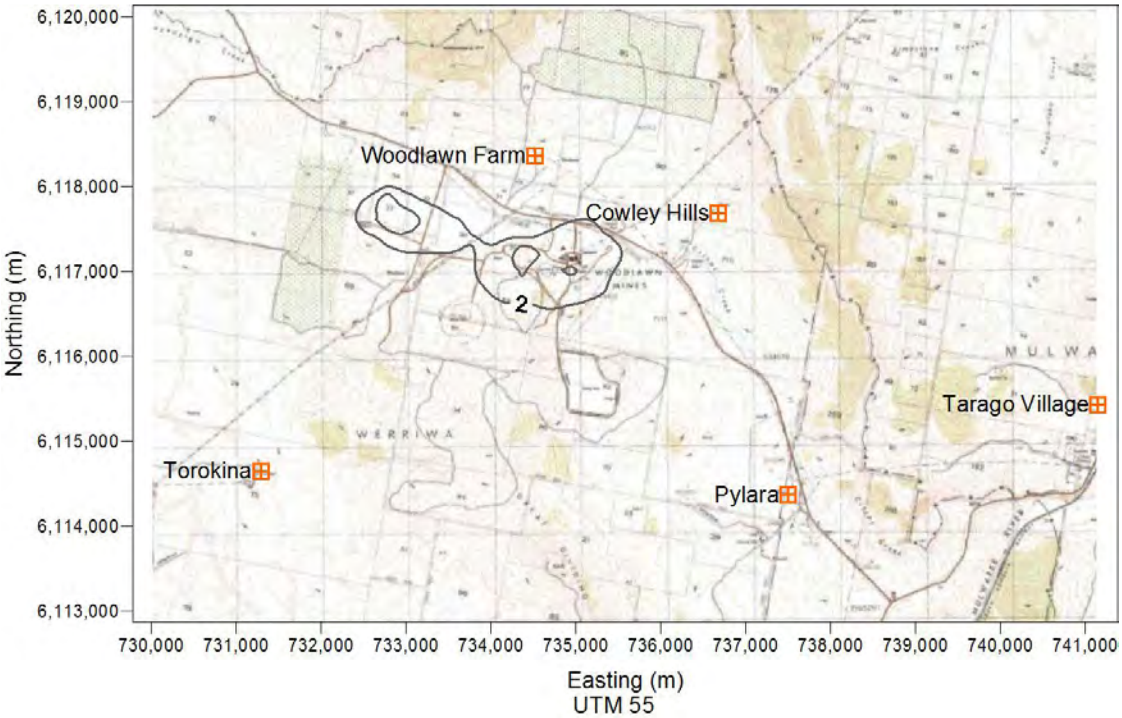
Receptor	Annual Average PM_{10} Concentrations (µg/m^3)						
	Background	MBT Const.	Bioreactor Operation	TriAusMin Operation	All Operations	Cumulative	Project Goal
1. "Woodlawn Farm"	9	0.2	<0.1	<0.1	0.4	9.4	30
2. "Cowley Hills"	9	0.2	0.2	0.1	0.6	9.7	30
3. "Pylara"	9	<0.1	<0.1	0.1	0.2	9.2	30
4. "Torokina"	9	<0.1	<0.1	<0.1	0.1	9.1	30
5. "Tarago Village"	9	<0.1	<0.1	<0.1	0.2	9.2	30

Figure 9 Predicted Annual Average PM_{10} Incremental Concentration (µg/m^3) – MBT Facility Construction Only



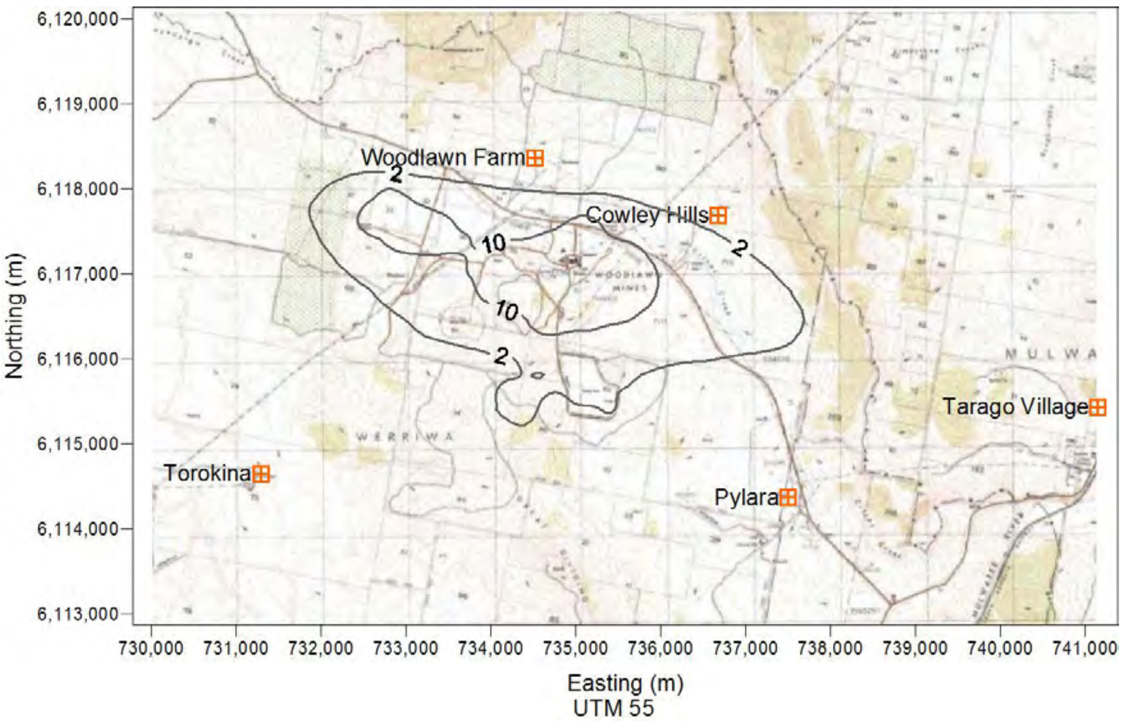
2005 Meteorology, Emission Rates adopted from **Section 7.1.2** Adopted Criterion – 30 µg/m^3

Figure 10 Predicted Annual Average PM_{10} Incremental Concentration (µg/m^3) – MBT Facility Construction plus Bioreactor Only



2005 Meteorology, Emission Rates adopted from **Section 7.1.2** Adopted Criterion – 30 µg/m^3

Figure 11 Predicted Annual Average PM_{10} Incremental Concentration (µg/m^3) – MBT Facility Construction plus Bioreactor plus TriAusMin



2005 Meteorology, Emission Rates adopted from **Section 7.1.2** Adopted Criterion – 30 µg/m^3

The results presented in **Table 17** indicate that at each receptor location, the maximum annual average concentration of PM_{10} (background plus increment) associated with the Project is predicted to be below the project goal of 30 µg/m^3. The contribution of the Project to the total annual average PM_{10} concentrations is predicted to be insignificant with a maximum incremental annual average PM_{10} concentration of 0.2 µg/m^3 at "Woodlawn Farm and "Cowley Hills".

8.1.2 Particulate Matter as TSP

Table 22 shows the results of the CALPUFF predictions for annual average TSP resulting from the construction of the MBT Facility. The results show the average concentrations predicted at the nearest receptor locations over a one year time frame. Background concentrations of TSP are assumed to be 18 µg/m^3 (refer **Section 5.3**).

Table 18 Background and Predicted Incremental Total Suspended Particulate – MBT Facility Construction

Receptor	Annual Average TSP Concentrations (µg/m^3)						
	Background	MBT Const.	Bioreactor Operation	TriAusMin Operation	All Operations	Cumulative	Project Goal
1. "Woodlawn Farm"	18	0.2	0.1	0.1	0.7	18.7	90
2. "Cowley Hills"	18	0.2	0.6	0.3	1.4	19.4	90
3. "Pylara"	18	<0.1	0.1	0.2	0.4	18.4	90
4. "Torokina"	18	<0.1	<0.1	<0.1	0.2	18.2	90
5. "Tarago Village"	18	<0.1	0.2	0.1	0.4	18.4	90

The results presented in **Table 18** show that increases in the annual average TSP concentration associated with the construction of the MBT Facility are predicted to be insignificant in comparison with current average background levels. Annual average TSP concentrations are predicted to easily comply with the project goal of 90 µg/m^3 even with the addition of the TriAusMin operations.

No contour plot has been provided of the incremental increase in annual average TSP concentrations due to the low concentrations predicted.

8.1.3 Particulate Matter as Dust Deposition

Table 19 shows the results of the modelling predictions for dust deposition resulting from the construction of the MBT Facility. The results show the average deposition rates predicted at the nearest receptor locations over a one year time frame. Background levels of dust deposition at these locations ranged from 1.5 g/m^2/month to 3.0 g/m^2/month. For assessment purposes, background levels have been conservatively assumed to be in the order of 3.0 g/m^2/month (refer **Section 5.2.1**).

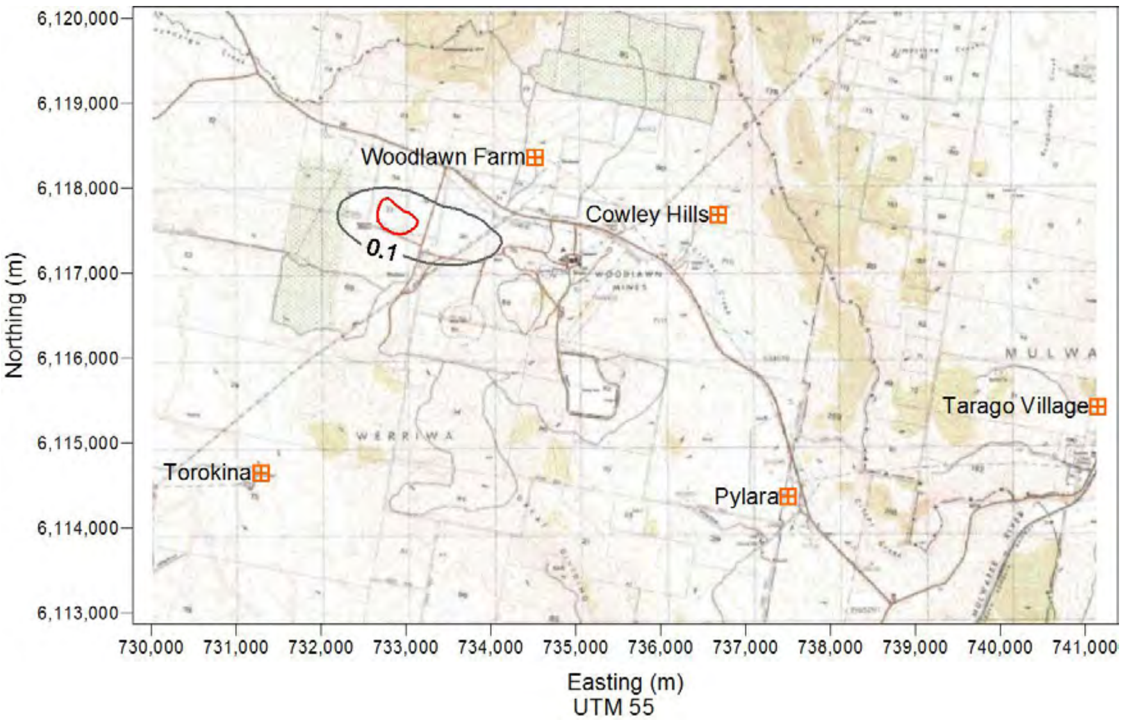
A contour plot of the modelled dust deposition values obtained around the Project Site is presented in **Figure 12** (MBT sources only), **Figure 13** (MBT plus Bioreactor) and **Figure 14** (MBT plus Bioreactor plus TriAusMin).

Table 19 Background and Predicted Incremental Dust Deposition – MBT Facility Construction

Receptor	Annual Average Dust Deposition Rate (g/m2/month)						
	Background	MBT Const.	Bioreactor Operation	TriAusMin Operation	All Operations	Cumulative	Project Goal
1. “Woodlawn Farm”	3.0	<0.1	<0.1	<0.1	<0.1	<3.6	4
2. “Cowley Hills”	3.0	<0.1	<0.1	<0.1	<0.1	<3.6	4
3. “Pylara”	3.0	<0.1	<0.1	<0.1	<0.1	<3.6	4
4. “Torokina”	3.0	<0.1	<0.1	<0.1	<0.1	<3.6	4
5. “Tarago Village”	3.0	<0.1	<0.1	<0.1	<0.1	<3.6	4

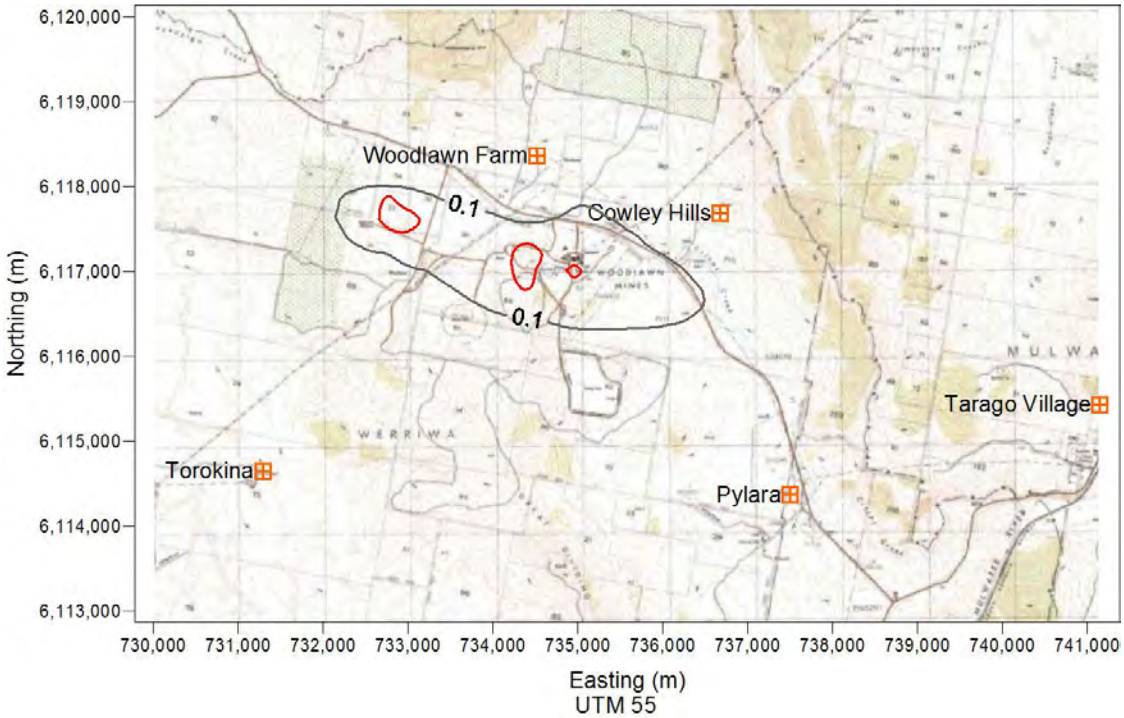
The results presented in **Table 19** show that increases in the annual average monthly dust deposition associated with the construction of the MBT Facility are predicted to be insignificant in comparison with current average background dust deposition levels. Annual average monthly dust deposition levels are predicted to comply with the project goal of 4 g/m^2/month even assuming worst case existing background dust levels.

Figure 12 Predicted Annual Average Incremental Dust Deposition (g/m^2/month) – MBT Sources Only



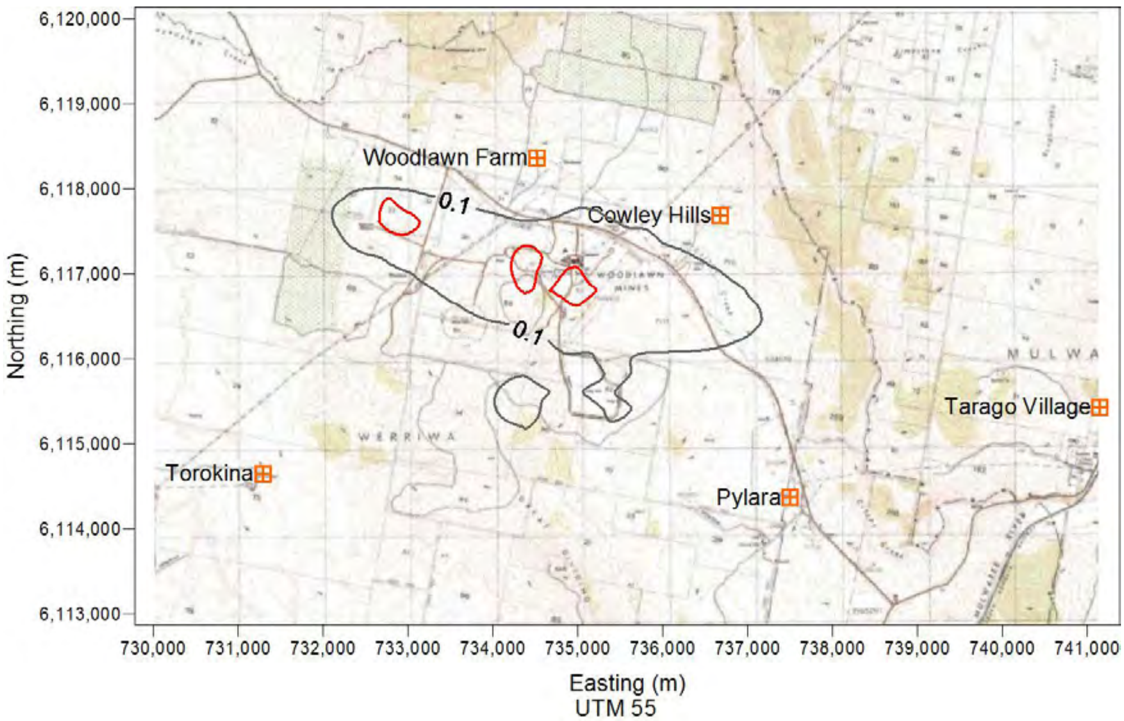
2005 Meteorology, Emission Rates adopted from **Section 7.1.2**; Adopted Criterion – 2 g/m^2/month (incremental)

Figure 13 Predicted Annual Average Incremental Dust Deposition (g/m^2/month) – MBT plus Bioreactor Sources Only



2005 Meteorology, Emission Rates adopted from **Section 7.1.2**; Adopted Criterion – 2 g/m^2/month (incremental)

Figure 14 Predicted Annual Average Incremental Dust Deposition (g/m^2/month) – MBT plus Bioreactor plus TriAusMin Sources



2005 Meteorology, Emission Rates adopted from **Section 7.1.2**; Adopted Criterion – 2 g/m^2/month (incremental)

8.2 Particulate Matter / Dust Impact Assessment – MBT Facility Operation

8.2.1 Particulate Matter as PM_{10}

Table 20 shows the results of the CALPUFF predictions for the 24-hour average PM_{10} concentrations resulting from the operation of the MBT Facility. The results show the maximum 24-hour average PM_{10} concentrations predicted at the nearest receptor locations surrounding the MBT Facility site over a one year time frame.

The background PM_{10} concentration has been taken to be 36.6 µg/m^3 as a 24 hour maximum as discussed in **Section 5.2.2**. The contribution from the existing Bioreactor operations, MBT Facility operation and TriAusMin operations have been modelled and reported separately in **Table 20** to allow examination of the main contributors to predicted cumulative concentrations at each receptor location.

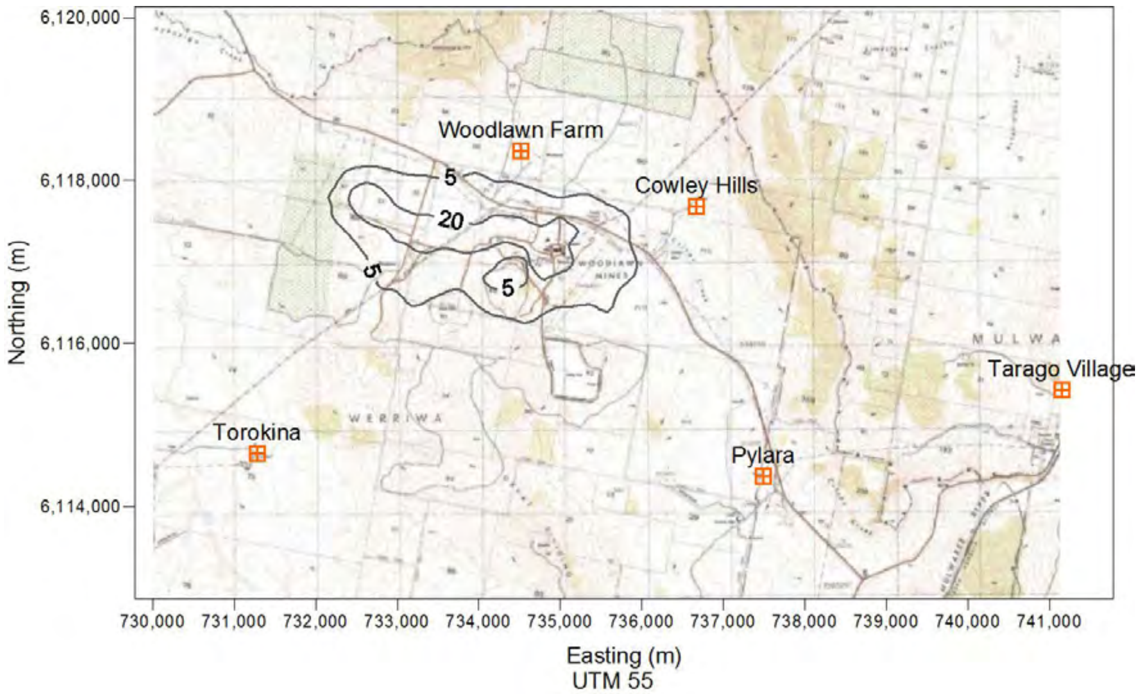
A contour plot of the maximum incremental 24-hour average PM_{10} concentrations is presented in **Figure 15** (MBT sources only), **Figure 16** (MBT plus Bioreactor) and **Figure 17** (MBT plus Bioreactor plus TriAusMin). The contour plots do not represent the dispersion pattern at any particular instant in time, but show the predicted maximum 24-hour average PM_{10} concentrations that occurred at each location. They therefore represent the concentrations that can possibly be reached under the conditions modelled.

Table 20 Background and Predicted 24-Hour Average PM_{10} Concentrations – MBT Operation

Receptor	Maximum 24-Hour PM_{10} Concentrations (µg/m^3)						
	Background	MBT Operation	Bioreactor Operation	TriAusMin Operation	All Operations	Cumulative	Project Goal
1. “Woodlawn Farm”	36.6	2.3	1.3	1.9	3.8	40.4	50
2. “Cowley Hills”	36.6	2.9	4.1	3.1	9.0	45.6	50
3. “Pylara”	36.6	0.4	0.6	0.6	1.6	38.2	50
4. “Torokina”	36.6	0.4	0.7	0.3	1.3	37.9	50
5. “Tarago Village”	36.6	0.4	0.5	0.4	1.3	37.9	50

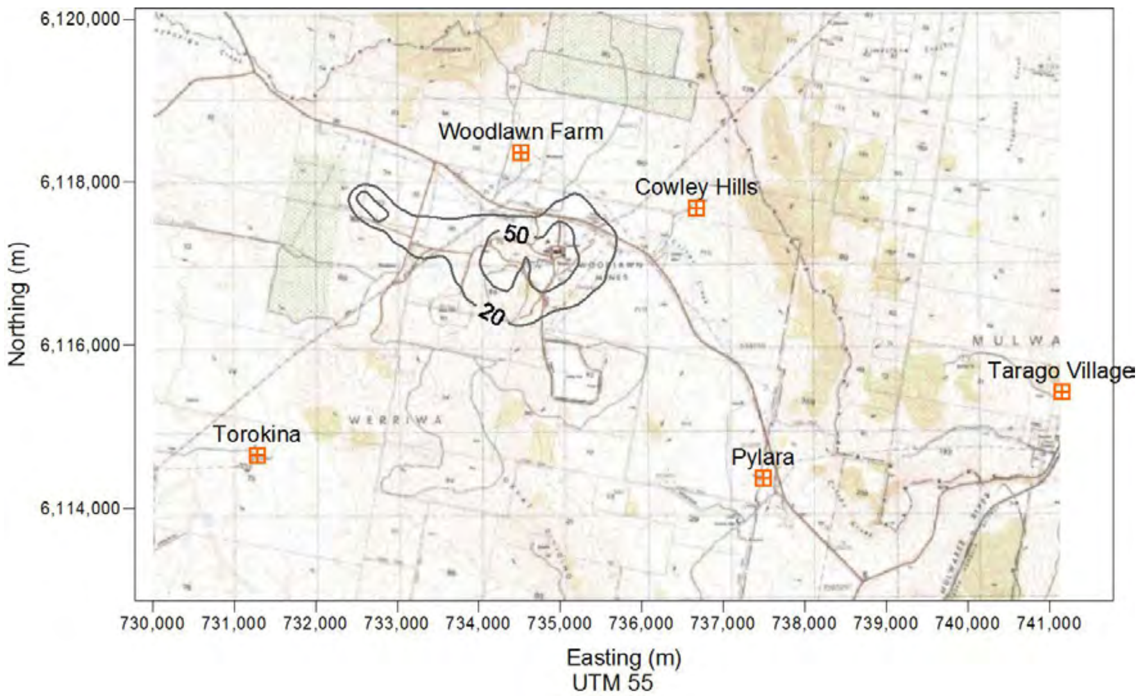
Note: Maximum impacts from each modelled element (MBT, Bioreactor and TriAusMin) will not sum to “All Operations” as maximum impacts from each may be experienced during varying 24-hour periods.

Figure 15 Predicted Maximum 24-hour Incremental PM_{10} Concentration (µg/m^3) – MBT Facility Sources Only



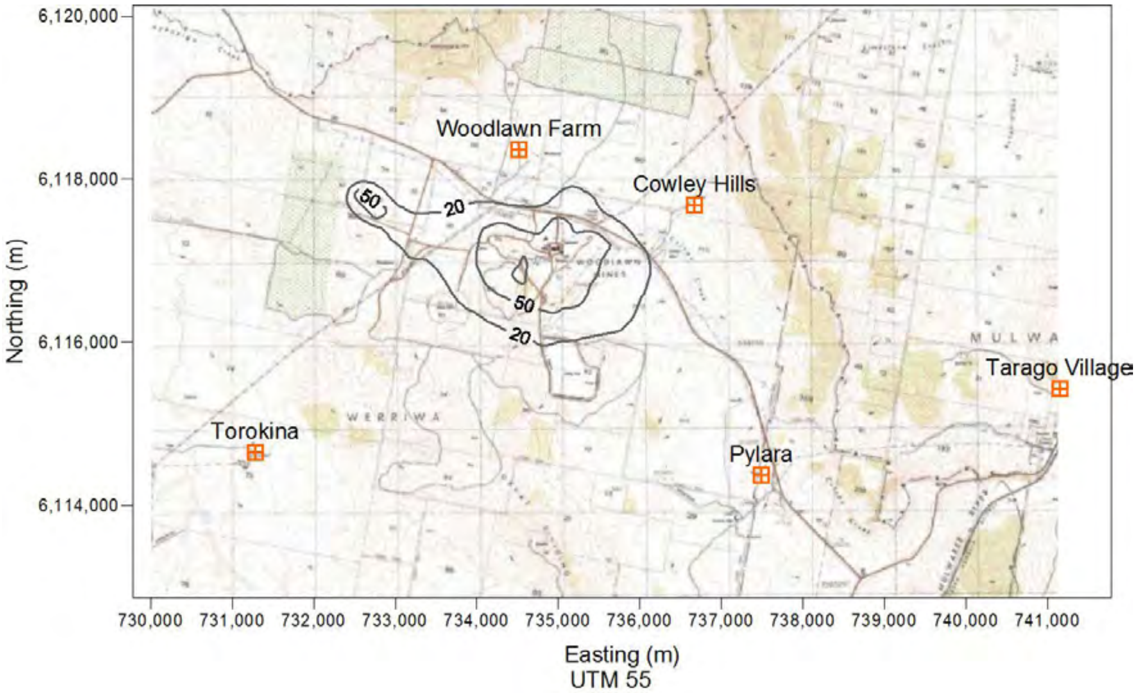
2005 Meteorology, Emission Rates adopted from **Section 7.1.2** Adopted Criterion – 50 µg/m^3

Figure 16 Predicted Maximum 24-hour Incremental PM_{10} Concentration (µg/m^3) – MBT Facility plus Bioreactor Sources Only



2005 Meteorology, Emission Rates adopted from **Section 7.1.2** Adopted Criterion – 50 µg/m^3

Figure 17 Predicted Maximum 24-hour Incremental PM_{10} Concentration (µg/m³) – MBT Facility plus Bioreactor plus TriAusMin Sources



2005 Meteorology, Emission Rates adopted from **Section 7.1.2** Adopted Criterion – 50 µg/m³

The results presented in **Table 20** shows that at all receptor locations the maximum 24-hour average concentration of PM_{10} (background plus increment) associated with the MBT Facility operation is predicted to be below the project goal of 50 µg/m³ (24-hour average).

The contribution of the MBT Facility operation to total 24 hour PM_{10} concentrations at all other receptors is predicted to be low, with a maximum incremental 24-hour PM_{10} concentration of 2.9 µg/m³ predicted at “Cowley Hills”. Even assuming a high background PM_{10} concentration of 36.6 µg/m³ (the 99.9th percentile of three years of monitoring data), the total predicted PM_{10} concentration as a result of MBT Facility operation is predicted to comply with the project goal of 50 µg/m³.

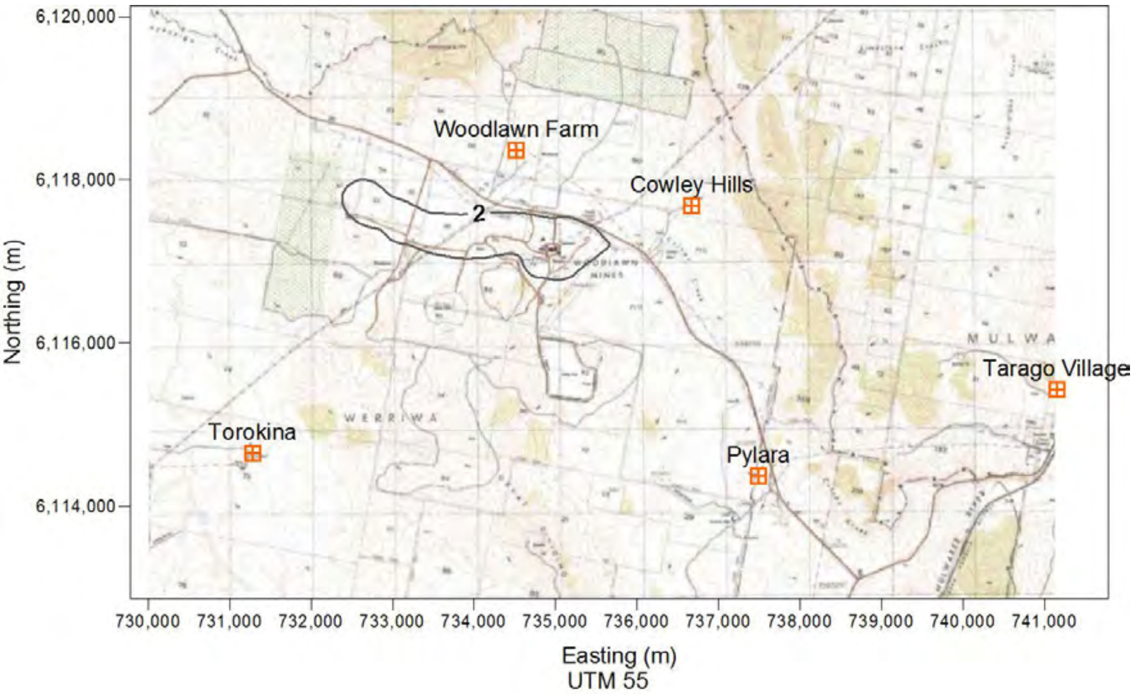
Table 21 shows the results of the CALPUFF predictions for annual average PM_{10} resulting from the operation of the MBT Facility. The results show the predicted annual average PM_{10} concentration at the nearest receptor locations surrounding the MBT Facility over a one-year time frame.

A contour plot of the annual average PM_{10} concentrations is presented in **Figure 18** (MBT sources only), **Figure 19** (MBT plus Bioreactor) and **Figure 20** (MBT plus Bioreactor plus TriAusMin).

Table 21 Background and Predicted Annual Average PM_{10} Concentrations – MBT Facility Operation

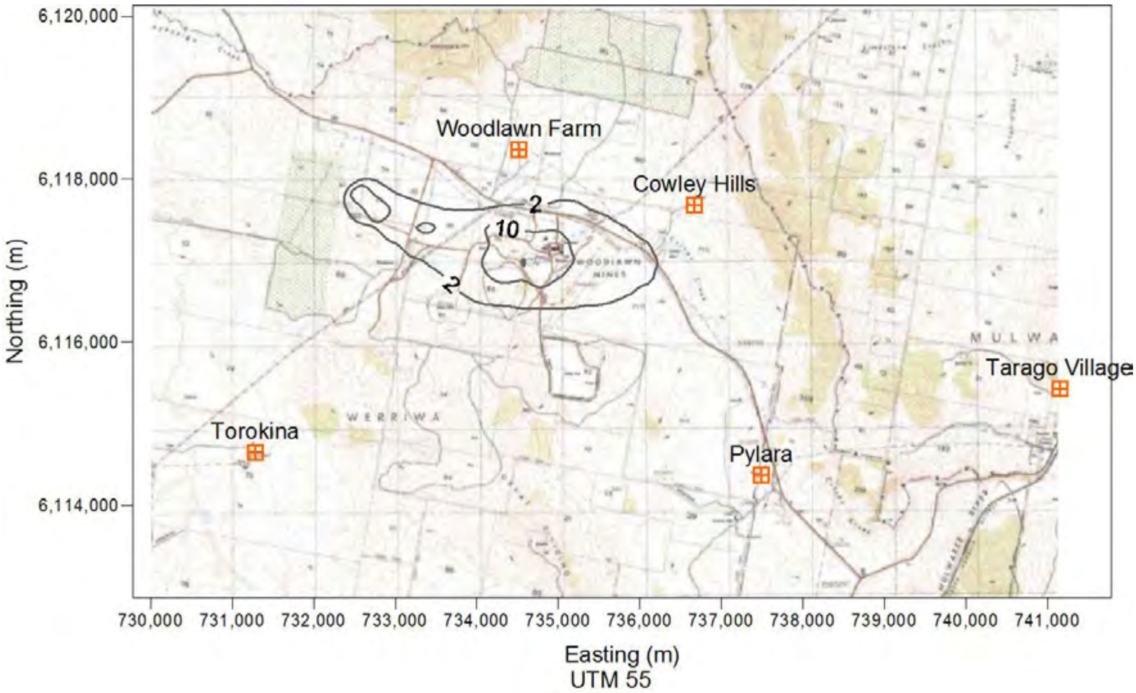
Receptor	Annual Average PM_{10} Concentrations (µg/m^3)						
	Background	MBT Operation	Bioreactor Operation	TriAusMin Operation	All Operations	Cumulative	Project Goal
1. "Woodlawn Farm"	9	0.1	<0.1	<0.1	0.3	9.3	30
2. "Cowley Hills"	9	0.3	0.2	0.1	0.7	9.7	30
3. "Pylara"	9	<0.1	<0.1	0.1	0.2	9.2	30
4. "Torokina"	9	<0.1	<0.1	<0.1	0.1	9.1	30
5. "Tarago Village"	9	<0.1	<0.1	<0.1	0.2	9.2	30

Figure 18 Predicted Annual Average PM_{10} Incremental Concentration (µg/m^3) – MBT Facility Sources Only



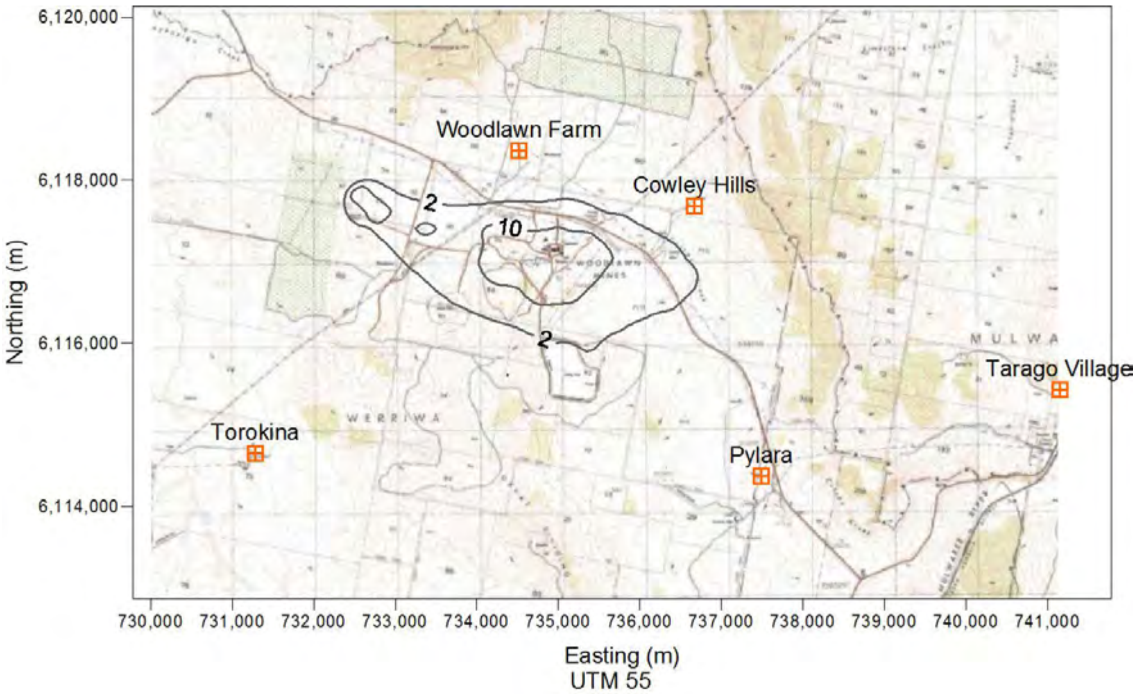
2005 Meteorology, Emission Rates adopted from **Section 7.1.2** Adopted Criterion – 30 µg/m^3

Figure 19 Predicted Annual Average PM_{10} Incremental Concentration ($\mu g/m^3$) – MBT Facility Sources plus Bioreactor Only



2005 Meteorology, Emission Rates adopted from **Section 7.1.2** Adopted Criterion – 30 $\mu g/m^3$

Figure 20 Predicted Annual Average PM_{10} Incremental Concentration ($\mu g/m^3$) – MBT Facility Sources plus Bioreactor plus TriAusMin



2005 Meteorology, Emission Rates adopted from **Section 7.1.2** Adopted Criterion – 30 $\mu g/m^3$

The results presented in **Table 21** indicate that at each receptor location, the maximum annual average concentration of PM_{10} (background plus increment) associated with the Project is predicted to be below the project goal of 30 µg/m^3. The contribution of the MBT Facility to the total annual average PM_{10} concentrations is predicted to be insignificant with a maximum incremental annual average PM_{10} concentration of 0.3 µg/m^3 at "Cowley Hills".

8.2.2 Particulate Matter as TSP

Table 22 shows the results of the CALPUFF predictions for annual average TSP resulting from the operation of the MBT Facility. The results show the average concentrations predicted at the nearest receptor locations over a one year time frame. Background concentrations of TSP are assumed to be 18 µg/m^3 (refer **Section 5.3**).

Table 22 Background and Predicted Incremental Total Suspended Particulate – MBT Facility Operation

Receptor	Annual Average TSP Concentrations (µg/m^3)						
	Background	MBT Operation	Bioreactor Operation	TriAusMin Operation	All Operations	Cumulative	Project Goal
1. "Woodlawn Farm"	18	0.3	0.1	0.1	0.6	18.6	90
2. "Cowley Hills"	18	0.6	0.6	0.3	1.5	19.5	90
3. "Pylara"	18	<0.1	0.1	0.2	0.4	18.4	90
4. "Torokina"	18	<0.1	<0.1	<0.1	0.2	18.2	90
5. "Tarago Village"	18	0.1	0.2	0.1	0.5	18.5	90

The results presented in **Table 22** show that increases in the annual average TSP concentration associated with the operation of the MBT Facility are predicted to be insignificant in comparison with current average background levels. Annual average TSP concentrations are predicted to comply with the project goal of 90 µg/m^3 even with the addition of the TriAusMin operations.

No contour plot has been provided of the incremental increase in annual average TSP concentrations due to the low concentrations predicted.

8.2.3 Particulate Matter as Dust Deposition

Table 23 shows the results of the modelling predictions for dust deposition resulting from the operation of the MBT Facility. The results show the average deposition rates predicted at the nearest receptor locations over a one year time frame. Background levels of dust deposition at these locations ranged from 1.5 g/m^2/month to 3.0 g/m^2/month. For assessment purposes, background levels have been conservatively assumed to be in the order of 3.0 g/m^2/month (refer **Section 5.2.1**).

A contour plot of the modelled dust deposition values obtained around the Eco Project Site is presented in **Figure 21** (MBT sources only), **Figure 22** (MBT plus Bioreactor) and **Figure 23** (MBT plus Bioreactor plus TriAusMin).

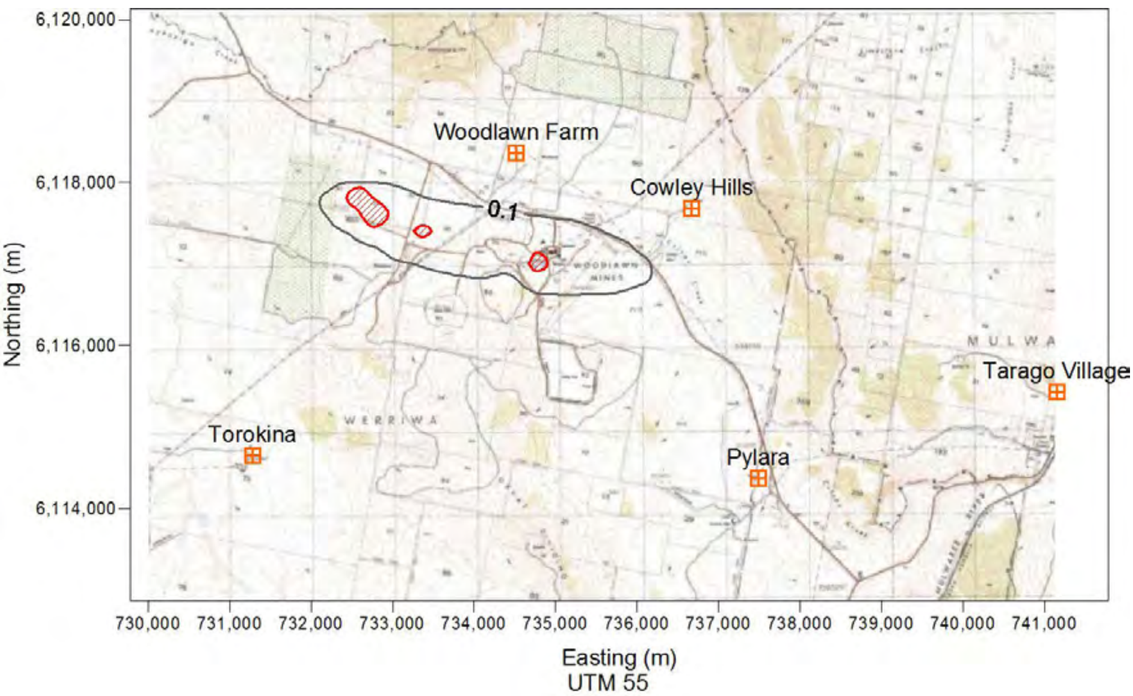
Table 23 Background and Predicted Incremental Dust Deposition – MBT Facility Operation

Receptor	Annual Average Dust Deposition Rate (g/m²/month)						
	Background	MBT Operation	Bioreactor Operation	TriAusMin Operation	All Operations	Cumulative	Project Goal
1. "Woodlawn Farm"	3.0	<0.1	<0.1	<0.1	<0.1	<3.1	4
2. "Cowley Hills"	3.0	<0.1	<0.1	<0.1	<0.1	<3.1	4
3. "Pylara"	3.0	<0.1	<0.1	<0.1	<0.1	<3.1	4
4. "Torokina"	3.0	<0.1	<0.1	<0.1	<0.1	<3.1	4
5. "Tarago Village"	3.0	<0.1	<0.1	<0.1	<0.1	<3.1	4

The results presented in **Table 23** show that increases in the annual average monthly dust deposition associated with the operation of the MBT Facility are predicted to be insignificant in comparison with current average background dust deposition levels. Annual average monthly dust deposition levels are predicted to comply with the project goal of 4 g/m^2/month even assuming worst case existing background dust levels.

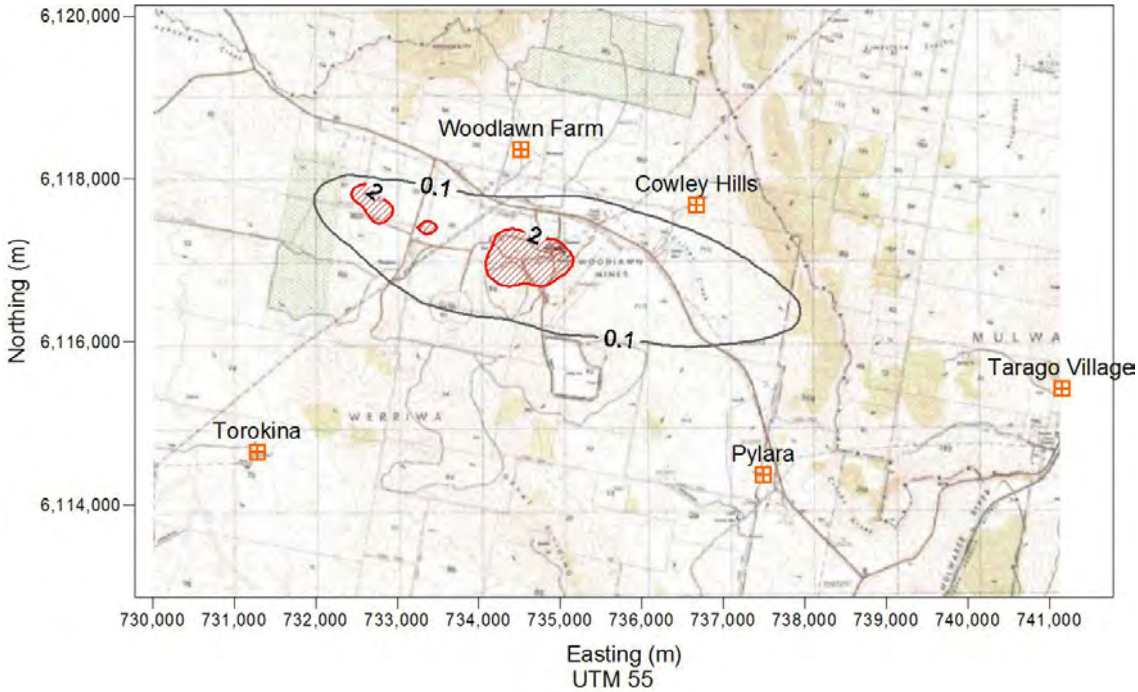
An marginal exceedance of the dust deposition criterion is predicted at the TriAusMin administration building, however the majority of this exceedance is caused by TriAusMin rather than MBT Facility operations.

Figure 21 Predicted Annual Average Incremental Dust Deposition (g/m^2/month) – MBT Facility Sources Only



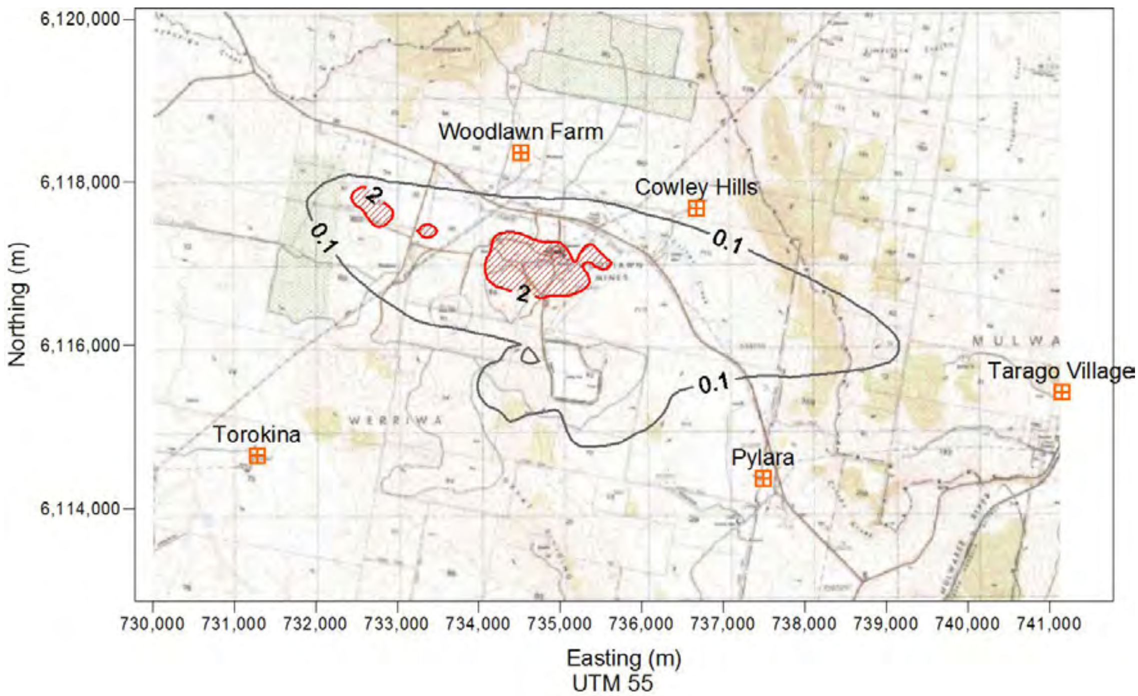
2005 Meteorology, Emission Rates adopted from **Section 7.1.2**; Adopted Criterion – 2 g/m^2/month (incremental)

Figure 22 Predicted Annual Average Incremental Dust Deposition (g/m²/month) – MBT Facility plus Bioreactor Sources Only



2005 Meteorology, Emission Rates adopted from **Section 7.1.2**; Adopted Criterion – 2 g/m²/month (incremental)

Figure 23 Predicted Annual Average Incremental Dust Deposition (g/m²/month) – MBT Facility plus Bioreactor plus TriAusMin Sources



2005 Meteorology, Emission Rates adopted from **Section 7.1.2**; Adopted Criterion – 2 g/m²/month (incremental)

8.3 Odour Impact Assessment

Table 24 presents the 99th percentile 1 second average odour concentrations at the surrounding sensitive receptor locations, as predicted by CALPUFF under worst case conditions, for proposed operations at the MBT Facility using the emission rates discussed in **Section 7.1.3**.

As discussed in **Section 3.1**, the TriAusMin administration office is included as a receptor when assessing odour impacts as workers may be exposed on relevant averaging periods (1 second nose response time average), whereas for particulate impacts of 24 hours and longer this will not be the case.

It can be seen that odour concentrations are predicted to range between 0.4 OU and 5.5 OU at all receptors and 8.5 OU at the TriAusMin administration office. Results are presented in **Table 24** for the impacts due to the MBT Facility operation only, Bioreactor only and all sources (MBT Facility plus Bioreactor). It is noted that odour is not anticipated to be emitted from the TriAusMin Woodlawn Project and is therefore not considered.

The corresponding isopleth plots of these dispersion modelling results are presented in **Figure 24**, **Figure 25** and **Figure 26**.

Table 24 Predicted 99th Percentile 1 Second Average Odour Concentration – MBT Facility Operation

Receptor	Predicted Odour Concentration (OU/m³)			
	Bioreactor Only	MBT Operation Only	All Sources	Project Goal
1. “Woodlawn Farm”	3.9	1.7	5.5	6
2. “Cowley Hills”	2.1	0.8	2.9	6
3. “Pylara”	0.3	0.2	0.5	6
4. “Torokina”	0.5	0.3	0.7	6
5. “Tarago Village”	0.3	0.1	0.4	6
6. “TriAusMin Admin”	7.3	1.7	8.5	6

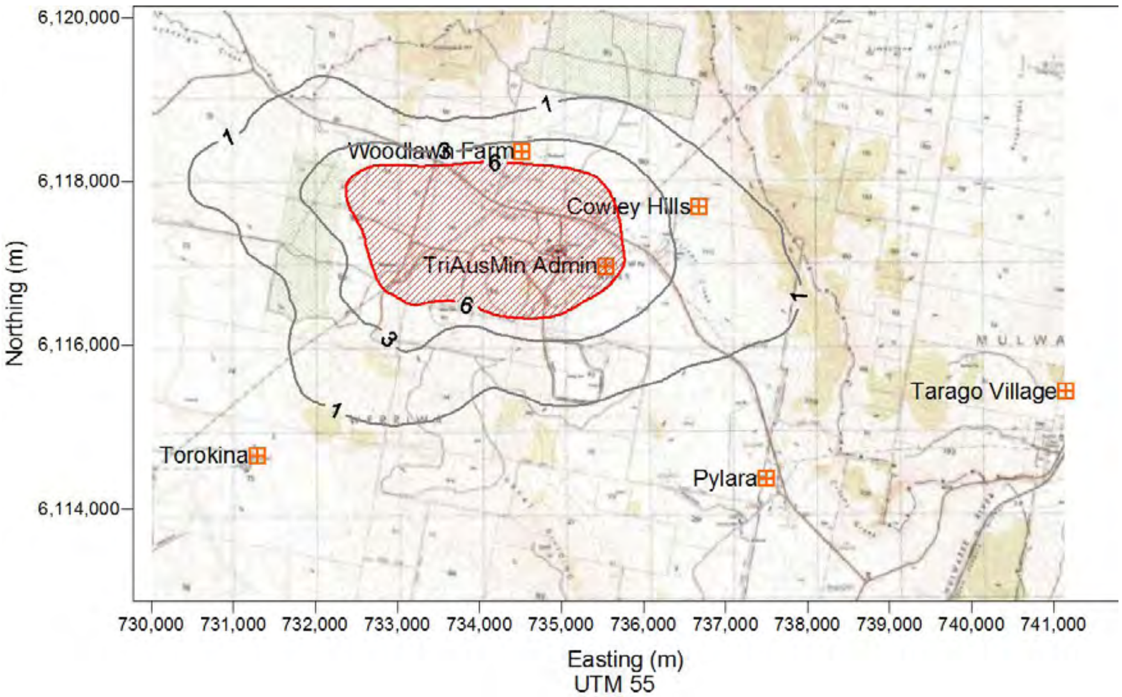
It is noted that the results presented in **Table 24**, **Figure 24**, **Figure 25** and **Figure 26** relate to the 99th percentile odour concentration, the 88th highest concentration of the 8,760 hours (1 year) which have been modelled. These results indicate that under worst case operating conditions, odour concentrations will satisfy the Project odour criterion of 6 OU at all surrounding receptors with the exception of the TriAusMin administration building (discussed further below). The compliance with the criterion of 6 OU indicates that the MBT Facility can operate up to the required 240,000 tonnes per annum of mixed waste, plus the 40,000 tonnes per annum of green waste without any exceedance of the criterion.

Although these predictions indicate that the NSW EPA criterion is not exceeded, they do not purport to show that *no odour* will be experienced at the receptors assessed within this report. As previously discussed in **Section 4.1** the odour criterion is designed to take into account the likelihood of sensitive individuals being present within a population, based on the population size. Additionally, the criterion is not designed to achieve *no odour.*

The detectability of an odour is a sensory property that refers to the theoretical minimum concentration that produces an olfactory response or sensation. This point is called the *odour threshold* and defines one odour unit per cubic metre (OU/m^3). An odour goal of less than 1 OU/m^3 would theoretically result in no odour impact being experienced.

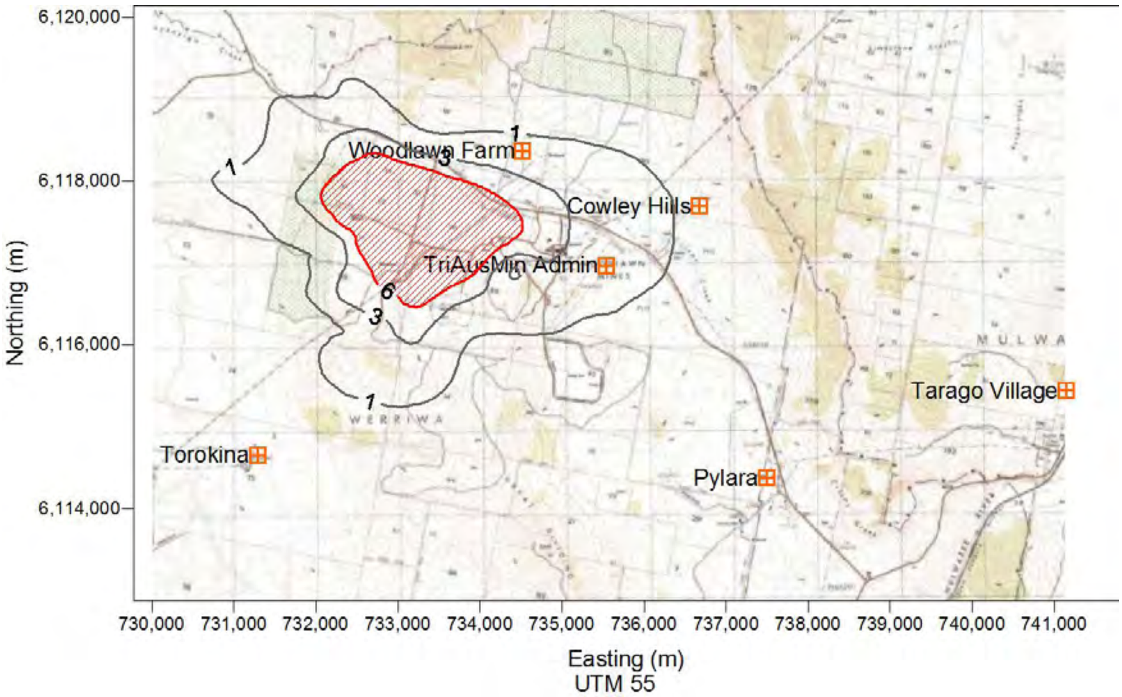
Concentrations of odour predicted to be experienced at the TriAusMin administration building are shown to be in exceedance of the odour criterion. It is shown in **Table 24** that the main cause of the exceedances is the operation of the Bioreactor with only a minor contribution from the proposed MBT Facility. It is considered that given the "industrial" nature of the operations at TriAusMin, and the fact that approval was sought and granted when the Bioreactor has been operating for several years that receptors may be less sensitive to the landfill odour, or more likely to accept it.

Figure 24 99th Percentile 1 Second Average Odour Concentration – Woodlawn Bioreactor Sources Only



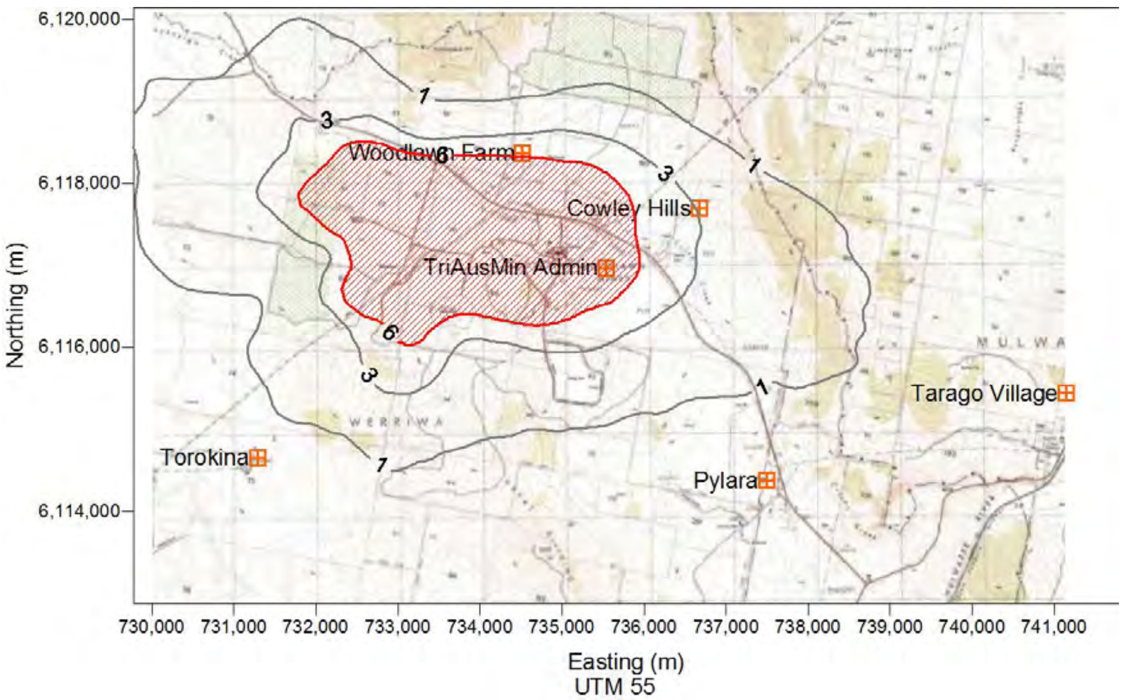
2005 Meteorology, Emission Rates adopted from **Section 7.1.3** Adopted Criterion – 6 OU

Figure 25 99th Percentile 1 Second Average Odour Concentration – MBT Sources Only



2005 Meteorology, Emission Rates adopted from **Section 7.1.3**; Adopted Criterion – 6 OU

Figure 26 99th Percentile 1 Second Average Odour Concentration – Bioreactor and MBT Sources (All Sources)



2005 Meteorology, Emission Rates adopted from **Section 7.1.3**; Adopted Criterion – 6 OU

8.4 Comparison with Previous Approval

The following sections describe the findings of the AQIA which have been performed for the Eco Project Site over recent years (2006 – present). Refinements in the adopted AQIA methodology, including the use of meteorological data, dispersion models and the approach to emissions estimation are discussed in addition to providing a summary of the findings of each AQIA.

Comparison is made below between the original AQIA for the approved Development, the AQIA performed for the Woodlawn Expansion Project and the current assessment. The Woodlawn Expansion Project has been used for comparison purposes as the impacts of the waste receival operations at the Bioreactor were not included within the original AQIA, but were included at currently approved receival rates in the Woodlawn Expansion Project AQIA. It is considered that comparison of the Woodlawn Expansion Project with the current assessment provides a “like-for-like” comparison and provides additional information when examining the predicted impacts within the original and current assessments alone.

8.4.1 Woodlawn Alternative Waste Treatment Technology Facility – AQIA (2006)

The Development gained Project Approval on 6 November 2007. Atmospheric dispersion modelling was performed (SLR [formerly Heggies], 2006) in support of this Approval to determine the cumulative odour and particulate impacts likely to be experienced at surrounding residences due to the operation of the Development and the Bioreactor as operational at that time (i.e. 500,000 tonnes of waste accepted for landfill per annum).

At the time of the assessment, odour emission rates from AWT sources were assumed based on a literature review of similar landfill odour assessments across NSW (i.e. Buttonderry Landfill, Woy Woy Landfill, Jacks Gully WMC and Camden Composting and Recycling Facility). Odour emissions from waste deposition in the Bioreactor were not assessed in the AQIA (2006). Particulate emissions were calculated based on the Commonwealth Department of Environment and Heritage National Pollutant Inventory Emission Estimation Technique Manual for Mining, Version 2.0 (DEH, 2000).

The Victorian EPA Ausplume dispersion model was used to predict cumulative (Development and Bioreactor) odour and particulate impacts using a two-dimensional meteorological field (i.e. no spatial variance assumed) which was constructed using site specific observations collected during 2005.

The findings of the assessment indicated that particulate matter and odour criteria were predicted to be met at all surrounding receptor locations. A summary of the findings is presented in **Table 25**.

8.4.2 Woodlawn Expansion Project – AQIA (2011)

The Woodlawn Expansion Project AQIA investigated the potential impacts on odour and particulate concentrations at surrounding receptors following a proposed (now approved) increase in waste acceptance at the Bioreactor to 1.13 Mt per annum. The approved Development was included within the dispersion modelling to assess the cumulative impacts of the AWT plus the increase in waste received at the Bioreactor.

Odour emission rates from Bioreactor sources were based on the results of a site specific monitoring exercise performed by SLR between 2007 and 2011. Particulate matter emission rates were derived from the Commonwealth Department of Environment and Heritage National Pollutant Inventory Emission Estimation Technique Manual for Mining, Version 2.3 (DEH, 2001).

The US EPA approved CALPUFF dispersion model was used to predict the cumulative odour and particulate impacts and used a three-dimensional meteorological field which was generated using site specific data from the year 2005. The use of a three-dimensional meteorological field allows the effects of topography to be included within the assessment.

Again, the findings of the assessment indicated that particulate matter and odour criteria were predicted to be met at all surrounding receptor locations. A summary of the findings is presented in **Table 25**.

8.4.3 Woodlawn Mechanical Biological Treatment Facility– AQIA (2013 [Current Assessment])

The current assessment investigates the impact of the redesigned MBT Facility with operations at the Bioreactor remaining as assessed in the Woodlawn Expansion Project. Since the submission of the Woodlawn Expansion Project, Veolia has commissioned two odour audits at the site (incidentally indicating marked reductions in odour emissions based on management practices adopted at the site), with the results of the most recent odour monitoring campaign being used to derive odour emission rates for the site. For the MBT Facility itself, The Odour Unit provided design criteria for the operation of the proposed odour control system (biofilters) based on predicted fugitive emissions from buildings, with odour emissions from the compost storage area being derived from monitored data.

Particulate matter emission rates were derived from the Commonwealth Department of Sustainability, Environment, Water, Population and Communities National Pollutant Inventory Emission Estimation Technique Manual for Mining, Version 3.1 (DSEWPC, 2012).

The dispersion modelling approach is as adopted for the Woodlawn Expansion Project, using the same 3-d meteorological field as input.

As with the previous AQIA, all air quality and odour criteria are predicted to be achieved. A summary of the findings is presented in **Table 25**.

No comparison of the impacts predicted during the MBT Facility construction phase are provided as impacts were not assessed in either the 2006 or 2010 AQIA for the Eco Project Site.

Although the methodology for emissions estimation and dispersion modelling has been refined over recent years, it is important to note that impacts of odour and particulate matter emissions are predicted to be below the relevant criteria in all assessments at all receptor locations (with the exception of odour at the TriAusMin administration building), including for the current MBT Facility.

Although an exceedance of the odour criterion is predicted at the TriAusMin administration building, the MBT Facility is predicted to contribute a minor amount to this exceedance. It is considered that the capture of fugitive emissions within the fermentation building and receival hall and use of biofilters to reduce odour emissions acts to reduce the odour impacts at all surrounding receptors.

Table 25 Summary of Previous AQIA Performed for the Eco Project Site

Receptor ID	Woodlawn Alternative Waste Treatment Technology Facility – AQIA (2006)	Woodlawn Expansion Project – AQIA (2011)	Woodlawn Mechanical Biological Treatment Facility– AQIA (2013 [Current Assessment])
Models and Data Used	**Ausplume Model 2-D Meteorology Literature Review of Odour Emissions PM Emissions (NPI, 2000)**	**CALPUFF Model 3-D Meteorology Monitored Odour Emissions (2007 – 2011) PM Emissions (NPI, 2001)**	**CALPUFF Model 3-D Meteorology Monitored Odour Emissions (2013) PM Emissions (NPI, 2012)**
Predicted Odour Impacts (OU) – Operations[3,4]			
1. "Woodlawn Farm"	2.4	2.9	5.5
2. "Cowley Hills"	2.5	1.5	2.9
3. "Pylara"	0.9	0.6	0.5
4. "Torokina"	1.2	0.7	0.7
5. "Tarago Village"	N/A	0.5	0.4
6: TriAusMin Admin	N/A	N/A	8.5
Predicted Particulate Matter Impacts - Operations			
Maximum 24hr PM_{10} (µg/m³) – Criterion 50 µg/m³			
1. "Woodlawn Farm"	49.0	43.9	40.4
2. "Cowley Hills"	48.2	42.0	45.6
3. "Pylara"	47.0	38.9	38.2
4. "Torokina"	47.0	38.8	37.9
5. "Tarago Village"	N/A	38.7	37.9
Annual Average PM_{10}[1] (µg/m³) – Criterion 30 µg/m³			
1. "Woodlawn Farm"	17.9	9.7	9.3
2. "Cowley Hills"	17.9	9.5	9.7
3. "Pylara"	17.7	9.2	9.2
4. "Torokina"	17.7	9.2	9.1
5. "Tarago Village"	N/A	9.1	9.2
Annual Average TSP (µg/m³) -Criterion 90 µg/m³			
1. "Woodlawn Farm"	N/A	<18.1	18.6
2. "Cowley Hills"	N/A	<18.1	19.5
3. "Pylara"	N/A	<18.1	18.4
4. "Torokina"	N/A	<18.1	18.2
5. "Tarago Village"	N/A	<18.1	18.5
Annual Average Dust Deposition[2] (g/m²/month)– Criterion 4 g/m²/month			
1. "Woodlawn Farm"	2.6	3.7	<3.1
2. "Cowley Hills"	2.6	3.7	<3.1
3. "Pylara"	2.5	3.6	<3.1
4. "Torokina"	2.5	3.6	<3.1
5. "Tarago Village"	N/A	3.7	<3.1

Note 1: - Annual average background PM_{10} assumed to be 17.6 µg/m³ in 2006 AQIA, and 9 µg/m³ in 2010 and current assessments

Note 2: Annual average background dust deposition assumed to be 2.5 g/m^2/month in 2006 AQIA, 3.5 g/m^2/month in 2010 AQIA and 3.0 g/m^2/month in current assessment

Note 3: N/A = Not modelled

Note 4: Impacts of TriAusMin operations are included within the predicted particulate impacts. These were not included within the 2006 or 2011 assessments.

9 CONCLUSIONS

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Veolia Environmental Services (Australia) Pty Ltd (Veolia) to undertake an Air Quality Impact Assessment (AQIA) of the proposed Woodlawn Alternative Waste Technology Project (the Development) located within the Woodlawn Eco Project Site, near Tarago, in the Southern Highlands of NSW.

9.1 Objectives

The objective of this report was to perform a comprehensive AQIA that addressed odour and particulate matter impacts during the construction and operation of the MBT Facility. It is noted that the Facility is to be capable of processing up to 240,000 tonnes per annum of mixed waste with an additional 40,000 tonnes per annum of green waste.

9.2 Approach to Assessment

A dispersion modelling exercise was performed to identify the potential impacts of the construction and operation phases of the proposed MBT Facility on surrounding receptors. In addition to the predicted impacts from the MBT Facility, impacts were also predicted resulting from the operation of the Woodlawn Bioreactor landfill and operations at the recently approved TriAusMin Woodlawn Project.

Background air quality was determined using available air quality monitoring data for the immediate area, monitored by Veolia in and around the Eco Project Site.

Estimates of odour and particulate emissions were calculated from monitored data (odour) and using available and appropriate emission factors (for particulate matter). These were then used as input to a dispersion model, along with modelled meteorological data which used measured data collected at the Eco Project Site.

9.3 Findings of the Assessment

9.3.1 Particulate Matter

PM_{10}

Maximum 24-hour PM_{10} concentrations resulting from the construction of the proposed MBT Facility have been predicted to be less than 4.4 µg/m^3 at all surrounding receptor locations. The addition of predicted impacts due to the Bioreactor operation, and the TriAusMin Woodlawn Project, plus a background, regional particulate matter component indicate that the NSW EPA criterion of 50 µg/m^3 will be achieved at all receptor locations.

Annual average concentrations of PM_{10} during MBT Facility construction are predicted to meet the relevant criterion at all surrounding receptors locations even with the addition of the Bioreactor operations and the TriAusMin Woodlawn Project. Maximum annual average PM_{10} concentrations resulting from MBT Facility construction are predicted to be 0.1 µg/m^3.

During MBT Facility operation, maximum 24-hour PM_{10} concentrations resulting from the MBT Facility operation are predicted to be less than 7.7 µg/m^3 at all receptors. Once again, the addition of predicted impacts due to the Bioreactor operation, and the TriAusMin Woodlawn Project, plus a background, regional particulate matter component indicate that the NSW EPA criterion of 50 µg/m^3 will be achieved at all receptor locations.

Predicted annual average PM_{10} concentrations are anticipated to easily meet the EPA criterion of 30 µg/m^3 when considering all sources during operation of the MBT Facility, with the MBT Facility itself providing a minor contribution of up to 1.6 µg/m^3.

TSP

Annual average TSP concentrations are predicted to easily meet the EPA criterion of 90 µg/m^3 during both the construction and operation of the MBT Facility. Construction activities contribute only 0.2 µg/m^3 to the annual average TSP concentration, with MBT Facility operations contributing only up to 3.9 µg/m^3 at any modelled receptor.

Dust Deposition

Dust deposition impacts resulting from both the construction and the operation of the MBT Facility are shown to meet the EPA criterion of 4 g/m^2/month at all receptors, with the addition of a 3.0 g/m^2/month background concentration dominating the cumulative predictions.

Odour

The adopted odour criterion of 6 OU is achieved at all receptors with the exception of the TriAusMin administration building which is predicted to experience a 99th percentile odour concentration of 8.5 OU. This concentration is predicted to be dominated by the existing source of the Bioreactor, rather than the operation of the MBT Facility which is predicted to result in a 99th percentile concentration of 1.7 OU when modelled alone.

9.4 Comparison with Previous Approvals

Comparison has been made between the original AQIA for the approved Development, the AQIA performed for the Woodlawn Expansion Project and the current assessment. The Woodlawn Expansion Project has been used for comparison purposes as the impacts of the waste receival operations at the Bioreactor were not included within the original AQIA, but were included at currently approved receival rates in the Woodlawn Expansion Project AQIA. It is considered that comparison of the Woodlawn Expansion Project with the current assessment provides a “like-for-like” comparison and provides additional information when examining the predicted impacts within the original and current assessments alone.

In summary, although the methodology for emissions estimation and dispersion modelling has been refined over recent years, it is important to note that impacts of odour and particulate matter emissions are predicted to be below the relevant criteria in all assessments at all receptor locations (with the exception of odour at the TriAusMin administration building), including for the current MBT Facility.

Although an exceedance of the odour criterion is predicted at the TriAusMin administration building, the MBT Facility is predicted to contribute a minor amount to this exceedance. It is considered that the capture of fugitive emissions within the fermentation building and receival hall and use of biofilters to reduce odour emissions acts to reduce the odour impacts at all surrounding receptors.

10 REFERENCES

- DSEWPC 2012, *National Pollutant Inventory Emission Estimation Technique Manual for Mining version 3.1* published by the Department of Sustainability, Environment, Water, Population and Communities
- Mott MacDonald 2013, *Woodlawn MBT Facility Concept Design Report*
- NSW DEC 2005, NSW Department of Environment and Conservation, "*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*", 26 August 2005.
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- The Odour Unit, 2012, *Woodlawn Bioreactor Expansion Project, Independent Odour Audit*
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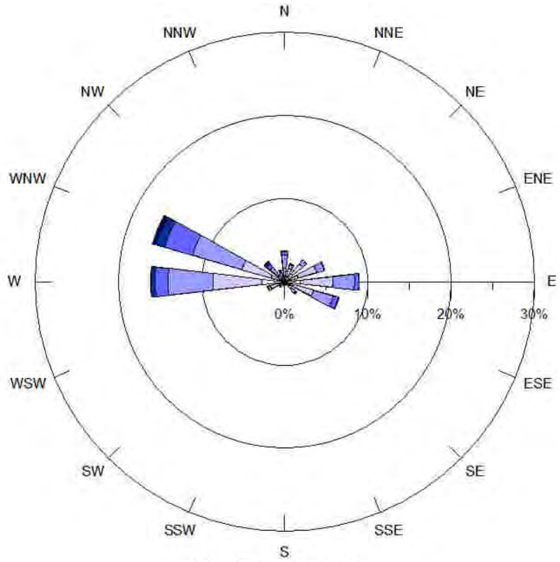
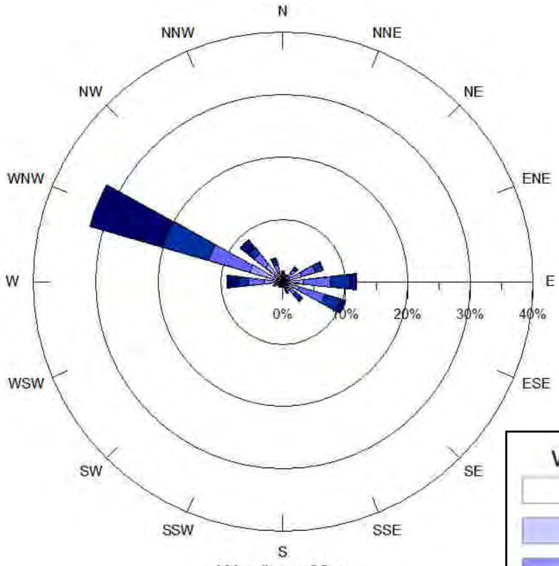
- VES and Umwelt, *2006, EA for Woodlawn AWT Project, Potential Impacts and Control Measures*

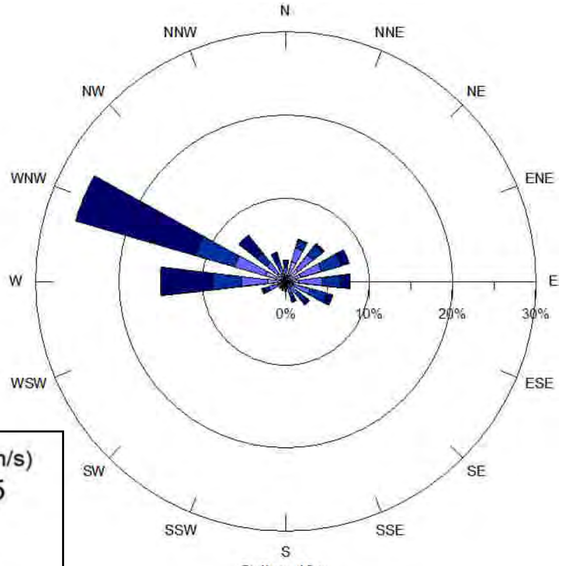
Annual and Seasonal Wind Roses for the Project Site – 2005 -2011



Woodlawn Bioreactor

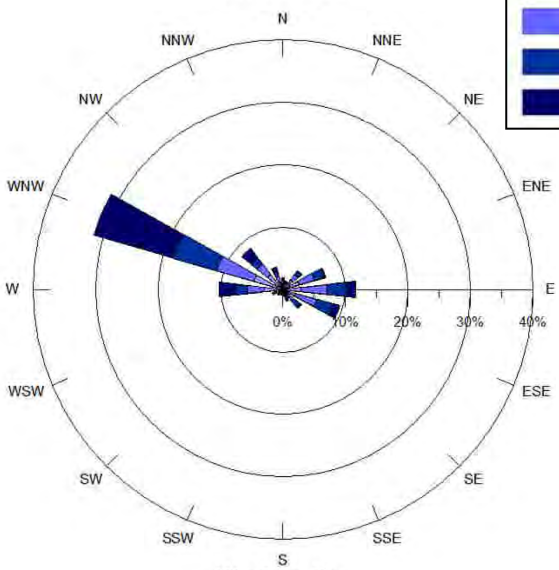


Woodlawn 30m

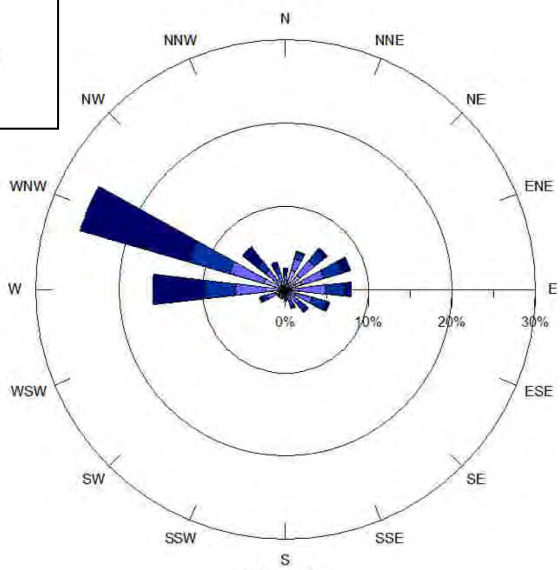


Collex 40m

Wind Speed (m/s)
- >0.5 - 1.5
- >1.5 - 3
- >3 - 5.5
- >5.5 - 8
- >8 - 10.5
- >10.5



Woodlawn 45m



Collex 65m

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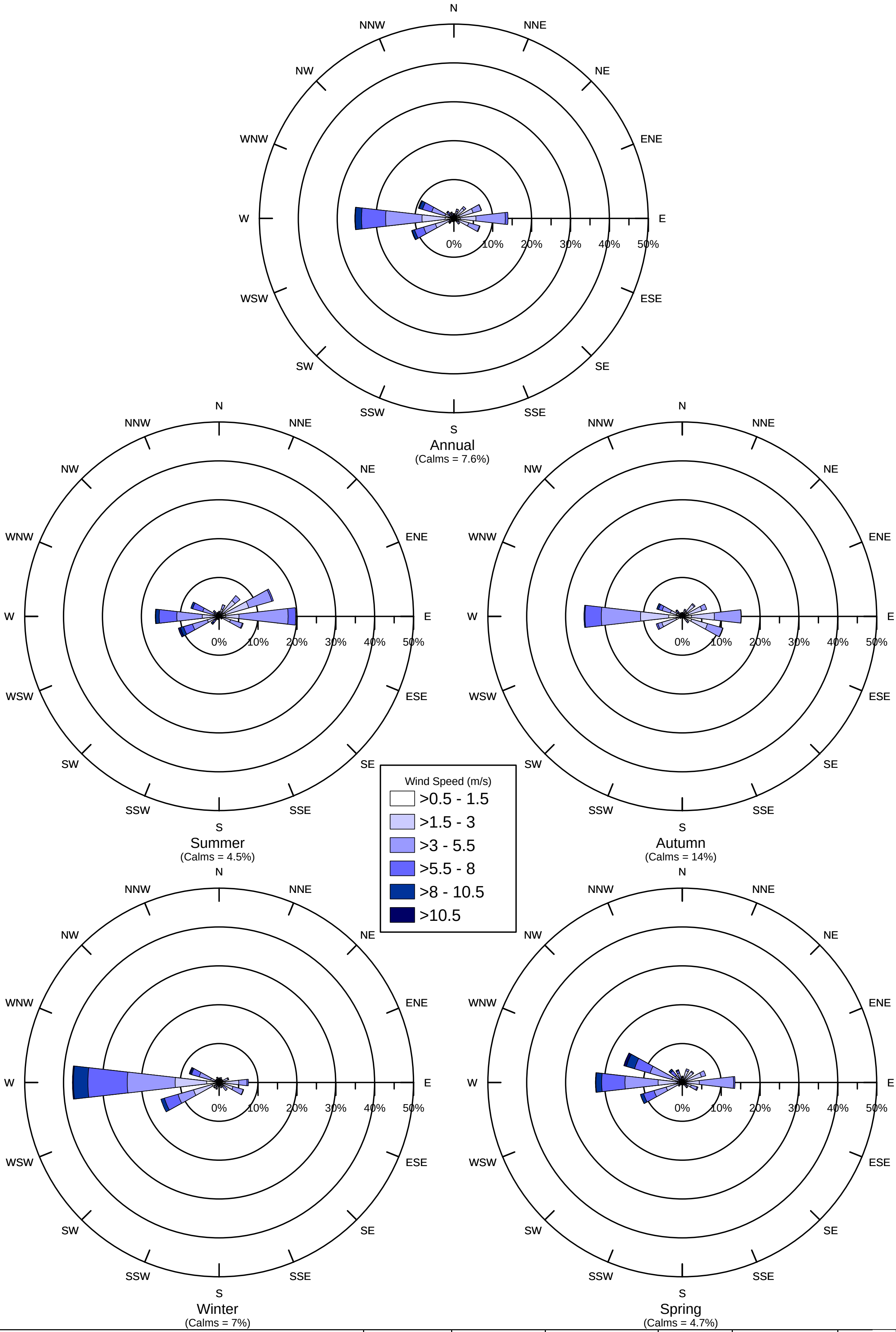
Designed by	Checked by	Approved by - date	Filename	Dated
RK	DR	DR – 09/06/06	30-1546	09/06/06

Appendix A: Annual Windroses for Woodlawn Weather Stations- 2005



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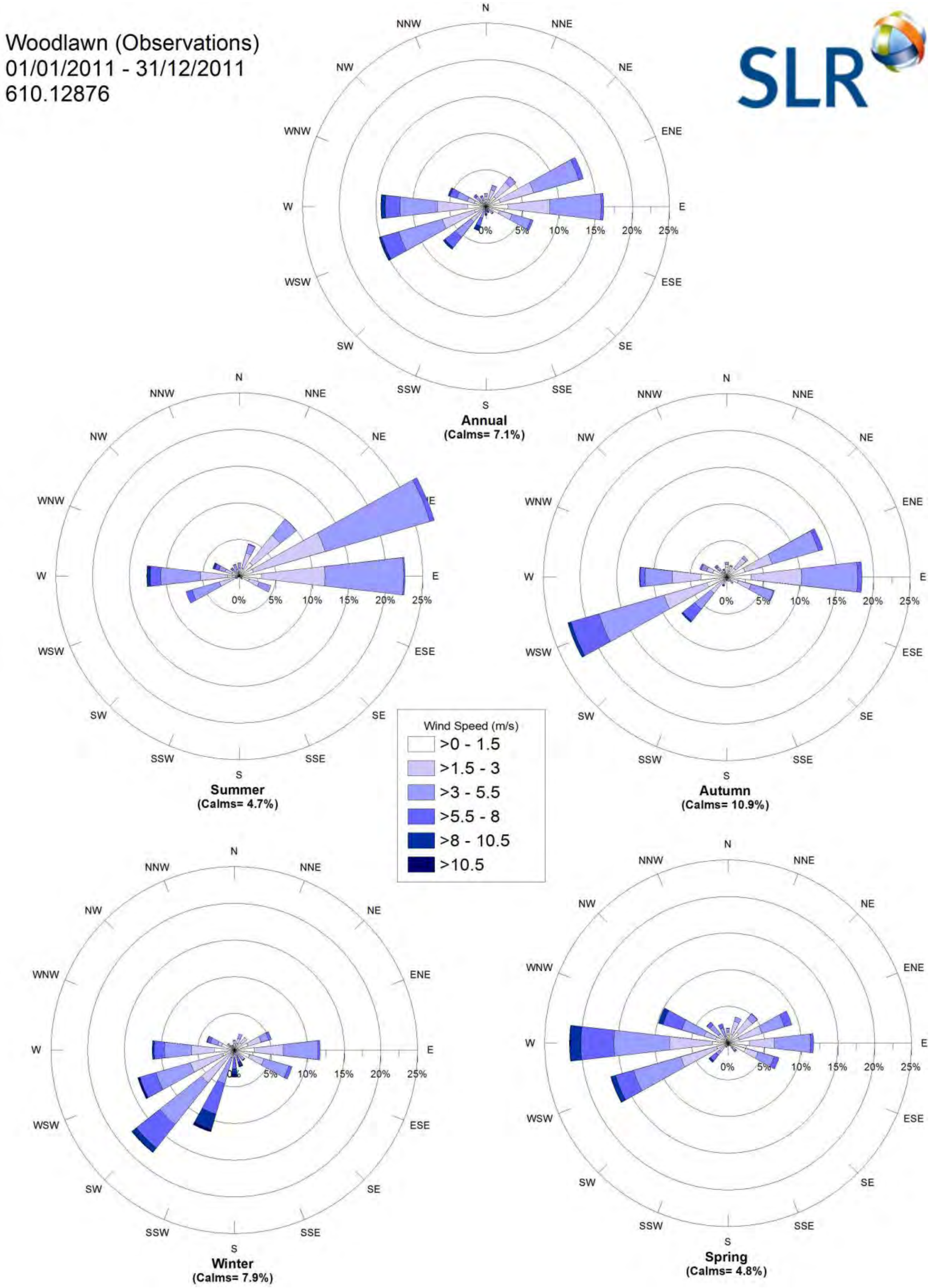
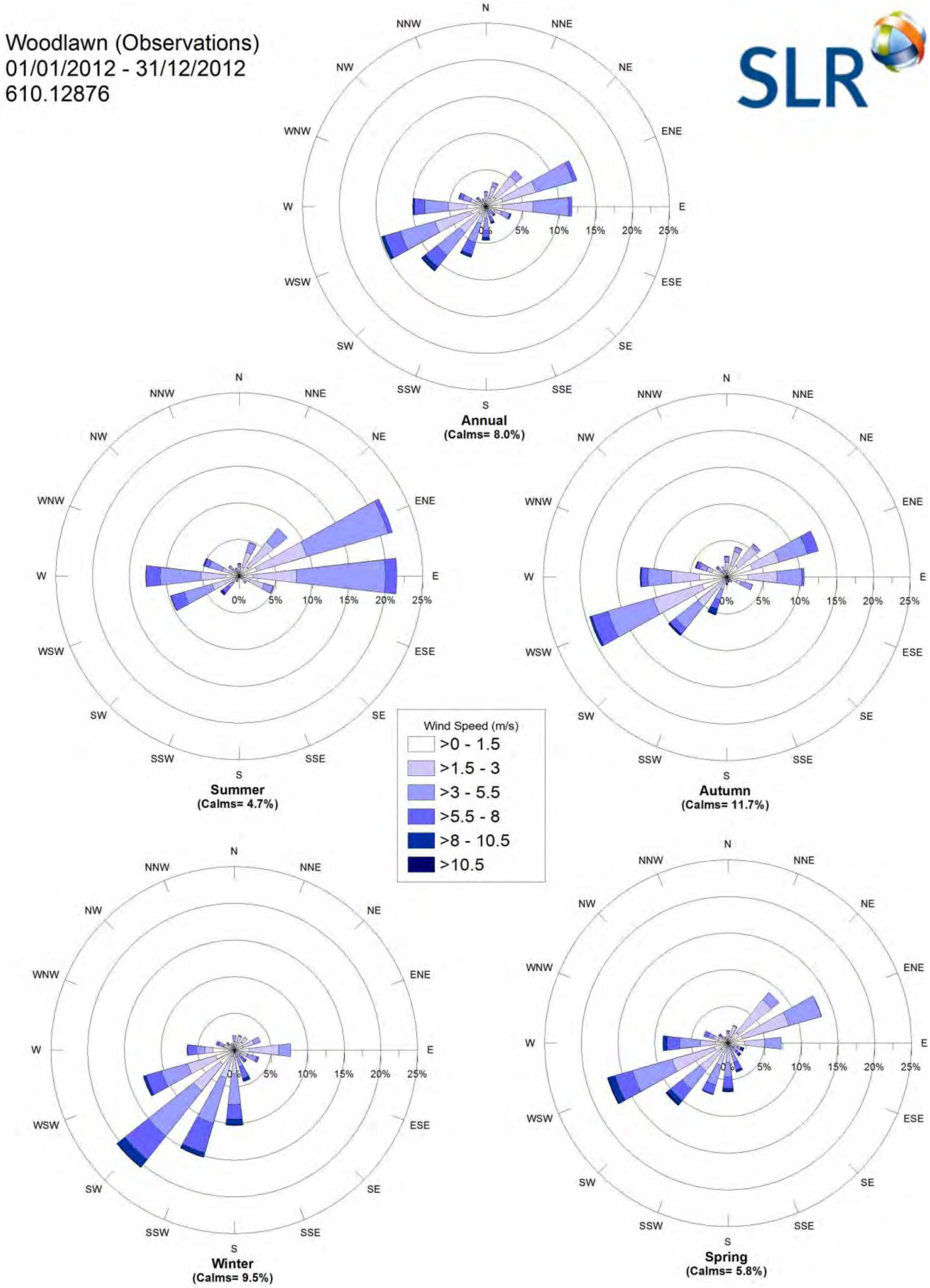
Designed by	Checked by	Approved by - date	Filename	Dated
MD	SF	MD	10-5410	18/12/09

Appendix A: Woodlawn Seasonal Windroses
March 2008 – March 2009

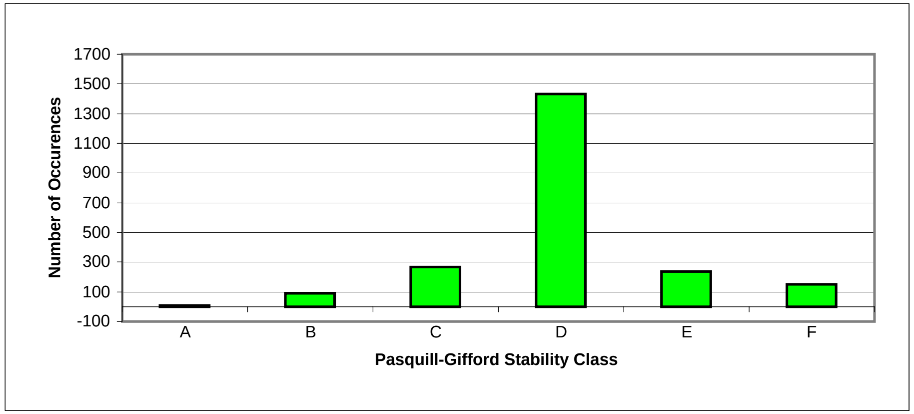
Annual and Seasonal Wind Roses for the Project Site – 2005 -2011



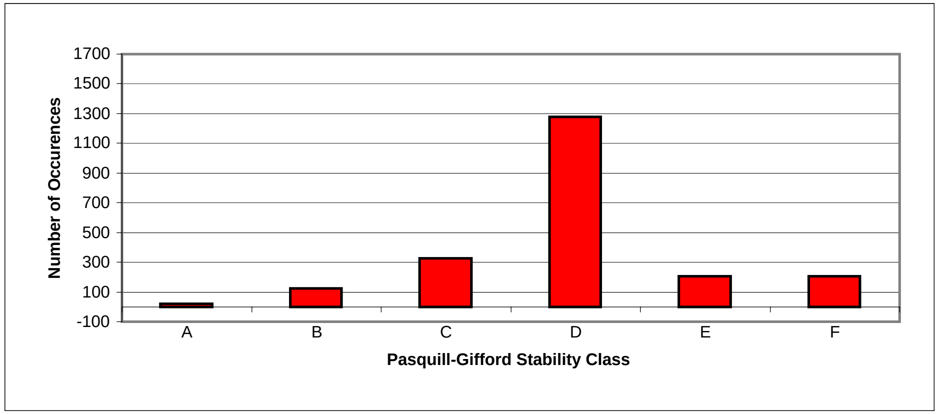
Annual and Seasonal Wind Roses for the Project Site – 2005 -2011



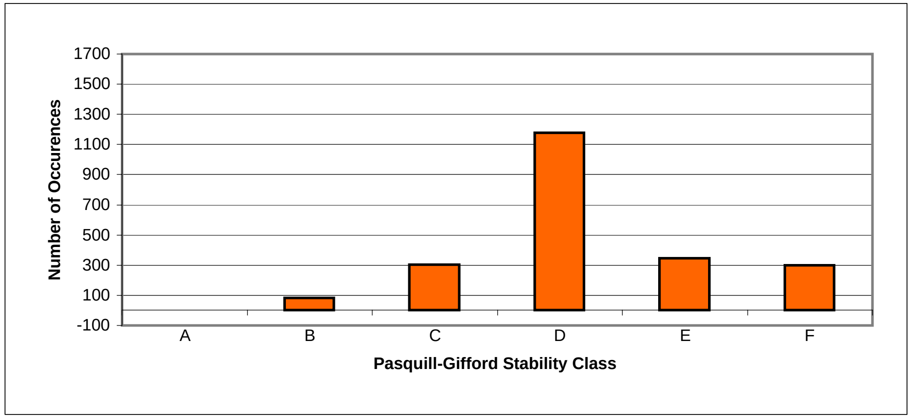
Seasonal Atmospheric Stability Class Distribution for the Project Site - 2005



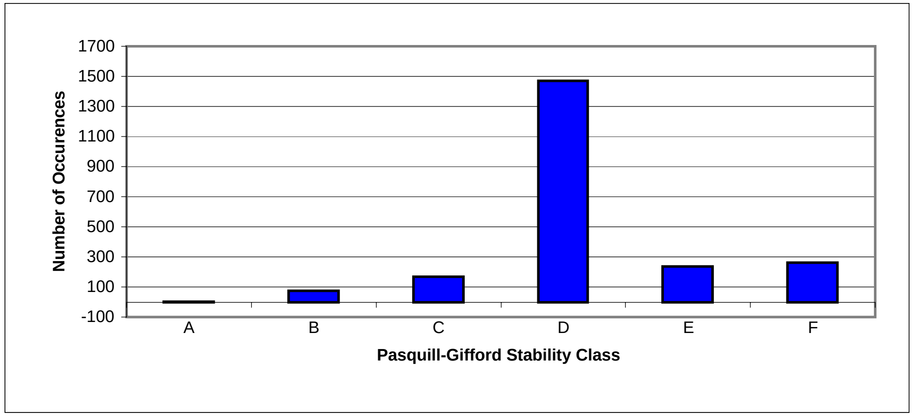
Spring



Summer



Autumn



Winter

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Designed by	Checked by	Approved by - date	Filename	Dated
SF	DR	31/08/2006		31/08/2006

Seasonal Stability Class Frequency Distribution for Woodlawn Site - 2005

Design Memorandum for MBT Odour Control (The Odour Unit)

THE ODOUR UNIT

DESIGN MEMORANDUM

TO:	**PROMIT BISWAS**
COMPANY:	**VEOLIA ENVIRONMENTAL SERVICES**
FROM:	**TERRY SCHULZ** **DATE: 30 JULY 2013**
JOB NO:	**N1907R.06**
SUBJECT:	**WOODLAWN MBT FACILITY – ODOUR CONTROL SYSTEM – PRELIMINARY CONCEPT DESIGN V2**

INTRODUCTION

The Memorandum contains a preliminary design of an Odour Control System (OCS) for the Woodlawn MBT Facility, to be located on the existing Bioreactor site operated by Veolia, outside Tarago, NSW. It replaces the earlier memo issued in draft form on 17 July 2013. The overall OCS will comprise two separate OCSs servicing the two different sections of the proposed plant, namely the Fermentation Building OCS (OCS2) and the processing areas/buildings upstream of the Fermentation Building (OCS1).

This Design Concept is to be used as a basis for discussion, leading to the development of a final OCS design concept, which will then be further developed into a detailed design by Mott MacDonald (Motts). It will also be incorporated into a supplementary environmental impact assessment report, being prepared by SLR Consulting Australia (SLR).

Appended to this memorandum is a summary brief for a small odour dispersion modelling study to be carried out by SLR which will determine the viability of a design for the Fermentation Building OCS2 involving a low air exchange rate and the potential for some minor release of fugitive odours from this building. This modelling is a necessary precursor to the finalisation of the overall OCS design concept. This Appendix can be issued direct to SLR .

CONCEPT DESIGN BASIS

In developing this concept design consideration has been given to the type of processes occurring at the proposed plant, the potential for each of these processing areas to generate odours, the layout of the plant, the proximity of the plant to potential odour receptors, and The Odour Unit's (TOU) experience with several other large in-vessel composting facilities across Australia. As a result, the proposed preliminary design concept is based on the following objectives:

- Capture and/or containment of all odours generated in the 'front-end' processing areas (Reception Building, BRS Drum system, Refining Tower Building and Buffer Storage Building);
- The maintenance of negative pressure conditions in these areas, under normal operating conditions;
- Capture of the bulk of the odours generated in the Fermentation Building, without necessarily achieving negative pressure conditions;
- Treatment of all odour captured by the two independent collection systems in a pair of up-flow, open-bed biofilters, each equipped with a foul air humidification system; and
- The lowest possible capital cost.

It is understood, from information supplied by Veolia that the proposed BRS composting process provides a higher level of process control of the composting process, and produces intermediate and final composted products with lower odour potential than similar drum-composting plants on which TOU has worked in recent years (most notably the Bedminster and Conporec processes).

The only significant odour emissions that would be released to atmosphere from the proposed OCS would be the treated emissions from the two biofilters, containing none of the original waste character, the emissions from the external Compost Maturation Area, and any fugitive emissions from the Fermentation Building. The proposed SLR dispersion modelling will be able to determine compliance with the NSW EPA's Odour performance Criterion for this facility.

SUMMARY OF TOU EXPERIENCE WITH SIMILAR PLANTS

Notwithstanding the differences in the composting processes at the large MSW composting plants that TOU has been involved with in recent years, the following comments are provided on the odours generated in the various processing areas of these plants:

- **Receival/Tipping Buildings** generate a characteristic MSW odour during the truck unloading and waste handling operations within these buildings that must be captured and treated. The necessary frequent truck movements provide an opportunity for fugitive odour release which can be problematical. Fast-acting doors may be required. TOU experience is that an air exchange rate of 3/hr is adequate, if the building is well-sealed during construction. There are no potentially problematic thermal buoyancy air movement effects inside this type of building.

- **Drum composter vessels** produce a low volume but extremely odorous waste airstream (typically several thousand cubic metres per hour) which needs to be captured and treated. The proposed BRS drum system is understood to be equipped with a proprietary hood design and airflow that can be incorporated into the final OCS design. TOU experience is that the unloading of the drums produces a disturbance and exposed waste that releases large volumes of odour, making the design of the hood collection units very important. Extraction from these hoods will need to be at a far greater rate than the process airflow leaving the drums. It is noted that this material is conveyed externally to the Refining Tower in covered conveyors.
- **Primary refining** further disturbs the partially-composted material, in the various screening and separation steps. TOU's experience is that this is a highly odorous process, although it is understood that the BRS drum system provided a longer retention time and a less odorous intermediate material. While chemical results provided by Veolia France seems to suggest that this area is not particularly odorous, it would be unwise to leave this building out of the OCS. The drum exit material will be hot and therefore thermal buoyancy effects will be significant, resulting in odours rising towards the under-roof area and possibly releasing from the building under thermal-induced positive pressure. TOU experience is that an air exchange rate of 3/hr is adequate, if the building is well-sealed during construction, in particular the wall/roof joints. Extraction at roof level is essential.
- TOU is not familiar with a separate **Buffer Storage** building, as this is usually part of the Aeration/Composting building area. While it is understood that there will be separate areas for inert materials and compost, this study has considered the Buffer Storage Building as a single entity. In the absence of further experience with this area an air exchange rate of 3/hr is proposed. Thermal buoyancy effects are possible is this building.
- The **Fermentation Building**, also known elsewhere as the Aeration Building or the Compost Hall, has been found to generate a very characteristic odour that is easily distinguished from other plant odours, having a 'harsh compost' character, with no evidence of either the MSW Reception Building odour or the fruity/estery MSW Drum odour. Most of TOU's experience is based on the Bedminster aerated and turned static piles process, which is understood to be far more odorous than the better process-controlled tunnel process proposed for Woodlawn. TOU has other experience with open tunnel systems but has been unable to differentiate the tunnel area odours from the other upstream process airstreams which all combine in a single large building. In these plants capture and treatment of all Fermentation Building air is essential, as this has been proven to cause off-site odour problems. In addition, negative pressure was a necessary part of the design of the OCS systems. Based on one set of 'odour unit' olfactometry data from Veolia France and the judgements of Veolia Australia and France personnel there

appears to be a case for providing less than full negative pressure conditions and lower airflows for this building. This is subject to a confirmatory odour modelling results and is discussed further below. Thermal buoyancy effects will still need to be considered, through the collection of the extracted air high in the building.

- The **Compost Maturation Area** stores composted product from the Fermentation Building in open windrows that will not be turned or disturbed until load-out. The extent to which this area emits significant amounts of odour will depend on the quality of the upstream composting processes. For the purposes of this assessment this area is not expected to be a significant odour source. Specific Odour Emission Rate (SOER) data compiled by TOU indicates that the Maturation Area will emit odour at a rate of between 0.29 and 0.43 ou.m^3/m^2/hr.
- **External Conveyors** conveying partially composted material through the refining process and into the Fermentation Building are not familiar to TOU. Because they are partially-enclosed/covered and small in exposed surface area, they have not been included in the OCS design.

CONCEPT DESIGN DETAILS

OCS1: Primary System

This design has assumed that it will be feasible to connect the Reception Building, the BRS Drums, the Refining Tower and the Buffer Storage Building to a single collection ductwork system, and has developed the following design concept based on this. However if, for example, ducting run lengths are prohibitive or the system deemed to be impractical for other reasons, it would be possible to split OCS1 into two smaller systems, each with its own smaller biofilter. Given that there is little economy of scale benefits with biofilters, this should possibly be considered. Another option would be to connect the Refining Tower and the Buffer Storage Building to OCS2 servicing the Fermentation Building.

The following Table summarises the proposed design parameters for OCS1.

Process Area	Volume (m^3)	Air exchanges/hr	Airflow (m^3/hr)	Comments
Reception Building	36,000	3	108,000	Fast doors may be needed
BRS Drums	3,000	VES design	(15,000)	Estimate only
Refining Tower	8,100	3	25,000	Effective building sealing, elevated ductwork
Buffer Storage	17,000	3	51,000	
TOTAL OCS1	**-**		**200,000**	

All buildings should be designed to be as airtight as practicable, to encourage negative pressures at the design airflows. This is particularly important at the wall/roof interfaces.

Air inlet louvres (fixed) are proposed, and should be strategically located at or near ground level, to encourage a stable upward airflow and provide cooling for plant operators on the floor. Details of the louvre sizing and location will be provided at a later date

A design airflow velocity of 20 m/s is proposed for the ductwork. Higher velocities are possible, but will incur higher fan power costs. The biofilter fan(s) should be designed for the above flow, at a pressure duty up to 3.5 kPa, and be fitted with variable speed drives.

A biofilter for this airflow would have a bed area of 1,100 m2, and a bed depth of 2m, based on an empty bed residence time of 40 seconds. The unit would be located in a position that minimised ducting costs. Pre-humidification of the foul air stream to the biofilter would use a cost-effective in-duct air-atomised spray nozzle system. This system has been used successfully at a 2,000 m^2 biofilter at a WCF plant in Western Australia and a 1,000 m^2 TOU biofilter in Tasmania.

There are several satisfactory designs and configurations for this biofilter and also for the OCS2 Biofilter. For the purposes of this concept design a standard TOU design has been used, as shown on the attached **Site Arrangement drawing (1907-005)**. This comprises a single-sided, open-front, 3-cell configuration, with a side-located concrete distribution chamber. Other design configurations are also provided, as a basis for discussions in which the final location, design and layout will be selected. Similarly, initial ducting layouts for the two odour collection systems are also shown in the drawing. The final selected location for the biofilters and fans will determine the optimum ducting layout.

OCS2: Fermentation Building System

The Fermentation Building has a volume of 124,000 m^3. The use of the same air exchange rate (3/hr) as adopted for OCS1 would result in a design airflow of 372,000 m^3/hr and a biofilter area of around 2,000 m^2. Based on the understanding that this building will be less odorous that equivalently sized Bedminster plants (the plant at SMRC in Perth is similar in capacity) it is proposed to adopt an exchange rate of 1/hr and accept that some fugitive emissions from the building may be possible under adverse wind conditions. A comparison of historical SMRC odour generation data for the Aeration Building (only) with the data supplied by Veolia France for a presumed similar sized facility in France has been carried out to test the hypothesis that the proposed process produces less odour. Note that the French data is for the entire facility, including Reception and Drums. The results of this comparison are as follows:

Parameter	Veolia France Entire Plant	SMRC Aeration Building
Airflow (m^3/hr)	83,000	442,000
Odour Concentration (ou)	23,500 – 55,000 ou range	2,900 – 11,600 ou range **7,400 mean (actual)**
Odour Generation Rate ($ou.m^3/s$)	545,000 – 1,250,000 ou **900,000 mean (arithmetic mean of 2 results)**	810,000 – 1,020,000 **910,000 mean (actual)**

It can be seen that the odour generation <u>rate</u> in both plants is similar, but the SMRC plant generates this from the Aeration Building only. Other emission data from the SMRC plant indicates that the Aeration Building accounts for approximately 80% of the total plant emissions. From this simple analysis it can be concluded that the Fermentation Building at the proposed plant will be significantly less odorous than the older-style Bedminster Aeration Building, generating odour within the building at a rate no greater than 720,000 $ou.m^3/s$.

It is therefore proposed to adopt an airflow of 124,000 m^3/hr for the extraction system from the Fermentation Building at Woodlawn. SLR modelling of the impact of fugitive emissions will be needed to justify this low airflow. TOU suggests modelling at 2% and 5% fugitive escape of odour from the building (equivalent to 14,400 and 36,000 $ou.m^3/s$ respectively). These estimates are highly conservative in that actual emissions would be unlikely to reach 5%. A 'pass' on the modelling would ensure that the proposed design passes scrutiny.

A biofilter for this airflow would have a bed area of 700 m^2, and a bed depth of 2m, based on an empty bed residence time of 40 seconds. The unit would be located in a position that minimised ducting costs. **Site Arrangement drawing (1907-005)**.shows a location that would allow a biofilter expansion, should Stage 2 of the development take place. The attached site arrangement drawing shows this biofilter in the location originally proposed, but identifies another location for consideration. Note that the biofilter area is smaller than that originally allocated.

The same in-duct spray humidification system as for the OCS1 biofilter would be used.

Fan specifications and ducting velocity parameters will be as per OCS1. A single fan is proposed for this application, on the basis that short term fan inactivity would not be problematical for the Fermentation Building. As an alternative two smaller fans operating at 62,000 m^3/hr would provide some level of redundancy.

The internal ducting for the extraction system would need to run longitudinally along the centreline of the building, as high in the roof as possible. As with the design for OCS1, various ducting/fan configurations are possible and should be discussed with Motts. Ducting should be manufactured from either **304SS or HDPE**. Galvanised iron will not be suitable in the expected environment of high internal moisture and possibly ammonia.

At this airflow normal building leakage would provide air inlet. Inlet louvres will not be required. This building will need close attention to wall/roof sealing, to prevent thermally buoyant escape of foul air to the atmosphere.

Notes on Site Arrangement Drawing

Site Arrangement drawing (1907-005) is for discussion purposes only, to be used as a basis for locating the two biofilters and developing a layout for the ducting systems. Key points are:

- The biofilter areas are considerably less than originally shown;
- The biofilter area shown for each biofilter is based on TOU's standard biofilter design (concrete floor, walls and distribution chamber). A typical design drawing can be provided at the appropriate time, on the understanding that a lower cost design will be pursued;
- An alternate location is suggested for each biofilter, without any local knowledge of the appropriateness of these locations;
- An alternate shape/configuration is also shown for each biofilter, to indicate that there are opportunities for lower cost construction techniques. This can be discussed and finalised during the design development process;
- The proposed ducting layout is provided for completeness, but is outside TOU's scope of work;
- Two fans are proposed for OCS1, drawing from a common extraction duct. An alternate arrangement would see two independent collection systems for OCS1, with one fan drawing from the Reception Building, and the other from the BRS system and the Refining and Buffer Storage Buildings; and
- A third biofilter system servicing only the Refining and Buffer Storage Buildings should be considered. This system is likely to save on ducting costs.

Cost Estimates

A preliminary cost estimate for the biofilters is $700 to $1,000 per square metre of nominal surface area, with the upper figure being for a fully-engineered concrete structure (floor, walls and distribution chamber). This includes an allowance for the internal components of the biofilters of $350/m^2 (based on many similar TOU projects). Opportunities exist for lower cost biofilter structures based on lightweight materials and innovative design. This can be explored during the design development phase of the project. The biofilter internals costs will not divert from the above estimate.

The estimate for the in-duct spray humidification systems for the two biofilter systems is $20,000 for each system, and includes Relative Humidity monitoring probes in each biofilter inlet duct. The cost estimates for alternative wet scrubber humidification systems is $400,000 for OCS1 and $250,000 for OCS2.

Estimates have been obtained from a fan supplier for the Biofilter fans, and are given below for a range of possible fan sizes. These prices are for supply only and do not include variable speed drives (VSDs) or electrics.

OCS1 Fan	200,000 m^3/hr	$145,000
OCS1 Fans	100,000 m^3/hr	2 x $95,000
OCS2 Fan	124,000 m^3/hr	$120,000
OCS2 Fans	2 x 62,000 m^3/hr	2 x $60,000

Ducting costs cannot be estimated at this stage of the design process.

The Odour Unit Pty Ltd

Terry Schulz,
Managing Director
30 July 2013

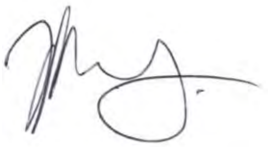
Summary of Modelling Brief to SLR

1. Carry out 'sensitivity' odour dispersion modelling of fugitive odour releases from the Fermentation Building in isolation to check the significance of this emission. Model as a volume source under two emission scenarios, namely 22,500 and 45,000 ou.m^3/s. Feedback to TOU as soon as possible, in order to finalise design concept for OCS2.

2. Carry out dispersion modelling of the entire facility based on the emission sources and emission rates given below, and biofilter locations shown in the attached site arrangement drawing. The locations of the two biofilters will need to be finalised before this modelling can proceed.

OCS1: Biofilter 1,100 m^2, 200,000 m^3/hr, 500 ou
OCS2: Biofilter 700 m^2, 124,0000 m^3/hr, 500 ou
Compost Maturation Area: 0.36 ou.m^3/m^2/s SOER for exposed surface area of windrows (SOER x Area = OER)
Fugitive emission rates: to be determined for Fermentation Building, from sensitivity modelling results. Minor emissions from conveyors excluded from modelling.

The Odour Unit Pty Ltd



Terry Schulz,
Managing Director
30 July 2013

Particulate Emissions Inventory

Activity	Emission Rate (kg/annum)		Intensity	Unit	Operating Hours (hrs/day)
	TSP	PM_{10}			
Existing Operation					
Hauling	120,899	31,065	15.6	VKT/hr	16
Dozer	584	75	4992	Hrs	16
Unloading waste material	45	23	1.13	Mtpa	16
Wind erosion –Covered Area	42,078	21,039	12	Ha	24
Proposed MBT Operation					
Hauling	95,906	24,643	12.4	VKT/hr	16
Material transfer	8	4	200	ktpa	16
Wind erosion – Storage Area	4,042	2,021	1.15	ha	
Gas Engines					
24 × 1 MW GE Jenbacher Engines	NA	21,221	3.5	m^3/hr	24

Appendix F2 : Traffic Impact Assessment

Woodlawn Mechanical Biological Treatment Facility

Veolia Environmental Services

27-Nov-2013

Woodlawn MBT Facility

Traffic Assessment

Woodlawn MBT Facility

Traffic Assessment

Client: Veolia Environmental Services

ABN: 20 051 316 584

Prepared by

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27-Nov-2013

AECOM in Australia and New Zealand is certified to the latest version of ISO9001, ISO14001, AS/NZS4801 and OHSAS18001.

Quality Information

Document Woodlawn MBT Facility – Traffic Assessment

Ref 60305022

Date 27-Nov-2013

Prepared by Parish Chandra

Reviewed by Nick Bernard

Revision History

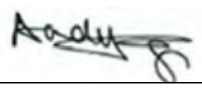
Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	14-Aug-2013	Draft	Andy Yung Principal Planner	Original signed
B	17-Sep-2013	Draft	Andy Yung Principal Planner	Original signed
C	08-Nov-2013	Draft Final	Andy Yung Principal Planner	Original signed
0	25-Nov-2013	Final	Andy Yung Principal Planner	Original signed
1	26-Nov-2013	Updated Final	Andy Yung Principal Planner	Original signed
2	27-Nov-2013	Updated Final	Andy Yung Principal Planner	

Table of Contents

Executive Summary

This Traffic Impact Assessment (TIA) supports the Environmental Assessment for the modification to the Project Approval 06_0239, which relates to the construction and operation of the Woodlawn Alternative Waste Technology (AWT) Project (the Development). The Development was granted Project Approval on 6 November 2007.

The proposed Development is approved to be developed within the 6,000 ha Woodlawn Eco Project Site, owned and operated by Veolia Environmental Services (Australia) Pty Ltd and located in the Southern Highlands of NSW, approximately 250 kilometres southwest of Sydney. The proposed Development, hereon referred to as the Woodlawn Mechanical Biological Treatment (MBT) Facility, will be sited on an area of approximately 30 ha, within the Eco Project Site.

An assessment of the traffic impacts due to proposed changes in waste receipt operational hours, capacity of the containers transporting the waste and site access to the MBT facility, was undertaken. Access to the MBT facility is now proposed to be at the existing Woodlawn Eco Project site access.

Assessments of traffic conditions in the main construction year (2015), year of opening (2016) and a 10-year horizon (2026) were compared to conditions in the current year (2013). The MBT facility is proposed to receive 280,000 tpa of waste, which would be in addition to the approved 1.13 million tpa of waste that the Bioreactor at the Eco Project site can receive.

The waste would originate from Sydney and reach the IMF by train. It would then be loaded onto trucks and transported by road to the MBT facility. Based on waste transport occurring six days a week, 52 weeks a year, in containers of 31.5 tonnes net payload capacity, a total of 29 daily truck trips would be required to transport the waste to the MBT facility (i.e. 58 daily truck movements on the haulage route).

The site access intersection was assessed with the construction and operational traffic from the MBT facility and was shown to operate at a very good level of service in all assessment periods. The mid-block capacities of the surrounding roads and the roads on the haulage route were also assessed and they continue to operate at a very good level of service. Therefore, the proposed modifications to the approved development of the MBT facility are likely to have a minimal impact on traffic operations and road safety.

1.0 Introduction

1.1 Background

This Traffic Impact Assessment (TIA) supports the Environmental Assessment for the modification to the Project Approval 06_0239 (the Project Approval), which relates to the construction and operation of the Woodlawn Alternative Waste Technology (AWT) Project (the Development). The Development was granted Project Approval on 6 November 2007.

The proposed Development is approved to be developed within the 6,000 ha Woodlawn Eco Project Site (the Site), owned and operated by Veolia Environmental Services (Australia) Pty Ltd (Veolia) and located in the Southern Highlands of NSW, approximately 250 kilometres southwest of Sydney. The proposed Development hereon referred to as the Woodlawn Mechanical Biological Treatment (MBT) Facility, will be sited on an area of approximately 30 ha, within the Eco Project Site.

The Woodlawn Bioreactor (the Bioreactor), located at the same Site is approved to receive 1.13 million tonnes per annum (Mtpa) of waste from Sydney and regional locations. Regional waste to Bioreactor is transported via road directly to the Site. Waste from Sydney is transported to the Crisp Creek Intermodal Facility (IMF) by rail and transported to the Bioreactor via road. The proposed MBT facility will receive an additional 280,000 tonnes of waste from Sydney in the same manner.

This report presents an assessment of the traffic impacts due to proposed changes in waste receipt operational hours, capacity of the containers transporting the waste and site access to the MBT facility. An assessment was undertaken for the construction and operation phases (at year of opening and at a 10-year horizon) of the proposed MBT facility. The report has been prepared in accordance with the Guide to Traffic Generating Developments RMS (formerly RTA) NSW.

1.2 Site location

The Site is located in Tarago, within the Goulburn Mulwaree Local Government Area (LGA). It is approximately 250km south-west of Sydney, approximately 40km south of Goulburn and approximately 50km north-east of Canberra. The Site in its regional context is shown in **Figure 1**

Figure 1: Location of Woodlawn Eco Project Site

Source: AECOM, 2013

2.0 Existing traffic conditions

2.1 Road network

The Site is accessed via Collector Road, off Bungendore Road. At present, containerised waste from Sydney is transported to the Site from the IMF along the following designated B-double route, as shown in **Figure 2**:

- Bungendore Road, Tarago (3km)
- Collector Road, Tarago (7km).

Figure 2: Existing haulage route

Source: AECOM, 2013

2.1.1 Bungendore Road (Tarago Road)

Bungendore Road connects Braidwood Road at Tarago with the Kings Highway in the town of Bungendore. The section of Bungendore Road south of Mount Fairy becomes Tarago Road as it approaches Bungendore. The road is a sealed, divided road with one lane in each direction and has a posted speed limit of 100km/h for the majority of its length. The posted speed limit reduces to 50km/h travelling through Tarago and Bungendore.

2.1.2 Collector Road

Collector Road forms a T-intersection with Bungendore Road approximately 2.5km south of Tarago and connects Bungendore Road with the Site. The road is a sealed, divided road with one lane in each direction and has a speed limit of 100km/h.

In terms of safe sight distance when exiting from Collector Road, the intersection of Collector Road / Bungendore Road is considered to be acceptable as there is good visibility to north and south. There is also a deceleration and an acceleration lane on Bungendore Road at the intersection.

2.1.3 Site access

The access road to the Site connects to Collector Road via a priority controlled T-intersection. The intersection has a separate left turn/deceleration lane on the Collector Road eastern approach for trucks entering the site, so as not to interfere with the through traffic on Collector Road. In terms of safe sight distance when exiting the access road, there is good visibility to both the east and west.

2.2 Proposed road upgrades

There are no proposed major upgrades, in terms of changes to capacity, to the local roads in proximity to the Site.

2.3 Traffic volumes

Annual Average Daily Traffic (AADT)[1] has been obtained from Roads and Maritime Services (RMS) to determine the historical traffic growth and mid-block traffic flows in the surrounding area.

Historical traffic growth has been estimated from traffic data between 1984 to the latest available data and subsequently used to estimate existing and future background AADT's for each road.

Table 2.1 shows historical AADT volumes at the RMS stations in the vicinity of the site (shown on **Figure 3**).

Table 2.1: Historical Traffic Volumes and Growth

Station Number	Road	AADT								% growth per yr
		1984	1988	1992	1994	1997	2000	2003	2006	
94.136	Tarago Road	630	-	-	820	-	-	-	-	2.7%
94.470	Bungendore Road	270	589	593	596	789	684	663	601	3.7%
94.143	Bungendore Road	1,010	2,414	1,524	1,731	1,733	2,085	2,577	-	5.1%

Source: RMS Traffic Volume Data

The original Environmental Assessment[2] indicated that Collector Road had about 57 vehicle movements per day in 2005 between the Bungendore Road intersection and the site access with approximately 7% heavy vehicles. As no other historical data is available for Collector Road, the growth rate of the nearest available count data, i.e. Tarago Road, was used to forecast existing and future background AADT on this road.

Table 2.2 presents the existing background traffic flows for 2013 and the future background traffic flows on the surrounding roads for 2015 and 2016. Construction of the MBT facility is proposed to commence in July 2014 and be completed in the first quarter of 2016 (including commissioning). Therefore, 2015 has been used as the assessment year for construction impacts, with operations commencing in 2016 and 2026 the 10-year horizon from start of operations.

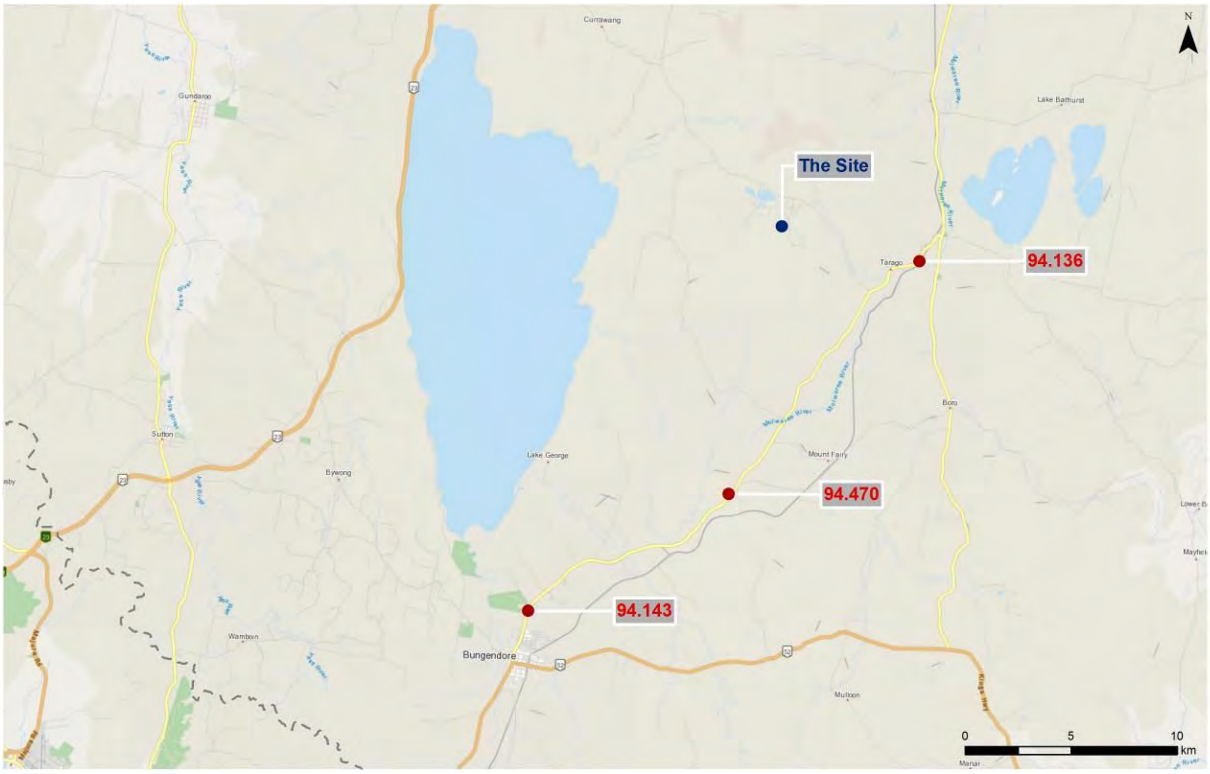
Table 2.2: Background AADT for assessment years (without Woodlawn operations or other committed developments)

Road	Location	Latest available AADT (year)	Growth per year	2013 AADT	2015 AADT	2016 AADT	2026 AADT
Tarago Road	Tarago, at railway crossing	820 (1994)	2.7%	1,360	1,435	1,474	1,923
Bungendore Road	South of Mt Fairy	601 (2006)	3.7%	775	833	864	1,906
Bungendore Road	Bungendore, N of Kings Hwy	2,577 (2003)	5.1%	4,238	4,681	4,920	8,503
Collector Road	West of Tarago Road	57 (2005)	2.7%	71	74	76	100

Source: AECOM, 2013

[1] Annual Average Daily Traffic is the sum of the total traffic (two-way) on a road for the entire year divided by 365 days.
[2] Umwelt (Australia) Pty Ltd, *EA for Woodlawn AWT Project*, November 2006

Figure 3: AADT Station Locations



Source: RMS

Table 2.3 presents the existing traffic flows for 2013 and the future traffic flows for 2015, 2016 and 2026 including the existing and forecast traffic from committed developments in the area. The 2013 flows include the current operational traffic from the Bioreactor and construction traffic from the TriAusMin Woodlawn Project[3], while the 2015, 2016 and 2026 flows include the forecast operational traffic based on the approved 1.13 Mtpa of waste to be received at the Bioreactor and the construction and operational traffic from the TriAusMin Woodlawn Project[4]. Traffic from the TriAusMin Woodlawn Project peaks in 2016, when both construction and operational traffic is present. More detail on other committed developments is provided in **Chapter 4**

Table 2.3: Existing and future AADT for assessment years (including Woodlawn Bioreactor operations and other committed developments)

Road	Location	2013 AADT	2015 AADT	2016 AADT	2026 AADT
Tarago Road	Tarago, at railway crossing	1,450	1,530	1,697	2,104
Bungendore Road	South of Mt Fairy	879	928	1,121	2,081
Bungendore Road	Bungendore, N of Kings Hwy	4,342	4,776	5,177	8,678
Collector Road	West of Tarago Road	375	554	846	746

Source: AECOM, 2013

[3] Based on forecast flows from Parsons Brinckerhoff, *TriAusMin Woodlawn Project Traffic Impact and Haulage Route Assessment*, April 2011
[4] Ibid

2.4 Road network level of service

2.4.1 Midblock level of service

An indicative level of service (LOS) for the surrounding roads was assessed based on the existing and future year traffic forecasts. The assessment criteria were taken from Table 3.9 of the Guide to Traffic Engineering Practice – Part 2: Roadway Capacity (AUSTROADS, 1999). The level of service relative to AADT for two-lane, two-way rural roads is used to give an overall appreciation for planning purposes, particularly where detailed terrain and geometric data is not available. For this study a level terrain was assumed on all surrounding roads. **Table 2.4** presents the midblock level of service on the surrounding roads for the assessment years.

Table 2.4: Levels of service based on AADT for assessment years

Road	Location	Max AADT at LOS A*	2013 AADT (LOS)	2015 AADT (LOS)	2016 AADT (LOS)	2026 AADT (LOS)
Bungendore Road	Tarago, at railway crossing	2,400	1,450 (A)	1,530 (A)	1,697 (A)	2,104 (A)
Bungendore Road	South of Mt Fairy	2,400	879 (A)	928 (A)	1,121 (A)	2,081 (A)
Tarago Road	Bungendore, N of Kings Highway	4,800	4,342 (A)	4,776 (A)	5,177 (B)	8,678 (C)
Collector Road	West of Tarago Road	2,400	375 (A)	554 (A)	846 (A)	746 (A)

* From AUSTROADS, 1999
Source: AECOM, 2013

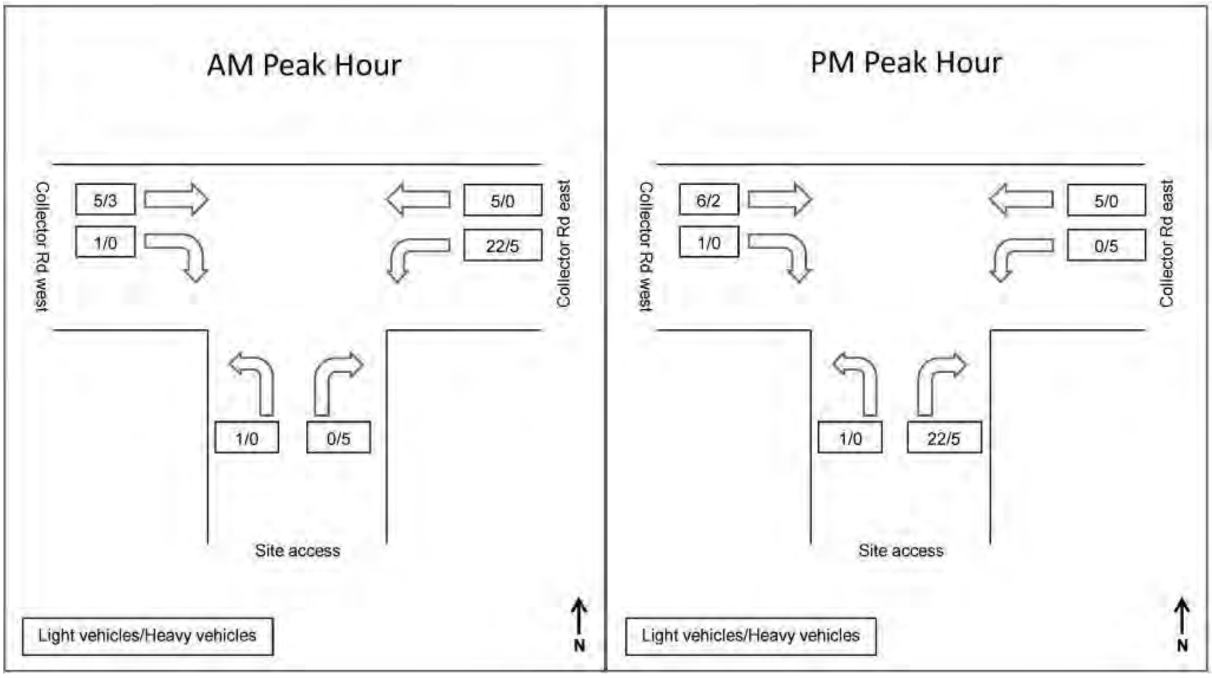
This illustrates that the roads in the vicinity of the Site are operating well within capacity and at a good operational level of service. LOS A, B and C are defined by the Guide to Traffic Engineering Practice – Part 2: Roadway Capacity (AUSTROADS, 1999) in the following way:

- LOS A is a condition of free flow in which individual drivers are virtually unaffected by the presence of others in a traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent; and
- LOS B is in the zone of stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream, although the general level of comfort and convenience is a little less than level of service A.
- LOS C is also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.

2.4.2 Intersection level of service

The level of service at the existing Site access intersection was assessed during the morning (AM) and evening (PM) peak hours in 2013. These two peak hours are the busiest hours at the intersection when employees are either arriving or leaving and heavy vehicles are also operating, i.e. the busiest traffic conditions. The 2013 traffic flows (through and turning movements) at the intersection are shown in **Figure 4**. These comprise the background traffic flow on Collector Road and the vehicles turning in and out of the Site, based on the Bioreactor's existing operational receipt of 500,000 tpa of waste. It is noted that traffic from other committed developments in the area do not travel through this intersection.

Figure 4: Site access intersection traffic flows (2013)



The intersection performance was evaluated using SIDRA Intersection 5.1, a computer based modelling package designed for estimating operational traffic performance of an intersection. The main performance indicators include:

- Degree of Saturation (DoS) – measure of the ratio between traffic volumes and capacity of an intersection; is used to measure the performance of isolated intersections. As DoS approaches 1.0, both queue length and delays increase rapidly. Satisfactory operations usually occur in a DoS range between 0.7 and 0.8, or below.
- Average Delay – duration, in seconds, of the average vehicle waiting at an intersection.
- Level of Service (LoS) – a measure of the overall performance of the intersection (this is explained further in **Table 2.5**).

Table 2.5: Performance criteria for intersections

Level of Service	Average Delay (secs/veh)	Traffic Signals, Roundabouts	Give Way and Stop Signs
A	<14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays	At capacity; requires other control mode
F	>70	Roundabouts require other control mode	At capacity; requires other control mode

Source: Guide to Traffic Generating Developments, RTA, 2002

Table 2.6 shows the intersection performance at the site access intersection. It indicates that the site access intersection performs at LoS A in both the AM and PM peak hours. **Appendix A** provides detailed intersection performance results.

Table 2.6: Peak hour intersection performances

Assessment Year	AM Peak				PM Peak			
	Vehicle (veh/hr)	DoS	Average Delay (secs)*	LoS	Vehicle (veh/hr)	DoS	Average Delay (secs)*	LoS
2013 (Existing)	47	0.016	13.6	A	47	0.034	13.5	A

* The average delay represents the delay of the worst performing approach movement.
Source: AECOM, 2013

3.0 Approved and proposed operations

The Project Approval proposed an alternative sorting and processing facility which would handle up to 240,000 tonnes of mixed waste per year and an organics and green-waste facility which would handle up to 40,000 tonnes of garden organics per year. This 280,000 tonnes per annum (tpa) of waste is in addition to the approved 1.13 Mtpa of waste that the Bioreactor can now receive.

The proposed modification seeks to retain the approved waste volumes as per the original approval. The containerised waste will be loaded onto trucks and transported by road to the MBT facility. Assuming waste transport occurs six days a week throughout the year in containers of 31.5 tonnes net payload capacity, an estimated 29 daily truck trips would be required to transport the waste.

While the Project Approval proposed a new access road for receiving the MBT waste, it is now proposed that the existing site access to the Site is used by traffic to and from the MBT facility. **Table 3.1** presents the changes proposed in this modification.

Table 3.1: Changes proposed from the Project Approval

Criteria	Original Project Approval	Proposed changes
Annual input rate for MBT facility	240,000 tpa mixed waste + 40,000 tpa green waste	No change
Operational days		
1. Waste Receipt	Monday to Saturday (6 days/week for 52 weeks/year)	No change
2. Indoor Operations	Monday to Saturday	No change
3. Outdoor Operations & Product Dispatch	Monday to Friday	Monday to Saturday
4. Emergency	Monday – Sunday	No change
Hours of operation		
a. Construction	7am to 6pm (Monday – Friday) 7 am to 1 pm (Saturday) Nil – (Sunday & Public Holidays)	No change
b. Operations		
1. Waste Receipt	6 am to 7 pm (Monday – Saturday)	6 am to 10 pm (Monday - Saturday)
2. Indoor Operations	6 am to 10 pm (Monday – Saturday)	No change
3. Outdoor Operations & Product Dispatch	6 am to 7 pm (Monday - Friday)	6 am to 10 pm (Monday - Saturday)
4. Emergency	Anytime (Monday – Sunday)	No change
Container capacity	28.5 tonnes	31.5 tonnes
Site access	Separate access road on Collector Road (approximately 2.5km west of the main Eco Project access road)	Use existing main Eco Project Site access road on Collector Road

4.0 Non-Veolia operations

Other non-Veolia operations located within the Woodlawn Eco Project site include the Woodlawn Wind Farm and the TriAusMin Woodlawn Project. **Figure 5** provides an indicative location of these operations.

4.1 Woodlawn Mine Project

TriAusMin's Woodlawn Mine Project proposes to recommence the retreatment and mining operations located within the boundary of Special Mining Lease (SML) 20. The project was approved by the Department of Planning and Infrastructure (DP&I) on 4 July 2013.

The mine project will have a separate access road off Collector Road, approximately 760 metres to the east of the Woodlawn Eco Project Site access road. All construction and operation related traffic is noted to come via Tarago Road[5]. As such, additional traffic generated from this project will not have any impact on the Site access intersection.

The traffic assessment on surrounding roads for this project was completed as part of the Mine EA in 2011. The daily traffic forecasts were included in the base traffic flows used in the midblock level of service assessments in this TIA.

4.2 Woodlawn Wind Farm

Woodlawn Wind Farm is located south-east of the Site. The wind farm was approved by DP&I on 29 October 2010. Construction and commissioning activities for the Woodlawn Wind Farm achieved practical completion on 17 October 2011.

As per the Operation Environmental Management Plan, the Wind Farm generates two cars a day for routine service and two cars a week for breakdown maintenance. Thus the operational generated traffic from Wind Farm has minimal impact on the surrounding road network, and in particular on the Site access intersection. Therefore, no traffic generated by this development has been considered in the analysis of the peak hours.

Figure 5: Indicative locations of Non-Veolia operations

Source: AECOM, 2013

[5] Parsons Brinckerhoff, *TriAusMin Woodlawn Project Traffic Impact and Haulage Route Assessment*, April 2011

5.0 Traffic impact assessment

5.1 Construction traffic

5.1.1 Traffic generation and distribution from site

The original Environmental Assessment[6] stated that up to 25 people would be working on the site in the peak construction period. For this assessment the same number has been assumed, however a vehicle occupancy rate of 1.08 was assumed based on the latest Journey to Work data (2011 release). This equates to 23 light vehicles arriving in the AM peak hour and leaving in the PM peak hour. A trip distribution of 90% from the east and 10% from the west has been assumed for construction employee traffic which is consistent with the 2010 Woodlawn Bioreactor TIA[7].

For heavy construction traffic, the Project Approval stated that 16 heavy vehicle movements per day were expected in the peak construction period. Assuming a fairly even spread throughout the day, this equates to one heavy vehicle trip (or two heavy vehicle movements) in each of the AM and PM peak hours. All heavy construction traffic is assumed to come from the east i.e. from Bungendore Road.

5.1.2 Impact on midblock level of service

As before, an indicative level of service (LOS) for the surrounding roads was assessed using Table 3.9 of the Guide to Traffic Engineering Practice – Part 2: Roadway Capacity (AUSTROADS, 1999). **Table 5.1** presents the midblock level of service on the surrounding roads with the addition of construction traffic in 2015 compared to the current 2013 LOS.

Table 5.1: Levels of service based on AADT during construction (2015) compared to existing level of service (2013)

Road	Location	2013 AADT (LOS)	2015 AADT (LOS)
Bungendore Road	Tarago, at railway crossing	1,450 (A)	1,551 (A)
Bungendore Road	South of Mt Fairy	879 (A)	957 (A)
Tarago Road	Bungendore, N of Kings Highway	4,342 (A)	4,805 (B)
Collector Road	West of Tarago Rd	375 (A)	600 (A)

Source: AECOM, 2013

This illustrates that the roads would operate well within capacity and at a good operational level of service.

[6] Umwelt (Australia) Pty Ltd, *EA for Woodlawn AWT Project*, November 2006
[7] URS Australia Pty Ltd, *Woodland Bioreactor Environmental Assessment, Transport Impact Assessment*, July 2010

5.1.3 Impact on site access intersection level of service

The traffic flows at the site access intersection during construction in 2015 are shown in **Figure 6**.

Figure 6: Site access intersection traffic flows: Background + construction (2015)

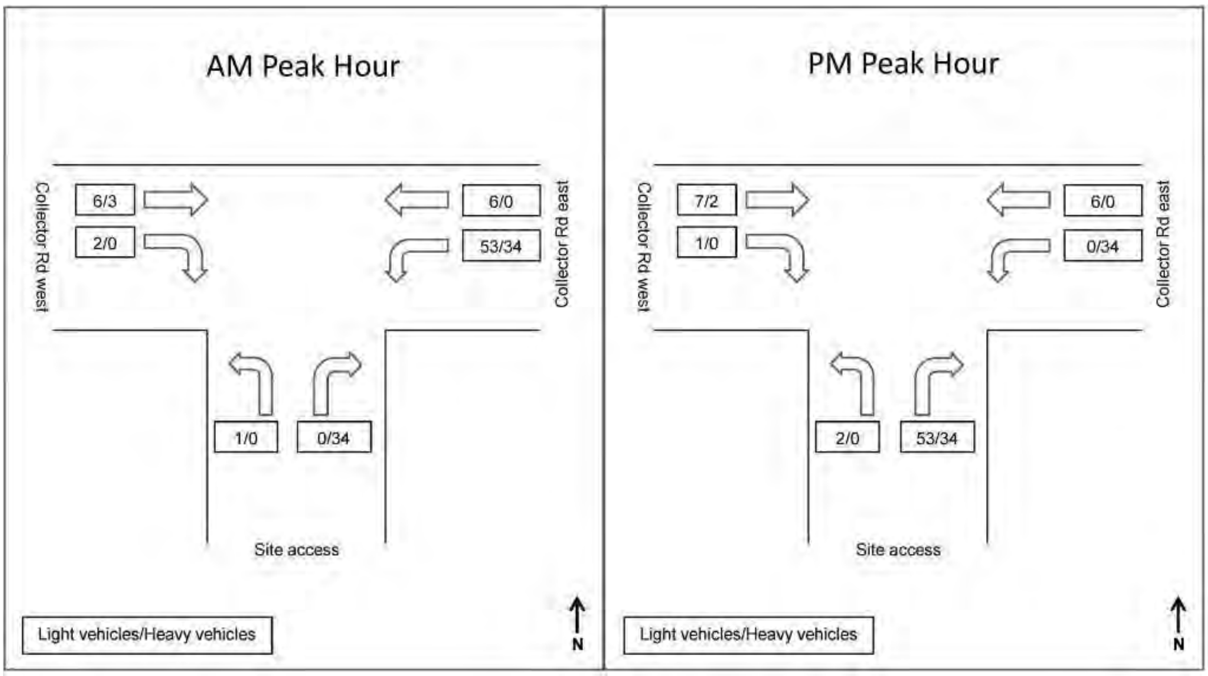


Table 5.2 shows the performance of the site access intersection during construction in 2015 compared to the current 2013 situation. It indicates that the site access intersection still performs at LoS A in both the AM and PM peak hours. **Appendix A** provides detailed intersection performance results.

Table 5.2: Peak hour intersection performance during construction (2015) compared to existing intersection performance (2013)

Assessment year	AM Peak				PM Peak			
	Vehicle (veh/hr)	DoS	Average Delay (secs)*	LoS	Vehicle (veh/hr)	DoS	Average Delay (secs)*	LoS
2013 (Existing)	47	0.016	13.6	A	47	0.034	13.5	A
2015 (Construction)	139	0.060	13.9	A	139	0.120	13.7	A

* The average delay represents the delay of the worst performing approach movement.

Source: AECOM, 2013

5.2 Operational traffic

5.2.1 Traffic generation and distribution from site

The original Environmental Assessment[8] stated that, at full operation, the MBT facility would employ up to 24 people travelling to and from the site each day. For this assessment the same number has been assumed, however a vehicle occupancy rate of 1.08 is assumed based on the latest Journey to Work data (2011 release). This equates to 23 light vehicles arriving in the AM peak hour and leaving in the PM peak hour, the same number as during construction. As per the construction employee traffic, a trip distribution of 90% from the east and 10% from the west has been assumed for operations employee traffic which is consistent with the 2010 Woodlawn Bioreactor TIA[9].

Operating six days a week, 52 weeks of the year, to transport 280,000 tonnes of waste from the IMF to the MBT facility equates to 897.4 tonnes transported per day. The proposed increase in container carrying capacity from 28.5 to 31.5 tonnes per container means 29 daily truck trips are required to transport this daily tonnage (i.e. 58 daily truck movements on the haulage route). Assuming a uniform split across the 16 hours of operation per day, equates to an average of 2 truck trips per hour (or 4 truck movements per hour).

In addition, approximately 64.6 tonnes of recovered recyclable material is expected from the MBT facility per week. However, due to the low number and frequency of trucks required to transport the material away from the Site, analysis of this was not included in the assessment.

5.2.2 Impact on midblock level of service

An indicative level of service (LOS) for the roads on the haulage route was assessed using Table 3.9 of the Guide to Traffic Engineering Practice – Part 2: Roadway Capacity (AUSTROADS, 1999). While the traffic count location on Bungendore Road at the Tarago railway crossing is east of the IMF, and hence not on the haulage route, due to its proximity to the haulage route, the same AADT was assumed between the IMF and Collector Road. This is a worst case scenario as traffic further out of the town of Tarago is likely to be less than at the railway crossing.

Table 5.3 presents the midblock level of service on the haulage route with the addition of operational traffic in 2016 and 2026 compared to the current 2013 LOS.

Table 5.3: Haulage route levels of service based on AADT during operation (2016 and 2026) compared to existing level of service (2013)

Road	Location	2013 AADT (LOS)	2016 AADT (LOS)	2026 AADT (LOS)
Bungendore Road	Between the IMF and Collector Road	1,450 (A)	1,772 (A)	2,178 (A)
Collector Road	West of Tarago Road	375 (A)	946 (A)	846 (A)

Source: AECOM, 2013

This illustrates that the roads are operating well within capacity, at a very good operational level of service with no change in level of service.

[8] Umwelt (Australia) Pty Ltd, *EA for Woodlawn AWT Project*, November 2006
[9] URS Australia Pty Ltd, *Woodland Bioreactor Environmental Assessment, Transport Impact Assessment*, July 2010

5.2.3 Impact on site access intersection level of service

The traffic flows at the site access intersection during operations in 2016 are shown in **Figure 7**, while those at a 10-year horizon in 2026 are shown in **Figure 8** .

Figure 7: Site access intersection traffic flows: Background + operation (2016)

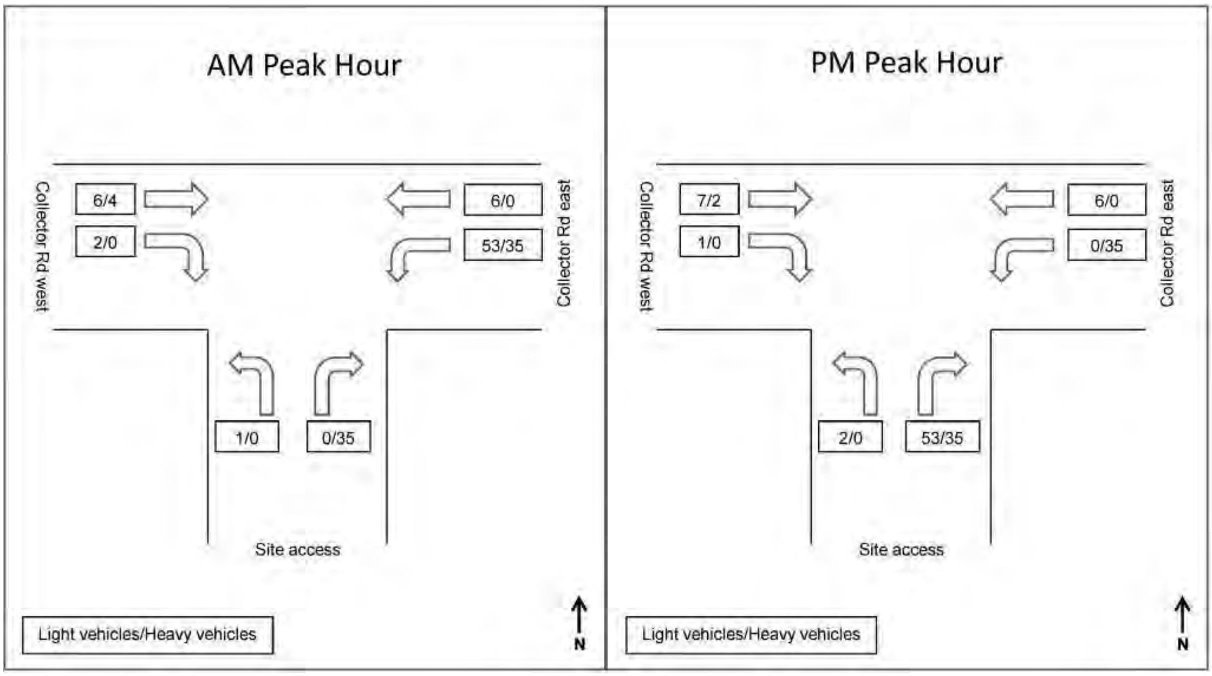


Figure 8: Site access intersection traffic flows: Background + operation (2026)

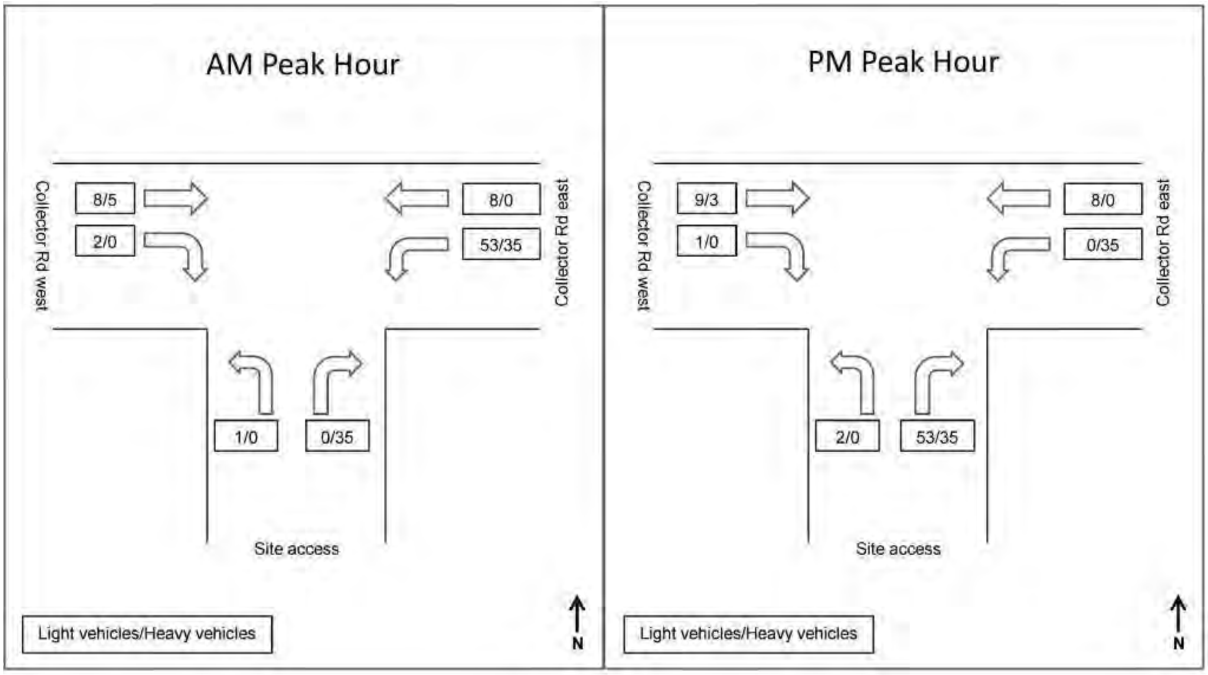


Table 5.4 shows the performance of the site access intersection for the start of operations in 2016 and for a 10-year horizon in 2026. It indicates that the site access intersection performance remains at LoS A in both the AM and PM peak hours in all assessment years. **Appendix A** provides detailed intersection performance results.

Table 5.4: Peak hour intersection performances during operation (2016 and 2026) compared to existing intersection performance (2013)

Assessment Year	AM Peak				PM Peak			
	Vehicle (veh/hr)	DoS	Average Delay (secs)*	LoS	Vehicle (veh/hr)	DoS	Average Delay (secs)*	LoS
2013 (Existing)	47	0.016	13.6	A	47	0.034	13.5	A
2016 (Operation)	142	0.061	13.9	A	141	0.121	13.7	A
2026 (Operation)	147	0.062	13.9	A	146	0.122	13.7	A

* The average delay represents the delay of the worst performing approach movement.

Source: AECOM, 2013

6.0 Conclusion

An assessment of the traffic impacts due to proposed changes in waste receipt operational hours, capacity of the containers transporting the waste and site access to the MBT facility, was undertaken. The access is now proposed to be at the existing Woodlawn Eco Project site access.

Assessments of traffic conditions in the main construction year (2015), year of opening (2016) and a 10-year horizon (2026) were compared to conditions in the current year (2013). The MBT facility is proposed to receive 280,000 tpa of waste, which would be in addition to the approved 1.13 Mtpa of waste that the Bioreactor can now receive. The waste would originate from Sydney and reach the IMF by train. It would then be loaded onto trucks and transported by road to the MBT facility.

Based on waste transport occurring six days a week, 52 weeks a year, on containers of 31.5 tonnes net payload capacity, a total of 29 daily truck trips would be required to transport the waste to the MBT facility (i.e. 58 daily truck movements on the haulage route).

The site access intersection was assessed with the construction and operational traffic from the MBT facility and was shown to operate at a very good level of service in all assessment periods. The mid-block capacities of the surrounding roads and the roads on the haulage route were also assessed and they continue to operate at a very good level of service. Therefore, the proposed modifications to the approved development of the MBT facility are likely to have a minimal impact on traffic operations and road safety.

Appendix A

SIDRA Outputs

MOVEMENT SUMMARY

Site: AM Existing - 2013

MBT Site Access
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Bioreactor Site											
1	L2	1	0.0	0.009	7.5	LOS A	0.0	0.3	0.06	0.38	50.0
3	R2	5	100.0	0.009	7.4	LOS A	0.0	0.3	0.06	0.38	50.0
Approach		6	83.3	0.009	7.4	LOS A	0.0	0.3	0.06	0.38	50.0
East: Collector Rd East											
4	L2	27	18.5	0.016	12.6	LOS A	0.0	0.0	0.00	0.53	69.1
5	T1	5	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		32	15.6	0.016	10.6	NA	0.0	0.0	0.00	0.45	72.7
West: Collector Rd West											
11	T1	8	37.5	0.006	0.1	LOS A	0.0	0.2	0.09	0.14	89.3
12	R2	1	0.0	0.006	13.6	LOS A	0.0	0.2	0.09	0.14	89.3
Approach		9	33.3	0.006	1.6	NA	0.0	0.2	0.09	0.14	89.3
All Vehicles		47	27.7	0.016	8.5	NA	0.0	0.3	0.03	0.38	71.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Processed: Wednesday, 27 November 2013 3:58:53 PM
SIDRA INTERSECTION 6.0.14.4193

Project: \\ausyd1fp001\Projects\60305022_WMBT_Traffic\4. Tech work area\4.1 Transport\MBT Site Access_v5.sip6
8000907, AECOM, NETWORK / Enterprise

MOVEMENT SUMMARY

Site: PM Existing - 2013

MBT Site Access
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Bioreactor Site											
1	L2	1	0.0	0.034	7.4	LOS A	0.1	0.9	0.07	0.49	50.0
3	R2	27	18.5	0.034	7.4	LOS A	0.1	0.9	0.07	0.49	50.0
Approach		28	17.9	0.034	7.4	LOS A	0.1	0.9	0.07	0.49	50.0
East: Collector Rd East											
4	L2	5	100.0	0.005	12.6	LOS A	0.0	0.0	0.00	0.35	69.1
5	T1	5	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		10	50.0	0.005	6.3	NA	0.0	0.0	0.00	0.18	81.9
West: Collector Rd West											
11	T1	8	25.0	0.006	0.0	LOS A	0.0	0.2	0.05	0.14	91.9
12	R2	1	0.0	0.006	13.5	LOS A	0.0	0.2	0.05	0.14	91.9
Approach		9	22.2	0.006	1.5	NA	0.0	0.2	0.05	0.14	91.9
All Vehicles		47	25.5	0.034	6.0	NA	0.1	0.9	0.05	0.36	60.2

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: AM Construction - 2015

MBT Site Access
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Bioreactor Site											
1	L2	1	0.0	0.059	7.6	LOS A	0.2	2.4	0.09	0.36	49.9
3	R2	34	100.0	0.059	7.5	LOS A	0.2	2.4	0.09	0.36	49.9
Approach		35	97.1	0.059	7.5	LOS A	0.2	2.4	0.09	0.36	49.9
East: Collector Rd East											
4	L2	87	39.1	0.060	12.6	LOS A	0.0	0.0	0.00	0.40	69.1
5	T1	6	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		93	36.6	0.060	11.8	NA	0.0	0.0	0.00	0.37	70.5
West: Collector Rd West											
11	T1	9	33.3	0.007	0.4	LOS A	0.0	0.3	0.18	0.22	83.3
12	R2	2	0.0	0.007	13.9	LOS A	0.0	0.3	0.18	0.22	83.3
Approach		11	27.3	0.007	2.8	NA	0.0	0.3	0.18	0.22	83.3
All Vehicles		139	51.1	0.060	10.0	NA	0.2	2.4	0.04	0.36	64.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: PM Construction - 2015

MBT Site Access
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Bioreactor Site											
1	L2	2	0.0	0.120	7.5	LOS A	0.4	3.7	0.08	0.40	50.0
3	R2	87	39.1	0.120	7.4	LOS A	0.4	3.7	0.08	0.40	50.0
Approach		89	38.2	0.120	7.4	LOS A	0.4	3.7	0.08	0.40	50.0
East: Collector Rd East											
4	L2	34	100.0	0.031	12.6	LOS A	0.0	0.0	0.00	0.35	69.1
5	T1	6	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		40	85.0	0.031	10.7	NA	0.0	0.0	0.00	0.30	72.5
West: Collector Rd West											
11	T1	9	22.2	0.006	0.2	LOS A	0.0	0.2	0.12	0.12	89.3
12	R2	1	0.0	0.006	13.7	LOS A	0.0	0.2	0.12	0.12	89.3
Approach		10	20.0	0.006	1.5	NA	0.0	0.2	0.12	0.12	89.3
All Vehicles		139	50.4	0.120	7.9	NA	0.4	3.7	0.06	0.35	56.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: AM Operation - 2016

MBT Site Access
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Bioreactor Site											
1	L2	1	0.0	0.061	7.6	LOS A	0.2	2.5	0.10	0.36	49.9
3	R2	35	100.0	0.061	7.6	LOS A	0.2	2.5	0.10	0.36	49.9
Approach		36	97.2	0.061	7.6	LOS A	0.2	2.5	0.10	0.36	49.9
East: Collector Rd East											
4	L2	88	39.8	0.061	12.6	LOS A	0.0	0.0	0.00	0.40	69.1
5	T1	6	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		94	37.2	0.061	11.8	NA	0.0	0.0	0.00	0.37	70.5
West: Collector Rd West											
11	T1	10	40.0	0.008	0.4	LOS A	0.0	0.3	0.18	0.20	83.3
12	R2	2	0.0	0.008	13.9	LOS A	0.0	0.3	0.18	0.20	83.3
Approach		12	33.3	0.008	2.6	NA	0.0	0.3	0.18	0.20	83.3
All Vehicles		142	52.1	0.061	9.9	NA	0.2	2.5	0.04	0.35	64.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: PM Operation - 2016

MBT Site Access
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Bioreactor Site											
1	L2	2	0.0	0.121	7.5	LOS A	0.4	3.8	0.08	0.39	50.0
3	R2	88	39.8	0.121	7.4	LOS A	0.4	3.8	0.08	0.39	50.0
Approach		90	38.9	0.121	7.4	LOS A	0.4	3.8	0.08	0.39	50.0
East: Collector Rd East											
4	L2	35	100.0	0.032	12.6	LOS A	0.0	0.0	0.00	0.35	69.1
5	T1	6	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		41	85.4	0.032	10.7	NA	0.0	0.0	0.00	0.30	72.4
West: Collector Rd West											
11	T1	9	22.2	0.006	0.2	LOS A	0.0	0.2	0.12	0.12	89.2
12	R2	1	0.0	0.006	13.7	LOS A	0.0	0.2	0.12	0.12	89.2
Approach		10	20.0	0.006	1.5	NA	0.0	0.2	0.12	0.12	89.2
All Vehicles		141	51.1	0.121	8.0	NA	0.4	3.8	0.06	0.35	56.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: AM Operation - 2026

MBT Site Access
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Bioreactor Site											
1	L2	1	0.0	0.062	7.7	LOS A	0.2	2.5	0.11	0.36	49.9
3	R2	35	100.0	0.062	7.6	LOS A	0.2	2.5	0.11	0.36	49.9
Approach		36	97.2	0.062	7.6	LOS A	0.2	2.5	0.11	0.36	49.9
East: Collector Rd East											
4	L2	88	39.8	0.061	12.6	LOS A	0.0	0.0	0.00	0.40	69.1
5	T1	8	0.0	0.004	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		96	36.5	0.061	11.5	NA	0.0	0.0	0.00	0.36	71.0
West: Collector Rd West											
11	T1	13	38.5	0.010	0.4	LOS A	0.0	0.4	0.18	0.16	84.6
12	R2	2	0.0	0.010	13.9	LOS A	0.0	0.4	0.18	0.16	84.6
Approach		15	33.3	0.010	2.2	NA	0.0	0.4	0.18	0.16	84.6
All Vehicles		147	51.0	0.062	9.6	NA	0.2	2.5	0.05	0.34	65.2

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: PM Operation - 2026

MBT Site Access
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Bioreactor Site											
1	L2	2	0.0	0.122	7.5	LOS A	0.4	3.9	0.10	0.39	49.9
3	R2	88	39.8	0.122	7.5	LOS A	0.4	3.9	0.10	0.39	49.9
Approach		90	38.9	0.122	7.5	LOS A	0.4	3.9	0.10	0.39	49.9
East: Collector Rd East											
4	L2	35	100.0	0.032	12.6	LOS A	0.0	0.0	0.00	0.35	69.1
5	T1	8	0.0	0.004	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		43	81.4	0.032	10.2	NA	0.0	0.0	0.00	0.29	73.4
West: Collector Rd West											
11	T1	12	25.0	0.008	0.2	LOS A	0.0	0.3	0.13	0.09	89.9
12	R2	1	0.0	0.008	13.7	LOS A	0.0	0.3	0.13	0.09	89.9
Approach		13	23.1	0.008	1.2	NA	0.0	0.3	0.13	0.09	89.9
All Vehicles		146	50.0	0.122	7.7	NA	0.4	3.9	0.07	0.34	57.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix F3: Noise and Vibration Impact Assessment

Woodlawn Mechanical Biological Treatment Facility

Noise and Vibration Impact Assessment

Report Number 610.12876R3

10 December 2013

Veolia Environmental Services (Australia)
619 Collector Road
Tarago NSW 2580

Version: Revision 0

Woodlawn Mechanical Biological Treatment Facility

Noise and Vibration Impact Assessment

PREPARED BY:

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
610.12876R3	Revision 0	10 December 2013	Martin Davenport	Katie Teyhan	Katie Teyhan

Executive Summary

Veolia Environmental Services (Australia) Pty Ltd (Veolia) are seeking a modification to Project Approval 06_0239 (PA 06_0239) which relates to the construction and operation of the Woodlawn Alternative Waste Technology Project (the Development). The modification addresses industry best practice and environmental controls as part of the design of the proposed Woodlawn Mechanical Biological Treatment (MBT Facility) Facility (the Project).

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Veolia to undertake a Noise and Vibration Impact Assessment (NVIA) to support the EA.

The purpose of this report is to present a comprehensive NVIA that addresses potential noise and vibration impacts during the construction and operation of the proposed MBT Facility.

Development of the MBT Facility is a multi-staged approach commencing with capacity process 120,000 tonnes of waste each year up to a maximum approved capacity of 280,000 tonnes of waste each year. Operational noise has been assessed within this report for maximum approved capacity given that the impacts at this stage would be greater than at commencement.

The MBT Facility processes will comprise:

- Receipt of mixed waste.
- Pre-treatment including biological refining and mechanical separation.
- Recovery of recyclable material.
- Fermentation of organic material into compost.

Noise modelling of the project area was carried out using the SoundPLAN 7.1 noise modelling software package. Noise levels at the potentially most affected residential receivers were predicted for the worst case operational scenario under calm and prevailing weather conditions.

Noise emission levels from the project were predicted and assessed against relevant noise policy documents and the conditions contained in PA 06_0239.

Noise prediction results indicate that operational noise emissions from the MBT Facility would comply with project specific noise criteria for operation during the day, evening and night periods for calm and prevailing weather conditions. It should also be noted that predicted noise levels from the MBT Facility are less than that of the approved Development.

Maximum noise emissions during the night-time period are predicted to be compliant with the relevant sleep disturbance noise goals at all potentially affected residential receivers.

Predicted cumulative amenity noise from existing, approved and proposed industrial sources and the MBT Facility are below the relevant acceptable amenity levels for rural receivers at all locations during the daytime and evening period. During the night period the cumulative amenity noise level exceeds the acceptable level at “Cowley Hills” but is below the maximum noise level of 45 dBA. Cowley Hills” is owned by Veolia and as such is considered Project related for the purpose of this assessment.

Noise predictions indicate that noise emissions during construction of the Project would comply with the relevant noise criteria at all receivers during the recommended standard construction hours.

The predicted road traffic noise levels from construction and operation of the MBT Facility are predicted to be below the relevant criteria provided in the NSW Road Noise Policy (RNP) and PA 06_0239 for both Bungendore Road and Collector Road.

Executive Summary

Vibration associated with construction of the project is predicted to be negligible at all receiver locations.

No road traffic vibration impacts are predicted at the nearest residential receivers.

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APPENDICES

1 INTRODUCTION

Veolia Environmental Services (Australia) Pty Ltd (Veolia) are seeking a modification to Project Approval 06_0239 (PA 06_0239), which relates to the construction and operation of the Woodlawn Alternative Waste Technology Project (the Development).

Subject to the provisions of Section 75W of the Environmental Planning and Assessment Act 1979 (EP&A Act), an Environmental Assessment (EA) has been prepared by Veolia to detail modifications sought to the Project Approval, which will enable utilisation of the best available technology for processing mixed waste to produce compost. The EA comprises:

- A description of the Development and its surrounds.
- Details of the modification to the Project Approval.
- Assessment of any potential environment impacts associated with the modifications proposed.
- Recommended mitigation measures to minimise the identified impacts.

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Veolia to undertake a Noise and Vibration Impact Assessment (NVIA) to support the EA.

The NVIA has been prepared with reference to Australian Standard AS 1055:1997 *Description and Measurement of Environmental Noise* Parts 1, 2 and 3 and in general accordance with the Environment Protection Authority's (EPA) *NSW Industrial Noise Policy* (INP) (EPA, 2000) and *Interim Construction Noise Guideline* (ICNG) (DECC, 2009). Where issues relating to noise are not addressed in the INP or ICNG, such as sleep disturbance, reference has been made to the INP Application notes (last updated June 2013) and the *NSW Road Noise Policy* (RNP) (DECCW, 2011).

This report utilises specialist acoustic terminology. Explanation and definitions of common terms are provided in **Appendix A**.

1.1 Woodlawn Eco Project Site

The proposed Development is approved to be developed within the 6000 hectare (ha) Woodlawn Eco Project Site (the Eco Project Site), owned and operated by Veolia and located in the Southern Highlands of NSW, approximately 250 kilometers (km) southwest of Sydney

The Eco Project Site comprises of two equally sized properties, Woodlawn and Pylara on which the following operations exist or are being developed:

- The former Woodlawn Mine (the Mine Site).
- Woodlawn Bioreactor (the Bioreactor).
- Woodlawn Bio Energy Power Station (the Power Station).
- Woodlawn Bio Energy Aquaculture (the Fish Farm).
- Woodlawn and Pylara farms.
- Pylara Wind Farm (the Wind Farm).
- The proposed Development.

The Development was granted Project Approval on 6 November 2007. Veolia has since been involved in the inception of the revised concept design for the Project, the commencement of which was subject to obtaining viable volumes of waste.

1.2 Proposed Development

The proposed MBT Facility will be sited on an area of approximately 30 ha, within the approved Development boundary, of the Eco Project Site.

The waste received at the Eco Project Site for processing in the MBT Facility shall be sourced from the Sydney Metropolitan Area (SMA), which shall be brought to the Clyde Transfer Terminal (CTT), located in the geographic centre of Sydney. As part of the expansion to the Eco Project and increased waste receipt capability of the Bioreactor, Veolia is proposing to build an additional waste transfer station and associated rail infrastructure at an existing industrial site in Banksmeadow (eastern Sydney). The proposed Banksmeadow Transfer Terminal (BTT) shall operate similarly to the CTT, with waste destined for both the Bioreactor and the proposed MBT Facility.

Waste collected from the SMA and brought to the CTT (and the BTT in the future) is containerised into shipping containers for transport via rail to the Crisps Creek Intermodal Facility (IMF) located in the township of Tarago, NSW. The containers are unloaded and transferred via road on semi-trailers to the Eco Project Site, some 11 km away.

The compost produced will be used to rehabilitate the areas of the Eco Project Site degraded by former mining activities. It is also envisaged by Veolia that the compost product will confer agricultural benefits to the surrounding farms operated by Veolia, forestry and broad acre land.

Any non-compostable residuals and recyclable materials will be removed during the treatment process and deposited in the adjacent Bioreactor, for further energy generation or taken offsite for reuse respectively.

The MBT Facility process concept design was developed by Veolia's engineering division Technical Scientific and Sustainable Development Depart (TSSDD) in France and has been successfully implemented overseas. The treatment process involves a number of stages including separation, fermentation and storage, utilising specialist equipment sourced locally and from overseas.

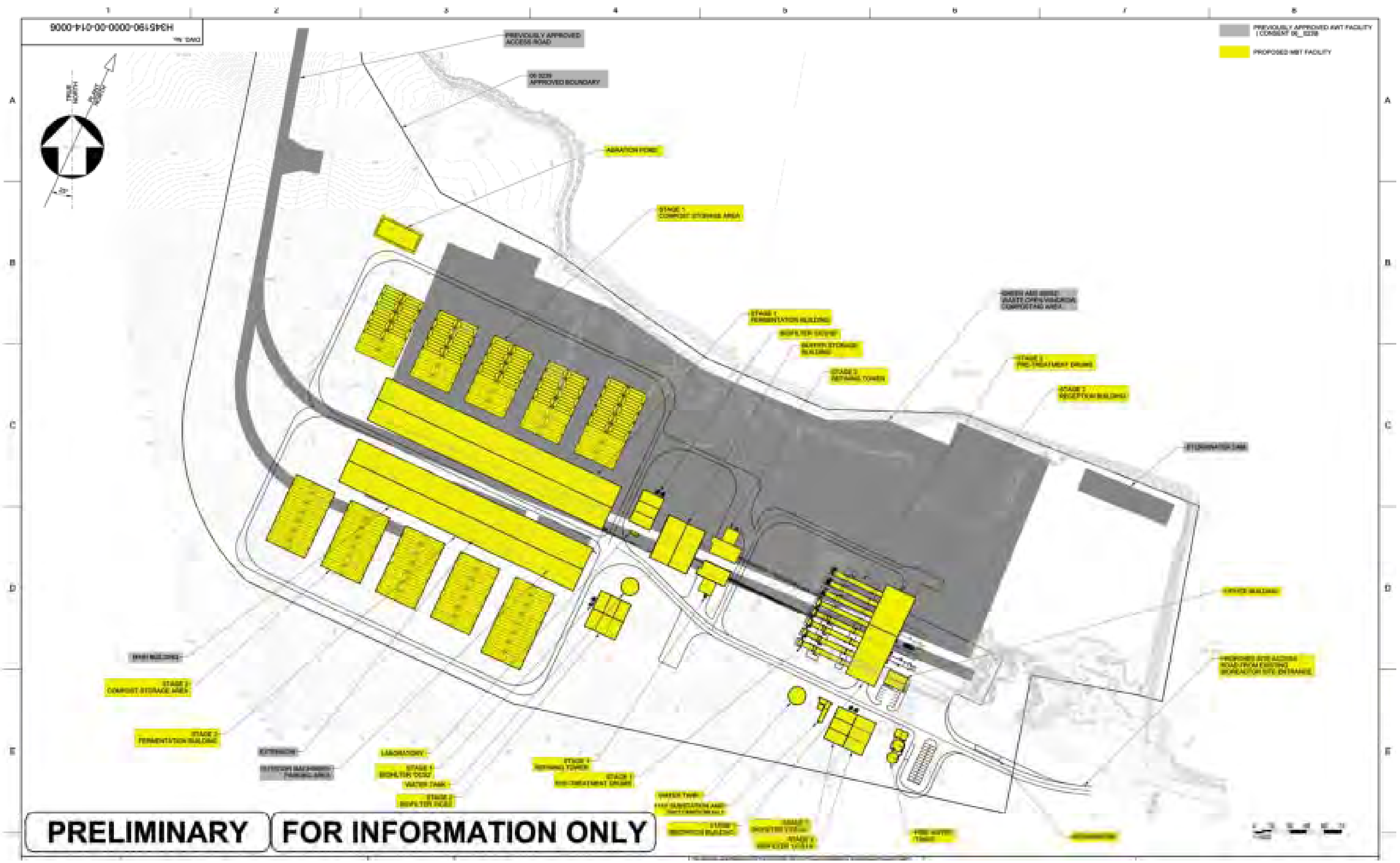
The proposed MBT Facility has been designed to be modular and will be built in stages to process 120,000 tonnes per annum (tpa) initially, up to a maximum capacity of 240,000 tpa plus 40,000 tpa of green waste.

The MBT Facility processes will comprise:

- Receipt of mixed waste.
- Pre-treatment including biological refining and mechanical separation.
- Recovery of recyclable material.
- Fermentation of organic material into compost.

The proposed layout of the MBT is presented in **Figure 1**, along with the design of the approved Development.

Figure 1 Previously Approved AWT and Proposed MBT Facility



1.2.1 Hours of Operation

The proposed hours of operation of the MBT Facility are provided in **Table 1**.

Table 1 MBT Facility Operating Hours

Activity	Day	Approved Development Hours	Proposed MBT Hours
Construction	Monday - Friday	7:00 am to 6:00 pm	7:00 am to 6:00 pm
	Saturday	7:00 am to 1:00 pm	7:00 am to 1:00 pm
	Sunday and Public Holidays	Nil	Nil
Waste Receipt	Monday - Saturday	6:00 am to 7:00 pm	6:00 am to 10:00 pm
Indoor Operations	Monday - Saturday	6:00 am to 10:00 pm	6:00 am to 10:00 pm
Ventilation Control and BRS Drums	Monday to Sunday	6:00 am to 10:00 pm	24 Hours
Outdoor Operations and Product Dispatch	Monday - Friday	6:00 am to 7:00 pm	6:00 am to 10:00 pm
Emergency	Monday to Sunday	Anytime	Anytime

1.3 Assessment Objectives

The purpose of this report is to present a comprehensive NVIA that addresses potential noise and vibration impacts during the construction and operation of the MBT Facility. It is noted that development of the MBT Facility is a multi-staged approach commencing with a capacity to process 120,000 tonnes of waste each year up to a maximum approved capacity of 280,000 tonnes of waste each year. Operational noise has been assessed within this report for maximum approved capacity given that the impacts at this stage would be greater than at commencement.

1.4 Document Review

A review of background information and data supplied by Veolia was undertaken. The review sought to understand the nature of the proposed works, and the outcomes of any previously completed assessments. The review of previously completed assessments was also undertaken to allow a comparison of the findings of this assessment with previous assessments. Documents reviewed included:

- *Woodlawn MBT Facility Facility Concept Design Report* (July 2013), prepared by Mott MacDonald
- Environmental Assessment*, 'Noise Impact Assessment Woodlawn Expansion Project*' (2010), prepared by SLR Consulting Australia Pty Ltd
- *Project Approval 06_0239*, signed by the Minister of Planning
- *Woodlawn MBT Facility, FEL2 Load List* (2013), prepared by Hatch
- Various Woodlawn MBT Facility Site Plans and Drawings
- *Woodlawn Community Brochure* Veolia
- Environmental Assessment, *Woodlawn Alternative Waste Technology (AWT) Facility Noise Impact Assessment* dated January 2006 prepared by SLR Consulting Australia Pty Ltd (then Heggies Pty Ltd).
- *Woodlawn Alternative Waste Technology Project* (2006), prepared by Veolia and Umwelt

- Wilkinson Murray Report No. 04098 Version B *Woodlawn Wind Farm Noise Assessment* dated 2004.
- PAEHolmes Report No 5665B *TriAusMin Woodlawn Project – Noise And Vibration Assessment* dated 22 February 2012.

2 STUDY AREA

2.1 Sensitive Receptors

The nearest potentially affected noise sensitive receivers to the MBT Facility are summarised in **Table 2**.

Table 2 Nearest Potentially Affected Noise-sensitive Receptors

Property ID	Property Name	Receiver Type	Distance to Project Site (m)	Easting (m)	Northing (m)	Elevation (m AHD)
1	"Woodlawn Farm"	Residence	1,600	734,518	6,118,363	796
2	"Cowley Hills"	Residence	2,000	736,673	6,117,689	794
3	"Pylara"	Residence	4,000	737,493	6,114,373	742
4	"Torokina"	Residence	3,700	731,287	6,114,653	720
5	"Willeroo"	Residence	4,000	729,728	6120677	718
6	TriAusMin Administration Office	Industrial premises	*	735,535	6,116,967	769

Note *: Located within Project Boundary

The properties of "Woodlawn Farm", "Cowley Hills" and "Pylara" are all Veolia-owned residences and as such, have been considered to be 'Project-related' residences.

TriAusMin has recently gained approval to retreat tailings material within existing tailings dams at the Mine site, referred to as the Woodlawn Retreatment Project (WRP). In addition, TriAusMin has gained approval to extract further material using underground mining techniques, termed the Woodlawn Underground Project (WUP). The operations are collectively referred to as the TriAusMin Woodlawn Project. Potential noise and vibration impacts due to these operations on surrounding receptors were assessed in a NVIA prepared by PAEHolmes in February 2012 (PAEHolmes, 2012). Noise impacts of the MBT Facility have been predicted at the proposed TriAusMin administration office.

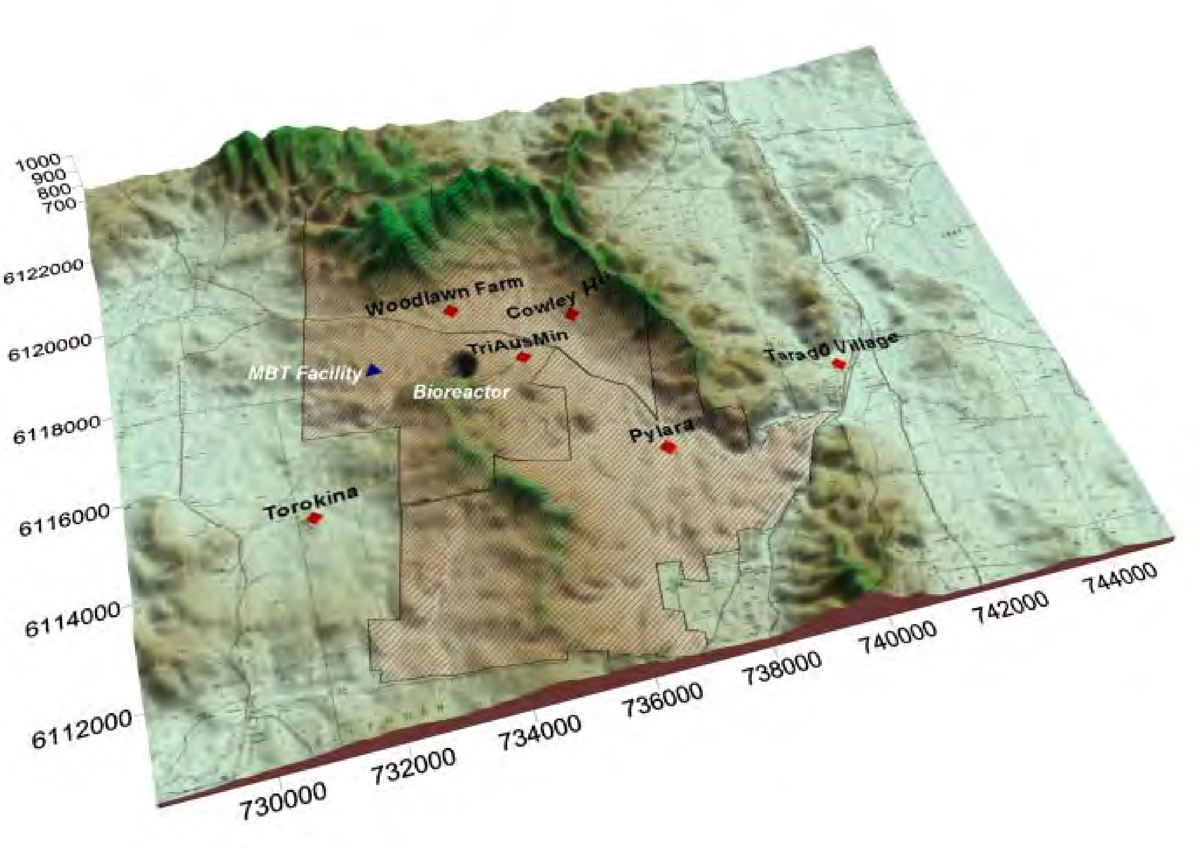
2.2 Site Topography

The project site and surrounding residences are located in undulating terrain. To the northeast of the site the topography rises to a high point of 1000 metres (m) AHD falling away to a height of 690 m AHD to the southwest. To the southeast of the proposed MBT Facility and directly south of the mine void, a topographic ridge extends to a height of 880 m AHD. Beyond this, the land falls away to a height of 740 m AHD.

The residences to the east of the Facility ("*Woodlawn Farm*" and "*Cowley Hills*") are on a similar elevation to the proposed MBT Facility with no significant topographical features in-between. To the northwest and west of the proposed Facility, the land falls away to a height of 700 m AHD.

A three dimensional representation of the area is given in **Figure 2**, with a vertical exaggeration of four (4) applied to emphasise terrain features.

Figure 2 3-Dimensional Regional Topography Surrounding MBT Site (Vertical Exaggeration 4)



NOTE: Eco Project Site boundary indicated by hatched area.

3 IMPACT ASSESSMENT PROCEDURES

3.1 General Objectives

Two methods have been used to assess noise emission from the MBT Facility. The methods are outlined as follows:

- INP Assessment - The determination and application of noise limits in accordance with the INP are typically triggered by new developments or modifications to existing developments/approvals (INP Section 10).
- Existing Project Approval – the MBT Facility was assessed against existing noise conditions contained in *Project Approval 06_0239* for the approved Development.

3.2 Project Approval

In November 2007, Veolia received a project approval, Project Approval PA 06_0239, under Part 3A of the EP&A Act for the currently approved Development. A summary of the relevant noise criteria are provided as follows:

NOISE

Noise Impact Assessment Criteria

25. The Applicant shall ensure that the noise generated by the development does not exceed the limits in Table 4.

Table 4: Noise impact assessment criteria dB(A)

Receiver	*Day/Evening/Night* $L_{Aeq(15minute)}$
Residences on privately-owned land (during construction)	*40*
Residences on privately-owned land (during operations)	*35*

Notes:

a) *Noise from the development is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural situations) where the dwelling is more than 30 metres from the boundary, to determine compliance with the* $L_{Aeq(15minute)}$ *noise limits in the above table. Where it can be demonstrated that direct measurement of noise from the project is impractical, the DECC 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 Policy shall also be applied to the measured noise levels where applicable.*

b) *The noise emission limits identified in the above table apply under meteorological conditions of:*
   - wind speeds of up to 3 m/s at 10 metres above ground level; or
   - temperature inversion conditions of up to 3°C/100m, and wind speeds of up to 2 m/s at 10 metres above ground level.

Road Traffic Noise Impact Assessment Criteria

26. The Proponent shall ensure that the traffic noise generated by the project on the road between Crisps Creek Intermodal Terminal and the site access road does not exceed 60 dBA $L_{Aeq(1hour)}$ *at any residence on privately-owned land.*

Note: Traffic noise generated by the project is to be measured in accordance with the relevant procedures in the DECC's Environmental Criteria for Road Traffic Noise.

3.3 INP Assessment

Responsibility for the control of noise emission in NSW is vested in Local Government and the NSW Environment Protection Authority (EPA). The Industrial Noise Policy (INP) was released in January 2000 and provides a framework and process for deriving noise criteria for consents and licences that will enable the relevant authority to regulate premises that are scheduled under the Protection of the Environment Operations Act, 1997.

The specific policy objectives are:

- To establish noise criteria that would protect the community from excessive intrusive noise and preserve amenity for specific land uses.
- To use the criteria as the basis for deriving project specific noise levels.
- To promote uniform methods to estimate and measure noise impacts, including a procedure for evaluating meteorological effects.
- To outline a range of mitigation measures that could be used to minimise noise impacts.
- To provide a formal process to guide the determination of feasible and reasonable noise limits for consents or licences that reconcile noise impacts with the economic, social and environmental considerations of industrial development.
- To carry out functions relating to the prevention, minimisation and control of noise from premises scheduled under the Act.

The policy sets two separate noise criteria to meet environmental noise objectives; one to account for intrusive noise and the other to protect the amenity of particular land uses.

Assessing Intrusiveness

For assessing intrusiveness, the background noise level must be measured. The intrusiveness criterion essentially means that the equivalent continuous noise level (L_{Aeq}) of the source should not be more than five decibels above the measured background level (L_{A90}).

Assessing Amenity

The amenity assessment is based on noise criteria specific to land use and associated activities (**Table 3**). The criteria relate only to industrial-type noise and do not include road, rail or community noise. The existing noise level from industry is measured. If it approaches the criterion value, then noise levels from new industries need to be designed so that the cumulative effect does not produce noise levels that would significantly exceed the criterion (**Table 4**).

Table 3 Amenity Criteria Recommended L_{Aeq} Noise Levels from Industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended $L_{Aeq(Period)}$ Noise Level (dBA)	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
	Urban	Day	60	65
		Evening	50	55
		Night	45	50
	Urban/Industrial Interface (for existing situations only)	Day	65	70
		Evening	55	60
		Night	50	55
School classrooms - internal	All	Noisiest 1 hour period when in use	35	40
Hospital wards - internal - external	All	Noisiest 1 hour period	35 50	40 55
Place of worship - internal	All	When in use	40	45
Area specifically reserved for passive recreation (eg National Park)	All	When in use	50	55
Active recreation area (eg school playground, golf course)	All	When in use	55	60
Commercial premises	All	When in use	65	70
Industrial premises	All	When in use	70	75

Note: Monday - Saturday: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am.
Sundays, Public Holidays: Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.
The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

Table 4 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, dBA
≥ Acceptable noise level plus 2 dBA	If existing noise level is *likely to decrease* in future acceptable noise level minus 10 dBA If existing noise level is *unlikely to decrease* in future existing noise level minus 10 dBA
Acceptable noise level plus 1 dBA	Acceptable noise level minus 8 dBA
Acceptable noise level	Acceptable noise level minus 8 dBA
Acceptable noise level minus 1 dBA	Acceptable noise level minus 6 dBA
Acceptable noise level minus 2 dBA	Acceptable noise level minus 4 dBA
Acceptable noise level minus 3 dBA	Acceptable noise level minus 3 dBA
Acceptable noise level minus 4 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 5 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 6 dBA	Acceptable noise level minus 1 dBA
< Acceptable noise level minus 6 dBA	Acceptable noise level

* ANL = recommended acceptable L_{Aeq} noise level for the specific receiver, area and time of day from **Table 3**

3.4 INP Project Specific Criteria

The INP Project Specific Noise Criteria are the more stringent of either the amenity or intrusive criteria. The INP states that these criteria have been selected to protect at least 90% of the population living in the vicinity of industrial noise sources from the adverse effects of noise for at least 90% of the time. Provided the criteria in the INP are achieved, it is unlikely that most people would consider the resultant noise levels excessive.

In those cases where the INP project specific assessment criteria are not achieved, it does not automatically follow that all people exposed to the noise would find the noise unacceptable. In subjective terms, exceedances of the INP project specific assessment criteria can be generally described as follows:

- Negligible noise level increase <1 dBA (Not noticeable by all people)
- Marginal noise level increase 1 dBA to 2 dBA (Not noticeable by most people)
- Moderate noise level increase 3 dBA to 5 dBA (Not noticeable by some people but may be noticeable by others)
- Appreciable noise level increase >5 dBA (Noticeable by most people)

In view of the foregoing, **Table 5** presents the methodology for assessing noise levels which may exceed the INP project specific noise assessment criteria.

Table 5 Noise Impact Assessment Methodology

Assessment Criteria	Project Specific Criteria	Noise Management Zone	Noise Affectation Zone
Intrusive	Rating background level plus 5 dBA	≤ 5 dBA above project specific criteria	> 5 dBA above project specific criteria
Amenity	INP based on existing industrial level	≤ 5 dBA above project specific criteria	> 5 dBA above project specific criteria

For the purposes of assessing the potential noise impacts the project specific, management and affectation criteria are further defined as follows:

3.4.1 Project Specific Criteria

Most people in the broader community would generally consider exposure to noise levels corresponding to this zone acceptable.

3.4.2 Noise Management Zone

Depending on the degree of exceedance of the project specific criteria (1 dBA to 5 dBA) noise impacts could range from negligible to moderate. It is recommended that management procedures be implemented including:

- Prompt response to any community issues of concern.
- Noise monitoring on site and within the community.
- Refinement of onsite noise mitigation measures and plant operating procedures where practical.
- Consideration of acoustical mitigation at receivers.
- Consideration of negotiated agreements with property holders.

3.4.3 Noise Affectation zone

Exposure to noise levels exceeding the project-specific criteria by more than 5 dBA may be considered unacceptable by some property holders and the INP recommends that the proponent explore the following:

- Discussions with relevant property holders to assess concerns and provide solutions.
- Implementation of acoustical mitigation at receivers.
- Negotiated agreements with property holders, where required.

3.5 Construction Noise

The EPA has prepared an interim guideline covering construction noise. The ICNG sets out noise criteria applicable to construction site noise for the purpose of defining intrusive noise impacts. **Table 6** and **Table 7** provide the relevant construction noise management levels and how they are to be applied. The approach is intended to provide respite for residents exposed to excessive construction noise outside the recommended standard hours whilst allowing construction during the recommended standard hours without undue constraints.

Table 6 Construction Noise Goals - Residences

Time of Day	Management Level	How to apply
Recommended standard hours : Monday to Friday 7:00am to 6:00pm Saturday 8:00am to 1:00pm No work on Sundays or public holidays	Noise affected RBL + 10dBA	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq(15minute)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to minimise noise. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dBA	The highly affected noise level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent should communicate with the impacted residents by clearly explaining the duration and noise levels of the works, and by describing any respite periods that will be provided.
Outside recommended standard hours	Noise affected RBL + 5 dBA	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community.

RBL: Rating Background Level as defined in the INP (EPA, 2000)

Table 7 Interim Construction Noise Guideline at Sensitive Land Uses (other than residences)

Land Use	Management Level $L_{Aeq(15minute)}$
Active Recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion).	External Noise Level 65 dBA When in use
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation).	External Noise Level 60 dBA When in use

3.6 Sleep Disturbance

The EPA's current approach to assessing potential sleep disturbance is to apply an initial screening criterion of background plus 15 dBA (as described in the Application Notes to the INP), and to undertake further detailed analysis if the screening criterion cannot be achieved. The sleep disturbance screening criterion applies outside bedroom windows during the night-time period.

Where the screening criterion cannot be met, the additional analysis should consider the number of potential sleep disturbance events during the night, the level of exceedance and noise from other events. It may also be appropriate to consider other guidelines including the RNP which contains additional guidance relating to potential sleep disturbance impacts.

A review of research on sleep disturbance, which is summarised in the RNP, indicates that in some circumstances, higher noise levels may occur without significant sleep disturbance. Based on studies into sleep disturbance, the RNP concludes that:

- "Maximum internal noise levels below 50 dBA to 55 dBA are unlikely to cause awakening reactions."
- "One or two noise events per night, with maximum internal noise levels of 65 dBA to 70 dBA, are not likely to affect health and wellbeing significantly."

It is generally accepted that internal noise levels in a dwelling, with the windows open, are 10 dBA lower than external noise levels. Based on a minimum attenuation, with windows normally open for ventilation, of 10 dBA, the first conclusion above suggests that short term external noise levels of 60 dBA to 65 dBA are unlikely to cause awakening reactions. The second conclusion suggests that one or two noise events per night with maximum external noise levels of 75 dBA to 80 dBA are not likely to affect health and wellbeing significantly.

3.7 Road Traffic Noise

The RNP presents guidelines for road traffic noise assessment. The policy document provides road traffic noise criteria for proposed road, residential and industrial developments, as well as criteria for other sensitive land uses.

Table 8 presents the most relevant RNP criteria for the MBT which has the potential to increase road traffic noise levels on Collector Road and Bungendore Road.

Table 8 Road Traffic Noise Assessment Criteria for Residential Land Uses

Road Category	Type of Project/Land Use	Assessment Criteria	
		Day	Night
Freeway/arterial/Sub-arterial Roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq(15hour)}$ 60 dBA (external)	$L_{Aeq(9hour)}$ 55 dBA (external)

Day 7:00 am to 10:00 pm, Night 10:00 pm to 7:00 am.

4 EXISTING ACOUSTICAL AND METEOROLOGICAL ENVIRONMENT

4.1 Ambient Background Noise Monitoring

PAEHolmes Pty Ltd has conducted background noise monitoring at residences surrounding the MBT Facility from Tuesday 17 May 2011 to 26 May 2011. Due to an equipment malfunction at the "Woodlawn Farm" monitoring location a previous baseline noise survey conducted by Wilkinson Murray between 15 February 2008 and 26 February 2008 has been used at this location (refer PAEHolmes Report No 5665B *TriAusMin Woodlawn Project – Noise And Vibration Assessment* dated 22 February 2012). A summary of the measured background noise levels is provided in **Table 9**.

Table 9 Summary of Ambient Noise Monitoring (PAEHolmes, February 2012)

Location	Period	Rating Background Level (RBL)	Estimated Existing Industrial Contribution LAeq
"Woodlawn Farm"	Day	33 dBA	<44 dBA
	Evening	35 dBA	<39 dBA
	Night	30 dBA	<34 dBA
"Cowley Hills"	Day	30 dBA	<44 dBA
	Evening	30 dBA	<39 dBA
	Night	30 dBA	<34 dBA
"Pylara"	Day	30 dBA	<44 dBA
	Evening	30 dBA	<39 dBA
	Night	30 dBA	<34 dBA
"Torokina"	Day	30 dBA	<44 dBA
	Evening	30 dBA	<39 dBA
	Night	30 dBA	<34 dBA
"Willeroo"	Day	30 dBA	<44 dBA
	Evening	30 dBA	<39 dBA
	Night	30 dBA	<34 dBA

With the exception of Woodlawn Farm, background noise levels measured at the nearest surrounding receivers during all periods were determined to be below the INP minimum RBL noise level of 30 dBA.

4.2 Effects of Meteorology on Noise Levels

4.2.1 Wind

Wind has the potential to increase noise at a receiver when it is light and stable and blows from the direction of the source of the noise. As the strength of the wind increases the noise produced by the wind will obscure noise from most industrial and transport sources.

Wind effects need to be considered when wind is a feature of the area under consideration. Where wind blows from the source to the receiver at speeds up to 3 m/s for more than 30% of the time in any season, then wind is considered to be a feature of the area and noise level predictions must be made under these conditions.

Weather data was obtained, for a period of 24 months - January 2011 to December 2012, from a weather station located on the Woodlawn site. The weather data was analysed to determine the frequency of occurrence of winds up to speeds of 3 m/s for daytime, evening and night in each season. A summary of the most frequently occurring winds is contained within **Table 10**, **Table 11** and **Table 12**. The percentage occurrence figures provided in bold are those that exceed the 30% threshold.

Table 10 Seasonal Frequency of Occurrence of Wind Speed Intervals - Daytime

Period	Calm	Wind Direction	0.5 - 2 m/s	2 - 3 m/s	0.5 - 3 m/s
Summer	0.7%	ENE±45	5.8%	16.8%	22.6%
Autumn	3.2%	WSW±45	9.4%	11.1%	20.5%
Winter	3.6%	WSW±45	7.8%	8.0%	15.8%
Spring	0.3%	WSW±45	5.5%	9.4%	15.0%

Table 11 Seasonal Frequency of Occurrence of Wind Speed Intervals - Evening

Period	Calm	Wind Direction	0.5 - 2 m/s	2 - 3 m/s	0.5 - 3 m/s
Summer	1.9%	ENE±45	9.0%	13.0%	22.0%
Autumn	11.6%	ENE±45	10.8%	10.7%	21.5%
Winter	12.8%	WSW±45	8.8%	8.8%	17.6%
Spring	4.3%	ENE±45	11.2%	10.0%	21.2%

Table 12 Seasonal Frequency of Occurrence of Wind Speed Intervals - Night

Period	Calm	Wind Direction	0.5 - 2 m/s	2 - 3 m/s	0.5 - 3 m/s
Summer	11.0%	ENE±45	20.2%	18.7%	**38.9%**
Autumn	21.0%	WSW±45	13.5%	7.6%	21.1%
Winter	13.1%	SW±45	10.9%	10.4%	21.4%
Spring	11.9%	ENE±45	16.3%	9.7%	26.0%

Seasonal wind records indicate that winds from 0.5 m/s to 3 m/s exceed the 30% threshold during the night from the east-north-east and east and are therefore a feature of the area during this period. Consequently, these prevailing winds have been considered as part of this assessment.

4.2.2 Temperature Inversion

Temperature inversions, when they occur, have the ability to increase noise levels by focusing sound waves. Temperature inversions occur predominantly at night during the winter months. The NSW INP states that temperature inversions need only be assessed for the night-time noise assessment period (10.00 pm to 7.00 am).

The occurrence of atmospheric stability classes during the winter night-time period at the Project site are presented in **Table 13**.

Table 13 Winter Night-Time Stability Frequency of Occurrence - Woodlawn

Stability Class	Occurrence Percentage During Winter
A	0.0%
B	0.0%
C	0.0%
D	43.1%
E	13.6%
F	**37.9%**
G	5.4%

In accordance with the INP the frequency of occurrence of F class temperature inversions is greater than 30% and therefore this weather condition has been included in the assessment.

5 PROJECT SPECIFIC NOISE EMISSION CRITERIA

5.1 Operational Noise Criteria

INP

The noise emission design criteria for the MBT Facility have been established with reference to the INP outlined in **Section 3** of this report.

Table 14 Operational Project Specific Noise Criteria

Location	Period	Adopted RBL	Intrusiveness Criteria $L_{Aeq(15minute)}$	EPA Acceptable Amenity Criteria $L_{Aeq(Period)}$	Project Specific Noise Criteria
"Woodlawn Farm"	Day	33 dBA	38 dBA	50 dBA	**38 dBA $L_{Aeq(15minute)}$**
	Evening	33 dBA*	38 dBA	45 dBA	**38 dBA $L_{Aeq(15minute)}$**
	Night	30 dBA	35 dBA	40 dBA	**35 dBA $L_{Aeq(15minute)}$**
"Cowley Hills"	Day	30 dBA	35 dBA	50 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Evening	30 dBA	35 dBA	45 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Night	30 dBA	35 dBA	40 dBA	**35 dBA $L_{Aeq(15minute)}$**
"Pylara"	Day	30 dBA	35 dBA	50 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Evening	30 dBA	35 dBA	45 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Night	30 dBA	35 dBA	40 dBA	**35 dBA $L_{Aeq(15minute)}$**
"Torokina"	Day	30 dBA	35 dBA	50 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Evening	30 dBA	35 dBA	45 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Night	30 dBA	35 dBA	40 dBA	**35 dBA $L_{Aeq(15minute)}$**
"Willeroo"	Day	30 dBA	35 dBA	50 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Evening	30 dBA	35 dBA	45 dBA	**35 dBA $L_{Aeq(15minute)}$**
	Night	30 dBA	35 dBA	40 dBA	**35 dBA $L_{Aeq(15minute)}$**
TriAusMin Administration Area	When in use		N/A	70 dBA	**70 dBA (Period)**

*Daytime RBL has been adopted in accordance with the INP Application Notes.

PA 06_0239

The consented operational noise criteria contained in PA 06_0239 are contained in **Table 15**.

Table 15 PA 06_0239 Consented Operational Noise Levels

Location	Period	Consented Operational Noise Criteria $L_{Aeq(15minute)}$
"Torokina", "Willeroo"	Day	**35 dBA**
	Evening	**35 dBA**
	Night	**35 dBA**

Consented noise criteria are not applicable at "Woodlawn Farm", "Cowley Hills" and "Pylara" as they are Veolia owned residences.

A review of **Table 14** and **Table 15** indicates that the INP project specific noise criteria are identical to the consented noise criteria in PA 06_0239 for privately owned residences.

5.2 Sleep Disturbance Criteria

Sleep disturbance criteria for the MBT Facility have been set with reference to the INP Application Notes as outlined in **Section 3.5** of this report and are provided in **Table 16**.

Table 16 Sleep Disturbance Criteria

Location	Period	Sleep Disturbance Noise Goal $L_{A1(1minute)}$ (dBA)
"Woodlawn Farm", "Cowley Hills", "Pylara", "Torokina", "Willeroo"	Night	45

5.3 Construction Noise Goals

ICNG Criteria

Construction noise criteria for the MBT have been set with reference to the ICNG as outlined in **Section 3.6** of this report and are provided in **Table 17**.

Table 17 ICNG Construction Noise Criteria

Receiver Location	Period	Noise Goal $L_{Aeq(15minute)}$	
		Noise Affected	Highly Noise Affected
"Woodlawn Farm"	Day	43 dBA	75 dBA
	Evening	38 dBA	N/A
	Night	35 dBA	N/A
"Cowley Hills"	Day	40 dBA	75 dBA
	Evening	35 dBA	N/A
	Night	35 dBA	N/A
"Pylara"	Day	40 dBA	75 dBA
	Evening	35 dBA	N/A
	Night	35 dBA	N/A
"Torokina"	Day	40 dBA	75 dBA
	Evening	35 dBA	N/A
	Night	35 dBA	N/A
"Willeroo"	Day	40 dBA	75 dBA
	Evening	35 dBA	N/A
	Night	35 dBA	N/A

With respect to construction noise impacts at commercial and industrial premises, the ICNG states the following:

> *Due to the broad range of sensitivities that commercial or industrial land can have to noise from construction, the process of defining management levels is separated into three categories. The external noise levels should be assessed at the most-affected occupied point of the premises:*

- *industrial premises: external $L_{Aeq(15min)}$ 75 dB(A)*
- *offices, retail outlets: external $L_{Aeq(15min)}$ 70 dB(A)*

PA 06_0239

The consented construction noise criteria contained in PA 06_0239 are contained in **Table 18**.

Table 18 PA 06_0239 Consented Noise Criteria

Location	Period	Construction Noise Criteria $L_{Aeq(15minute)}$
"Torokina", "Willeroo"	Day/Evening/Night	40 dBA

A review of **Table 17** and **Table 18** indicate that construction noise goals established in accordance with the ICNG are identical to the consented construction noise criteria in PA 06_0239 for privately owned residences during recommended standard construction hours.

5.4 Road Traffic Noise

RNP

The MBT Facility will use Collector Road and Bungendore Road for access and haulage to and from the site. In addition, employees, contractors and delivery vehicles would travel to/from the MBT Facility via these roads. As described in **Section 3.6**, these roads fall into the category of arterial/sub-arterial roads and, therefore the noise criteria outlined in **Table 8** have been adopted.

PA 06_0239

The consented road traffic noise criteria contained in PA 06_0239 are provided in **Table 19**.

Table 19 PA 06_0239 Consented Road Traffic Noise Criteria

Location	Period	Road Traffic Noise Criteria
Privately Owned Residence	Anytime	60 dBA $L_{Aeq(1hour)}$

6 ASSESSMENT OF NOISE IMPACTS

6.1 Noise Modelling

Noise modelling of the project area was carried out using the CONCAWE algorithms incorporated into the SoundPLAN 7.1 noise modelling software package. A three-dimensional digital terrain map giving all relevant topographic information was used in the modelling process. Additionally the model uses relevant noise source data, ground type, shielding such as barriers and/or adjacent buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers.

6.2 Noise Modelling Parameters

The predicted noise emission levels from operation of the MBT Facility at potentially affected receivers have been calculated under the meteorological parameters shown in **Table 20**.

Table 20 Noise Modelling Parameters

Assessment Condition	Temperature	Wind Speed/ Direction	Relative Humidity	Temperature Gradient
Day – Calm	20°C	N/A	65%	N/A
Evening – Calm	20°C	N/A	65%	N/A
Night – Calm	10°C	-	85%	-
Night - Inversion	10°C	-	85%	3°C/100 m
Night – Inversion with drainage flow*	10°C	2 m/s – source to receiver where applicable	85	3°C/100 m
Night – Prevailing Wind	10°C	3 m/s ENE, E	85%	-

*Drainage flow is considered only where a development is at a higher altitude than a noise-sensitive receiver, with no intervening higher ground.

6.3 Operational Noise Modelling Scenario

Equipment assumed to be in operation for each assessment period is provided in **Table 21**.

Equipment considered to be in operation is marked with a 'tick' (✓) and those not considered to be in operation are marked with a 'cross' (×). Where a 'tick' or 'cross' are separated by a slash indicates whether the selected equipment is operational during the day, evening and night-time period respectively. For instance ✓/✓/× would indicate that the equipment is operational during the day and evening periods but not during the night-time period.

Table 21 Modelled Operational Noise Sources

Equipment	Considered Onsite Activity (Day/Evening/Night)
Reception Building Waste Receipt	✓/✓/✓
Pre-Treatment – BRS Drums	✓/✓/✓
Pre-Treatment – Refining/Mechanical Separation	✓/✓/✓
Buffer Building	✓/✓/✓
Fermentation Building	✓/✓/✓
Compost Storage Area - FEL	✓/✓/✓
Compost Storage Area - Despatch Truck	✓/✓/✓
Aeration Pond Aerators	✓/✓/✓
Biofilters	✓/✓/✓
Maintenance	✓/✓/✓
Pumps	✓/✓/✓

To provide a conservative assessment of noise impacts it has been assumed that all plant and equipment is operational during the day, evening and night-time periods given that waste receipt, indoor activities and outdoor activities would occur from 6:00 am to 10:00 pm.

The sound power levels of acoustically significant plant and equipment to be used at the site during operation of the MBT Facility have been obtained from a SLR database of similar equipment. Details of these levels are given in **Appendix B**.

6.4 Predicted Operational Noise Levels

Predicted noise emission levels from the modelled operational scenario at the nearest most potentially affected receivers are provided in **Table 22**.

Table 22 Predicted Operational Noise Levels

Receiver Location	Period	Predicted Noise Level $L_{Aeq(15minute)}$ (dBA)			Project Specific Noise Level
		Calm	Prevailing Wind*	Temperature Inversion	
"Woodlawn Farm"	Day	<30	N/A	N/A	**38 dBA $L_{Aeq(15minute)}$**
	Evening	<30	N/A	N/A	**38 dBA $L_{Aeq(15minute)}$**
	Night	<30	<30	32	**35 dBA $L_{Aeq(15minute)}$**
"Cowley Hills"	Day	<30	N/A	N/A	**35 dBA $L_{Aeq(15minute)}$**
	Evening	<30	N/A	N/A	**35 dBA $L_{Aeq(15minute)}$**
	Night	<30	<30	<30	**35 dBA $L_{Aeq(15minute)}$**
"Pylara"	Day	<30	N/A	N/A	**35 dBA $L_{Aeq(15minute)}$**
	Evening	<30	N/A	N/A	**35 dBA $L_{Aeq(15minute)}$**
	Night	<30	<30	<30	**35 dBA $L_{Aeq(15minute)}$**
"Torokina"	Day	<30	N/A	N/A	**35 dBA $L_{Aeq(15minute)}$**
	Evening	<30	N/A	N/A	**35 dBA $L_{Aeq(15minute)}$**
	Night	<30	<30	<30	**35 dBA $L_{Aeq(15minute)}$**
"Willeroo"	Day	<30	N/A	N/A	**35 dBA $L_{Aeq(15minute)}$**
	Evening	<30	N/A	N/A	**35 dBA $L_{Aeq(15minute)}$**
	Night	<30	<30	<30	**35 dBA $L_{Aeq(15minute)}$**
TriAusMin Administration Area	Day	<30	N/A	N/A	70 dBA (period)
	Evening	<30	N/A	N/A	
	Night	<30	<30	33	

Noise prediction results indicate that noise emissions from the MBT Facility would comply with project specific noise criteria for operation during the day, evening and night periods for calm and prevailing weather conditions. It should also be noted that predicted noise levels from the MBT Facility are less than that of the approved Development.

6.5 Sleep Disturbance Noise Modelling

In assessing sleep disturbance, typical L_{Amax} noise levels of acoustically significant operations at night have been considered (i.e. the percussive impact noise associated with workshop activities). The use of the L_{Amax} noise level provides a worst-case prediction since the $L_{A1(1minute)}$ noise level of a noise event will be equal to or less than the L_{Amax}. Also, to provide a conservative assessment, it has been assumed that the noise source is outside the workshop, with no screening from the workshop or other structures.

The noise events considered are the following:

- Hammering – Sound power level of 123 dBA L_{Amax}.
- Grinding – Sound power level of 120 dBA L_{Amax}.

The highest L_{Amax} predicted at any potentially affected receiver was 41 dBA at "Woodlawn Farm". This predicted L_{Amax} noise level is compliant with the relevant sleep disturbance noise goal (provided in **Table 16)** of 45 dBA $L_{A1(1minute)}$.

6.6 Cumulative Noise Impact

As discussed in **Section 3**, the INP prescribes detailed calculation routines for establishing "Project specific" $L_{Aeq(15minute)}$ intrusive criteria and $L_{Aeq(Period)}$ amenity criteria at potentially affected receivers for a development (in isolation).

Potential cumulative noise impacts from existing and successive developments are embraced by the INP procedures by ensuring that the appropriate noise emission criteria (and consent limits) are established with a view to maintaining acceptable noise amenity levels for residences.

Potential sources of noise surrounding the MBT Facility have been identified as the Woodlawn Bioreactor, Wind Farm and proposed TriAusMin operations.

The anticipated operating noise levels from each these developments have been obtained by reviewing the project approvals or environmental assessments and utilised for the purposes of the cumulative noise amenity assessment.

The potential for the simultaneous operation of the MBT Facility and other approved and proposed developments can be assessed on a worst case scenario basis by adding the predicted noise levels from the proposed and approved operations together. The cumulative intrusive level is then adjusted (by -3 dBA) to the equivalent amenity level for comparison with the relevant amenity criteria for each location.

It should be noted that, for each of the developments assessed, the likelihood of the existing and future approved developments as well as the proposed MBT Facility emitting simultaneous maximum noise emissions is remote due to the range of development locations and differences in the noise enhancing weather effects. This cumulative assessment is therefore considered to be conservative.

The daytime, evening, and night-time cumulative noise levels, together with the acceptable and maximum $L_{Aeq(period)}$ noise amenity criteria for the nearest receivers are presented in **Table 23** to **Table 25** respectively.

Table 23 Cumulative Daytime Noise Amenity Levels

Location	MBT Facility	Wind Farm	BioReactor	TriAusMin	**Cumulative Intrusive Noise Level**	**Cumulative Amenity (intrusive sum minus 3 dBA)**	**Acceptable Maximum Range**
"Woodlawn Farm"	<30	<30	35	40	42	39	50 to 55
"Cowley Hills"	<30	<30	34	44	45	42	
"Pylara"	<30	<30	<30	32	37	34	
"Torokina"	<30	<30	<30	<30	36	33	
"Willeroo"	<30	<30	<30	<30	36	33	

Note: Where the predicted contribution is <30 dBA, the contributed noise level is assumed to be 30 dBA.

Table 24 Cumulative Evening Noise Amenity Levels

Location	MBT Facility	Wind Farm	BioReactor	TriAusMin	Cumulative Intrusive Noise Level	Cumulative Amenity (intrusive sum minus 3 dBA)	Acceptable Maximum Range
"Woodlawn Farm"	<30	<30	35	40	42	39	45 to 50
"Cowley Hills"	<30	<30	34	44	45	42	
"Pylara"	<30	<30	<30	32	37	34	
"Torokina"	<30	<30	<30	<30	36	33	
"Willeroo"	<30	<30	<30	<30	36	33	

Note: Where the predicted contribution is <30 dBA, the contributed noise level is assumed to be 30 dBA.

Table 25 Cumulative Night Noise Amenity Levels

Location	MBT Facility	Wind Farm	BioReactor	TriAusMin	Cumulative Intrusive Noise Level	Cumulative Amenity (intrusive sum minus 3 dBA)	Acceptable Maximum Range
"Woodlawn Farm"	32	<30	34	40	42	39	40 to 45
"Cowley Hills"	<30	<30	33	44	45	**42**	
"Pylara"	<30	<30	<30	32	37	34	
"Torokina"	<30	<30	<30	<30	36	33	
"Willeroo"	<30	<30	<30	<30	36	33	

Note: Where the predicted contribution is <30 dBA, the contributed noise level is assumed to be 30 dBA.

As presented in **Table 23** to **Table 25** the predicted cumulative amenity noise from existing, approved and proposed industrial sources and the MBT Facility are below the relevant acceptable amenity levels for rural receivers at all locations during the daytime and evening period.

During the night period the cumulative amenity noise level exceeds the acceptable level of 40 dBA at "Cowley Hills" but is below the maximum noise level of 45 dBA. Cowley Hills" is owned by Veolia and as such is considered Project related for the purpose of this assessment.

6.7 Construction Noise Assessment

Construction is proposed to commence in July 2014 and is predicted to be complete, inclusive of commissioning, in the first quarter of 2016. Two (2) potential construction scenarios have been modelled for construction of the MBT Facility based on the likely stages of construction and are provided in **Table 26**.

Table 26 Construction Scenarios

Scenario	Description
Scenario 1	Site preparation; including excavation and pouring of a concrete slab
Scenario 2	Installation of MBT plant and equipment, construction of the buildings and delivery of materials.

The sound power levels of acoustically significant plant and equipment to be used in each scenario during construction of the MBT Facility have been obtained from a SLR Consulting database of similar equipment. Details of these levels are given in **Appendix B.**

Results of the noise modelling for each construction scenario are provided in **Table 27**.

Table 27 Predicted Construction Noise Levels

Receiver Location	Period	Predicted Noise Level LAeq(15minute) (dBA)		Noise Affected Construction Noise Goal LAeq(15minute)
		Scenario 1	Scenario 2	
"Woodlawn Farm"	Day	32	<30	43 dBA
"Cowley Hills"	Day	<30	<30	40 dBA
"Pylara"	Day	<30	<30	40 dBA
"Torokina"	Day	<30	<30	40 dBA
"Willeroo"	Day	<30	<30	40 dBA
TriAusMin Administration Block	Day	<30	<30	75 dBA (When in Use)

Noise predictions indicate that noise emissions during construction of the MBT Facility would comply with the relevant noise criteria at all receivers during the recommended standard construction hours.

Notwithstanding the above, the following recommendations are made with the aim of minimising construction noise impacts at nearby noise sensitive receivers:

- An important aspect of the mitigation of noise impacts during construction activity will be adherence to the standard daytime construction hours.
- Noisy plant operating simultaneously to be avoided wherever possible.
- Maintenance work on all construction plant will be carried out away from noise sensitive areas and confined to standard daytime construction hours, where practicable.
- Site noisy equipment behind structures that act as barriers or at the greatest distance from the noise-sensitive area or orient the equipment so that noise emissions are directed away from any sensitive areas.
- Keep equipment well maintained.
- Employ "quiet" practices when operating equipment (eg positioning and unloading of trucks in appropriate areas).

With regard to potentially offensive noise events associated with construction activities AS 2436-1981 "*Guide to noise control on construction, maintenance and demolition sites"* provides the following:

> *If noisy operations must be carried out, then a responsible person should maintain liaison between the neighbouring community and the contractor. This person should inform the public at what time to expect noisy operations and also inform the contractor of any special needs of the public.*

Consultation and cooperation between the contractor and site neighbours and the removal of uncertainty and rumour can help to reduce the adverse reaction to noise.

6.8 Road Traffic Noise Assessment

There is one (1) privately owned residential receiver along the transport route from the Crisp Creek Intermodal Facility along Bungendore Road ("Chinnery" approximately 530 metres from trucks exiting the Intermodal Facility. There are two (2) residential receivers along Collector Road at Pylara and Cowley Hills, at which the closest residences are 40 metres and 140 metres respectively from the roadside. These residences on Collector Road are owned by Veolia. There are no planned traffic movements along Collector Road west of the Woodlawn Bioreactor towards the Federal Highway.

Road traffic noise levels from the Project have been predicted using with the Federal Highway Administration Model. The modelling allows for traffic volume and mix, vehicle speed, reflections off building surfaces, ground absorption and shielding from ground topography and physical noise barriers.

All reported noise levels are "facade-corrected". The predicted noise levels have been adjusted upwards to include a notional 2.5 dBA reflection within the noise model computation.

Road traffic movements detailed in this report refer to the number of vehicles passing by during the relevant time period.

PA 06_0239

MBT Facility related hourly road traffic movements for light and heavy vehicles along the transport route used for traffic noise predictions during construction and operation are provided in **Table 28**.

Table 28 MBT Facility Related Hourly Road Traffic Movements

Road	Construction		Operation	
	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles
Collector Road, Bungendore Road	2	23	4	23

Road traffic noise contributions from the proposed Project have been predicted (at 40 metres from the roadside for Collector Road and 530 metres for Bungendore Road) and are presented in **Table 29**.

Table 29 Predicted Road Hourly Road Traffic Noise Levels

Road	Predicted $L_{Aeq(1hour)}$ Noise Level		PA 06_0239 Criteria
	Construction	Operation	
Collector Road	47 dBA	49 dBA	60 dBA $L_{Aeq(1hour)}$
Bungendore Road	30 dBA	32 dBA	60 dBA $L_{Aeq(1hour)}$

The predicted road traffic noise levels from construction and operation of the MBT Facility are predicted to be below the relevant criteria provided in PA_06_0239.

RNP

Traffic movements for light and heavy vehicles along the transport route used for traffic noise predictions during construction and operation are provided in **Table 30**.

Table 30 Road Traffic Movements

Column 1 Heading	Collector Road				Bungendore Road			
	Average Daily Movements		Average Night-time Movement		Average Daily Movements		Average Night-time Movement	
	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
Existing[1]	57	10	8	1	1103	195	150	27
Bioreactor (Approved Expansion Movements)	64	220	64	20	64	220	64	20
TriAusMin[2](Proposed)	150	26	84	0	60	26	34	0
MBT Facility Construction	23	32	23	0	23	32	23	0
MBT Facility Operation	46	54	46	4	46	54	46	4
Total Construction	**294**	**288**	**179**	**21**	**1250**	**473**	**271**	**47**
Total Operational	**317**	**310**	**202**	**25**	**1273**	**495**	**294**	**51**

1. Based on 2016 AADT Figures. Assumes 12% of Vehicles are HV and 15% of LV / HV movements occur during the night-time.
2. Operational traffic movements

Road traffic has been predicted (at 40 metres from the roadside for Collector Road and 530 metres for Bungendore Road) and is presented in **Table 29**.

Table 31 Predicted Road Traffic Noise Levels

Road	Scenario	Predicted Noise Level		RNP Criteria Criteria
		Day $L_{Aeq(15hour)}$	Night $L_{Aeq(9hour)}$	
Collector Road	Construction	54 dBA	47 dBA	Day - 60 dBA $L_{Aeq(15hour)}$ Night – 55 dBA $L_{Aeq(9hour)}$
	Operation	54 dBA	48 dBA	
Bungendore Road	Construction	39 dBA	33 dBA	
	Operation	40 dBA	33 dBA	

The predicted road traffic noise levels from construction and operation of the MBT Facility are predicted to be below the relevant criteria provided in the RNP for both Bungendore Road and Collector Road.

7 VIBRATION

7.1 Construction Vibration

Energy from construction equipment is transmitted into the ground and transformed into vibration, which attenuates with distance. The magnitude and attenuation of ground vibration is dependent on the following:

- The efficiency of the energy transfer mechanism of the equipment (i.e. impulsive; reciprocating, rolling or rotating equipment).
- The frequency content.
- The stiffness of the medium (ground).
- The type of wave (surface or body).

- The ground type and topography.

Due to the above factors, there is inherent variability in ground vibration predictions without site-specific measurement data.

German Standard 4150-3 1999 *Structural Vibration Part 3: Effects of Vibration on Structures* also provides guideline criteria for evaluating the short and long-term effects of vibration on structures. The NSW EPA has released an interim guideline "*Assessing Vibration: A Technical Guideline"* which provides guideline building vibration levels associated with a low probability of annoyance from occupants. The range of applicable damage risk and annoyance vibration velocity criteria are provided in **Table 32**

Table 32 Vibration Velocity Annoyance Risk Criteria (mm/s)

Receiver Area	Damage Risk (mm/s)		Annoyance Risk (mm/s)	
	Horizontal	Vertical	Horizontal	Vertical
Residential/Dwellings	15	5	1.2	0.45

Vibratory rollers are anticipated to be used during construction of the MBT Facility. Buffer distances predicted to achieve compliance with the vertical vibration damage criteria are presented in **Table 33**.

Table 33 Predicted Buffer Distance Vibratory Rolling

Receiver Area/Type	Damage Risk (m)	Annoyance Risk (m)
Residential/Dwellings	18	43
Industrial/Workshops	1	37
Subsurface/Pipework	<1	n/a

Based on the predicted buffer distances vibration levels are predicted to be negligible at all residential receivers.

7.2 Vibration from Road Traffic

Trucks travelling to and from the MBT Facility have the potential to generate ground borne vibration.

Previous assessments of truck vibration levels have indicated that haulage trucks travelling at 80 km/hr or less were predicted to generate vibration levels well below the vibration damage criteria of 5 mm/s at residences at a distance of 7.5 m or greater from the road.

These conclusions are consistent with the description of the potential impacts from ground borne traffic vibration detailed in the RNP, which states:

> *Vehicles operating on a roadway are unlikely to cause a perceptible level of vibration unless there are significant road irregularities, particularly if the affected receiver is more than 20 metres from the roadway.*

As noted above, receivers are located at a distance of greater than 20 metres from the road and as such no road traffic vibration impacts are predicted at the nearest residential receivers.

8 CONCLUSION

SLR has conducted a noise and vibration impact assessment for the MBT Facility. The purpose of the noise and vibration impact assessment was to identify the potential impacts of noise and vibration from the MBT Facility.

Operation

Noise levels at potentially affected receivers were predicted under calm and prevailing weather conditions. Noise from operation of the MBT Facility is predicted to comply with the Project specific noise levels under calm and prevailing conditions at all receiver locations.

Night-time sleep disturbance noise goals are also predicted to be met at all receiver locations.

Predicted cumulative amenity noise from existing, approved and proposed industrial sources and the MBT Facility are below the relevant acceptable amenity levels for rural receivers at all assessment locations during the daytime and evening period. During the night-time period cumulative noise levels are predicted to be below the relevant maximum amenity levels for all privately owned residences.

Construction

Noise levels associated with construction activities at potentially affected receivers were predicted for two (2) scenarios and were predicted to meet the noise affected construction noise goals at all receiver locations.

Road Traffic

Noise levels on Bungendore Road and Collector Road, including the additional traffic generated by the MBT Facility during construction and operation are predicted to comply with RNP criteria and those contained in PA_06_0239.

Vibration

Vibration associated with construction of the MBT Facility is predicted to be negligible at all receiver locations.

No road traffic vibration impacts are predicted at the nearest residential receivers.

1 Sound Level or Noise Level

The terms "sound" and "noise" are almost interchangeable, except that in common usage "noise" is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

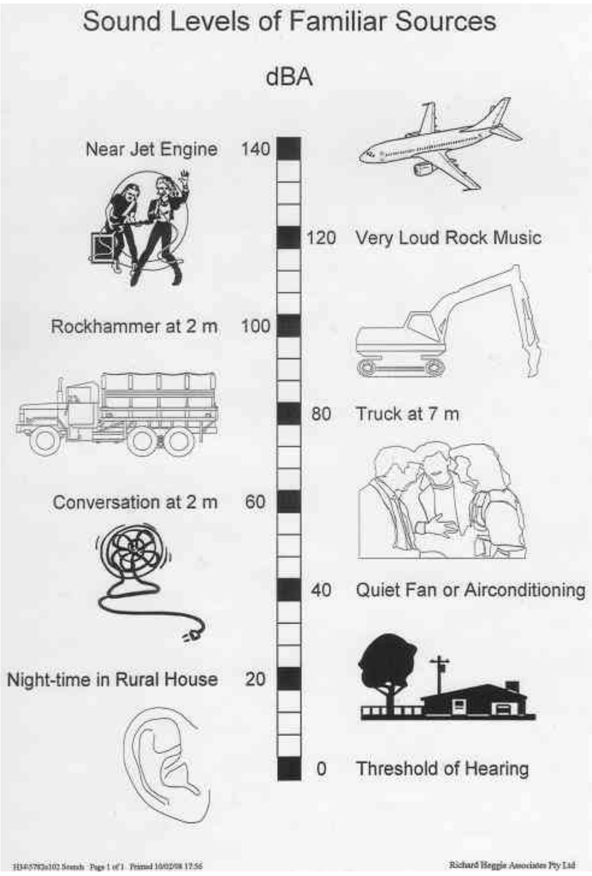
The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level. The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2 x 10^{-5} Pa.

2 "A" Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an "A-weighting" filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The figure below lists examples of typical noise levels



Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as "linear", and the units are expressed as dB(lin) or dB.

3 Sound Power Level

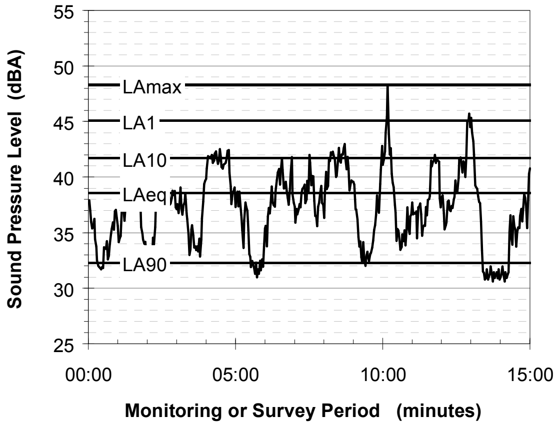
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or L_W, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

L_{Amax} The maximum noise level during the 15 minute interval

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} The noise level exceed for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the "repeatable minimum" L_{A90} noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or "average" levels representative of the other descriptors (L_{Aeq}, L_{A10}, etc).

5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than “broad band” noise.

6 Impulsiveness

An impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.

7 Frequency Analysis

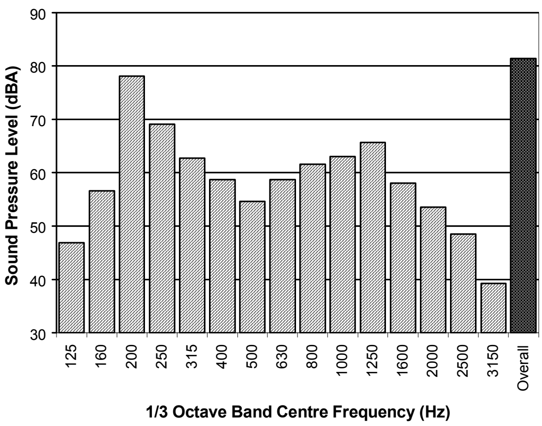
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



8 Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of “peak” velocity or “rms” velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as “peak particle velocity”, or PPV. The latter incorporates “root mean squared” averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse.

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/V_o), where V_o is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used by some organizations.

9 Human Perception of Vibration

People are able to “feel” vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as “normal” in a car, bus or train is considerably higher than what is perceived as “normal” in a shop, office or dwelling.

10 Over-Pressure

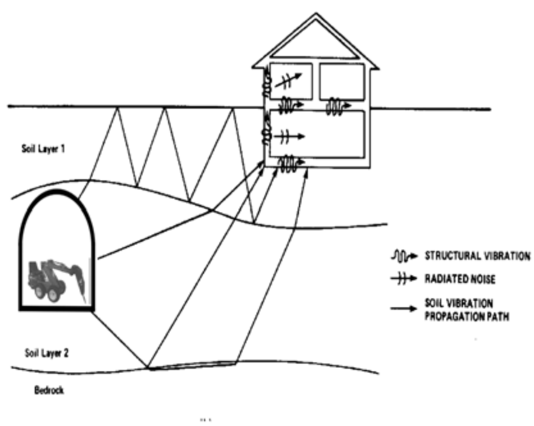
The term “over-pressure” is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (ie unweighted), at frequencies both in and below the audible range.

11 Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed “structure-borne noise”, “ground-borne noise” or “regenerated noise”. This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term “regenerated noise” is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

Equipment Sound Power Levels - Operation

Equipment Description	Octave Band Centre Frequency (Hz) – dB re 1pW										dB Lin	dBA
	32	63	125	250	500	1000	2000	4000	8000	16000		
External Noise Sources												
Conveyor (per metre)	76	74	72	70	73	69	69	61	55	44	81	75
Truck Delivery (3 off)	102	111	98	105	100	98	95	96	88	88	113	104
Front End Loader	100	110	109	103	104	99	95	89	85	78	114	105
Rotating drum (8 off)	92	95	94	88	94	93	93	89	81	81	102	99
Hand Tools (Grinder) (2 off)	63	67	65	67	75	84	95	100	100	95	104	104
Aerator (3 off)	87	90	96	91	94	92	93	92	90	85	102	100
Pump (5 off)	95	75	85	90	87	90	86	78	69	61	95	93
Reception Building												
Scrap Grab	100	110	109	103	104	99	95	89	85		114	105
Bridge Crane	92	92	91	91	100	93	90	81	71		103	99
Bin	104	113	100	107	102	100	97	98	90		115	106
Truck Delivery	102	111	98	105	100	98	95	96	88	88	113	104
Conveyor	92	90	88	86	89	85	85	77	71		97	91
Refining Tower (Each)												
Conveyor	100	98	96	94	97	93	93	84	79		105	99
Trommel (2 off)	102	105	104	98	104	103	103	99	91		112	109
Ballistic separator (2 off)	106	112	110	107	106	105	103	99	94		117	110
Magnetic separator (2 off)	92	92	91	91	100	93	90	81	71		103	99
Buffer Storage												
Front-End Loader	100	110	109	103	104	99	95	89	85		114	105
Conveyor	92	90	88	86	89	85	85	77	71		97	91
Fermentation Building (Each)												
Fan (36 off)	100	99	99	90	88	90	79	79	79		104	93
Front-End Loader	100	110	109	103	104	99	95	89	85		114	105
Bio Filter (Each)												
Air Extraction	119	115	118	109	107	109	98	98	98		123	112
Sump Pumps	67	78	88	93	90	93	89	80	72		98	96

Equipment Sound Power Levels - Construction

Equipment Description	Octave Band Centre Frequency (Hz) – dB re 1pW										dB Lin	dBA
	32	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**16000**		
Construction Scenario 1												
Compactor (2 off)	99	104	109	112	107	105	102	96	90	90	116	110
Excavator (2 off)	103	104	107	103	104	99	94	86	76	76	112	104
Truck Delivery (2 off)	102	111	98	105	100	98	95	96	88	88	113	104
Water Cart (2)	110	115	113	106	109	108	104	99	95	95	119	112
Grader (2 off)	103	109	111	112	108	106	101	96	83	82	117	111
Concrete Agitator Truck (2 off)	103	108	108	105	106	107	105	99	94		115	111
Dozer (2 off)	108	112	111	108	110	103	101	99	93	93	117	110
Backhoe (2 off)	85	94	93	92	97	94	88	101	95	84	105	104
Pump (2 off)	95	75	85	90	87	90	86	78	69	61	95	93
Roller (2 off)	99	104	109	112	107	105	102	96	90	90	116	110
Construction Scenario 2												
Hand Tools (Grinder) (2 off)	63	67	65	67	75	84	95	100	100	95	104	104
Crane (4 off)	99	106	96	96	99	97	93	89	87	87	109	101
Hammering (4 off)	108	107	87	93	89	94	93	88	84	79	111	98
Truck Delivery (2 off)	102	111	98	105	100	98	95	96	88	88	113	104
Excavator (2 off)	103	104	107	103	104	99	94	86	76	76	112	104

Appendix F4: Greenhouse and Energy Assessment

Woodlawn Mechanical Biological Treatment Facility

Greenhouse Gas Assessment

Report Number 610.12876

Veolia Environmental Services
619 Collector RoadTARAGO NSW 2580

Version: Revision 2 FINAL

Woodlawn Mechanical Biological Treatment Facility

Greenhouse Gas Assessment

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Executive Summary

Veolia Environmental Services (Australia) Pty Ltd (Veolia) are seeking a modification to Project Approval 06_0239 (the Project Approval), which relates to the construction and operation of the Woodlawn Alternative Waste Technology Project (the Development). The modification addresses industry best practice and environmental controls as part of the design of the proposed Woodlawn Mechanical Biological Treatment (MBT) Facility.

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Veolia to undertake a Greenhouse Gas (GHG) assessment to support the Environmental Assessment (EA). This GHG assessment draws comparisons between the estimated greenhouse gas emissions from the previously approved development and the proposed development.

The purpose of this report is to undertake a comprehensive greenhouse gas assessment that addresses Scope 1 and 2 emissions for the construction and operation of the MBT with the proposed design modification to allow a comparison against the currently approved Development.

This assessment aims to:

- Identify and quantify the Scope 1 and 2 Greenhouse Gas emissions associated with the construction and operation of the proposed MBT Facility.
- Present the operational emissions of the MBT Facility as a multi-staged process:
  - Stage 1: 120,000 tonnes per annum of mixed waste;
  - Stage 2: 240,000 tonnes per annum of mixed waste;
  - 40,000 tonnes per annum of green waste (both stages)
- To compare the findings of this assessment with the findings of the GHG assessment for the *previously approved* AWT Facility.

The calculations presented within the GHG assessment for the currently approved AWT facility did not include a comprehensive assessment of Scope 3 emissions. Therefore, acknowledging that this assessment is to request an approval modification and should be consistent with the previous assessment, Scope 3 emissions have not been considered.

The MBT facility processes will comprise:

- Receipt of mixed waste;
- Pre-treatment including biological refining and mechanical separation;
- Recovery of recyclable material; and
- Fermentation of organic material into compost

Given that the project is still in early design stages, there is limited information available regarding the construction process, materials volumes and construction staging. Where possible, the results from other comparable projects have been used to develop greenhouse gas emission estimates for various construction activities (including, the transport of materials on and around site and movement of staff around site).

The total estimated Scope 1 and 2 emissions for the construction of the MBT Facility are estimated to be approximately **1,094 tonnes of carbon dioxide equivalent (tCO_2-e)**.

Executive Summary

Operations include Scope 1 and 2 emissions from operating the plant and machinery of the MBT, transfer and transport of waste from Veolia owned transfer facilities in Sydney, through the intermodal facility at Tarago, and to the MBT facility for processing. This assessment also includes the emissions generated from the composting process (occurring within the MBT Facility).

Emissions from operations are presented in the table below to show the relative difference between the two proposed stages and associated tonnages.

Stage	Tonnage accepted	Total t CO_2-e per annum	t CO_2-e / tonnes of waste
1	120,000 tonnes per annum of mixed waste + 40,000 tonnes per annum of green waste	30,457	0.19
2	240,000 tonnes per annum of mixed waste + 40,000 tonnes per annum of green waste	35,697	0.13

To compare this proposed development and previously approved AWT facility, the results from the maximum processing capacity of the MBT facility has been used (stage 2).

Both projects show similar emission profiles for operational emissions:

- AWT Facility (approved) = 24,797 t CO_2-e pa and 0.10 t CO2-e / tonnes of waste
- MBT Facility (proposed) = 35,697 t CO_2-e pa and 0.13 t CO2-e / tonnes of waste

The emission profile for the proposed facility is higher than the approved facility, however it is noted that the approved facility calculations did not include emissions from biological processes.

The total annual Scope 1 and 2 emissions for this project, assuming the maximum tonnage for the MBT facility is 280,000 tonnes per annum, is estimated to be **36,791 t CO_2-e pa**.

The NSW Office of Environment and Heritage (OEH) has published the NSW state emissions profile for 2010 as 157 million t CO2-e. Therefore in the NSW state context this project represents approximately 0.02% of the total state emissions

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1 INTRODUCTION

1.1 Background

Veolia Environmental Services (Australia) Pty Ltd (Veolia) are seeking a modification to Project Approval 06_0239 (the Project Approval), which relates to the construction and operation of the Woodlawn Alternative Waste Technology Project (the Development).

Subject to the provisions of Section 75W of the Environmental Planning and Assessment Act 1979 (EP&A Act), an Environmental Assessment (EA) has been prepared by Veolia to detail modifications sought to the Project Approval, which will enable utilisation of the best available technology at the proposed Woodlawn Mechanical Biological Treatment (MBT) Facility for processing mixed waste to produce compost.

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Veolia to undertake a Greenhouse Gas (GHG) assessment to support the EA. This GHG assessment draws comparisons between the estimated greenhouse gas emissions from the currently approved Development and the proposed MBT Facility.

1.2 Woodlawn Eco Project Site

The proposed MBT Facility shall be developed within the 6000 hectare (ha) Woodlawn Eco Project Site (the Eco Project Site), owned and operated by Veolia and located in the Southern Highlands of NSW, approximately 250 kilometres (km) southwest of Sydney

The Eco Project Site comprises of two equally sized properties, Woodlawn and Pylara on which the following operations exist or are being developed:

- the former Woodlawn Mine (the Mine Site);
- the Woodlawn Bioreactor (the Bioreactor);
- the Woodlawn Bio Energy Power Station (the Power Station);
- the Woodlawn Bio Energy Aquaculture (the Fish Farm)
- the Woodlawn and Pylara farms;
- the Pylara Wind Farm (the Wind Farm); and
- the proposed MBT Facility.

1.3 Proposed Facility

The Development was granted Project Approval on 6 November 2007. Veolia has since been involved in the inception of the revised concept design for the proposed MBT Facility. The proposed MBT Facility will be sited on an area of approximately 30 ha, within the approved Development boundary, of the Eco Project Site.

The waste received at the Eco Project Site for processing in the MBT Facility shall be sourced from the Sydney Metropolitan Area (SMA), which shall be brought to the Clyde Transfer Terminal (CTT), located in the geographic centre of Sydney. As part of the expansion to the Eco Project and increased waste receipt capability of the Bioreactor, Veolia is proposing to build an additional waste transfer station and associated rail infrastructure at an existing industrial site in Banksmeadow (eastern Sydney). The proposed Banksmeadow Transfer Terminal (BTT) shall operate similarly to the CTT, with waste destined for both the Bioreactor and the proposed MBT Facility.

Waste collected from the SMA and brought to the CTT (and the BTT in the future) is containerised into shipping containers for transport via rail to the Crisps Creek Intermodal Facility (IMF) located in the township of Tarago, NSW. The containers are unloaded and transferred via road on semi-trailers to the Eco Project Site, some 11 km away.

The compost produced will be used to rehabilitate the areas of the Eco Project Site degraded by former mining activities. It is also envisaged by Veolia that the compost product will confer agricultural benefits to the surrounding farms operated by Veolia, forestry and broad acre land.

Any non-compostable residuals and recyclable materials will be removed during the MBT process and deposited in the adjacent Bioreactor for further energy generation or taken offsite for reuse respectively.

The MBT process concept design was developed by Veolia's engineering division Technical Scientific and Sustainable Development Depart (TSSDD) in France and has been successfully implemented overseas. The treatment process involves a number of stages including separation, fermentation and storage, utilising specialist equipment sourced locally and from overseas.

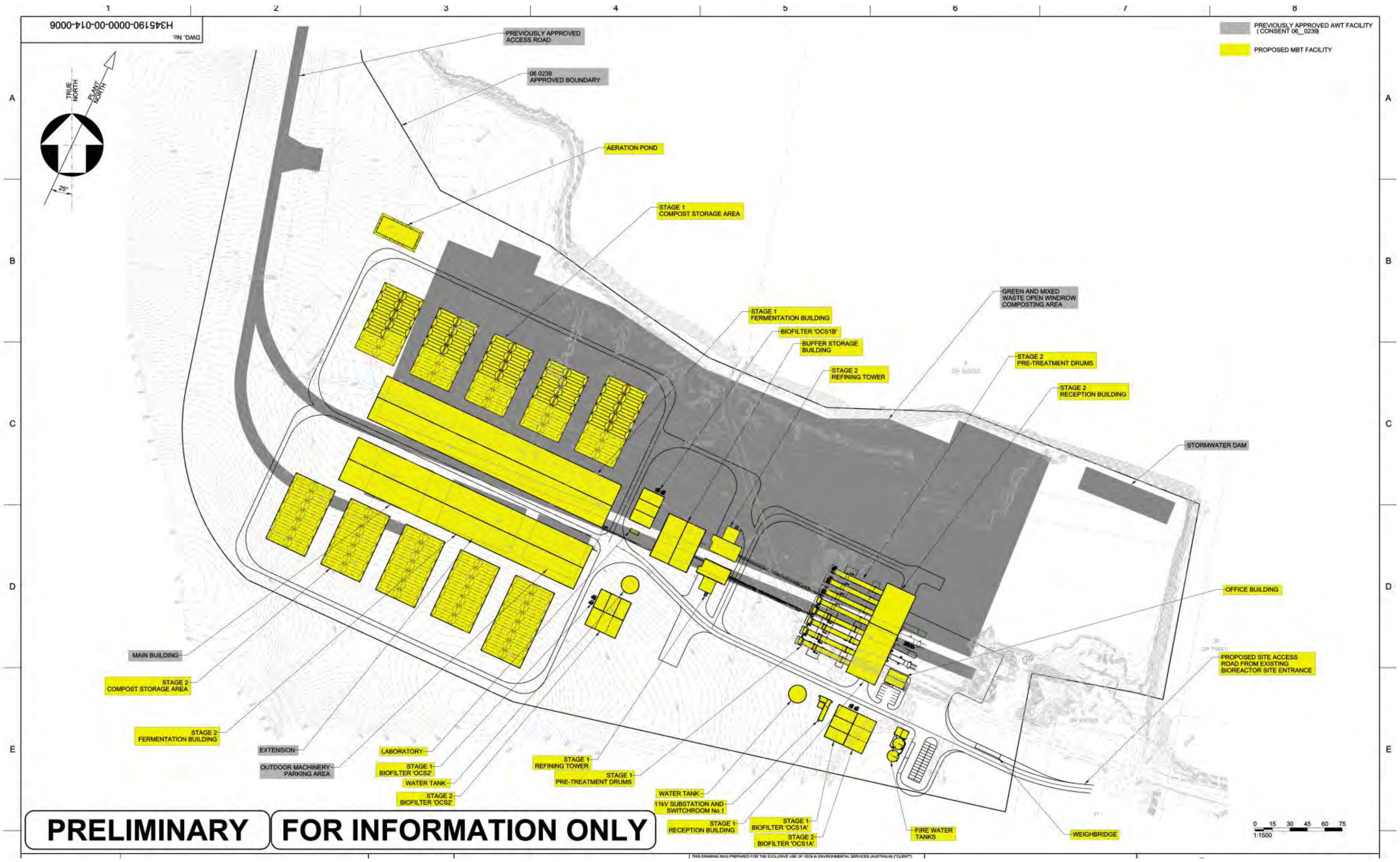
Development of the MBT has been proposed as a multi-staged approach; initially processing 120,000 tonnes per annum of mixed waste and up to a maximum approved 240,000 tonnes per annum. On top of the accepted mixed waste, 40,000 tonnes per annum of green waste will also be accepted and received, as per the original project approval.

The MBT facility processes will comprise:

- Receipt of mixed waste;
- Pre-treatment including biological refining and mechanical separation;
- Recovery of recyclable material; and
- Fermentation of organic material into compost;

The proposed layout of the MBT is presented in **Figure 1**, along with the design of the approved AWT.

Figure 1 Previously Approved AWT and Proposed MBT



1.4 Assessment Objectives

The purpose of this report is to undertake a comprehensive greenhouse gas assessment that addresses Scope 1 and 2 emissions for the construction and operation of the proposed MBT Facility to allow a comparison against the currently approved Development.

For every 100 tonnes of Municipal Solid Waste (MSW), the proposed MBT Facility is anticipated to produce:

- 31.8 tonnes of mixed waste compost for all mine degraded areas of the SML20 and surrounding farmlands;
- 1.4 tonnes of ferrous metal to be transported offsite;
- 40.2 tonnes of residual waste (to be transported to the Bioreactor for disposal); and,
- 36.6 tonnes of water lost through the process.

Note: 10 tonnes of water is added throughout the process.

Development of the MBT has been proposed as a multi-staged approach; initially processing 120,000 tonnes per annum of mixed waste and up to a maximum approved 240,000 tonnes per annum. On top of the accepted mixed waste, 40,000 tonnes per annum of green waste will also be accepted and received, as per the original project approval.

This assessment aims to:

- Identify and quantify the Scope 1 and 2 Greenhouse Gas emissions associated with the construction and operation of the proposed MBT Facility.
- Present the operational emissions of the MBT Facility as a multi-staged process:
  - Stage 1: 120,000 tonnes per annum of mixed waste;
  - Stage 2: 240,000 tonnes per annum of mixed waste;
  - 40,000 tonnes per annum of green waste (both stages)
- To compare the findings of this assessment with the findings of the GHG assessment for the *previously approved* AWT Facility.

The calculations presented within the GHG assessment for the currently approved AWT facility did not include a comprehensive assessment of Scope 3 emissions. Therefore, acknowledging that this assessment is to request an approval modification and should be consistent with the previous assessment, Scope 3 emissions have not been considered.

1.4.1 Greenhouse gas emissions

The National Greenhouse Accounts (NGA) Factors (DCCEE 2012) defines two types of greenhouse gas emissions (see **Table 1**). This assessment seeks to consider both direct emissions and indirect emissions.

Table 1 Greenhouse gas emission types

Emissions	Definition
Direct	Produced from sources within the boundary of an organisation and as a result of that organisation's activities (e.g. consumption of petrol in on-site vehicles)
Indirect	Generated in the wider economy as a consequence of an organisations activities (particularly from its demand for goods and services), but which are physically produced by the activities of another organisation (e.g. consumption of purchased electricity)

Note:. adapted from NGA Factors 2012

1.4.2 Emission scopes

The NGA Factors also identifies two 'scopes' of emissions for greenhouse gas accounting and reporting purposes as shown in **Table 2**.

Table 2 Greenhouse gas scopes

Scope	Definition
Scope 1	Direct (or point-source) emission factors give the kilograms of carbon dioxide equivalent (CO_2-e) emitted per unit of activity at the point of emission release (i.e. fuel use, energy use, manufacturing process activity, mining activity, on-site waste disposal, etc.). These factors are used to calculate scope 1 emissions.
Scope 2	Indirect emission factors are used to calculate scope 2 emissions from the generation of the electricity purchased and consumed by an organisation as kilograms of CO_2-e per unit of electricity consumed. Scope 2 emissions are physically produced by the burning of fuels (coal, natural gas, etc.) at the power station.

2 ASSESSMENT METHODOLOGY

2.1.1 Document review

A review of background information and data supplied by Veolia was undertaken. The review sought to understand the nature of the proposed works, and the outcomes of any previously completed assessments. The review of previously completed assessments was also undertaken to allow a comparison of the findings of this assessment Documents reviewed included:

- *Woodlawn MBT Facility Concept Design Report* (July 2013), prepared by Mott MacDonald
- *Environmental Assessment, Appendix F* 'Woodlawn Bioreactor Greenhouse Gas Assessment Woodlawn Expansion Project' (2010), prepared by Heggies Pty Ltd
- *EA for Woodlawn AWT Project,* (2006) prepared by Veolia and Umwelt
- *Project Approval 06_0239*, signed by the Minister of Planning
- *Rational for WASP EA GHG Calculations* (spreadsheet), Umwelt and Veolia
- *Woodlawn MBT, FEL2 Load List* (2013), prepared by Hatch
- Various MBT Site Plans and Drawings
- *Woodlawn Community Brochure* Veolia
- *MBT Mass Balance Schematic* Veolia

2.1.2 Assessment of Impacts

The methodology for the greenhouse gas assessment phase included the key stages as identified within **Table 3**.

Table 3 Assessment phase methodology

Stage	Summary
Source identification and boundary definition	Determine reporting boundaries for operations and constructions and identify activities that will result in GHG emissions.
Calculate source data and emission factors / coefficients	Develop estimations for source-level data (e.g. fuel quantities), using information provided by Veolia and previous studies (including the AWT assessment). Where possible, emissions factors were taken from the *National Greenhouse Accounts Factors*.
Establish an emissions	Collation and management of all relevant activity data (e.g. MWh/year,

inventory	tonnes/year, km/year, etc.) for all sources identified for the project. Where data was not able to be provided by Veolia, estimations were made by SLR where possible or reasonable. Source data was *aggregated* to major activity types (e.g. early works, main works).
Quantitative GHG emissions assessment	Quantitative assessment of GHG emissions using the most current emissions factors from the National Greenhouse Accounts Factors.
GHG management, mitigation and offsets	Identification of possible measures to minimise, mitigate or offset these emissions formed an important component of this study.

2.2 Emission Factors

Emissions factors used for construction and operation of the MBT Facility were taken from the NGA Factors (see **Table 4**).

Table 4 Emissions Factors

Scope	Source	Emissions factor	Energy Content Factor[4]
	Diesel fuel for transport purposes	69.9 kg CO_2-e /GJ	38.6 GJ/kL
	Diesel fuel for stationary purposes[2]	69.5 kg CO_2-e /GJ	38.6 GJ/kL
	composting of organic waste[3]	0.08 t CO_{2}.e / t wet waste	NA
Scope 2	Electricity (NSW)	0.87 kg CO_2-e/kWh	NA

1. Transport purposes include machinery and vehicles which by law can drive on the road
2. Stationary purposes include forklifts, tipping platforms, excavators etc,
3. Composting occurs throughout the MBT facility
4. Not all emission sources have an energy content factor, as per the NGA Factors this has been represented by an NA.

2.3 Calculation Methodology

The greenhouse gas emissions were calculated by multiplying the aggregated quantities for the major activities (e.g. total fuel volumes consumed or electricity purchased) with the relevant emissions factors.

2.4 Construction

With the proposed MBT Facility still in early design stages, there is limited information available regarding the construction process, material volumes and construction staging. Where possible, the results from other comparable projects have been used to develop greenhouse gas emission estimates for various construction activities (including the transport of materials on and around site and movement of staff around site).

2.4.1 Reporting boundary

The reporting boundary for construction includes Scope 1 and 2 emissions, this includes the following activities:

- Fuel use during construction
- Electricity purchased during construction

Scope 3 emissions have not been considered as part of the construction activities; this includes embodied energy within construction materials as they are regarded as immaterial in the broader emission context within this assessment. It is anticipated that for the volume of materials that will be required for construction (approximately 14,000 – 18,000 tonnes / 4,500 cubic metres), embodied emissions are expected to be less that 5% of the total Facility emissions.

2.4.2 Assumptions

The following key assumptions have been used to undertake this assessment:

- Site clearing will be required before construction can begin as part of the early works, emission estimates for site clearance have been developed based on the following comparative project (based on the relative footprint of the projects) reports:
  - *Greenhouse Gas and Energy Impact Assessment for Proposed Minor Modification to Holcim Regional Distribution Centre (RDC), Rooty Hill* (Umwelt, 2010)
  - *Report for Eurombah Fairview Transmission Line Project, Greenhouse Gas Assessment* (GHD, 2013)
- The list of construction machinery was provided by Veolia for use in this assessment as a best estimate.
- Construction will be undertaken between 7am and 6pm, Monday – Friday and 7am-1pm on Saturday (61 hours per week).
- Each piece of machinery will operate 25% of the time during construction.
- Construction will commence in July 2014 and continue to the end of the first quarter of 2016 (including the commissioning stage).
- All construction machinery other than generators, compressors, forklifts and pumps have been assumed to be road registered and the emission factors for *transport fuel emissions* for these have therefore been used.
- All machinery will be floated to and from the site with an articulated truck (54.6L/100kms). As a worst case, it is assumed that each piece of machinery would be delivered at the start of construction and picked up at the end of construction, therefore accounting for 4 trips per piece to-and-from Sydney (200 km). It is assumed that each piece would be delivered separately (refer to **Section 4.2** for relevant mitigation measures).

2.4.3 Emissions Sources

Emission sources have been identified based on the range of construction plant and equipment provided by Veolia.

Table 5 Emissions sources for construction

Scope	Activity	Source
Scope 1	Construction (Early Works)	Fuel use (diesel)
	Construction (Main Works)	Fuel use (diesel)
	Equipment transport	Fuel use (diesel)
Scope 2	Operation of site support facilities (e.g. temporary site sheds)	Consumption of purchased electricity

2.4.4 Source data for construction

The below table (**Table 6**) show the estimated fuel use for the range of machinery types expected to be used on the Project. Estimates for electricity use (kWh) during construction were not available at the time of the assessment, and have therefore not been included within the below table.

It is assumed that the majority of the sites electricity requirements will be met through the use of diesel generators and these have therefore been included in the below table.

Table 6 Fuel use for construction sources

Fuel type	Source	Fuel use (kL diesel)
	Early Works (6 months)	
Transport fuel	33t Product Truck	4.76
	Dozer	15.37
	Mobile Crane 1	2.93
	Mobile Crane 2	2.93
	Excavator 1	4.39
	Excavator 2	4.39
	Grader	5.86
	Compactor	3.44
	Backhoe 1	5.12
	Backhoe 2	5.12
	Rollers	3.44
	Water cart	5.49
	Truck and dog	4.76
	Tipper trucks	4.83
	Dump trucks	4.83
	Scrapers	13.73
	Whacker Packer	0.44
	Electric saw	0.00
	Pile drivers	2.01
	Augers	2.01
	Profiling machines	2.20
	Bitumen /hot mix machines	4.39
Stationary fuel	Generator 1	4.76
	Generator 2	4.76
	Diesel submersible pumps	0.37

Fuel type	Source	Fuel use (kL diesel)
	Main Works (18 months)	
Transport fuel	Mobile Crane 1	8.78
	Mobile Crane 2	8.78
	Concrete trucks	9.42
	Scissor Lifts	0.58
Stationary fuel	Forklifts	5.95
	Compressors	18.19
	Generator 1	45.68
	Generator 2	45.68
	Concrete pumps	0.23

Table 7 shows the aggregated quantities for each major construction activity.

Table 7 Aggregated quantities for construction

Scope	Activity	Source	Quantity	Units
Scope 1	Construction (Early Works)	Fuel use (diesel)	112.33	kL diesel
	Construction (Main Works)	Fuel use (diesel)	413.28	kL diesel
	Equipment transport	Fuel use (diesel)	3.06	kL diesel
Scope 2	Construction	Consumption of purchased electricity	NA	kWh

Electricity will be generated on site with the use of diesel generators.

2.5 Operations

2.5.1 Reporting boundary

The reporting boundary for this assessment has been defined following consideration of:

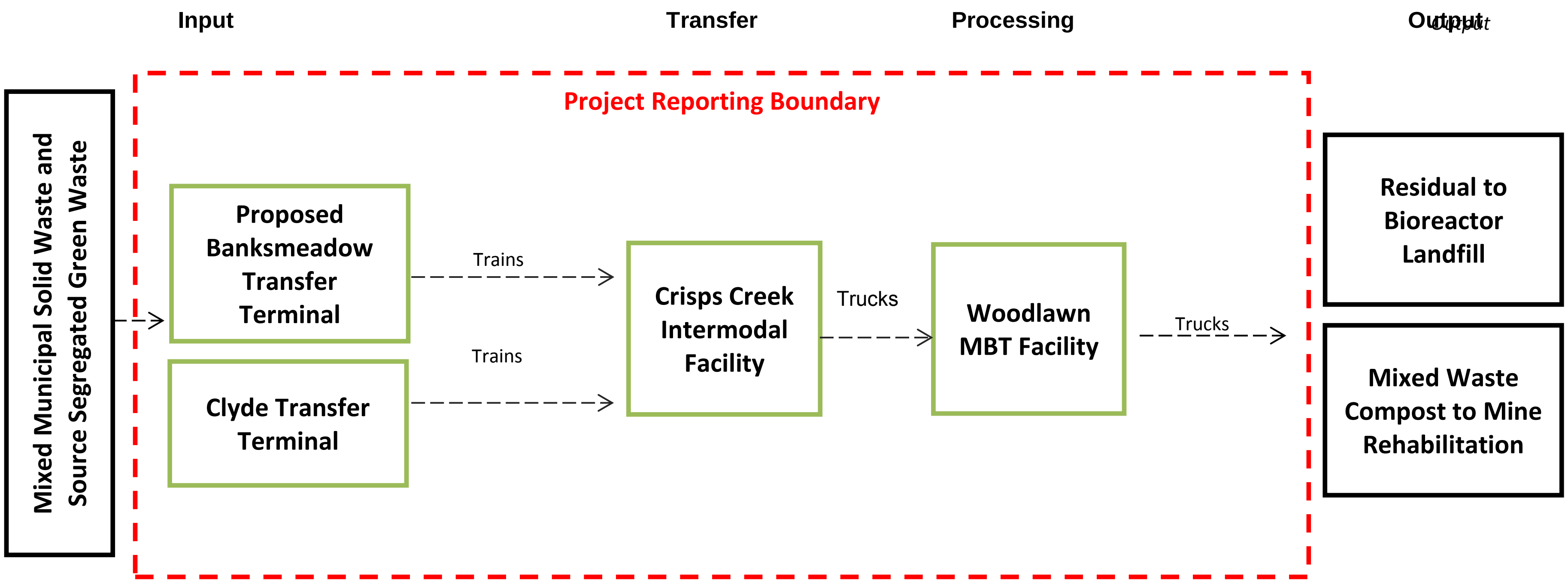
- The previous GHG Assessment and dataset (completed for currently approved AWT facility).
- The previous GHG report entitled 'Woodlawn Bioreactor Greenhouse Gas Assessment Woodlawn Expansion Project'. Heggies 2010
- Guidance contained in 'World Resource Institute, Greenhouse Gas Reporting Protocol'.
- Guidance contained in 'National Greenhouse and Energy Reporting (NGER) Measurement Determination 2008'.

The reporting boundary is illustrated in **Figure 2** - a process summary for the operation of the MBT.

Operational emissions have been calculated for the following development stages:

- Stage 1: 120,000 tonnes of mixed waste + 40,000 tonnes of green waste
- Stage 2: 240,000 tonnes of mixed waste + 40,000 tonnes of green waste

Figure 2 MBT Operation – Process Summary



2.5.2 Assumptions

The following key assumptions have been made in undertaking this assessment.

A large number of assumptions, particularly in relation to the transfer and transport of waste between the Sydney transfer facilities, the Crisps Creek Intermodal Facility and the MBT Facility, have been adopted from the GHG assessment completed for the previously approved AWT Facility. When relevant, this has been noted within each relevant assumption presented in **Table 8**.

Table 8 Assessment assumptions

Activity	Assumption
General	Development of the MBT is proposed to be a multi-stage approach, designed to process MSW as follows: • Stage 1: 120,000 tonnes per annum of mixed waste; • Stage 2: 240,000 tonnes per annum of mixed waste; • 40,000 tonnes per annum of green waste (both stages)
	Based on MSW composition data from two key sources (*Review of Waste Strategy and Policy in NSW* (2010), DECCW and *National Waste Report* (2010) DEWHA) it is assumed that 60% of all MSW sent to landfill is mixed organics (garden and food waste)
	Organics fed through the biological treatment stage of the MBT will be mixed MSW organics Green waste added to the fermentation/composting process of the MBT is assumed to be garden waste only
	Of every 100 tonnes of MSW and 10% water inputs, the following key outputs will be generated: • 31.8 tonnes of compost • 40.2 tonnes of residual waste • 1.4 tonnes of ferrous metals
	Tonnes of waste per annum available for composting are estimated based on the assumed proportion of organics within MSW (60%) and the additional 40,000 tonnes of green waste added to the MBT Facility at the fermentation stage
	It is assumed that all fuels used within stationary machinery and transport vehicles are 100% non-renewable fuels (refer to **Section 4** for mitigation measures) The use of B5 or E10 fuels has not been considered within this assessment
	It is assumed that 100% of purchased electricity is from non-renewable sources. The use of *green power* has not been considered within this assessment (refer to **Section 4** for mitigation measures)
	Electricity use at the intermodal facility and the MBT facility is consistent irrespective of the tonnage of waste put through the facility. The amount of electricity used has been established based on operating hours, assuming that all plant and lighting will operate 100% of the time when the facility is open
Transport of waste from the Sydney transfer facilities to the Crisps Creek Intermodal Facility	Energy used at the Sydney transfer facilities has been included based on data provided in the AWT facility data (assumption adapted from previously approved AWT GHG assessment) – inclusive of MSW and green waste It is assumed that the energy use will be equivalent and relative to the input tonnage across both stages
	All waste will be transported by locomotive (1400 t of waste per locomotive at 4.3 L diesel use per kilometre travelled) from each transfer station to the intermodal facility (assumption adopted from previously approved AWT GHG assessment)
	Applied distances from the Sydney transfer facilities to the Intermodal Facility have been assumed based on kilometres travelled by road. It is assumed that the distance by road would be relatively consistent with the distance by rail.

	The distance from both Sydney transfer facilities to the Intermodal Facility is approximately 230 km each way and 460km for a return trip
	As assumed percentage allocation of waste has been applied to each transfer station; 23% of the total tonnages will be sourced from Clyde and 77% of the total tonnages will be sourced from the proposed Banksmeadow Transfer Facility.
	59,876 L of diesel used to transport 40,000 tonnes of green waste from source location (Clyde Transfer station) to the Intermodal facility (assumption adopted from previously approved AWT GHG assessment). It is noted that for the MBT Facility it is possible that green waste may also be sourced from the proposed Banksmeadow Transfer Facility. It is unlikely that this change will affect the overall emissions (diesel use) given that both facilities are approximately the same distance from the Intermodal Facility.
Intermodal Facility Transfer of waste to MBT	Waste will be unloaded at the Intermodal facility by forklifts and loaded into 19T quad axle semi-trailers (plus 31.5 tonnes laden) for transfer to the MBT Facility (22 km return trip) (assumption adopted from previously approved AWT GHG assessment)
	The 19T quad axle semi-trailers use 14.6 L of diesel fuel to complete the 22 km return trip from the Intermodal facility to the MBT Facility (assumption adopted from previously approved AWT GHG assessment)
	Electricity use at the intermodal facility is assumed at 600kWh/week (assumption adopted from previously approved AWT GHG assessment)
	Therefore annual electricity usage is 31,200kWh/yr based on the assumption that the Intermodal facility operates 52 weeks out of the year
	36,457 L of diesel used to transfer and transport 40,000 tonnes of waste through the Intermodal facility to the MBT facility (assumption adopted from previously approved AWT GHG assessment)
MBT Facility	A Columbia tipping platform will remove the waste from the quad axle semi-trailers onto the platform. The Columbia tipping platform uses 8L/hour of diesel and moves six containers per hour (assumption adopted from previously approved AWT GHG assessment)
	All equipment used within the MBT facility is electricity powered and was provided within the *Equipment Load List.* The kW for each piece of equipment was calculated based on the Average Load (KVA) and the power factor number provided
	The three outputs of the MBT Facility includes: Recycled materials, mixed waste compost and residual waste. The end-points for all three products are considered outside the project boundary
	Emissions from composting are classified as emissions from the biological treatment of solid waste.
Residual Waste to Landfill	All residual waste from the MBT Facility will be moved to the Bioreactor for disposal
	Residual waste will be moved from the MBT to the Bioreactor with walking floor trailers (22 tonnes net mass)
	Walking floor trailers (22t net mass) use 2.05L/km and therefore will consume 6.6L of diesel for each 3.24km return trip from the MBT Facility to the Bioreactor for disposal (assumption provided by Veolia)

2.5.3 Emissions Sources

Emission sources for the activities within the reporting boundary have, where possible, remained consistent with those identified in *Woodlawn MBT Facility Concept Design Report* (VES 2013).

Table 9 Emission sources for operations

Scope	Activity	Source
Scope 1	Transport by rail	Fuel use (diesel)
	Transport by road	Fuel use (diesel)
	Stationary equipment operation	Fuel use (diesel)
	Plant operation	Composting of organic waste
Scope 2	Intermodal Facility operation	Consumption of purchased electricity
	Transfer facility operation (Clyde and Banksmeadow)	Consumption of purchased electricity
	MBT plant operation	Consumption of purchased electricity

2.5.4 Source data for Stage 1 operations

Table 10 and **Table 11** show the estimated fuel and electricity use and fugitive emissions expected during Stage 1 operations.

Table 10 Annual fuel use for operational sources

Fuel type	Source	Fuel use (kL per annum)
	Transport by rail	
Transport fuel	Clyde to Intermodal Facility (MSW)	78.3
	Banksmeadow to Intermodal Facility (MSW)	262.2
	Sydney Transfer Facilities to Intermodal Facility (green waste)	59.9
	Transport by road	
Transport fuel	Intermodal Facility to MBT Facility (mixed and green waste)	92.1
	MBT to Eco Project Site	10.1
	Plant operations	
Stationary fuel	Plant operation at transfer stations	127.0
	Forklift transfers of waste from train to trucks at Intermodal Facility	46.8
	Forklift transfers of residual waste from MBT to Trucks	18.8
	Columbia tipping platform at MBT	5.1

Table 11 Annual electricity use for operational sources

Source	Electricity use (kWh per annum)
Plant operations[1]	
Transfer facility operation (Clyde and Banksmeadow[2])	730,400
Intermodal Facility operation	31,200
MBT operations (all components of the facility *and* administration)	25,003,884

1. Electricity use at the intermodal facility and the MBT facility is consistent irrespective of the tonnage of waste put through the facility. The amount of electricity used has been established based on operating hours, assuming that all plant and lighting will operate 100% of the time when the facility is operational.
2. Electricity use at the proposed Banksmeadow facility has been estimated and may change depending on the final facility

Table 12 Organic waste use for operational sources

Source	Tonnes of compostable waste per annum
Plant operations	
Organic waste (biological processes)	78,160

Tonnes of compostable waste per annum are estimated based on the assumed proportion of organics within MSW (60%) and the additional 40,000 tonnes of green waste added to the MBT Facility at the fermentation stage

2.5.5 Source data for Stage 2 operations

The following tables show the estimated fuel and electricity use and fugitive emissions expected during Stage 2 operations.

Table 13 Annual fuel use for operational sources

Fuel type	Source	Fuel use (kL per annum)
	Transport by rail	
Transport fuel	Clyde to Intermodal Facility (MSW)	156.7
	Banksmeadow to Intermodal Facility (MSW)	524.5
	Sydney Transfer Facilities to Intermodal Facility (green waste)	59.9
	Transport by road	
Transport fuel	Intermodal Facility to MBT Facility (mixed and green waste)	147.7
	MBT to Eco Project Site	28.9
	Plant operations	
Stationary fuel	Plant operation at transfer stations	254.0
	Forklift transfers of waste from train to trucks at Intermodal Facility	93.6
	Forklift transfers of residual waste from MBT to Trucks	37.6
	Columbia tipping platform at MBT	10.1

Table 14 Annual electricity use for operational sources

Source	Electricity use (kWh per annum)
Plant operations[1]	
Transfer station operation (Clyde and Banksmeadow[2])	1,235,040
Intermodal Facility operation	31,200
MBT operations (all components of the facility *and* administration)	25,003,884

1. Electricity use at the intermodal facility and the MBT facility is consistent irrespective of the tonnage of waste put through the facility. The amount of electricity used has been established based on operating hours, assuming that all plant and lighting will operate 100% of the time when the facility is open
2. Electricity use at the proposed Banksmeadow facility has been estimated and may change depending on the final facility

Table 15 Organic waste use for operational sources

Source	Tonnes of compostable waste per annum
Plant operations	
Organic waste (biological processes)	116,320

Tonnes of compostable waste per annum are estimated based on the assumed proportion of organics within MSW (60%) and the additional 40,000 tonnes of green waste added to the MBT Facility at the fermentation stage

3 GREENHOUSE GAS ASSESSMENT

3.1 Construction Emissions

Table 16 shows the anticipated GHG emissions from construction of the MBT Facility and associated infrastructure.

Table 16 Construction Greenhouse Gas emissions

Activity	Quantity	Units	t CO_2-e	
			Scope 1	Scope 2
Construction (Early Works)	273.66	kL diesel p/a	651.4	
Construction (Main Works)	413.28	kL diesel p/a	384.8	
Equipment transport	21.4032	kL diesel p/a	57.7	
Construction (electricity use)	NA	kWh p/a		NA
Total			**1093.90**	**-**

Electricity will be generated on site with diesel generators. Fuel use for these generators have been included above

3.2 Operational Emissions

This assessment presents estimated GHG emissions for the two proposed stages of the operation of the MBT:

- Stage 1: 120,000 tonnes per annum of mixed waste;
- Stage 2: 240,000 tonnes per annum of mixed waste;
- 40,000 tonnes per annum of green waste

3.2.1 Stage 1 Operations

Table 17 shows the estimated GHG emissions from operation of the MBT Facility and associated infrastructure.

Table 17 Operations Greenhouse Gas emissions

Activity	Quantity	Units	t CO_2-e	
			Scope 1	Scope 2
Transport by rail (diesel)	400.44	kL diesel p/a	1080.4	
Transport by road (diesel)	65.7265	kL diesel p/a	177.3	
Stationary equipment operation (diesel)	234.12	kL diesel p/a	628.7	
Organic waste (biological processes)	78,160	Tonnes of wet waste	6252.8	
Transfer Stations operation (electricity)	730,400	kWh p/a		635.45
Intermodal Facility operation (electricity)	31,200.00	kWh p/a		27.14
Plant operation (electricity)	25,003,884	kWh p/a		21,753
Total			**8139.2**	**22,415.6**

The total estimated operational greenhouse gas emissions for Stage 1 are **30,555 tCO_2-e**

3.2.2 Stage 2 Operations

Table 18 shows the estimated GHG emissions from operation of the MBT Facility and associated infrastructure.

Table 18 Operations Greenhouse Gas emissions Stage 2

Activity	Quantity	Units	t CO_2-e	
			Scope 1	**Scope 2**
Transport by rail (diesel)	741	kL diesel p/a	1999.3	
Transport by road (diesel)	140.18	kL diesel p/a	378.2	
Stationary equipment operation (diesel)	431.79	kL diesel p/a	1158.9	
Organic waste (biological processes)	116,320	Tonnes of wet waste	9305.6	
Transfer Stations operation (electricity	1,235040	kWh p/a		1074.5
Intermodal Facility operation (electricity)	31,200	kWh p/a		27.5
Plant operation (electricity)	25,003,884	kWh p/a		21,753
Total			**12,842**	**22,855**

The total estimated greenhouse gas emissions for Stage 2 are **35,697 tCO_2-e**

4 MITIGATION AND MANAGEMENT MEASURES

The following potential emission mitigation and management measures should be considered when developing the project specifications and detailed design.

4.1 Electricity Usage

The following points should be considered to reduce the emissions caused from on-site electricity usage:

- A percentage of the total electricity for the site could be offset through purchasing *green power* from an electricity supplier.
- All plant and machinery (stationary) within the MBT facility should be regularly serviced to ensure efficient energy use.
- Sensor lighting could be used in some areas to minimise the number of lights on during all hours of operation.
- Where possible, high efficiency lighting should be used.

4.2 Vehicles and Stationary Plant and Equipment

The following points should be considered to reduce the overall fuel use from onsite vehicles:

- Where possible plant and machinery for construction should be sourced from a local supplier, rather than floating everything from Sydney.
- All vehicles/plant and machinery should be turned off when not in use and regularly serviced to ensure efficient operation.
- Where possible, B5 and E10 fuel should be used within onsite vehicles.
- Where possible B5 blended diesel should be used within stationary plant and equipment.
- Truck routes and loading capacity should be designed to reduce the distance and effort required by the vehicles.

4.3 Materials Selection

Where possible, construction materials should be selected which contain recycled or reused products. This is particularly relevant for concrete and steel purchasing as these materials typically have the most significant GHG impact during construction.

The use of recycled materials should also be considered during site development, for example, recycled aggregates and soil can be used during haul road construction.

5 CONCLUSIONS

Veolia are seeking a modification to Project Approval 06_0239, which relates to the construction and operation of the Woodlawn Alternative Waste Technology (AWT) Project. The proposed development is a more specialised Mechanical Biological Treatment (MBT) Facility which will be developed in three stages:

- Stage 1: 120,000 tonnes per annum of mixed waste;
- Stage 2: 240,000 tonnes per annum of mixed waste;
- 40,000 tonnes per annum of green waste (both stages)

This assessment has determined Scope 1 and 2 GHG emission estimates for the construction and operation of the proposed facility and provided a suite of mitigation and management measures that, if implemented, could potentially reduce the emissions for the construction and operation of the site.

Scope 3 emissions have not been calculated within this assessment.

The following sections of the report draw comparisons between estimated greenhouse gas emissions from the previously approved development and assessed proposed MBT Facility.

5.1 Construction

Emissions for construction have been estimated for Scope 1 and 2 only.

Given that the project is still in early design stages, there is limited information available regarding the construction process, materials volumes and construction staging. Where possible, the results from other comparable projects have been used to develop greenhouse gas emission estimates for various construction activities (including, the transport of materials on and around site and movement of staff around site).

The total estimated Scope 1 and 2 emissions for the construction of the MBT Facility are approximately **1,094 tCO_2-e.**

A comparison cannot be drawn between construction related emissions of the proposed MBT Facility and the previously approved AWT Facility as the previous assessment did not include construction emissions within scope.

It can however be concluded that **1,094 tCO_2-e** is a small amount when compared to other much larger developments. For example, the total construction emissions for a new rail line in Melbourne was 661,000 tCO2-e, the total construction emissions for a recent water transfer project was 31,700 tCO2-e.

Scope 3 emissions have not been considered as part of the construction activities; this includes embodied energy within construction materials as they are regarded as immaterial in the broader emission context within this assessment. It is anticipated that for the volume of materials that will be required for construction (approximately 14,000 – 18,000 tonnes / 4,500 cubic metres), embodied emissions are expected to be less that 5% of the total Facility emissions.

5.2 Operations

Operations include Scope 1 and 2 emissions from operating the plant and machinery of the MBT, transfer and transport of the waste from the Sydney transfer facilities, through the intermodal facility, and to the MBT facility for processing. This assessment also includes the emissions generated from the composting process (occurring within the MBT Facility).

Emissions from operations are presented in the table below to show the relative difference between the two proposed stages and associated tonnages.

Table 19 Operational Emissions, Conclusions

Stage	Tonnage accepted	Total t CO_2-e per annum	t CO_2-e / tonnes of waste
1	120,000 tonnes per annum of mixed waste + 40,000 tonnes per annum of green waste	30,457	0.19
2	240,000 tonnes per annum of mixed waste + 40,000 tonnes per annum of green waste	35,697	0.13

To compare this proposed development and previously approved AWT facility, the results from the maximum processing capacity of the MBT facility has been used (stage 2).

Both projects show similar emission profiles (operational emissions only)[1]:

- AWT Facility (approved) = 24,797 t CO_2-e pa and 0.10 t CO2-e / tonnes of waste
- MBT Facility (proposed) = 35,697 t CO_2-e pa and 0.13 t CO2-e / tonnes of waste

The emission profile for the proposed facility is higher than the approved facility, however it is noted that the approved facility calculations did not include emissions from biological processes.

5.3 Emissions Context

The total annual Scope 1 and 2 emissions for this project, assuming the maximum tonnage for the MBT facility is 280,000 tonnes per annum, is estimated to be **36,791 t CO_2-e pa**.

The NSW Office of Environment and Heritage (OEH) has published the NSW state emissions profile for 2010 as 157 million t CO2-e. Therefore in the NSW state context **this project represents approximately 0.02% of the total state emissions**.

[1] The original GHG Assessment, undertaken as part of the EA for the AWT, did not present an emission profile for construction, therefore, comparison of the emission profiles only compares operational emissions.