Environmental Impact Statement

Mayfield West Recycling Facility

80 Tourle Street Mayfield West

Prepared for Benedict Recycling Pty Ltd
26 March 2015

EMM
EMGA Mitchell McLennan

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Environmental Impact Statement

Final

Report J14152RP1 | Prepared for Benedict Recycling Pty Ltd | 26 March 2015

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Date	26 March 2015	Date	26 March 2015

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Executive Summary

Benedict Recycling Pty Ltd proposes to develop a recycling facility and undertake a range of ancillary activities at 80 Tourle Street, Mayfield West. There are currently no mixed waste recycling facilities in the region except for a small number of facilities accepting segregated loads and bricks, concrete and timber. The recycling facility will accept waste from businesses and the general public and would complement the activities of the Summerhill Waste Management Centre allowing additional waste generated in the Lower Hunter Region to be recycled, reducing the quantity of waste being land-filled at Summerhill. The recycling facility would therefore contribute to meeting the NSW Government's recycling strategies and targets. Benedict Recycling has purchased the site with the sole purpose of developing a recycling facility on the site.

The recycling facility will import inert "pre-classified general solid waste (non-putrescible)", such as construction and demolition wastes, and selected commercial and industrial wastes, for processing (eg crushing, shredding and sorting) to produce saleable recycled materials. No special, liquid, hazardous, restricted solid waste or general solid waste (putrescible) will be accepted at the facility.

All of the materials brought onto the site will be taken from the site as products or as non-recyclable residues for disposal at a licensed landfill. There will be no materials land-filled or otherwise disposed anywhere within the site as a result of the proposal.

The site has been remediated following the previous use by Delta EMD for the processing of electrolytic manganese dioxide. A site audit statement under the NSW *Contaminated Land Management Act* determined that the site is suitable for commercial and industrial use provided that there is compliance with the Site Management Plan for Subsurface Disturbance Activities during any subsurface disturbance activities.

The site, is zoned IN1 General Industrial under the Newcastle Local Environmental Plan (LEP) 2012 and the proposal is permissible with consent in a prescribed zone under Clause 121.

The site is ideally suited for the development of a recycling facility because it is: in an industrial area centrally located in Newcastle; readily accessible to light and heavy vehicles; distant from residences; already contains sheds ideal for receiving, processing and storing wastes; already has runoff controls; and will not result in any significant disturbance of the contaminated soil. Development of the proposal will provide an ongoing economic and social benefit from a site that is only suitable to a small range of uses.

This environmental impact statement (EIS) has been prepared in accordance with the Secreatary's environmental assessment requirements (SEARs), Clauses 71 and 72 of the Environmental Planning and Assessment Regulation 2000 and advice provided by Newcastle City Council (NCC) following a pre-development application meeting. It describes the existing environment, the proposal, the legislative and policy context, proposed environmental management measures and the impacts of the project. Given the location and condition of the site, the proposed activities will only have minor environmental impacts.

The proposal is considered to be in the public's interest for the following reasons:

- the proposal provides a suitable use for an existing industrial site;
- the proposal will provide socio-economic benefits through employment and stronger regional industrial activity;

- the materials received onsite will be recycled and reused where possible to minimise waste sent to landfills and provide material suitable for construction projects and other purposes; and

- the proposal's environmental and social amenity impacts are negligible with the implementation of the recommended mitigation and management measures.

It is, therefore, recommended that the proposed recycling facility is approved subject to the mitigation measures outlined in this EIS.

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1 Introduction

1.1 Proposal overview

Benedict Recycling Pty Ltd (Benedict Recycling) proposes to develop a recycling facility and undertake a range of ancillary activities at 80 Tourle Street, Mayfield West.

The recycling facility will[1] import inert pre-classified general solid waste (non-putrescible), such as construction and demolition wastes, and selected commercial and industrial wastes, for processing (eg crushing, shredding and sorting) to produce saleable recycled materials.

Ready-to-use recycled products will include aggregates, road-base, soils and mulches. Segregated recycled materials that will be sold to other recycling firms for further processing will include ferrous and non-ferrous metals, dry paper/cardboard, shredded wood and plastics. All of these products will meet recycled material specifications while recovering a range of materials that would otherwise be disposed to landfill. It is not proposed to compost any wastes.

Only 'pre-classified general solid waste (non-putrescible) waste' as defined by the *Waste Classification Guidelines - Part 1: Classification of Waste* (Environment Protection Authority (EPA) 2014) will be accepted by the site. No special, liquid, hazardous, restricted solid waste or general solid waste (putrescible), as defined in EPA (2014b), will be accepted at the facility.

All of the materials brought onto the site will be taken from the site as products, as non-recyclable residues for disposal at an EPA licensed landfill, as refuse derived fuel (RDF) for use at a licensed facility in Australia or overseas or as biochar. There will be no materials land-filled or otherwise disposed anywhere within the site as a result of the proposal.

1.2 The applicant

The applicant is Benedict Recycling which is part of Benedict Industries, a New South Wales (NSW)-based group of companies with quarrying, resources and recycling businesses. Established in 1966, it is one of the largest producers of quarried materials in NSW and continues to be family owned and managed. The group supplies a range of sands, soils, sandstone, decorative aggregates and recycled products to customers in the greater Sydney Region and across NSW. It owns (or is a joint partner in) operations in Menai, Banksmeadow, Chipping Norton, Moorebank, Menangle, Belrose, Mittagong, Appin and Cowra. Benedict Industries' major customers include Roads and Maritime Services (RMS), Sydney Water, Holcim, Boral Concrete, Concrite, Fulton Hogan, most major construction and infrastructure companies, and numerous local councils.

Benedict Recycling currently operates recycling facilities at Chipping Norton, Banksmeadow and Belrose.

[1] The project is a development proposal and its implementation is conditional on receiving relevant approvals. For reason of style however, the project and related proposed activities have been described in the active mood 'will' rather than 'would'.

1.3 Site description

1.3.1 Location and characteristics

The site is located at 80 Tourle Street, Mayfield West and is legally described as Lot 1 in DP 874109. It is within the Steel River industrial estate and covers about 8.9 ha (Figure 1.1). The site is flat (approximately 10 m Australian Height Datum (mAHD)) and is largely devoid of vegetation (Photograph 1.1) except for trees around the boundary (Photograph 1.2) and patches of planted vegetation near old office buildings. Since the closure of Delta EMD's operations in 2008, the site has been decommissioned leaving:

- a number of buildings, including the EMD Delta Electrolysis Building that is about 150 m long and 25 m wide (Photograph 1.3 and Photograph 1.4);
- large open areas covered by concrete, asphalt or crushed rock (Photograph 1.1); and
- a bitumen-lined drain surrounding the site (Photograph 1.5) that directs all site drainage to a sedimentation pond with a single discharge point (Photograph 1.6). Discharge can be controlled by valves.

Benedict Recycling has purchased the site to develop the recycling facility so has secure tenure to meet Newcastle and the surrounding areas' needs for many years to come.

Photograph 1.1 View across the site from the north-west corner

KEY

Site

0 200 400 m

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Site Location

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Figure 1.1

Photograph 1.2 Example of trees on the boundary — southern boundary

Photograph 1.3 Delta EMD Electrolysis Building (main processing shed) — southern end

Photograph 1.4 **Delta EMD Electrolysis Building (main processing shed) — interior**

Photograph 1.5 **Section of perimeter drain**

Photograph 1.6 Sedimentation pond discharge point in north-west of the site

1.3.2 History

The site was previously used by Delta EMD for the processing of electrolytic manganese dioxide (Figure 1.2).

The site has been remediated following the previous use. A site audit statement under the *Contaminated Land Management Act 1997* has been issued for the site. This determined that the site is suitable for commercial and industrial use provided that there is compliance with the Site Management Plan for Subsurface Disturbance Activities (AECOM 2009) during subsurface disturbance activities (see Section 2.10.3).

1.3.3 Surrounding environment

The site is located south of the Hunter River and has Tourle Street to the east, light industrial buildings to the west and Ausgrid Mayfield West Substation to the south. Further to the south, the land rises to about 24 mAHD before dropping to about 20 mAHD along Industrial Drive.

Land to the east and north of the site, including the Hunter River, is zoned SP1 Special Activities under the State Environmental Planning Policy (Three Ports) 2013. Land to the west and south of the site is zoned IN1 General Industrial under the Newcastle LEP.

The nearest residential properties are on the far side of Industrial Drive, about 500 m south of the site (Figure 1.1). With the exception of the top of the largest shed on the site (which will not be modified), there are no views to the site from Industrial Drive or any other residential areas. As described in Chapter 6, the site's substantial distance from residential areas coupled with the industrial/commercial nature of its immediate surrounds means that development will result in minimal impacts to industrial/commercial neighbours and negligible impacts on more distant residential properties.

Delta EMD site prior to decomissioning (circa 2002)

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Figure 1.2

1.4 Project justification and alternatives

1.4.1 Project justification

The NSW Government has committed close to $500 million to transform waste and recycling in NSW. The Waste *Less, Recycle More: A Five-year $465.7 million Waste and Resource Recovery Initiative* (EPA 2013) states that "[m]ore effort is needed to continue increasing the recycling rate for waste from households, business and industry" and further that "[s]ignificant infrastructure investment is required in order to keep up with the increasing waste generation rates and meet the NSW recycling targets."

As an established recycling business in NSW, Benedict Recycling supports these strategies and their ongoing implementation. The recycling facility will contribute to meeting the NSW Government's recycling strategies and targets.

There are currently no mixed waste recycling facilities in the region except for a small number of facilities accepting segregated loads of bricks, concrete and timber. The recycling facility will accept waste from businesses and the general public and will complement the activities of the Summerhill Waste Management Centre allowing additional waste generated in the Lower Hunter Region to be recycled, reducing the quantity of waste being land-filled at Summerhill.

The proposal has many benefits from an economic, social and environment perspective. Specifically the recycling facility will:

- divert recyclable and reusable wastes from landfill, including co-mingled waste for which there are few recycling alternatives in the Lower Hunter region;
- diverting these wastes from landfill will preserve space within local landfills, including the Summerhill Waste Management Centre, for general waste (putrescible) extending the life of these landfills;
- produce ready-to-use recycled materials (eg aggregates) to assist construction firms and government agencies (including councils) to meet their environmental commitments to use recycled materials;
- produce segregated recycled materials (eg ferrous and non-ferrous metals, and plastics) for further processing;
- potentially produce RDF or biochar from non-recyclable residue that will otherwise be land-filled;
- provide storage for vehicles and bins owned by small- to medium-sized waste contractors away from residential areas and with appropriate environmental controls such as runoff controls and a self-contained truck wash;
- provide a commercial return and will contribute to the economy of NSW; and
- provide employment for 12 people within the recycling facility and potentially further employment associated with ancillary waste activities.

The *NSW Waste Avoidance and Resource Recovery Strategy 2014–21* (EPA 2014a) provides a framework for actions to minimise environmental harm from waste generation through to disposal, and maximising efficient resource use. The strategy sets targets for preventing waste generation, increasing the recovery and use of secondary resources, reducing toxic substances in products and materials, and reducing litter and illegal dumping. The strategy aims to increase the recovery and use of materials from the construction and demolition sector. The recycling facility will assist to achieve this aim through recycling construction and demolition waste.

1.4.2 Site location

Benedict Recycling has purchased the site at 80 Tourle Street, Mayfield West, with the sole purpose of developing a recycling facility on the site. The site is ideally suited for the development of a recycling facility because:

- it is centrally located in Newcastle;
- it is readily accessible from the Lower Hunter Region from roads suitable for heavy vehicle use;
- it is adjacent to Tourle Street and about 500 m from Industrial Drive which both carry high traffic volumes so the limited noise emitted from the site will not be add appreciably to noise levels at the closest residential receivers on the far side of Industrial Drive;
- the proposed activities are generally not expected to be visible from publically accessible locations;
- the site contains sheds that are ideal for receiving, processing and storing wastes, and for storing recycled materials, undercover to minimise environmental impacts;
- there are existing runoff controls at the site; and
- the proposed activities will not result in any significant disturbance of the contaminated soil that is a legacy of previous operations on the site will provide an ongoing economic and social benefit from the site that is only suitable to a small range of uses.

1.4.3 Consideration of alternatives

i Do nothing

The site is currently in aesthetically poor condition as a result of disuse. If the site were to remain unused, rubbish and graffiti will continue to accumulate on the site (Photograph 1.7 and Photograph 2.9). Without the construction of the facility, the land will remain unused and continue to detract from the amenity of the surrounding industrial area.

ii Alternative land use

The land is zoned as industrial so the land is not suitable for commercial or residential uses. The recycling facility and ancillary activities are suitable uses for the site as little additional infrastructure for its operation and disturbance of the contaminated fill on which the site sits will be minimal. The site could potentially be developed for other industrial uses although there are many suitable vacant sites in the Steel River industrial estate.

Photograph 1.7 Graffiti and vandalism in abandoned unused buildings

1.5 Purpose of report

This EIS accompanies a development application (DA) for the proposal under Part 4 of the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act). The consent authority for the DA is NCC and the determining authority is the Hunter and Central Coast Joint Regional Planning Panel (JRPP).

This EIS has been prepared in accordance with the EP&A Act and EP&A Regulation, and addresses the requirements of the relevant government agencies as described in the SEARs and matters raised during consultation with NCC, agencies and surrounding neighbours that are likely to be impacted by the proposal.

1.6 Newcastle City Council requirements

The NCC letter (28 January 2015) regarding the pre-development application meeting held on 22 January 2015 listed issues to be addressed in future application. These requirements and where they are addressed in this EIS are summarised in Table 1.1.

Table 1.1 Newcastle City Council requirements

Assessment requirement	Reference in EIS
• Designated development – the proposal constitutes designated development, requires SEARs from Department of Planning and Environment (DPE) for the EIS.	Sections 1.7 and 3.2.2
• Traffic report – addressing traffic impacts, frequency and types of vehicles, impacts on intersection queuing lengths and times.	Appendix F
• Acoustic report – to consider impacts to any residential and industrial receivers.	Appendix E
• Air quality – to address the nature of materials process, methods to mitigate unreasonable impacts, impacts to residential and industrial receivers.	Appendix D
• Drainage/water quality – stormwater management plan in accordance with Newcastle Development Control Plan (DCP).	Appendix C
• Odour report/putrescibles materials/vermin.	No receipt of putrescibles or composting materials is proposed. However, an odour report has been prepared due to odours associated with glass processing (see Appendix D)
• Equipment used (crushing & shredding) – to address the proposed machinery and how it will operate on site.	Section 2.7, Appendices D and E
• Landscape screening – recommended that additional landscaping is incorporated around the boundaries of the site. Views to Tourle Street Bridge and the waterway should also be considered.	Section 2.10.4 and Appendix H
• Dedicated access/locked gates – need to be demonstrated that erection of locked gates does not result in any conflicts for access across the adjoining lot (ie Lot 16 DP 270249).	Table 4.1, Appendix B
• Contamination – site has specific contamination issues that will need to be addressed.	Sections 2.10.3 and 6.6.
• Steel River – site is part of the Steel River precinct, and consideration of the Strategic Impact Assessment Study will be required.	Appendices C to E

1.7 Secretary's environmental assessment requirements

This EIS accompanies a DA for designated development as defined in Schedule 3 of the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation). The EIS has been prepared to address specific requirements provided by the DPE and other relevant agencies. These SEARs were issued on 5 February (SEAR 889) and are provided in Appendix A.

As required under Section 78A of the EP&A Act, this EIS has been prepared in accordance with the SEARs. The SEARs and where they are addressed in this EIS are summarised in Table 1.2.

Table 1.2 Secretary's environmental assessment requirements

Assessment requirements	Reference in EIS
Strategic context:	
• a detailed justification for the proposal and suitability of the site for the development;	Section 1.4 and Chapter 8
• a demonstration that the proposal is consistent with all relevant planning strategies, environmental planning instruments, DCPs, or justification for any inconsistencies; and	Chapter 3
• a list of any approvals that must be obtained under any other Act or law before the development may lawfully be carried out.	Chapter 3
Waste management:	
• details of the type, quantity and classification of waste to be received at the site;	Section 2.3
• details of the resource outputs and any additional processes for residual waste;	Section 2.5
• details of waste handling including, transport, identification, receipt,	Section 2.3
• stockpiling and quality control; and	Section 2.6
• the measures that would be implemented to ensure that the proposed development is consistent with the aims, objectives and guidelines in the NSW Waste Avoidance and Resource Recovery Strategy 2014-2021.	Section 1.4.1
Hazards and risk	
• the Environmental Impact Statement must include a preliminary risk screening completed in accordance with State Environmental Planning Policy No. 33 - Hazardous and Offensive Development and Applying SEPP 33 (Department of Planning (DoP) 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the project is "potentially hazardous" a Preliminary Hazard Analysis (PHA) must be prepared in accordance with Hazardous Industry Planning Advisory Paper No.6 - Guidelines for Hazard Analysis (DoP 2011) and Multi-Level Risk Assessment (DoP 2011).	Chapter 5
Air quality and odour	
• a description of all potential sources of air emissions and odour;	Appendix D
• an air quality impact assessment in accordance with relevant Environment Protection Authority Guidelines; and	Appendix D
• a description and appraisal of air quality impact mitigation and monitoring measures.	Appendix D
Noise and vibration	
• a description of all potential noise and vibration sources during construction and operation, including road traffic noise;	Appendix E
• a noise and vibration assessment in accordance with the relevant Environment Protection Authority Guidelines; and	Appendix E
• a description and appraisal of noise and vibration mitigation and monitoring measures.	Appendix E
Soil and water	
• a description of local soils, topography, drainage and landscapes;	Section 6.6
• the details of stormwater and wastewater management;	Appendix C
• the details of sediment and erosion controls;	Appendix C
• the details of water usage including water supply and licences;	Appendix C
• an assessment of impacts to surface and groundwater resources, flooding impacts, and impacts to groundwater dependant ecosystems; and	Appendix C
• a description and appraisal of impact mitigation and monitoring measures.	Appendix C

Table 1.2 Secretary's environmental assessment requirements

Assessment requirements	Reference in EIS
Traffic and transport	
• details of road transport routes and access to the site;	Appendix F
• road traffic predictions for the development during construction and operation; and	Appendix F
• an assessment of impacts to the safety and function of the road network; and the details of any road upgrades required for the development.	Appendix F
Biodiversity	
• accurate predictions of any vegetation clearing on site or for any road upgrades;	Section 6.8
• a detailed assessment of the potential impacts on any threatened species, populations, endangered ecological communities or their habitats, groundwater dependent ecosystems and any potential for offset requirements; and	Section 6.8
• a detailed description of the measures to avoid, minimise, mitigate and offset biodiversity impacts.	Section 6.8
Visual	
• including an impact assessment at private receptors and public vantage points.	Appendix H
Heritage	
• including Aboriginal and non-Aboriginal cultural heritage.	Section 6.9

2 Project description

2.1 General

Benedict Recycling proposes to develop a recycling facility on the site and undertake a range of ancillary activities. The facility will have two main components (Figure 2.1):

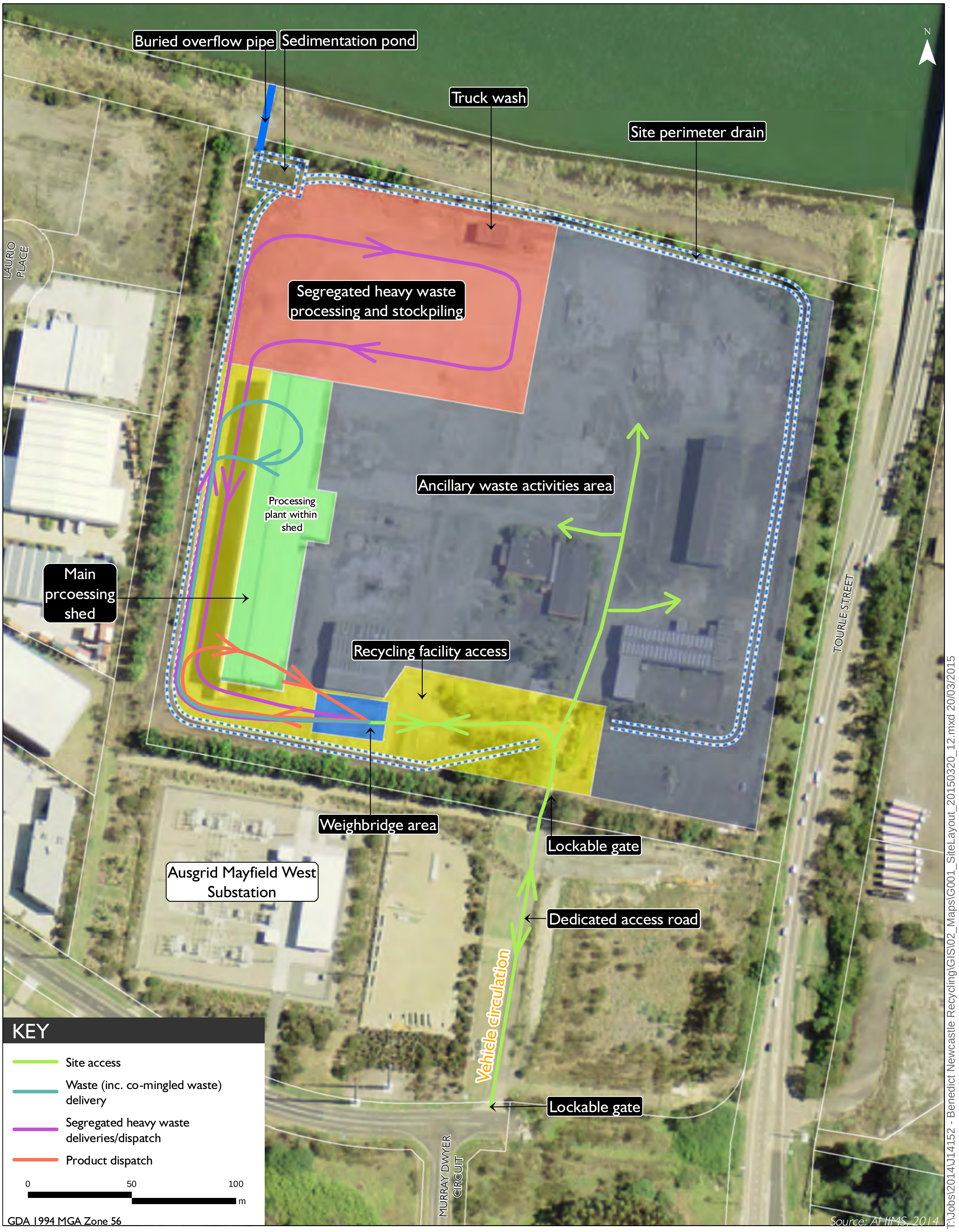
- the main recycling facility on the west of the site that will accept and process segregated and co-mingled inert waste; and
- ancillary activities on the east of the site that will include:
  - temporary storage of plant, equipment, machinery, commercial vehicles, bins and containers;
  - some waste storage and processing (eg recyclable glass crushing within an existing building); and
  - RDF and/or biochar production within a building if a market for these products develops.

This chapter describes the components of the proposed recycling facility and the activities that are proposed. It also introduces site-wide environmental controls.

2.2 Site components

The site will include the following components:

- a weighbridge area with two weighbridges, a wheel wash for outbound vehicles, demountable offices and amenities;
- the main processing shed (previously the EMD Delta Electrolysis Building) which will contain the majority of waste processing activities;
- a segregated heavy waste processing and stockpiling area north of the main processing shed;
- vehicle repair and maintenance facilities in an existing shed;
- a truck wash in an existing shed;
- access and internal roads; and
- an ancillary waste activity area for storage, parking and other ancillary uses.



Proposed site layout
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Figure 2.1

2.2.1 Weighbridge and office area

The weighbridge and office area in the south of the site (Photograph 2.1) will contain weighbridges, a wheel wash, site offices and amenities.

Initially, a single above-ground weighbridge will be used for incoming and outgoing vehicles. It is anticipated that a second above-ground weighbridge will be installed later to improve segregation of incoming and outgoing vehicles. The weighbridges will be installed on an existing site road (see Photograph 2.1) and will not require any excavation.

An above-ground self-contained wheel wash will be provided prior to the weighbridge for trucks leaving the site. Water in the wheel wash will be lost on tires leaving the wheel wash will evaporate. It will therefore require periodic replenishment. Sediment in the wheel wash will be regularly removed using an excavator.

The offices and amenities will be demountables that will not require foundations. The site office and reception will include a raised platform to allow incoming loads to be inspected (see Section 0).

Site services, including amenities are described in Section 2.2.9.

Photograph 2.1 Location of weighbridge and office area (foreground and left of shed) with southern end of the processing shed in the background

2.2.2 Main processing shed

The majority of waste storage, processing and product storage will occur within the main processing shed.

The shed is about 150 m long, 25 m wide (3,800 m^2) and about 14 m high. The floor of the shed is generally concrete, level and is surrounded by a bund approximately 250 mm high (Photograph 2.3). The bund extends across doorways (Photograph 2.4) and vehicular entry ramps to the shed are raised so that liquid on the base of the shed could not escape through these portals.

Photograph 2.2 Main processing shed (northern end)

The main processing shed will contain:

- a marked roadway for vehicles delivering waste and picking up recycled products;
- a flip-flow screen waste sorter (eg Finlay 883 flip flow screen);
- two picking lines with fans; and
- waste/product stockpiles and bins.

Processing within the shed is described in Section 2.4.

The roof of this shed was replaced shortly before the Delta EMD plant was decommissioned and is free of leaks (Photograph 2.3). It will protect equipment and workers from rainfall. It will also prevent rainfall from falling onto, and leaching through, waste and product stockpiles.

Photograph 2.3 **Interior of main processing shed showing concrete floor, surrounding bund and roof**

Photograph 2.4 **Interior of main processing shed showing bunding around access door**

Diesel for plant and equipment used on the site will be stored in an external above-ground tank (approximately 40,000 L) adjacent to the main processing shed. The tank will be within a bund with a capacity of 10% more than the tank's capacity. The tank and bund will be covered by an awning on the main processing shed that prevent rain falling into the bund. Plant and vehicle diesel tanks will be filled from a bowser located next to the diesel tank.

Photograph 2.5 Location of external diesel tank and bowser

2.2.3 Heavy waste processing and stockpiling area

The heavy waste processing and stockpiling area is in the north-west of the site (Photograph 2.6 and Photograph 2.7). There will no modification of this area other than ensuring that the surface is stabilised to ensure that the ground surface is not disturbed by plant or vehicles (see Section 2.10.1).

The area will be used for the storage of segregated concrete (including tiles, bricks, etc) and segregated wood waste[2] and for recycled products derived from these materials. Campaign processing of these materials is described in Section 2.4.

[2] Wood is not technically a "heavy" waste but segregated wood waste will be handled and stored in the same area as the segregated concrete (including tiles, bricks, etc) wastes.

Photograph 2.6 Heavy waste processing and stockpiling area (looking north)

Photograph 2.7 Heavy waste processing and stockpiling area (looking south)

2.2.4 Vehicle repair and maintenance

An existing shed will be used for vehicle repair and maintenance activities. Activities that may result in the loss of liquids (eg diesel, oil and hydraulic fluids) from plant or vehicles will be undertaken over impervious bunded areas (eg concrete or metal). As maintenance areas will be in a shed, there will be no mixing of hydrocarbons and rainwater so water-oil separators will not be required.

2.2.5 Truck wash

A truck wash area will be established in an existing building in the north of the site (see Figure 2.1). A commercially available self-contained truck wash will be installed. Water used in the truck wash will be recycled within the truck wash system. The water will be treated within the recycling circuit to remove sediment and oils/grease. Excess treated water will be discharged to the perimeter channel and basin.

It is anticipated that the truck wash will be used by customers using the ancillary waste activities area as opposed to those delivering material to, or dispatching products from, the recycling facility.

Photograph 2.8 Shed to be used as truck wash

2.2.6 Roads

i Access road

The existing sealed site access road from McIntosh Drive will be used with no modification other than repairing the existing lockable gates at the northern and southern ends of the access road (Figure 2.1). These gates will restrict unauthorised out-of-hours vehicular access to the site and surrounds and will help to prevent illegal dumping of waste in the site or along the access road (see Photograph 2.9).

The Ausgrid laydown area west of the access road can be accessed from the site access road. Ausgrid have approved the ongoing use of the locked gate (see Appendix B) at the southern end of the access road.

Photograph 2.9 Waste illegally dumped immediately west of the site entrance (northern end of access road)

ii Internal roads

The indicative internal road layout is provided in Figure 2.1. The main processing building and yard will be accessed via the weighbridge area and from the existing road west of the building (Photograph 2.10).

Vehicle circulation within the ancillary waste activity area will be dependent on the uses of this area. Road vehicle traffic will be restricted to existing internal roads (Photograph 2.11).

All roads will be marked and speed limits posted.

2.2.7 Site security

The site is surrounded by a 1.8 m high cyclone fence. There are currently a number of gates that are unlocked or missing that allow pedestrian access to the site. Concrete blocks have been installed at the southern end of the access road to prevent vehicle access, although motor bikes and bicycles are used illegally on the site currently.

As described in Section 2.2.6, existing gates will be repaired at the north and south ends of the access road. The other gates to the site will be repaired and locked to prevent unauthorised access by pedestrians, motor bikes and bicycles.

A separate application will be made to install a sign at the southern end of the access road. This sign include the name of the facility, opening hours and a telephone number for a phone that will be attended whenever the site is accepting waste or operating.

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Photograph 2.10 Main processing shed access road

Photograph 2.11 Example of existing internal road

2.2.8 Ancillary waste activity area

The ancillary waste activity area will be used for a range of uses, including:

- parking for trucks, and employee and visitor light vehicles generally in the existing car park in the south-east corner of the site;
- temporary storage for:
  - light and heavy vehicles;
  - bins and containers;
  - construction and demolition plant and equipment;
  - general machinery storage; and
  - temporary demountable offices and sheds.
- recyclable glass crushing within one of the existing buildings.

Any additional waste processing (such as for RDF or biochar production) will be conducted within a building/shed (see Section 2.5).

2.2.9 Site services

Power, water and gas supplies and sewerage were removed to the edge of the site as part of the Delta EMD site decommissioning.

It is anticipated that above ground pipelines will be installed to distribute water around the site from the existing 300 mm diameter high capacity water mains pipe outside of the south-east corner of the site.

In the short-term, a small generator will be used to provide power to the weighbridge area and to provide lighting in the main processing shed. Discussions have commenced with electricity suppliers regarding the reconnection of the mains power the site. Gas may be connected for the production of RDF or biochar (see Section 2.5).

Small volumes of sewage and grey-water generated from site amenities will be generated by the site employees. Initially, this water will be stored in an onsite storage system for off-site disposal at a licensed facility. The mains sewer outside of the south-west corner of the site will be reconnected.

2.3 Waste materials, sources and quantities

2.3.1 Waste materials accepted

The recycling facility will accept 'Pre-classified general solid waste (non-putrescible)' as defined by EPA (2014b) (see Section 2.3.2). This will mainly consist of the following wastes:

- co-mingled and segregated building and demolition waste — soils, bricks, concrete, paper/cardboard, cloth, plastics, rubber, plasterboard, ceramics, glass, metal and wood, and the like;
- vegetation and uncontaminated soils;
- tiles, asphalt, suitable slags and concrete batching waste;
- excavated natural materials (ENMs) including virgin natural excavated material (VNEM) such as sand and sandstone which are generated during bulk earthworks and road and infrastructure repair; and
- rail ballast and spoils.

As described above, no special, hazardous restricted solid waste (including asbestos) or will be accepted at the site.

2.3.2 Waste classification

Wastes accepted by the site will be classified according to the *Waste Classification Guidelines - Part 1: Classification of Waste* (EPA 2014b).

The following wastes will not be accepted:

- special waste (including clinical and related waste; asbestos waste; waste tyres; or anything classified as special waste under an EPA gazettal notice) as defined in EPA (2014b) Step 1;
- liquid waste as defined in EPA (2014b) Step 2;
- wastes pre-classified as hazardous waste as defined in EPA (2014b) Step 3;
- general solid waste (putrescible) as defined in EPA (2014b) Step 3;
- waste possessing hazard as defined in EPA (2014b) Step 4; or
- waste that requires chemical assessment to determine its classification as defined in EPA (2014b) Step 5.

Only waste that is pre-classified as General solid waste (non-putrescible) as listed in Table 2.1 will be accepted by the site.

Table 2.1 Pre-classified 'General solid waste (non-putrescible)' as defined by EPA (2014b)

The following wastes (other than special waste, liquid waste, hazardous waste, restricted solid waste or general solid waste (putrescible)) are pre-classified as 'general solid waste (non-putrescible)':

- glass, plastic, rubber, plasterboard, ceramics, bricks, concrete or metal;
- paper or cardboard;
- household waste from municipal clean-up that does not contain food waste;
- waste collected by, or on behalf of, local councils from street sweepings;
- grit, sediment, litter and gross pollutants collected in, and removed from, stormwater treatment devices and/or stormwater management systems, that has been dewatered so that they do not contain free liquids;
- grit and screenings from potable water and water reticulation plants that has been dewatered so that it does not contain free liquids;
- garden waste;
- wood waste;
- waste contaminated with lead (including lead paint waste) from residential premises or educational or child care institutions;
- containers, previously containing dangerous goods, from which residues have been removed by washing [The cleaning method must be as good as or better than the triple-rinsing method outlined in Appendix 2 of EPA (2014b)] or vacuuming;
- drained oil filters (mechanically crushed), rags and oil-absorbent materials that only contain non-volatile petroleum hydrocarbons and do not contain free liquids;
- drained motor oil containers that do not contain free liquids;
- non-putrescible vegetative waste from agriculture, silviculture or horticulture;
- building cavity dust waste removed from residential premises or educational or child care institutions, being waste that is packaged securely to prevent dust emissions and direct contact;
- synthetic fibre waste (from materials such as fibreglass, polyesters and other plastics) being waste that is packaged securely to prevent dust emissions, but excluding asbestos waste;
- virgin excavated natural material;
- building and demolition waste;
- asphalt waste (including asphalt resulting from road construction and waterproofing works);
- biosolids categorised as unrestricted use, or restricted use 1, 2 or 3, in accordance with the criteria set out in the Biosolids Guidelines (EPA 2000a);
- cured concrete waste from a batch plant;
- fully cured and set thermosetting polymers and fibre-reinforcing resins;
- fully cured and dried residues of resins, glues, paints, coatings and inks; and
- any mixture of the wastes referred to above.

In assessing whether waste has been pre-classified as general solid waste (non-putrescible), the following definitions apply:

Building and demolition waste means unsegregated material (other than material containing asbestos waste or liquid waste) that results from:

- the demolition, erection, construction, refurbishment or alteration of buildings **other than**:
    - chemical works;
    - mineral processing works;
    - container reconditioning works; and
    - waste treatment facilities.
- the construction, replacement, repair or alteration of infrastructure development such as roads, tunnels, sewage, water, electricity, telecommunications and airports;

and includes materials such as:

- bricks, concrete, paper, plastics, glass and metal; and

Table 2.1 Pre-classified 'General solid waste (non-putrescible)' as defined by EPA (2014b)

- timber, including unsegregated timber, that may contain timber treated with chemicals such as copper chrome arsenate (CCA), high temperature creosote (HTC), pigmented emulsified creosote (PEC) and light organic solvent preservative (LOSP).

but does not include excavated soil (for example, soil excavated to level off a site prior to construction or to enable foundations to be laid or infrastructure to be constructed).

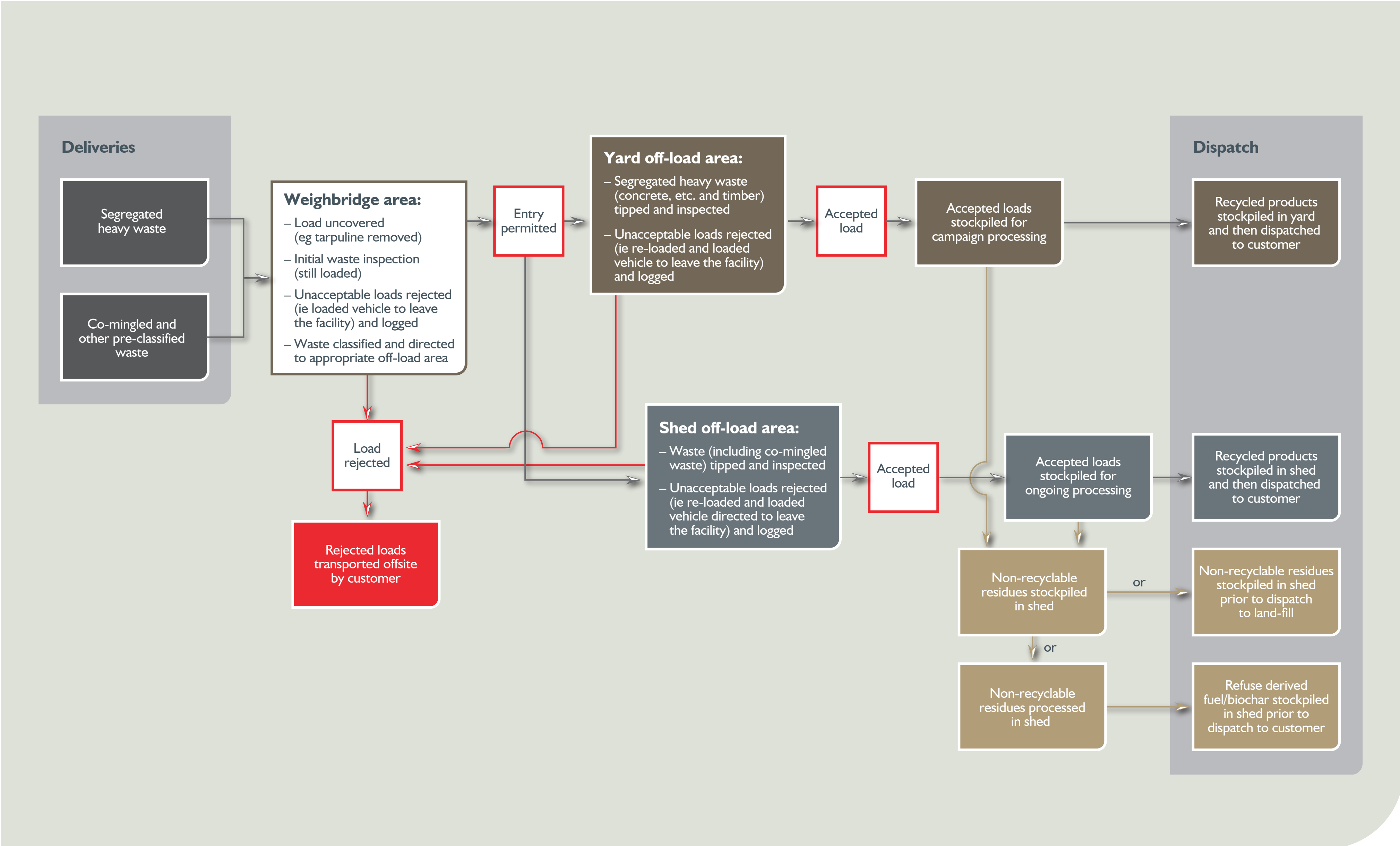
Garden waste means waste that consists of branches, grass, leaves, plants, loppings, tree trunks, tree stumps and similar materials, and includes any mixture of those materials.

Virgin excavated natural material means natural material (such as clay, gravel, sand, soil or rock fines):

- that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities; and
- that does not contain sulfidic ores or soils, or any other waste.

and includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved from time to time by a notice published in the NSW Government Gazette.

Wood waste means sawdust, timber offcuts, wooden crates, wooden packaging, wooden pallets, wood shavings and similar materials, and includes any mixture of those materials, but does not include wood treated with chemicals such as CCA, HTC, PEC and LOSP.



EMM
EMGA Mitchell McLennan

Waste flowchart

Recycling Facility, Mayfield West

Figures 2.2

2.3.3 Waste deliveries

The site will accept inert waste from businesses and the general public. Accordingly, waste will be delivered to site by a variety of vehicles including:

- light vehicles such as cars with box trailers, and utilities;
- single or dual axle heavy vehicles such as 'Daihatsu's' and skip-bin trucks; and
- multiple axle combination heavy vehicles.

Vehicles will be access the site from Industrial Drive via Steel River Boulevard and McIntosh Drive. Industrial Drive is a major heavy vehicle route. Steel River Boulevard and McIntosh Drive are wholly within the IN1 General Industrial zone and are also suitable for heavy vehicles. The numbers of vehicle movements associated with the operation of the site are described in Section 6.3 and Appendix F.

All vehicles delivering waste will be directed to the weighbridge where the load will be inspected for potential contaminants and classified. A ticket will be issued and the driver will be instructed where to deliver the waste within the processing shed or external yard. The driver will then deliver the waste to the appropriate area where it will be tipped adjacent to a stockpile and will be closely inspected prior to the vehicle being directed back to the weighbridge area. Vehicles will be re-weighed as they leave the site to determine the mass of the load delivered.

All incoming waste will be inspected according to the incoming waste quality management plan (see Section 2.3.2) prior to being accepted.

2.3.4 Incoming waste quality plan

General waste (non-putrescible) can contain materials (eg hazardous materials, including asbestos) that are not pre-classified general solid waste (non-putrescible) as defined by EPA (2014b) (see Table 2.1). An incoming waste quality plan will be prepared in accordance with the NSW WorkCover *Management of Asbestos in Recycled Construction and Demolition Waste Guide* (2010).

Incoming waste will be inspected in two stages:

1. a preliminary inspection of the incoming waste on the vehicle at the weighbridge; and
2. an inspection of the incoming waste after it is tipped off but before it is added to the appropriate feed stockpile. The customer will be required to wait until the waste has passed the inspection.

Any incoming waste loads that are suspected to contain contaminants (ie loads that contain wastes that are not listed in Table 2.1) will be rejected and the customer will be required to take the contaminated load out of the recycling facility immediately.

The plan will describe the waste inspection also include:

- Prevention actions such as:
    - a 'no asbestos' clause in supplier contracts, advising suppliers that asbestos containing materials will not be accepted;
    - installing warning signage;

- training workers on waste inspection and asbestos management; and
- education programs at material source locations to minimise the risk of asbestos containing materials such as fibro entering the supply chain and being imported onto the premises.

- Contingency actions if potential asbestos containing materials are identified, including a rejected load register and reporting to the EPA.
- A program to review systems, operations and randomly test for asbestos or other unacceptable materials, ie materials that are not pre-classified general solid waste (non-putrescible).

Products will be tested in accordance with requirements of the relevant resource recovery exemption.

2.4 Waste processing

Recycling facility processing will include the following steps:

1) Waste will be inspected prior to being accepted on site and any loads suspected to contain material that cannot be accepted by the site will be rejected (see Section 2.3.2).

2) Wastes will generally be stored undercover in the main processing shed prior to processing. However, some segregated heavy materials (eg concrete and timber) will be stored on the hardstand north of the main processing shed.

3) Waste processing will include sorting, blowing, picking, crushing (eg concrete and bricks) and shredding (eg timber).

4) Sorting will mostly occur within the main processing shed. A range of mobile plant (eg excavators, crushers, front-end loaders) and two picking lines, will be used to handle and process the waste and products in the shed. Material processed in the shed will be stockpiled in the shed prior to quality testing and dispatch.

5) Segregated heavy waste requiring crushing or shredding (eg concrete, bricks or timber) will be processed outside in a series of two to three campaigns during the year, each lasting about two weeks. Additional mobile equipment will be brought to site during these campaigns.

6) Some waste (less than 20%) will not able to be recycled (referred to as 'non-recyclable residues'). Non-recyclable residues will be stockpiled undercover prior being sent for disposal at an EPA licensed facility, most likely the Summerhill Waste Management Centre. However when economic, this waste may be further processed within a custom-built shed on the site and be sold to a licensed facility for use as RDF or biochar (see Section 2.5).

7) Recycled products generally will be dispatched to customers in the Lower Hunter Region, including Newcastle, by heavy vehicle.

8) Non-recyclable residues will generally be dispatched to a landfill by heavy vehicle.

2.5 Non-recyclable residue

Not all of the material delivered will be able to be separated to allow it to be recycled. This material, "non-recyclable residue", will be less than 20% (by mass) of the waste delivered to the recycling facility for processing. The non-recyclable residue will be stockpiled under cover prior to removal from site for disposal at a landfill or prior to further processing on site to produce saleable products (RDF or biochar).

Power plants that use RDF to generate electricity are expected to be approved and licensed in NSW. These plants use RDF that cannot be recycled to generate electricity (ie substituting RDF for fossil-fuels), while Biochar is a charcoal product with a range of uses, particularly as a soil ameliorant (ie as an additive to improve the fertility of soils).

Initially, non-recyclable residue will be transported to a licensed facility and be disposed to a landfill (most likely at Summerhill Waste Management Centre).

In the longer-term (when there is a market), it is proposed that RDF or biochar is produced onsite, converting non-recyclable residue from a material requiring land-filling to beneficial products. The non-recyclable residue will be processed in a shed dedicated to this purpose. This will include drying and heating (but not burning) of the non-recyclable residue — in the absence of oxygen in the case of biochar production. The products will also be stored in a dedicated shed. These fuel products are not proposed to be used onsite.

What really happens – from building site to recycled products

Waste accepted by the site will typically be in skips from building sites or from homes disposing of unwanted materials in a skip hired for the purpose. A typical journey from one of these skips to recycled products is described below.

Filling a skip

Photograph 2.12 Example of co-mingled construction waste and a typical skip bin truck

Builders generally hire skip bins during a construction or demolition project. These skips are used for disposing of a range of inert wastes (ie material that cannot be re-used or that does not require specific handling such as asbestos). For example, a builder undertaking an office refurbishment will dispose of waste from the demolition phase including concrete; bricks; tiles; plaster-board; glass; office partitions; plastic and metal pipes; timber, carpet and synthetic flooring; and plastic and cardboard packaging. Further waste from the construction phase will include excess concrete; wood and metal off-cuts; empty cement bags; cardboard; plastic packing straps and plastic film wrapping.

On many occasions, particularly on smaller construction sites, all of these materials are placed in the site skip bin. When full, the skip is picked up by the waste contractor and the co-mingled waste is generally delivered to a landfill for disposal. With the development of this proposed recycling facility, this co-mingled waste will be processed into useful products.

Arrival at the recycling facility

Photograph 2.13 Examples of wastes accepted (left-to-right: segregated masonry, segregated timber and co-mingled pre-classified waste)

A skip truck (or other vehicle) entering the recycling facility site will first stop for the tarp covering the load to be removed. The vehicle will then proceed to the weighbridge area. Here, the full truck will be weighed and the waste will be inspected from a raised platform. If the waste contains material that cannot be accepted by the facility (eg asbestos sheeting or closed containers), the driver will be instructed to leave the facility with the load. Otherwise, the driver will be issued with a docket and will be directed to where the waste is to be unloaded within the facility.

In the construction or demolition project example, the skip will contain co-mingled waste so the driver will be issued with a docket stating this and will be directed to the appropriate feed stockpile location in the main processing shed.

Unloading the waste

The waste will be emptied onto clear hardstand adjacent to the appropriate feed waste stockpile. The delivered waste will then be inspected while the truck waits. If the waste is accepted, it will be added to the appropriate stockpile. Otherwise, it will be reloaded onto the vehicle that delivered the waste and the driver will be instructed to leave the facility with the load.

Vehicles will leave the site via the wheel wash and the weighbridge.

Waste processing

The waste processing will depend on its level of segregation when delivered.

The waste is first sorted by an excavator using a grab to remove large non-recyclable components.

For example, co-mingled waste will be loaded onto the flip-flow screen using an excavator. The flip-flow plant uses a series of conveyors, picking lines, fans and vibrating screens to separate waste based on size and density. There will be three outputs from the flip-flow:

- rubble (coarse material) which will be fed onto the first hand-picking line;

- mid-size material which will be fed onto the second hand-picking line; and

- <6 mm fines that will be dispatched as a natural soil substitute replacing virgin top soils in a wide range of landscape applications.

The operation of a flip-flow is shown in the following videos:

- https://www.youtube.com/watch?v=e6d0MWFQCUw

- https://www.youtube.com/watch?v=JEu6e2L9A0U

- http://www.blue-group.com/en/recycling/fines-cleanup/

Waste fed onto the picking lines will be sorted by hand. Workers standing along the picking line conveyor pick out material that is not suitable for crushing.

These wastes will be further sorted as required, eg metals will be sorted into ferrous and non-ferrous metals.

Products



Photograph 2.14 Examples of ready-to-use products (left-to-right: building aggregate, shredded timber and soil substitute)



Photograph 2.15 Example recycling feed products (left-to-right: paper/cardboard, plastic and mixed metals)

The wastes will be sorted into ready-to-use products and feeds for further recycling.

For example, the co-mingled waste the construction site skip bin would yield:

- Ready-to-use products, eg:

- building aggregates from the masonry following sorting, crushing and screening; and

- mulches and soil substitutes from the timber following shredding.

- Recycling feed products, eg:

- clean, dry paper and cardboard from packaging;

- ferrous and non-ferrous metals from pipes and office fittings; and

- various plastics from packaging and fittings.

These products will be stored in stockpiles (heavies), bins or bales. Masonry or timber products will be stored outside while all other products will be stored within a shed.

Dispatch

Products (will be dispatched to retailers (eg construction and landscape suppliers), customers (eg local councils requiring road base) or licensed recyclers. This will be by a combination of customer and contractor trucks. Non-recyclable residue will be delivered to a licensed landfill by contractor trucks.

2.6 Waste and product storage

It is proposed to accept up to 90,000 tpa of waste at the recycling facility. The proportions of each waste type are unknown and will be variable. Therefore, a number of conservative assumptions have been adopted for determining the potential impacts of the recycling facility. These are described in each of the impact assessment chapters.

There will two primary stockpile types:

- waste feed stockpiles; and
- product stockpiles.

There may also be some intermediate stockpiles formed during processing. The required stockpiles are summarised in Table 2.2.

Table 2.2 Indicative stockpiles

Type[1]	Waste classification[2]	Stockpile location	Comments
Concrete Concrete, bricks and tiles Rail ballast and spoils Slags and concrete batching waste Recycled construction materials	Pre-classified general solid waste (non-putresible)	External	Maximum individual stockpile size[3]: 5,000 tonnes, up to 7 m tall Feed will be processed in campaigns
Wood	Pre-classified general solid waste (non-putresible)	External	Maximum individual stockpile size[3]: 4,000 tonnes, up to 7 m tall Feed will be processed in campaigns
Co-mingled waste	Pre-classified general solid waste (non-putresible)	Internal	

Notes: 1. Actual stockpile types will vary depending on the waste received.
2. EPA (2014b).
3. Multiple stockpiles may be required.

With the exception of segregated heavy wastes (concrete, etc and wood) and products derived from these materials, all wastes and products will be stored in bins or stockpiles in a shed, including:

- co-mingled wastes;
- ferrous and non-ferrous metals;
- shredded wood products;
- soil substitute products;
- glass; and
- non-recyclable residues.

2.7 Plant and equipment

Indicative equipment to be used at the recycling facility is listed in Table 2.3 and have been used in noise and air quality assessments. The actual equipment used may vary but Benedict Industries will ensure that noise and air quality compliance requirements are met.

Table 2.3 Indicative equipment and activities

Plant (or equivalent)[1]	Number	Typical activities
Equipment used across the site		
Front end loader (eg Volvo L150)	1	Unloading and loading trucks Moving waste and products
Generator	1	Power for weighbridge, offices, amenities and lighting
Trucks (customers)	4	Delivering waste and dispatching products Returning to/leaving the site
Equipment used in a processing shed		
Excavator (eg Komatsu PC120)	1	Sorting waste using a variety of excavator attachments Loading trucks
Heavies waste sorter (eg Finlay 883 flip flow screen)	1	Sorting co-mingled waste
Picking line	2	Sorting co-mingled waste from flip flow screen
Campaign processing in yard		
Excavator (eg Komatsu PC220)[2] and secondary crusher/screen (eg Metso LT1213)	1	Loading material to crusher Crushing/screening material
Wood shredder (eg Komptech Crambo)	1	Shredding wood and vegetation

Note: *1. As modelled in the air quality assessment (Appendix D) and noise assessment (Appendix E).*

2. Will also be used in the processing shed to load the flip flow screen.

Photograph 2.16 Heavies sorting using a flip flow screen and single picking line

2.8 Workforce and hours of operation

The recycling facility will normally accept waste deliveries (from businesses and the public) and dispatch materials between 6 am and 6 pm Monday to Friday and between 6 am and 5 pm on Saturday. It will also normally accept deliveries from 7 am to 3 pm on Sunday, providing an additional day on which the public could deliver recyclable waste to the facility if there is sufficient demand.

At times waste is generated by major infrastructure projects that require waste disposal at night, particularly from road and rail works. This application therefore seeks approval for the facility to accept (but not process) waste 24 hours per day on occasion. The NCC will be notified prior to these occasions.

Waste processing will only occur at the site from 7 am to 6 pm Monday to Saturday. There will be no processing on Sundays or public holidays.

The recycling facility is expected to be operated by approximately 12 employees. There will be additional contractors operating on the site during campaign processing of concrete and wood. There may also be additional employees or contractors operating in the ancillary waste activity area or operating the RDF/biochar plant should this be constructed in the future.

2.9 Construction activities

Project construction will require marking existing internal roads; repairing some gates and fencing; installing the weighbridges and demountable offices/amenities; ensuring runoff controls are operating efficiently; sealing/armouring unsealed areas and restoring services (electricity, water, gas, telecoms and sewerage) to the site.

No significant ground excavation is anticipated so potentially contaminated soil will not be disturbed although there may be very minor ground disturbance such as installing signage poles and anchors for demountables.

An initial estimate indicates that about $450,000 of site improvements will be required and about $2,500,000 of mobile plant will be used during operations. Contractors will use additional mobile equipment during processing campaigns.

2.10 Environmental management

2.10.1 Site integrity

The existing site surface is a mosaic of buildings, sealed and unsealed areas (Figure 2.3). There are several unsealed areas that excavated during remediation, backfilled and then covered with crushed rock.

The proposal will retain all areas of hardstand and will seal all but 4,000 m^2 of the site. Disturbance of unsealed areas by plant or vehicle movements will be prevented by surfacing areas with coarse crushed concrete/rock or asphalt.

All vehicle movements will be restricted to designated routes marked out by appropriate signage and fencing.

The wheel wash in the weighbridge area will be used to clean truck tyres to prevent mud or sediment being carried to and deposited on public roads.

Surfaces that have the potential to generate unacceptable amounts of dust will be surfaced with gravel, asphalt or a dust suppressing polymer. Water sprays will be used over any other bare or unsealed surfaces that have potential to generate unacceptable amounts of dust.

2.10.2 Existing surface water controls

The existing surface water controls at the site will be used to prevent uncontrolled release of water from the site.

As described in Section 1.3.2, the site was previously used as a heavy industry chemical plant. The site has extensive surface water management controls accordingly including:

- bunds to exclude of runoff entering the site from external areas;
- shaping of the site surface to drain evenly to the site perimeter channel;
- a large perimeter channel sealed with asphalt (see Photograph 2.17); and
- a final sedimentation basin in the north-western corner of the site with an outlet control via a stop valve, pipe outlet to the Hunter River.

These facilities will provide suitable soil and water management controls for the proposed activities. Surface water management is described in Section 6.4 and Appendix C.

Photograph 2.17 Perimeter drain at the south end of the site (almost two metres deep at this point)

Site surface covering

Recycling Facility, Mayfield West

Environmental Impact Statement

Figure 2.3

2.10.3 Contamination

There are elevated concentrations of a number of inorganic and organic compounds within soil and groundwater beneath the site (AECOM 2009). This contamination is primarily manganese associated with the former EMD operations and organics (total petroleum hydrocarbons and polycylic aromatic hydrocarbons) associated with reclaimed steel works materials previously used to fill the site. Much of the surrounding area is similarly filled.

A site audit statement under the *Contaminated Land Management Act 1997* has been issued for the site. This determined that the site is suitable for commercial and industrial use.

There will be minor subsurface intrusions resulting from the insertion of signposts, fencing and anchors. However, this will not disturb significant amounts of soil.

A Site Management Plan (SMP) for Subsurface Disturbance Activities has been prepared for use by the site owner and operational staff at the site during subsurface disturbance activities (AECOM 2009). This is provided in Appendix G. As part of purchasing the site, Benedict Recycling have agreed to implement the SMP for Subsurface Disturbance Activities.

The objectives of the SMP for Subsurface Disturbance Activities are to:

- summarise background environmental information and current conditions at the site;
- outline contaminants of concern present on the site;
- provide guidance for management of excavation works or disturbance of soil at the site; and
- outline safety controls.

The SMP for Subsurface Disturbance Activities describes the following for subsurface/intrusive works:

- methods for site establishment, earthworks and reinstatement of disturbed areas;
- environmental management plan actions;
- emergency response;
- general health and safety;
- contingency plans;
- record keeping; and
- auditing.

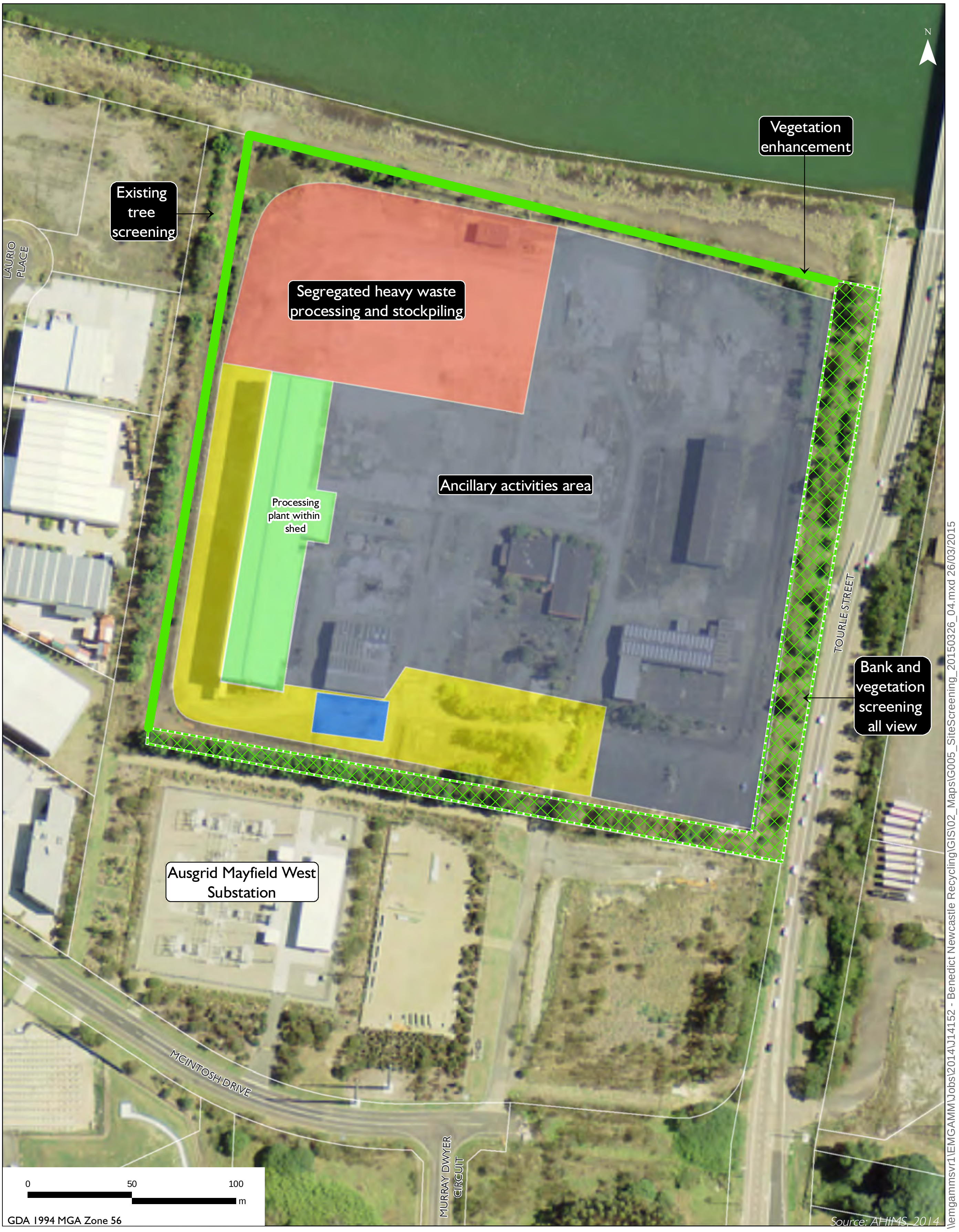
As stated above, no significant subsurface/intrusive works are planned. However, the Site Management Plan for Subsurface Disturbance Activities will be implemented if any significant subsurface/intrusive works are required.

2.10.4 Visual screening

There will be minimal visual impacts as a result of the operations on the site as existing buildings will be used and there are few public viewpoints (see Section 6.4 and Appendix H). The only public viewpoint that has direct views into the site is the southbound lane of Tourle Street bridge (Photograph 2.18). Views from the bridge will be fleeting, partially obscured by the bridge's safety barriers, and further by trees and other vegetation on the northern boundary of the site and the building close to the northern boundary.

Additional screening vegetation will be planted along the northern boundary of the site to further obscure views onto the site (Figure 2.4).

Photograph 2.18 Existing site buildings are visible from Tourle Street



Site screening

Recycling Facility, Mayfield West
Environmental Impact Statement

Figure 2.4

3 Statutory framework

3.1 Introduction

This chapter provides an overview of the statutory framework relevant to the proposal including State and Commonwealth legislation, and State, regional and local plans and policies.

3.2 Environmental Planning and Assessment Act 1979

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and the NSW Environmental Planning and Assessment Regulation 2000 (EP&A Regulation) provide the assessment and approvals framework for development in NSW. They are administered by DPE.

3.2.1 Section 79C

When assessing a DA under Part 4, the consent authority is required to take into consideration the matters outlined in Section 79C of the EP&A Act. This states:

> (1) Matters for consideration – general:
>
> In determining a development application, a consent authority is to take into consideration such of the following matters as are of relevance to the development the subject of the development application:
>
> (a) the provisions of:
>
> (i) any environmental planning instrument, and
>
> (ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Director-General has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and
>
> (iii) any development control plan, and
>
> (iiia) any planning agreement that has been entered into under section 93F, or any draft planning agreement that a developer has offered to enter into under section 93F, and
>
> (iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph), and
>
> (v) any coastal zone management plan (within the meaning of the Coastal Protection Act 1979), that apply to the land to which the development application relates,
>
> (b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,
>
> (c) the suitability of the site for the development,
>
> (d) any submissions made in accordance with this Act or the regulations,
>
> (e) the public interest.

The relevant Section 79C matters are considered in this EIS.

3.2.2 Designated development

Designated development, for the purposes of Section 77A of the EP&A Act, is defined in Schedule 3 of the EP&A Regulations. Schedule 3 of the EP&A Regulations includes particular waste management facilities of works described in Clause 32.

(1) Waste management facilities or works that store, treat, purify or dispose of waste or sort, process, recycle, recover, use or reuse material from waste and:

(a) that dispose (by landfilling, incinerating, storing, placing or other means) of solid or liquid waste:

(i) that includes any substance classified in the Australian Dangerous Goods Code or medical, cytotoxic or quarantine waste, or

(ii) that comprises more than 100,000 tonnes of “clean fill” (such as soil, sand, gravel, bricks or other excavated or hard material) in a manner that, in the opinion of the consent authority, is likely to cause significant impacts on drainage or flooding, or

(iii) that comprises more than 1,000 tonnes per year of sludge or effluent, or

(iv) that comprises more than 200 tonnes per year of other waste material, or

(b) that sort, consolidate or temporarily store waste at transfer stations or materials recycling facilities for transfer to another site for final disposal, permanent storage, reprocessing, recycling, use or reuse and:

(i) that handle substances classified in the Australian Dangerous Goods Code or medical, cytotoxic or quarantine waste, or

(ii) that have an intended handling capacity of more than 10,000 tonnes per year of waste containing food or livestock, agricultural or food processing industries waste or similar substances, or

(iii) that have an intended handling capacity of more than 30,000 tonnes per year of waste such as glass, plastic, paper, wood, metal, rubber or building demolition material, or

(c) that purify, recover, reprocess or process more than 5,000 tonnes per year of solid or liquid organic materials, or

(d) that are located:

(i) in or within 100 metres of a natural waterbody, wetland, coastal dune field or environmentally sensitive area, or

(ii) in an area of high watertable, highly permeable soils, acid sulphate, sodic or saline soils, or

(iii) within a drinking water catchment, or

(iv) within a catchment of an estuary where the entrance to the sea is intermittently open, or

(v) on a floodplain, or

(vi) within 500 metres of a residential zone or 250 metres of a dwelling not associated with the development and, in the opinion of the consent authority, having regard to topography and local meteorological conditions, are likely to significantly affect the amenity of the neighbourhood by reason of noise, visual impacts, air pollution (including odour, smoke, fumes or dust), vermin or traffic.

The proposal meets the definitions of designated development as it is (among other criteria) a 'Waste management facilities or works' that would have 'an intended handling capacity of more than 30,000 tonnes per year of waste such as glass, plastic, paper, wood, metal, rubber or building demolition material' and would involve 'crushing, grinding or separating works' that 'that have an intended processing capacity of more than 150 tonnes per day or 30,000 tonnes per year'.

Clause 79 of the EP&A Act details specific requirements for public participation that apply to a DA for designated development.

(1) Public exhibition and notification

As soon as practicable after a development application is made for consent to carry out designated development, the consent authority must:

(a) place the application and any accompanying information on public exhibition for a period of not less than 30 days (the submission period) commencing on the day after which notice of the application is first published as referred to in paragraph (d), and

(b) give written notice of the application in accordance with the regulations:

(i) to such persons as appear to it to own or occupy the land adjoining the land to which the development application relates, and

(ii) if practicable, to such other persons as appear to it to own or occupy land the use or enjoyment of which, in its opinion, may be detrimentally affected if the designated development is carried out, and

(iii) to such other persons as are required to be notified by the regulations, and

(c) cause notice of the application to be exhibited in accordance with the regulations on the land to which the application relates, and

(d) cause notice of the application to be published in accordance with the regulations in a newspaper circulating in the locality.

3.2.3 Integrated development

Integrated development is development that requires one or more of the approvals identified in Section 91 of the EP&A Act. The proposal is integrated development as it requires an environment protection licence (EPL) under the *Protection of the Environment Operations Act 1997* (POEO Act) (see Section 3.4.2) and a Controlled Activity Approval under the Water Management Act 2000 (see Section 3.4.3).

Section 91A of the EP&A Act applies to the determination of a DA for integrated development.

...

(2) Before granting development consent to an application for consent to carry out the development, the consent authority must, in accordance with the regulations, obtain from each relevant approval body the general terms of any approval proposed to be granted by the approval body in relation to the development. Nothing in this section requires the consent authority to obtain the general terms of any such approval if the consent authority determines to refuse to grant development consent.

(3) A consent granted by the consent authority must be consistent with the general terms of any approval proposed to be granted by the approval body in relation to the development and of which the consent authority is informed. For the purposes of this Part, the consent authority is taken to have power under this Act to impose any condition that the approval body could impose as a condition of its approval.

(4) If the approval body informs the consent authority that it will not grant an approval that is required in order for the development to be lawfully carried out, the consent authority must refuse consent to the application.

(5) If the approval body fails to inform the consent authority, in accordance with the regulations, whether or not it will grant the approval, or of the general terms of its approval:

(a) the consent authority may determine the development application, and

(b) if the consent authority determines the development application by granting consent:

(i) the approval body cannot refuse to grant approval to an application for approval in respect of the development, and

(ii) an approval granted by the approval body must not be inconsistent with the development consent, and

(iii) section 93 applies to an approval so granted as if it were an approval the general terms of which had been provided to the consent authority,

despite any other Act or law.

(6) If a development application is determined, whether or not by the granting of development consent, the consent authority must notify all relevant approval bodies of the determination.

3.3 Relevant provisions

This section describes the relevant provisions of the regulations, environmental planning instruments and development control plans as required by Section 79C(1)(a) of the EP&A Act. No proposed instruments or planning agreements are relevant to the proposal.

3.3.1 NSW Environmental Planning and Assessment Regulation 2000

Part 6 of the EP&A Regulations details procedures relating to DAs. Those relevant to the DA for the proposal include:

- Division 1 – Development applications generally;
- Division 3 – Development applications for integrated development;
- Division 5 – Public participation – designated development;
- Division 8 – Determination of development applications;
- Division 11 – Time within which development application procedures to be completed; and
- Division 12A – Additional provisions where regional panel is exercising consent authority functions.

Schedule 2 of the EP&A Regulation relates to the preparation of EISs. In particular, clauses 6 and 7 detail the required form and content of an EIS. Table 3.1 details the clauses 6 and 7 requirements and where they have been addressed in this EIS.

Table 3.1 Requirements for preparation of EIS under the EP&A Regulation

Requirement	Where addressed in EIS
Clause 6 Form of environmental impact statement	
An environmental impact statement must contain the following information:	
(a) the name, address and professional qualifications of the person by whom the statement is prepared,	Front cover
(b) the name and address of the responsible person,	Section 1.2
(c) the address of the land: (i) in respect of which the development application is to be made, or (ii) on which the activity or infrastructure to which the statement relates is to be carried out,	Section 1.1
(d) a description of the development, activity or infrastructure to which the statement relates,	Chapter 2
(e) an assessment by the person by whom the statement is prepared of the environmental impact of the development, activity or infrastructure to which the statement relates, dealing with the matters referred to in this Schedule,	Chapter 6
(f) a declaration by the person by whom the statement is prepared to the effect that: (i) the statement has been prepared in accordance with this Schedule, and (ii) the statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates, and (iii) that the information contained in the statement is neither false nor misleading	Front cover
Clause 7 Content of environmental impact statement	
(1) An environmental impact statement must also include each of the following:	
(a) a summary of the environmental impact statement,	Executive summary
(b) a statement of the objectives of the development, activity or infrastructure,	Section 1.4

Table 3.1 Requirements for preparation of EIS under the EP&A Regulation

Requirement	Where addressed in EIS
(c) an analysis of any feasible alternatives to the carrying out of the development, activity or infrastructure, having regard to its objectives, including the consequences of not carrying out the development, activity or infrastructure,	Section 1.4.3
(d) an analysis of the development, activity or infrastructure, including:	
(i) a full description of the development, activity or infrastructure, and	Chapter 2
(ii) a general description of the environment likely to be affected by the development, activity or infrastructure, together with a detailed description of those aspects of the environment that are likely to be significantly affected, and	Section 1.3, Chapter 6
(iii) the likely impact on the environment of the development, activity or infrastructure, and	Chapter 6
(iv) a full description of the measures proposed to mitigate any adverse effects of the development, activity or infrastructure on the environment, and	Chapter 6
(v) a list of any approvals that must be obtained under any other Act or law before the development, activity or infrastructure may lawfully be carried out,	Chapter 3
(e) a compilation (in a single section of the environmental impact statement) of the measures referred to in item (d) (iv),	Chapter 7
(f) the reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development set out in subclause (4).	Section 1.4 and Chapter 8

3.3.2 Environmental planning instruments

i State Environmental Planning Policy (State and Regional Development) 2011

Part 4 of the State Environmental Planning Policy (State and Regional Development) 2011 (the SRD SEPP) identifies council consent functions that are to be exercised by regional panels which includes the determination of DAs in accordance with Part 4 of the EP&A Act. Part 4 of the SRD SEPP applies to development of a class or description included in Schedule 4A to the EP&A Act. Schedule 4A includes:

> Clause 8 Particular designated development
>
> Development for the purposes of: ...
>
> (c) waste management facilities or works, which meet the requirements for designated development under clause 32 of Schedule 3 to the Environmental Planning and Assessment Regulation 2000.

As detailed above, the proposal is a waste management facility or work which meets the requirements for designated development under clause 32 of Schedule 3 to the EP&A Regulations. Therefore, the proposal will be determined by the Hunter & Central Coast JRPP.

It is noted that the proposal does not meet the threshold for State significant development as defined in Schedule 1 of the SRD SEPP as it will handle less than 100,000 tonnes per year of waste.

ii State Environmental Planning Policy (Infrastructure) 2007

Division 23 of the State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP) relates to waste or resource management facilities. The proposal is permissible with consent in a prescribed zone under Clause 121. A prescribed zone includes land zoned IN1 General Industrial. The site is zoned IN1 General Industrial under the Newcastle LEP 2012.

Schedule 3 of the Infrastructure SEPP details traffic generating development that is to be referred to the Roads and Traffic Authority (RTA) (now RMS) and includes recycling facilities of any size or capacity. Clause 104 of the Infrastructure SEPP requires the RMS to be notified of an application for traffic generating development.

iii State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

Under State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) a PHA prepared in accordance with the current circulars or guidelines must be submitted with a DA for potentially hazardous or offensive development. The guideline *Applying SEPP 33* (NSW Department of Planning 2011) includes a checklist and a risk screening procedure to determine whether a development is potentially hazardous or offensive.

An assessment against *Applying SEPP 33* found that the proposal is not potentially hazardous (see Section 5.3.5). Further, the proposal will not pose a significant risk to or have a significant adverse impact on human health, life, property or the biophysical environment (see Chapter 5). The proposal is not a potentially hazardous or offensive industry and, therefore, a PHA is not required.

iv State Environmental Planning Policy No. 55 – Remediation of Land

State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55) provides for a statewide planning approach to the remediation of contaminated land. Under clause 7(1) of SEPP 55, prior to granting consent to the carrying out of any development on land a consent authority is required to give consideration as to whether land is contaminated and, if the land is contaminated, whether the land is suitable for the purpose of the development or whether remediation is required.

A site audit statement determined that the site is suitable for commercial and industrial use provided that there is compliance with the SMP for subsurface disturbance activities.

No significant subsurface disturbance activities are proposed.

v State Environmental Planning Policy No. 71 – Coastal Protection

State Environmental Planning Policy No. 71 – Coastal Protection (SEPP 71) aims to ensure that development in coastal areas is suitably appropriate for coastal planning management. Clause 8 of SEPP 71 provides matters to be taken into account by a consent authority when determining an application to carry out development in the coastal zone.

The site is within the coastal zone as defined under the *Coastal Protection Act 1979* (CP Act). Assessment of the proposal against the Clause 8 matters is given in Table 3.2.

Table 3.2 Consideration of relevant SEPP 71, Clause 8 matters

Matter	Comment
(a) the aims of this Policy set out in clause 2, • to protect and manage the natural, cultural, recreational and economic attributes of the NSW coast, and • to protect and improve existing public access to and along coastal foreshores to the extent that this is compatible with the natural attributes of the coastal foreshore, and • to ensure that new opportunities for public access to and along coastal foreshores are identified and realised to the extent that this is compatible with the natural attributes of the coastal foreshore, and • to protect and preserve Aboriginal cultural heritage, and Aboriginal places, values, customs, beliefs and traditional knowledge, and • to ensure that the visual amenity of the coast is protected, and • to protect and preserve beach environments and beach amenity, and • to protect and preserve native coastal vegetation, and • to protect and preserve the marine environment of NSW, and • to protect and preserve rock platforms, and • to manage the coastal zone in accordance with the principles of ecologically sustainable development (within the meaning of section 6 (2) of the *Protection of the Environment Administration Act 1991*), and • to ensure that the type, bulk, scale and size of development is appropriate for the location and protects and improves the natural scenic quality of the surrounding area, and • to encourage a strategic approach to coastal management.	The proposal is consistent with the relevant aims of the Policy.
(b) existing public access to and along the coastal foreshore for pedestrians or persons with a disability should be retained and, where possible, public access to and along the coastal foreshore for pedestrians or persons with a disability should be improved,	The proposal does not impact existing public access to and along the coastal foreshore.
(c) opportunities to provide new public access to and along the coastal foreshore for pedestrians or persons with a disability,	The proposal will not impact any areas of coastal foreshore where new public access could be provided.
(d) the suitability of development given its type, location and design and its relationship with the surrounding area,	The site is within an existing industrial area and, therefore, the proposal is considered suitable.
(e) any detrimental impact that development may have on the amenity of the coastal foreshore, including any significant overshadowing of the coastal foreshore and any significant loss of views from a public place to the coastal foreshore,	The proposal will not have any detrimental impact on the amenity of the coastal foreshore.
(f) the scenic qualities of the NSW coast, and means to protect and improve these qualities,	The proposal will not impact the scenic qualities of the coast.
(g) measures to conserve animals (within the meaning of the Threatened Species Conservation (TSC) Act) and plants (within the meaning of that Act), and their habitats,	The proposal will not significantly impact on the conservation of threatened animal or plant species or their habitats (see Section 6.8).
(h) measures to conserve fish (within the meaning of Part 7A of the *Fisheries Management Act 1994*) and marine vegetation (within the meaning of that Part), and their habitats,	The proposal will not significantly impact on the conservation of threatened fish species or marine vegetation or their habitats.
(i) existing wildlife corridors and the impact of development on these corridors,	The proposal will not significantly impact on existing wildlife corridors.

Table 3.2 Consideration of relevant SEPP 71, Clause 8 matters

Matter	Comment
(j) the likely impact of coastal processes and coastal hazards on development and any likely impacts of development on coastal processes and coastal hazards,	The proposal will not impact on coastal processes or hazards. Sea level rise attributed to climate change is not anticipated to affect the site.
(k) measures to reduce the potential for conflict between land-based and water-based coastal activities,	The proposal does not conflict between land-based and water-based coastal activities.
(l) measures to protect the cultural places, values, customs, beliefs and traditional knowledge of Aboriginals,	The proposal will not significantly impact on Aboriginal heritage (see Section 6.9).
(m) likely impacts of development on the water quality of coastal waterbodies,	The proposal will not result in a significant impact on water quality of any coastal waterbodies (see Section 6.5.3 and Appendix C).
(n) the conservation and preservation of items of heritage, archaeological or historic significance,	The proposal will not significantly impact on Aboriginal or historic heritage (see Section 6.9).
(p) only in cases in which a development application in relation to proposed development is determined:	
(i) the cumulative impacts of the proposed development on the environment, and	The proposal will not have significant cumulative impacts on the environment (see Chapter 6).
(ii) measures to ensure that water and energy usage by the proposed development is efficient.	Captured runoff will be used for dust suppression so that mains water is not required for this purpose and the need for dust suppression will be minimised by sealing the majority of the site (see Section 2.10.1). Measures to minimise greenhouse gas emissions/energy use are described in Section 6.1.

vi Newcastle Local Environmental Plan 2012

As discussed above, the site is zoned IN1 General Industrial. Although the proposal is permissible with consent under the Infrastructure SEPP, general industries (being not a heavy or light industry) are permissible with consent within the IN1 zone. Depots and storage premises are also permissible with consent.

The proposal is considered to be compatible with the zone objections which are:

- To provide a wide range of industrial and warehouse land uses.
- To encourage employment opportunities.
- To minimise any adverse effect of industry on other land uses.
- To support and protect industrial land for industrial uses.
- To allow commercial, retail or other development where it is:

(i) ancillary to the use of land in this zone for industrial, research, service or storage purposes, or

(ii) primarily intended to provide personal services and community facilities to persons occupied or employed in activities otherwise permitted in this zone or for the benefit of the local community.

- To ensure that any such commercial, retail or other development is unlikely to be prejudicial:

(i) to employment-generating activities, or

(ii) to the viability of existing commercial centres.

Clause 5.5 of the LEP applies to development within the coastal zone and, therefore, applies to the proposal. An assessment of the proposal against the matters in clause 5.5 is provided in Table 3.3.

Table 3.3 Assessment against Newcastle Local Environmental Plan 2012 clause 5.5

Matter	Compliance
(1) The objectives of this clause are as follows:	
(a) to provide for the protection of the coastal environment of the State for the benefit of both present and future generations through promoting the principles of ecologically sustainable development,	Discussion on how the proposal promotes the principles of ecologically sustainable development is given in Section 8.2.
(b) to implement the principles in the NSW Coastal Policy.	Discussion on the NSW Coastal Policy is provided in Section 3.5.2.
(2) Development consent must not be granted to development on land that is wholly or partly within the coastal zone unless the consent authority has considered:	
(a) existing public access to and along the coastal foreshore for pedestrians (including persons with a disability) with a view to: (i) maintaining existing public access and, where possible, improving that access, and (ii) identifying opportunities for new public access, and	The site is located adjacent to the Hunter River. There is no existing public access to the river foreshore and creating a new public access is not considered practical as the site is within an industrial area.
(b) the suitability of the proposed development, its relationship with the surrounding area and its impact on the natural scenic quality, taking into account: (i) the type of the proposed development and any associated land uses or activities (including compatibility of any land-based and water-based coastal activities), and (ii) the location, and (iii) the bulk, scale, size and overall built form design of any building or work involved, and	The proposal is compatible with the site and surrounding area being an existing industrial area and will incorporate existing built elements into the design.
(c) the impact of the proposed development on the amenity of the coastal foreshore including: (i) any significant overshadowing of the coastal foreshore, and (ii) any loss of views from a public place to the coastal foreshore, and	As the proposal incorporates existing built elements it will not create any additional overshadowing or loss of views. Visual impacts of the proposal are considered in Section 6.4 and Appendix H.
(d) how the visual amenity and scenic qualities of the coast, including coastal headlands, can be protected, and	Visual impacts of the proposal are considered in Section 6.4 and Appendix H.
(e) how biodiversity and ecosystems, including: (i) native coastal vegetation and existing wildlife corridors, and (ii) rock platforms, and	The proposals impacts on biodiversity are considered in Section 6.8.

Table 3.3 Assessment against Newcastle Local Environmental Plan 2012 clause 5.5

Matter	Compliance
(iii) water quality of coastal waterbodies, and (iv) native fauna and native flora, and their habitats, can be conserved, and	
(f) the cumulative impacts of the proposed development and other development on the coastal catchment.	Cumulative impacts of the proposal are considered in Chapter 6.
(3) Development consent must not be granted to development on land that is wholly or partly within the coastal zone unless the consent authority is satisfied that:	
(a) the proposed development will not impede or diminish, where practicable, the physical, land-based right of access of the public to or along the coastal foreshore, and	The proposal will not impede or diminish land-based right of access of the public to or along the coastal foreshore.
(b) if effluent from the development is disposed of by a non-reticulated system, it will not have a negative effect on the water quality of the sea, or any beach, estuary, coastal lake, coastal creek or other similar body of water, or a rock platform, and	No effluent is to be disposed of by a non-reticulated system under the proposal.
(c) the proposed development will not discharge untreated stormwater into the sea, or any beach, estuary, coastal lake, coastal creek or other similar body of water, or a rock platform, and	Stormwater from the site will be treated prior to discharge. See Section 6.5 for more information on stormwater management.
(d) the proposed development will not: (i) be significantly affected by coastal hazards, or (ii) have a significant impact on coastal hazards, or (iii) increase the risk of coastal hazards in relation to any other land.	The site is located above the predicted sea level rise and is not subject to coastal flooding. See Section 5.4 for more discussion on hazards.

The site is mapped under the LEP as containing Class 2 acid sulfate soils (ASS). Clause 6.1 of the LEP requires development consent for carrying out of works below the natural ground surface or works by which the watertable is likely to be lowered more than 1 m below the natural ground surface on Class 2 land. The proposal does not involve such works and, therefore, does not require development consent under clause 6.1.

3.3.3 Development control plan

The proposal's compliance with the relevant controls of the Newcastle DCP 2012 is detailed in Table 3.4.

Table 3.4 Newcastle Development Control Plan 2012 compliance

Section	Control	Compliance
3.13 Industrial Development		
3.13.01 Site coverage	1. Site coverage of development is determined having regard to the following: (a) landscaping requirements; (b) car parking and manoeuvring; (c) loading areas; and (d) setbacks.	These elements have been considered in the design of the development.
3.13.02 Character and amenity	1. Buildings meet a high standard of building design to achieve a suitable level of visual and environmental quality.	No new buildings are proposed on the site.

Table 3.4 Newcastle Development Control Plan 2012 compliance

Section	Control	Compliance
3.13.03 Open storage and work areas	1. Where any work or storage of materials is proposed to be undertaken outside the confines of a building, full details of those parts of the site to be so used, and of the materials to be stored, are provided with the application.	See Chapter 2.
	2. Approved open work and storage areas are located at the rear of industrial developments and screened from view by the use of landscaping and screen fencing. Such fencing is constructed of masonry materials or pre-coloured metal cladding, having a minimum height of 2 m.	Open work and storage areas are located to the rear and screened from view by vegetation and existing fencing.
3.13.04 Building setbacks	1. Development is setback 5m from the front property boundary.	Proposal is setback more than 5 m from front boundary.
	3. Buildings and external work and storage areas are setback a minimum of 6m from side and rear boundaries on sites of 10,000m2 or more.	Buildings are setback more than 6m from side and rear boundaries.
3.13.05 Loading, unloading and servicing areas	1. All loading and servicing areas are located to the side or rear of buildings and effectively screened from any street frontage, adjoining buildings and residential areas.	Loading and servicing areas are located to the side and rear of site and screened by existing vegetation and fencing.
	2. Each individual allotment provides sufficient on-site loading facilities to accommodate its activities within the allotment. All loading movements, including turnaround areas, are accommodated within allotments. Sharing of loading facilities and manoeuvring areas between sites will be considered on merit.	Compliant
3.13.06 Parking and vehicle access	1. Car parking provided on site in accordance with the requirements of Section 7.03 Traffic, Parking and Access of this DCP.	See below.
	2. All car parking required by Council is provided 100% on site.	Compliant
	3. Off-street parking is provided behind or at the side of the building area from street frontage.	Compliant
	4. Loading docks are positioned so they do not interfere with visitor and employee parking spaces and to ensure delivery vehicles do not stand on any public road, footway or laneway.	Compliant
	5. Where possible separate heavy and light traffic movements.	Partially compliant where possible.

Table 3.4 Newcastle Development Control Plan 2012 compliance

Section	Control	Compliance
3.13.07 Land in Zone IN1 General Industrial 'Steel River'	1. The consent authority will not grant consent to the carrying out of development on land to which this part applies unless: (a) the development is allowed with consent and complies with the environmental envelope, and (b) the environmental effects of any aspect of the development relating to air quality, noise emissions or water quality that have not been addressed in the 'Strategic Impact Assessment Study', meet any relevant standards determined by the Office of Environment and Heritage (OEH).	See Appendices C to E.
4.01 Flood Management		The site is not affected by a floodway or flood storage area. See Flood Information Certificate for the site in Appendix C.
4.04 Safety and Security		
4.04.01 Crime prevention and public safety		The site is currently abandoned, heavily littered with rubbish and graffiti and prone to vandalism and unauthorised entry. The proposal will help secure the site and improve public safety.
5.02 Land Contamination – land on register/where risk from previous use		The site does contain contaminated material and previous contamination investigations for the site have been undertaken (see Section 2.10.3). The proposal does not involve a change of use of land or the carrying out of earthworks. Consideration of contamination impacts are given in Section 6.6.
5.03 Tree Management – trees within 5m of a development footprint or those trees likely to be affected by a development		
5.03.02 Preservation and maintenance of trees and vegetation		
A. Noxious weed control	1. Development facilitates the removal and ongoing management of noxious weeds within the site and any adjoining bushland, wetland or riparian corridor.	The proposal will include management of noxious weeds within the site.
	2. Development does not introduce noxious weed species as part of any plantings, imported soil, or mulch.	Compliant
	3. Landscaping excludes the use of undesirable tree and plant species, regardless if declared noxious or not, especially where in the vicinity of bushland, wetland or riparian corridor.	Proposed landscaping will use similar native species to that existing on the site.

Table 3.4 Newcastle Development Control Plan 2012 compliance

Section	Control	Compliance
B. Vegetation clearing	2. Clearing is undertaken only with the written agreement of the owner of the land on which the native vegetation is located.	The land is owned by Benedict Recycling Pty Ltd and there will be minimal impact on vegetation (see Section 6.8).
	3. Removal of noxious weeds is in accordance with the Noxious Weeds Act 1993.	Compliant
7.02 Landscaping, Open Space, and Visual Amenity		The site is a previous industrial development that includes landscaping along the site boundaries. The proposal will retain this landscaping, with the exception of overgrown vegetation that interferes with site access. Additional tree plantings are proposed along the northern and western site boundaries to assist with visual screening (see Section 2.10.4).
7.03 Traffic, Parking and Access		
7.03.01 Traffic studies and plans A. Traffic impact study		A traffic impact study has been prepared for the proposal see Appendix F.
B. Construction traffic management plan		There will be no major construction works so a construction management plan is not necessary.
7.03.02 Parking provision A. Parking rates, Industrial Activity:	Car Parking: 1 space per 100m^2 GFA or 1 space per 2 staff, whichever is the greater.	The site already contains extensive parking that was previously used for the much larger Delta EMD workforce.
	Bike Parking: 1 space per 20 staff (Class 2)	The site office will contain a secure location for storage of a bicycle.
	Motorbike Parking: 1 space per 20 car spaces	There is extensive space available for motorcycle parking.
7.03.03 Travel demand management		
A. Public transport		The proposal workforce is small enough to use existing transport infrastructure.
7.03.04 Design and layout of parking and access		The proposal will use the pre-existing parking area.
7.05 Energy Efficiency		There will be no new buildings or changes to facades.
7.06 Stormwater		A soil and water management plan is provided in Appendix C.

Table 3.4 Newcastle Development Control Plan 2012 compliance

Section	Control	Compliance
7.07 Water Efficiency		
7.07.01 Water efficiency	2. Where plumbing fixtures and water appliances are proposed to be installed, such are to be of the following types: (a) a minimum Water Efficiency Labelling and Standards (WELS) 3 Star Water Rating (b) maximum 6L dual flush toilet cisterns where they are not supplied by a roof water tank.	Fittings will be installed as required. All non rain water supplied fittings will be WELS 3 star or better. Non-rainwater toilets will be 6 L to 3 L dual flush.
	3. Where washing appliances are installed, they are WELS 3 Star (or better) Water Rated where they are not supplied by a roof water tank.	Will comply as described.
	4. Where installed, garden water hoses are fitted with trigger nozzles in order to maximise the efficiency of garden watering.	Will comply as described.
	5. A rainwater tank is installed for the dual purposes of mains water demand management and reducing the volume of stormwater discharge from sites. The rainwater tank must be connected to roof areas and not be connected to possible contaminating water sources. All rainwater tanks must be fitted with a first flush device to prevent contaminates fouling water and to prolong the life of the tank. Rainwater tanks should be designed to cater for maintenance and cleaning. Where rainwater tanks are provided, the volume of the tank can be used to offset any additional discharge control storage that is required. Rainwater tanks are to supply water for toilets, watering systems and other reuse devices and be designed and installed in accordance with Council's Stormwater and Water Efficiency for Development Technical Manual.	Rain water tanks will be installed capturing the run-off from the large sheds and office buildings and will be installed with first flush devices.
	6. Toilets and watering systems for landscaping are connected to rainwater supply.	Will comply as described.
7.08 Waste Management		A site waste management and minimisation plan (SWMMP) will be completed prior to the commencement of the proposal. The SWMMP will satisfy the waste management requirements as outlined in section 7.08 of the DCP. Waste management facilities will be clearly stated accompanying the development application.

Table 3.4 Newcastle Development Control Plan 2012 compliance

Section	Control	Compliance
7.09 Outdoor Advertising and Signage		
7.09.01 General limitations on outdoor signage	The following forms of advertising sign or promotional device are not favoured and shall generally not be approved in any zone. (a) Flashing or moving signs, which could otherwise affect traffic safety or neighbourhood amenity, including chasing or scintillating lighting. (b) Flyposting. (c) Any sign not permanently fixed to the premises, including moveable signs on footways or roads, other than a 'temporary sign'. (d) Any sign made of canvas, calico or the like. (e) Any fascia sign or flush wall sign which extends beyond the profile of the fascia or wall to which it is attached other than a 300mm maximum horizontal projection. (f) Roof signs, sky signs above awning signs and freestanding advertising panels or hoardings.	No uncompliant signs are proposed for the proposal.
7.09.04 Industrial zones	1. Signs are restricted to those necessary in order to identify lawfully established industrial or commercial enterprises on the subject land and to advise of a range of associated goods or services as appropriate.	The signage will contain only the necessary information required for its purpose.
	2. The total advertising area of all signage directed to the street frontage does not exceed $0.3m^2$ of advertising per lineal metre of that street frontage.	Signage will be compliant.
	3. Only one free-standing sign identifying the name of the occupants and/or products manufactured or produced on the site is permitted on any industrial land. Such signs are contained wholly within the site.	One free standing sign will be erected at the south end of the access road.
	4. Signs for multiple occupancy buildings are of a uniform shape, size and general presentation, supplemented by a directory board located in a position satisfactory to Council.	Not applicable.
	5. A company identification sign on a directory board does not exceed 2.4m x 0.6m.	Signage will be compliant.
8.00 Public Participation		DA will be publically notified as it is designated development and within the Steel River site.

3.3.4 Coastal zone management plan

As mentioned above, the site is located within the coastal zone. The Hunter Estuary Coastal Zone Management Plan (BMT WBM 2009) applies to the site. Appendix A to the plan includes a checklist of considerations for future proposed development. Compliance with this checklist is given in Table 3.5.

Table 3.5 Hunter Estuary Coastal Zone Management Plan checklist of considerations for future development

Consideration	Compliance
(a) Is the proposed development compassionate to existing economic, social and environmental values of the estuary, and does not diminish the significance of any of these values unless equivalent compensatory provisions have been made?	No significant impacts to the existing economic, social and environmental values of the estuary are expected (see Chapter 6).
(b) Does the proposed development improve or maintain the environmental condition of the Hunter River estuary and its tributaries compared to existing (2008) conditions, irrespective of social, recreational, tourism, industry or economic gains?	The proposal will improve or maintain the environmental conditions of the Hunter River estuary and its tributaries (see Chapter 6).
(c) Does the proposed development impact on Aboriginal or early European cultural values or degrade known sites of cultural significance?	The proposal will not impact on known sites of cultural significance (see Section 6.9).
(d) Does the proposed development duly consider existing and future risk of flooding and inundation from the Hunter River and its tributaries, catering for future climate change (to a timescale that is commensurate with the proposed development)?	Flooding and climate change impacts have been considered in Section 5.4.
(e) Does the proposed development diminish the fish and prawn stock within the estuary?	The proposal will not impact the fish or prawn stock within the estuary.
(f) Does the proposed development diminish scenic values of the estuary and its catchment areas?	The proposal will improve scenic values of the estuary through additional vegetation plantings which will screen existing and proposed industrial infrastructure.
(g) Does the proposed development comprise any existing functionality of the Hunter Valley Flood Mitigation Scheme that is still considered important to the viability of the Scheme?	Flooding impacts are considered in Section 5.4.
(h) Does the proposed development increase pollutant loads to the estuary or its tributaries through catchment runoff or through direct discharges compared to existing (2008) conditions?	The proposal will not result in a change to existing pollutant loads from the site.
(i) Does the proposed development exacerbate conflicts between the different user groups of estuary or between the waterway and foreshore users?	The proposal will not create conflicts between different user groups of the estuary.
(j) Does the proposed development disturb recognised shorebird roosting and breeding areas?	The proposal will not disturb any recognised shorebird roosting or breeding areas.
(k) Does the proposed development potentially impact on any existing Endangered Ecological Communities (EECs), estuarine and floodplain wetlands, or other significant habitats (including areas utilised by birds protected under international migratory treaties, areas utilised as wildlife corridors across the landscape, and fish and prawn nursery area)?	The proposal will not have any ecological impacts (see Section 6.8).
(l) Does the proposed development require significant clearing of vegetation, including clearing within an Asset Protection Zone (APZ)?	The proposal does not require significant clearing of vegetation.

Table 3.5 Hunter Estuary Coastal Zone Management Plan checklist of considerations for future development

Consideration	Compliance
(m) Does the proposed development involve bank stabilisation, excavation or river engineering works?	The proposal does not involve bank stabilisation, excavation or river engineering works.
(n) Does the proposed development increase low flow extraction from the Hunter estuary or its tributaries?	The proposal will not increase low flow extraction from the Hunter estuary or its tributaries.
(o) Does the proposed development involve extraction of sediment?	The proposal does not involve extraction of sediment.

3.3.5 Section 94A Development Contributions Plan 2009

The City of Newcastle's Section 94A Development Contributions Plan 2009 applies to development over $100,000 within Newcastle local government area (LGA) excluding the area covered by the Western Corridor Section 94 Plan. Part A of the Plan applies to the proposal. The Plan imposes conditions on certain development consents requiring the payment of a contribution pursuant to section 94A of the EP&A Act. Where the Plan applies no Section 94 levy will apply.

The proposed costs of the proposal, as calculated in accordance with Section 10 of the plan, are $450,000. A cost estimate report prepared in accordance with Section 12 of the Plan is included with the DA for the proposal.

3.4 Other State legislation

3.4.1 Coastal Protection Act 1979

The CP Act provides for the protection of the coastal environment. Under Part 3 of the Coastal Protection Act, concurrence from the Minister for the Environment is required for certain development within the coastal zone.

However, concurrence from the Minister is not required for development that requires development consent under the EP&A Act or that is carried out in accordance with a coastal zone management plan under Part 4A of the CP Act. Therefore, concurrence from the Minister is not required for the proposal.

3.4.2 Protection of the Environment Operations Act 1997

The POEO Act is the principal NSW environmental protection legislation and is administered by the EPA. Section 48 of the POEO Act requires an EPL to undertake scheduled activities at a premise. Scheduled activities are defined in Schedule 1 of the POEO Act and include the following premise-based activities that apply to the proposal:

- Resource recovery – having on site at any time more than 1,000 tonnes or processing more than 6,000 tonnes per year of general waste;

- Waste processing (non-thermal treatment) – having on site at any time more than 1,000 tonnes or processing more than 6,000 tonnes per year of general waste; and

- Waste storage – received from off-site and storing of more than 1,000 tonnes of waste at any time or more than 6,000 tonnes per year.

As the proposal involves scheduled activities it will require an EPL. A copy of the DA for the proposal will be forwarded to the EPA for its general terms of approval.

3.4.3 Water Management Act 2000

The *Water Management Act 2000* (WM Act) regulates the use and interference with surface and groundwater in NSW where a water sharing plan has been implemented. Clause 91(2) of the WM Act requires an activity approval for the carrying out of a controlled activity in, on or under waterfront land. A controlled activity includes:

(a) the erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979), or

(b) the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or

(c) the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or

(d) the carrying out of any other activity that affects the quantity or flow of water in a water source.

The WM Act defines waterfront land to include:

(a) the bed of any river, together with any land lying between the bed of the river and a line drawn parallel to, and the prescribed distance inland of, the highest bank of the river, or

(a1) the bed of any lake, together with any land lying between the bed of the lake and a line drawn parallel to, and the prescribed distance inland of, the shore of the lake, or

(a2) the bed of any estuary, together with any land lying between the bed of the estuary and a line drawn parallel to, and the prescribed distance inland of, the mean high water mark of the estuary, or

(b) if the regulations so provide, the bed of the coastal waters of the State, and any land lying between the shoreline of the coastal waters and a line drawn parallel to, and the prescribed distance inland of, the mean high water mark of the coastal waters,

where the prescribed distance is 40 metres or (if the regulations prescribe a lesser distance, either generally or in relation to a particular location or class of locations) that lesser distance. Land that falls into 2 or more of the categories referred to in paragraphs (a), (a1) and (a2) may be waterfront land by virtue of any of the paragraphs relevant to that land.

The proposal includes landscaping works within 40 m of the Hunter River which will require the removal of small volumes of material. The proposal, therefore, involves a controlled activity and an approval under Section 91(2) is required.

3.4.4 Contaminated Land Management Act 1997

The NSW *Contaminated Land Management Act 1997* is administered by the EPA. It establishes a process where the significant contamination of land is investigated and, where appropriate, remediated.

A site audit statement under the *Contaminated Land Management Act 1997* was issued for the site on 10 November 2009. This determined that the site is suitable for commercial and industrial use. Further information on contamination is provided in Sections 2.10.3 and 6.7.

3.5 State policies and plans

3.5.1 Lower Hunter Regional Strategy

The *Lower Hunter Regional Strategy* (DoP 2006) was prepared to meet a number of objectives including to provide adequate employment and housing for predicted growth in the region and for the protection of the region's environment. The strategy provides land use planning guidance for the Lower Hunter over the next 25 years. This will include:

- up to 115,000 new dwellings by 2031 for 160,000 additional people;
- provision of up to 85% of the anticipated 66,000 jobs required by 2031; and
- enabling release of up to 69,000 new greenfield lots.

The site is designated as Employment Lands. The proposal is consistent with Strategy objectives.

3.5.2 NSW Coastal Policy

The NSW Coastal Policy was issued by the NSW Government in 1997. The Policy aims to provide for population growth and economic development whilst protecting the natural, cultural, spiritual and heritage values of the coastal environment. The Policy defined and mapped the coastal zone to which NSW coastal legislation applies.

In preparing draft LEPs, councils are required to include provisions that give effect to and are consistent with the Policy. The LEP was prepared with consideration to the Policy, with the objective of clause 5.5 to implement the Policy. An assessment of the proposal against clause 5.5 was given in Table 3.3.

3.5.3 Newcastle Environmental Management Strategy 2013

The Newcastle Environmental Management Strategy 2013 (the Strategy) was adopted by NCC in November 2013 to replace the 2003 Newcastle Environmental Management Plan. The Strategy is intended to direct NCC's contribution to the strategic direction 'Protected and Enhanced Environment'; one of seven strategic directions identified in the Newcastle 2030 Community Strategic Plan. The three core environmental objectives of the strategic direction 'Protected and Enhanced Environment' are:

1. greater efficiency in the use of resources;
2. our unique natural environment is maintained, enhanced and connected; and
3. environment and climate change risks and impacts are understood and managed.

The Strategy describes the issues considered under the objective, discusses future challenges, and provides a list of strategies for achieving the three core objectives.

The proposal is considered to achieve the first core environmental objective, greater efficiency in the use of resources, through the reduction of waste. One of the issues identified in the Strategy is the increasing challenge to meet State targets of increasing recovery and use of materials from the municipal waste stream in the coming decades due to urban development and population growth in the Lower Hunter. The proposal will help alleviate this challenge by providing facilities to recycle and reuse domestic and construction wastes.

3.5.4 Hunter and Central Coast Regional Environmental Strategy

The Hunter and Central Coast Regional Environmental Management Strategy (HCCREMS) is a framework developed to guide and coordinate the efforts of 14 member councils, which includes NCC. The HCCREMS collaborate with councils on a range of environmental programs including, of relevance to the proposal, the Hunter Regional Waste Avoidance & Resource Recovery Strategy. The strategy provides a regional approach to changing waste management practice and promoting responsible waste management practices that considers the waste management hierarchy.

3.6 Commonwealth legislation

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), actions that may have a significant impact on a matter of national environmental significance (MNES) are ‘controlled actions’ and require approval from the Commonwealth. MNES include world heritage properties, wetlands of international importance, and listed threatened species and ecological communities.

The proposal will not have any significant impacts on any MNES and, accordingly, a referral to the Commonwealth Minister for the Environment has not been made.

4 Consultation

4.1 Consultation to date

The SEARs for the proposal require consultation with the following stakeholders:

- EPA;
- OEH;
- Department of Primary Industries (DPI);
- RMS;
- NCC; and
- the surrounding landowners and occupiers that are likely to be impacted by the proposal.

Consultation with all the above stakeholders was undertaken for the project. Consultation was also undertaken with Ausgrid. The method and outcomes of the consultation are detailed in Table 4.1.

Table 4.1 Summary of consultation

Stakeholder	Consultation methods	Outcomes
Government agencies		
EPA	EPA were briefed and provided input into the preparation of the EIS through the SEARs.	This EIS has been prepared in accordance with EPA comments included with the SEARs.
	A letter was sent to EPA on 26 February 2015 inviting further input and offer of face-to-face meeting.	No response to consultation letter was received.
OEH	Consultation letter sent 26 February 2015 inviting input into the EIS and offer of face-to-face meeting.	OEH responded (S. Lewer, 11 March 205, telephone) that the SEARs included OEH's assessment requirements.
NSW Office of Water (NOW), DPI	NOW were briefed and provided input into the preparation of the EIS through the SEARs.	This EIS has been prepared in accordance with NOW comments included with the SEARs.
	Consultation letter sent 26 February 2015 inviting further input and offer of face-to-face meeting.	Email response to consultation letter received 3 March 2015. Confirmed no additional issues than those outlined in the SEARs agency comments.
RMS	RMS were briefed and provided input into the preparation of the EIS through the SEARs.	This EIS has been prepared in accordance with RMS comments included with the SEARs.
	Consultation letter sent 26 February 2015 inviting further input and offer of face-to-face meeting.	No response to consultation letter received.

Table 4.1 Summary of consultation

Stakeholder	Consultation methods	Outcomes
NCC	Pre-DA briefing letter sent 5 December 2014. Pre-DA meeting held 22 January 2015.	Following the Pre-DA meeting, NCC issued preliminary planning advice and information for preparation of a DA (28 January 2015). The EIS has been prepared to address this advice.
Surrounding landowners/occupiers		
Fuji Xerox Document Management Solutions Facility (9 Laurio Place Mayfield West)	One-on-one meeting held with site manager (Roz Taylor).	No issues raised.
Grace Records Management & Removals Facilities (7 & 5 Laurio Place Mayfield West)	One-on-one meeting held with business manager (Thomas Dora).	No issues raised. Encouraged site possession to discourage vandals and illegal access by trail bikes.
Recall Australia Document Storage Facility (3 Laurio Place Mayfield West)	One-on-one meeting held with operations manager (Tony Condello).	No issues raised. Requested ongoing information be provided and further meeting held at a later date.
Other		
Ausgrid	A request was submitted for the placement of a more robust gate and double locking mechanism at the entry to the site to align with the existing right of carriageway in an email (4 February 2015).	Request was granted in email (11 February 2015 – see Appendix B). Email included a request that a drawing showing design of gate and site plan indicating location be forwarded to Ausgrid for its records.

4.2 Proposed consultation

This EIS will be placed on public exhibition. Benedict will respond to any submissions regarding the proposal. This may also highlight the need to consult with any individuals or groups with a particular interest in the proposal.

A factsheet will be prepared summarising the proposal and assessed impacts. This will be provided to interested stakeholders through Benedict and NCC.

The ongoing consultation is planned with the following:

- NCC – including regarding this EIS, development approval and subsequent consents;
- NOW – including regarding the requirement for a Controlled Activity Approval (see Section 3.4.2);
- EPA – including regarding an EPL;
- agencies providing comment on this EIS;
- neighbours (see Table 4.1) – one-on-one consultation regarding the EIS and upcoming activities at the site; and
- utilities (water, sewerage and power) regarding reconnecting services to the site.

5 Hazards

5.1 Introduction

This section determines whether the proposal is a potentially hazardous or offensive development according to SEPP 33 and whether a PHA is required. It references *Applying SEPP 33* (DoP 2011a) and the *Hazardous Industry Planning Advisory Paper No 4: Risk Criteria for Land Use Safety Planning* guidelines (DoP 2011b).

5.2 Hazardous materials

5.2.1 *Applying SEPP 33* risk screening method

i Hazardous materials stored, processed or handled

Potentially hazardous or offensive development is defined by SEPP 33 as development which poses a significant risk to, or which would have a significant adverse impact on, human health, life, property or the biophysical environment, if it were to operate without employing any control measures. This includes developments for the handling, storing or processing of hazardous materials. A development is classified as a hazardous or offensive development if the thresholds in *Applying SEPP 33* — which compare the quantities of stored or used hazardous materials to the distance from publicly accessible areas — are exceeded. The hazardous materials classifications in *Australian Code for the Transport of Dangerous Goods by Road and Rail* (National Transport Commission 2007) (the Dangerous Goods Code) are used in *Applying SEPP 33*.

The hazardous materials that are proposed to be stored and used under the proposal are diesel, oils, grease and liquid petroleum gas (LPG). These materials will be stored in the main processing shed with the exception of diesel which will be stored in a purpose built 40,000 L tank adjacent to the main processing shed. No hazardous wastes will be accepted onto the site. The storages, quantities and hazardous properties of the materials are provided in Table 7.1.

Table 5.1 Dangerous goods and other potentially hazardous materials to be stored onsite

Classification	Name	Storage conditions	Approximate quantity
Dangerous Goods			
Class 2.1 Flammable Gas	LPG	Two pressurised 7,500 L tanks.	15,000 L
	Battery terminal spray	Purpose built container, in enclosed storage room in main compound	0.4 L
	Hi press spray grease	Purpose built container, in enclosed storage room in main compound	0.4 L
	Acetylene	Three size G bottles (for 9.3 m^3 of gas at atmospheric pressure)	30 kg

Table 5.1 Dangerous goods and other potentially hazardous materials to be stored onsite

Classification	Name	Storage conditions	Approximate quantity
Class 2.2 Non-flammable, non toxic gas*	Oxygen	Five size G bottles (for 8.9 m^3 of gas at atmospheric pressure)	12 kg
	Contact cleaner aerosol	Purpose built container, in enclosed storage room in main compound	0.4 L
Class 3 Flammable Liquid PG II	Plumbers priming fluid	Purpose built container, in enclosed storage room in main compound	0.5 L
	Unleaded petrol	Purpose built container, in enclosed storage room in main compound	20 L
	Grip base	Purpose built container, in enclosed storage room in main compound	0.4 L
	Gasket sealant	Purpose built container, in enclosed storage room in main compound	0.05 L
	Quick dry enamel	Purpose built container, in enclosed storage room in main compound	3 L
Class 3 Flammable Liquid PG III	Hi-Tec heavy duty degreaser	Purpose built container, in enclosed storage room in main compound	20 L
Class 8 Corrosive substances PG III	Chemtech Heavy Duty Degreaser	Purpose built container, in enclosed storage room in main compound	20 L
Class 9 Miscellaneous dangerous substances PG III*	Diesel**	40,000 L metal tank kept in bunded and roofed storage container.	40,000 L
Other hazardous materials			
	Flocculent	Purpose built plastic container	1,000 L
	Oils (engine, hydraulic, and diesel)	Purpose built containers, in enclosed storage room in main compound	840 L
	Penetrant spray	Aerosol container, in enclosed storage room in main compound	4 L
	Concentrated traffic film remover	Purpose built container, in enclosed storage room in main compound	20 L
	Lubricant	Purpose built container, in enclosed storage room in main compound	0.5 L
	Anti-bacterial soap	Purpose built container, in enclosed storage room in main compound	20 L
	Grease	Purpose built container, in enclosed storage room in main compound	15 kg
	Coolant	Purpose built container, in enclosed storage room in main compound	40 L

Notes: **Exempt from "Applying SEPP" risk screening test.*

***The Dangerous Goods Code states that diesel is not subject to the code as it is has a flash point of more than 60°C. The Work Practice Data Sheet provided by Chemwatch identifies Diesel as a Dangerous Good Glass 9.*

A screening test against the thresholds in SEPP 33 for dangerous goods is provided in Table 7.2. All Class 3 PG II and III flammable liquids have been grouped together as Class 3 PG II which has a more stringent screening distance. The term 'sensitive' in the table refers to residential or other more sensitive land uses and 'other' applies to all other land uses (eg commercial or industrial). The screening test determines that the hazardous materials are not potentially hazardous.

Table 5.2 *Applying SEPP 33* screening test

Dangerous goods classification	Total quantities	SEPP 33 screening threshold	Potentially hazardous
Class 2.1 (LPG only)	8 t*	10 t	No
Class 2.1 (liquefied excluding LPG)	30 kg	Greater than 500 kg at specified distance	No
Class 3 PG II	50 kg	Greater than 5 t at specified distance	No
Class 8 PG III	20 kg	50 t	No

*Notes: *Conversion used for LPG 1 L = 0.53 kg.*

ii Transport of hazardous materials

Applying SEPP 33 also sets threshold limits for the transportation of hazardous materials to and from a site. The number of weekly and annual deliveries and the approximate quantities per load to the site are below the SEPP 33 transport screening thresholds as shown in Table 7.3.

Table 5.3 *Applying SEPP 33* transportation screening test

Hazardous materials	Deliveries		Quantities per load	Potentially hazardous
	Weekly (peak)	Annual		
Class 2.1 Flammable Gas	1	6	7.5 kL	No
Other hazardous materials	4	54	15 kL	No

5.2.2 Other risk factors

Applying SEPP 33 requires an assessment of other hazards/risk factors outside the scope of the risk screening method. An assessment of other types of hazards associated with the facility is provided in Table 7.4.

Table 5.4 Other types of hazards

Type of hazard	Comments
Any incompatible materials (hazardous and non-hazardous materials)	No
Any wastes that could be hazardous	No[1]
The possible existence of dusts within confined areas	No
Types of activities the dangerous goods and otherwise hazardous materials are associated with (storage, processing, reaction, etc.)	Only as indicated in Table 7.1
Incompatible, reactive or unstable materials and process conditions that could lead to uncontrolled reaction or decomposition.	No
Storage or processing operations involving high (or extremely low) temperatures and/or pressure.	No
Details of known past incidents (and near misses) involving hazardous materials and processes in similar industries.	No known incidents involving hazardous materials/processed at recycling industries.

Note: 1. Wastes delivered to site will be inspected and will not be accepted if they contain hazardous materials (see Section 2.3.4).

5.2.3 Hazard management

A range of hazard control measures will be implemented during construction and operation of the proposal. Each of these will be appropriate for the hazard they are designed to control and will generally follow the *Hierarchy of Hazard Controls* (WorkCover NSW not dated):

- engineering controls:
  - design — components will be designed and constructed to comply with relevant standards; and
  - enclosure — components will be enclosed as appropriate. For example, tanks will be bunded.
- administrative controls:
  - operating procedures;
  - scheduled maintenance; and
  - training and reinforcing correct work procedures.

The storage and use of hazardous materials will be in accordance with the following Australian Standards:

- *Australian Standard 1940:2004 The Storage and Handling of Flammable and Combustible Liquids*; and
- *Australian Standard 1596:2008 The Storage and Handling of LP Gas.*

5.3 Potentially offensive industry

The air, noise, and water emissions from the proposal have been assessed to determine if it is classified as a potentially offensive industry.

5.3.1 Air quality

ENVIRON assessed potential air quality impacts (see Section 6.1 and Appendix D). The assessment found that the particulate emissions of PM_{10}, total suspended particulates (TSP) and dust deposition from the proposal will comply with the relevant criteria at sensitive receptors and will not lead to any unacceptable impacts on the amenity of the area.

5.3.2 Noise

EMGA Mitchell McLennan (EMM) assessed potential noise impacts from the proposal (see Section 6.1 and Appendix D). The assessment concluded that noise modelling results predicted that noise emissions will not exceed the relevant criteria and will not lead to any unacceptable impacts on the amenity of the area.

5.3.3 Water

Surface water from the proposal will be managed by the existing surface water management system and additional minor controls (see Section 6.5 and Appendix C). Any water released will have a suspended solids content of less than 50 mg/L. The proposal will not significantly increase runoff peak flows, discharge volume or the sediment load in runoff. Therefore, the proposal will not have a significant impact on flows or water quality in the receiving environment.

5.3.4 Waste

Only inert pre-classified general solid waste (non-putrescible) will be accepted at the proposal and it will not be applied to land at the site. No special, liquid, hazardous restricted solid or general solid waste (putrescible) wastes will be accepted at the site.

5.3.5 Is the proposal a potentially offensive industry?

An assessment of the storage and transport of hazardous materials against *Applying SEPP 33* determined that the proposal is not potentially hazardous.

The proposal will not result in unacceptable levels of pollution that will impact the amenity of the area. Therefore, the proposal is not a potentially offensive industry.

5.4 Other hazards

The following other hazards have been considered:

- Bushfire: the site is not mapped as containing bushfire prone land.
- Flooding: the site is not subject to flooding, within a flood plain or flood risk area (see Appendix C).
- Sea level rise: sea level rise will not impact on built elements of the site which are at least 9 m above Australian Height Datum.
- Mine subsidence area: the site is not located within a mine subsidence area.

6 Impact assessment

This chapter provides an assessment of the likely environmental impacts of the proposal as required by Section 79C(1b) of the EP&A Act. Further details of the existing environment, assessment methods, assessment criteria, predicted impacts and proposed management measures are provided in:

- Appendix C: water assessment;
- Appendix D: air quality assessment;
- Appendix E: noise assessment;
- Appendix F: traffic assessment; and
- Appendix H: visual assessment.

6.1 Air quality and greenhouse gases

6.1.1 Air quality and greenhouse gases assessment

An air quality and greenhouse gas assessment was prepared for the proposal by ENVIRON Australia Pty Limited (see Appendix D). The assessment considered the potential air quality impacts (including dust, odour and cumulative impacts) of the proposal on nearby private properties (residential and industrial). Impacts were determined based on consideration of potential sensitive receivers; prevailing meteorological conditions; existing sources of air emissions; potential air emissions during construction and operation; and the proposed control measures. Impacts to 13 representative receptors were assessed against the relevant NSW EPA ambient air quality criteria. The assessment assumes that 90,000 tonnes of waste will be accepted annually and the processing of this waste will be evenly distributed across the year during times the site is processing waste.

6.1.2 Air quality management measures

Management measures that will be implemented during construction and operations to minimise air quality impacts will include:

- all existing sealed/hardstand areas will be retained;
- disturbance of unsealed areas by plant or vehicle movements will be prevented by surfacing areas with coarse crushed concrete/rock or asphalt (leaving only 4,000 m^2 of the 89,000 m^2 site unsealed);
- water sprays will be used over any other bare or unsealed surfaces that have potential to generate unacceptable amounts of dust;
- all vehicle movements will be restricted to designated routes marked out by appropriate signage and fencing using sealed internal roads;
- access to unsealed areas will be prevented;
- water sprays will be used at stockpiles, crushing and screening plants and during material handling;

- a wheel wash in the weighbridge area will be used to clean truck tyres to prevent mud or sediment being carried to and deposited on the access road (and public roads);
- existing sheds will be used to undertake particulate generating activities where possible; and
- no composting will be undertaken on the site.

Air quality management and any proposed monitoring will be described in the environment management plan (EMP).

6.1.3 Air quality impacts

The assessment found that the predicted incremental and cumulative particulate matter concentrations, dust deposition rates and odour concentrations generated by the proposal are well below the corresponding NSW EPA criteria at assessment locations.

The majority of material received under the proposal will be inert construction and demolition waste. Therefore, the potential for odour emissions will be low. The most likely waste streams with odour potential are green waste and glass material. All odour generating materials will be stored and processed within the main processing shed.

Given the negligible air quality impacts predicted for the proposal, no air quality management measures additional to those described in Section 6.1.2 are warranted. Noise management and any proposed monitoring will be described in the EMP.

6.1.4 Greenhouse gasses management measures

Management measures that will be implemented during construction and operations to minimise greenhouse gas emissions will include:

- on-site equipment will be regularly maintained and serviced to maximise fuel efficiency;
- vehicle kilometres travelled on site will be minimised;
- the mains power will be reconnected as soon as possible allowing access to electricity generated more efficiently than using an on-site generator; and
- energy efficiency will be progressively reviewed and implemented throughout the life of the facility.

6.1.5 Greenhouse gasses management impacts

The assessment calculated annual emissions from the proposal for greenhouse gases (GHG) including CO_2, CH_4 and N_2O. Sources of GHG emissions from the proposal include diesel fuel (Scope 1), purchased electricity (Scope 2), upstream and downstream emissions and employee travel (Scope 3). The total annual GHG emissions estimated for the proposal are 415 t CO_2-e/year. This represents 0.00025% and 0.00007% of annual NSW and Australian GHG emissions.

6.2 Noise

6.2.1 Noise assessment

A noise impact assessment was prepared for the proposal by EMM (see Appendix E). The assessment was undertaken in accordance with the *Industrial Noise Policy* (EPA 2000b), *Interim Construction Noise Guideline* (DECC 2009), and *Road Noise Policy* (RNP) (DECCW 2011). The assessment considered impacts to representative assessment locations most likely to be affected by the proposal (13 residential and 4 non-residential locations). The processing scenario for the assessment assumes that all plant and equipment is operating simultaneously to allow maximum noise levels to be predicted. It is noted that it will be rare for all equipment to be running simultaneous and that more than 90,000 tonnes of waste could be processed annually if all plant was used at full capacity.

Short-term attended and long-term unattended ambient noise monitoring at four locations between 31 January and 13 February 2015 to quantified the existing ambient acoustic environment. Previous noise assessments for the area, including the City of Newcastle (1998) *Strategic Impact Assessment Study, Steel River Projec*t, and historical data were also reviewed. The dominant noise sources at the residential areas (all south of the site) were determined to be from traffic on Industrial Drive and Tourle Street.

Background noise levels derived from the long-term noise monitoring results were used to determine the relevant noise criteria for the proposal. Sound power levels for the plant to be used on the site were determined based on sound levels from similar equipment listed in EMM's noise emissions database. Noise levels at receivers were modelled using Brüel and Kjær Predictor noise modelling software.

6.2.2 Noise management measures

Management measures that will be implemented during construction and operations to minimise noise impacts will include:

- plant with higher noise emissions will generally be located on the northern side of the site, furthest away from potentially noise affected neighbours;
- plant and equipment will be regularly maintained and serviced;
- low-frequency reversing alarms ("growlers") will be used rather than the standard high frequency beepers;
- a site layout has been adopted that minimises the need for mobile plant to reverse;
- plant and equipment will be switched off when not in use;
- any vehicle queuing will be on site rather than on public roads;
- material drop heights will be minimised and dragging materials along the ground will be minimised;
- site contact details will be provided on a board at the front of the site;
- any noise-related complaints will be handled promptly; and
- a complaints register will be maintained.

6.2.3 Noise impacts

The proposal is predicted to have a negligible impact on the existing ambient acoustic environment (in isolation and cumulatively with other development) and is not predicted to increase industrial noise levels above the relevant amenity criteria.

It is very unlikely that noise levels generated by construction activities associated with the proposal will be noticeable at assessment locations.

The nearest residences potentially affected by an increase in road traffic volumes as a result of the proposal are located adjacent to Industrial Drive in Mayfield West. The predicted total traffic volume increase associated with the proposal will result in a negligible increase (<0.5 dB) in road traffic noise from Industrial Drive. Therefore, the impact of road traffic noise associated with the proposal is predicted to be negligible and within the 2 dB allowable increase for land use developments as described in the RNP.

Given the negligible noise impacts predicted for the proposal, no noise management measures additional to those described in Section 6.2.2 are warranted. Noise management and any proposed monitoring will be described in the EMP.

6.3 Traffic and transport

6.3.1 Traffic and transport assessment

A traffic and transport assessment was prepared for the proposal by EMM (see Appendix F). The assessment considered the impacts on the proposed traffic generation of the proposal on existing and future traffic network. The assessment is based on average daily vehicle movements to and from the site, including: delivery of 90,000 tonnes of waste; dispatch of products and non-recyclable residues; employee and visitor vehicles; and vehicles associated with ancillary waste activities.

6.3.2 Traffic and transport impacts

The existing traffic volumes for Industrial Drive and Tourle Street were determined from historic tube traffic counts undertaken by RMS. Peak hourly traffic volumes and proportions of heavy vehicles on the local road network were determined by traffic surveys on 4 February 2015. A SIDRA analysis of the intersection of Steel River Boulevard and Industrial Drive found that the intersection is currently operating at a satisfactory level with low levels of congestion (level of service B).

The proposal will generate approximately 474 daily traffic movements (214 truck movements and 260 light vehicle movements). The peak hourly movements are predicted to be 103 in the morning and 61 in the afternoon and these will be distributed approximately 60%/40% to and from the east or the west on Industrial Drive. Construction generated traffic will be much lower than operational traffic with 40 total daily movements and 28 movements during the morning and afternoon peak hours.

The proposal will increase daily traffic volumes by about 7% on Steel River Boulevard and 0.6% to 0.9% on Industrial Drive. This will generally not be noticeable to existing road users. The proposal will result in minor increases to average vehicle delays during peak hour periods at the Industrial Drive/Steel River Boulevard intersection. However, this will not result in a change to the current level of service. The predicted 95th percentile traffic queue lengths will not exceed the actual storage capacity of turning lanes at this intersection.

A ten year future impacts scenario was undertaken as part of the assessment assuming a growth factor of 2% annual linear traffic growth. The scenario considered 2025 base traffic flows and 2025 traffic flows including the proposal. Minor increases to average vehicle delays during peak hour periods and no change to the current level of service at the Industrial Drive/Steel River Boulevard intersection are predicted for 2025.

It is predicted that the increase in base traffic flow by 2025 (ie without the proposal) will increase in the 95th percentile traffic queue length at the Industrial Drive/Steel River Boulevard intersection so that the storage capacity of the right turn lane on Industrial Drive is exceeded in the morning peak hour. Therefore, 95th percentile traffic queue lengths will also be exceeded by 2025 when traffic flow from the proposal is included. There is sufficient space within the centre of Industrial Drive (the grassed area immediately west of the current right-hand turn lane) to extend the length of the right turn lane to accommodate increased queue lengths that will occur with or without the proposal traffic.

The proposal will not have any impacts on parking, road safety and traffic management, public transport services, pedestrians or cyclists.

6.4 Visual

6.4.1 Visual assessment

A visual assessment was undertaken for the proposal by EMM (see Appendix H). The assessment considered visual impacts from public view points and private (residential and industrial) receptors. Visual impacts from 11 view points were assessed.

6.4.2 Visual management measures

Management measures that will be implemented during construction and operations to minimise visual impacts will include:

- Casuarina sp. will be planted along the northern boundary and the northern section of the western boundary of the site to mitigate visual impacts from viewpoints to the north, north-east and west;
- the visual appearance of the site entrance on McIntosh Drive will be improved and the area will be kept tidy (see Photograph 6.1);
- rubbish from around the site boundaries will be removed;
- further vandalism and graffiti within the site will be greatly reduced due to the passive security provided by activities on the site; and
- illegal dumping is expected to be reduced as the facility will provide an accessible alternative for disposing of many recyclable wastes.

6.4.3 Visual impacts

The assessment found that the proposal is unlikely to have significant visual impacts given that it is located within an existing industrial estate and is consistent with the visual character of the area.

Partial views of the upper portion of the main processing shed and the tops of stockpiles may be visible from some viewpoints. The proposal will result in improved screening of the site through the planting of vegetation along the site boundary where existing vegetation is sparse, particularly to the north and west.

Details of vegetation planting will be provided in EMP.

Photograph 6.1 Existing site entrance (note illegally dumped waste)

6.5 Water

6.5.1 Water assessment

A soil and water management report was prepared for the proposal by National Project Consultants Pty Limited (see Appendix C). The soil and water management strategy is based on the following guidelines:

- Managing Urban Stormwater – Soils and Construction, Vol.1 (Landcom 2004);
- Managing Urban Stormwater – Soils and Construction, Vol.2E Mines and Quarries (DECC 2008); and
- Newcastle Development Control Plan Section 7.06 Stormwater.

6.5.2 Existing site

The site is sloped so that runoff flows from the centre to two channels located around the boundary of the site. The asphalt lined perimeter channels are V shaped and vary in depth from 0 to 2 m and are 3 to 10 m wide. The channels drain into a sedimentation basin in the north-west corner of the site. The basin drains to an invert of the outlet chamber which has controlled discharge to the Hunter River. Runoff from external areas is directed away from the site by the presence of a bund wall along the southern site boundary and adjacent land levels. NCC has advised that the site is not affected by the 100 year average recurrence interval (ARI) or Probable Maximum flood in the Hunter River (see Appendix C).

6.5.3 Management measures

The soil and water management plan is presented in Figure 6.1. This divides the site into three areas:

- segregated heavy waste processing and stockpiling area (Area 1), about 14,000 m^2;
- recycling facility access area (Area 2), about 7,000 m^2; and
- ancillary waste activities area (Area 3), about 68,000 m^2.

The soil and water management plan is based in the existing controls including:

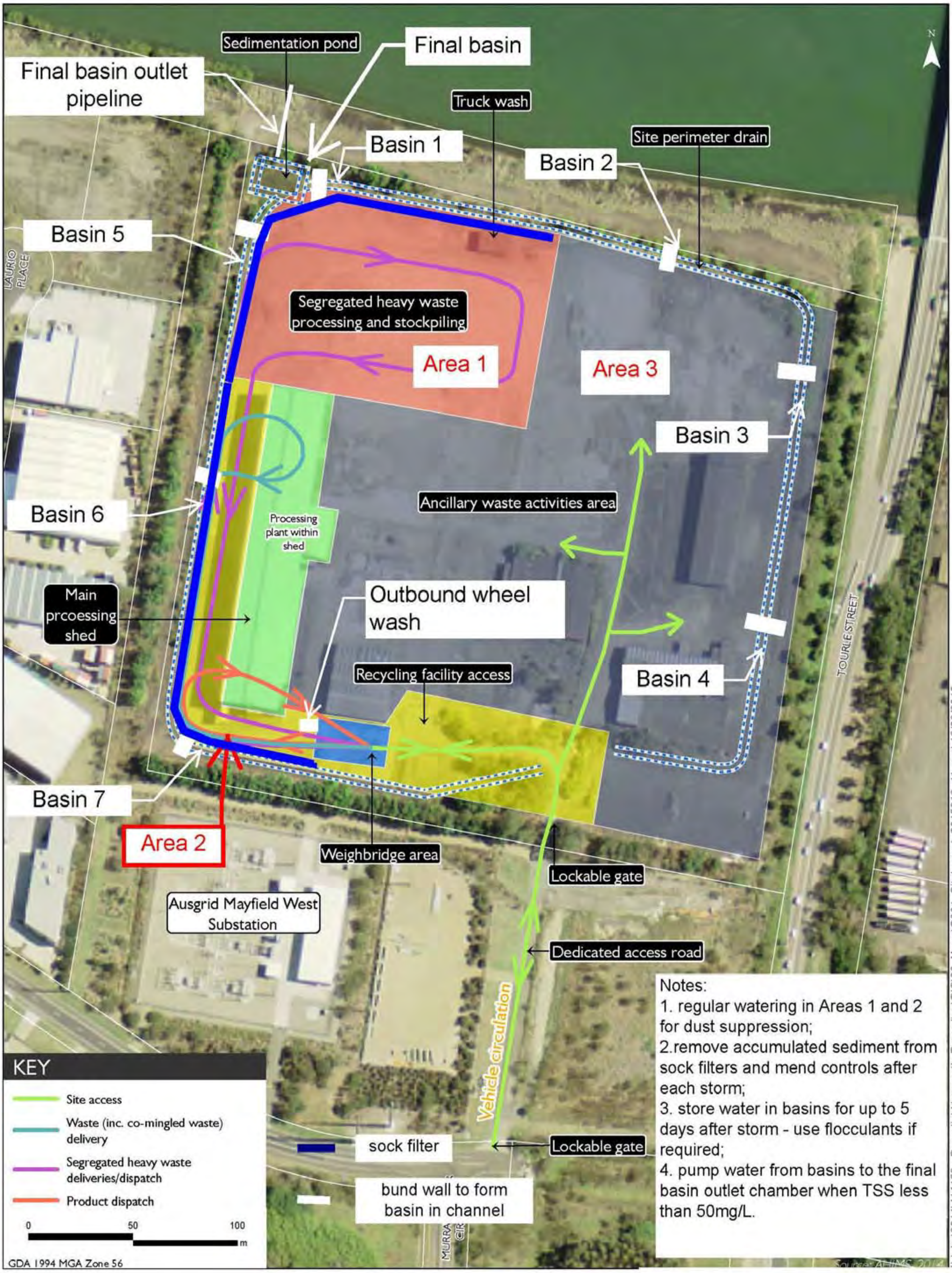
- bunding to prevent runoff from external areas entering the site;
- the perimeter sealed channel; and
- the final basin with outlet controls.

The project design features to prevent impacts to groundwater include:

- there will be no significant excavations within the site;
- existing sheds will be used to house the majority of the processing activities, preventing generation of runoff from these activities;
- the fuels storage area will be bunded;
- sheds and the segregated heavy waste stockpiling and processing area will be outside of major overland flowpaths;
- surface water captured within the runoff management system will be used for dust suppression so that mains water is not required for this purpose;
- the majority of unsealed site areas will be sealed to minimise the requirement for dust suppression using water (see Section 2.10.1);
- groundwater will not be used; and
- water will not be used in the product processing, other than for dust suppression.

The existing site runoff controls will be augmented with further controls including:

- most of the site surface will be stabilised, and where it is not, access will be restricted;
- a continuous line of sock filters will be placed along the perimeter channel in Area 1 to form a bund causing runoff to pond, sediments to accumulate and runoff to be filtered through the socks prior to discharge into the perimeter channel;
- a continuous line of sock filters will be placed along the perimeter channel in the section of Area 2 between Area 1 and weighbridge area;
- sock filters and basins will be regularly maintained to remove sediment and ensure they operate efficiently;
- seven sediment basins will be formed along the perimeter channel;



EMM EMGA Mitchell McLennan

Soil and water management plan
Recycling Facility, Mayfield West
Environmental Impact Statement
Figure 6.1

- the final sedimentation basin in the north-western corner of the site will continue to be used and will be maintained accordingly;
- a flocculent will be used in the sedimentation basins if necessary; and
- flows from the final sediment basin will be controlled to ensure that poor quality water is not discharged from site.

Initially, sewage generated from the on-site amenities will be stored on site then pumped out into a tanker for disposal off site at an approved facility. In the longer term, the sewer will be reconnected. Potable water will be trucked into the site to service the amenities until the mains water is reconnected.

These management measures and water quality monitoring will be described in the EMP.

6.5.4 Surface water impacts

Average annual rainfall for the site is about 1,100 mm. The estimated volume of runoff available from the site is about 63,000 m^3 per year. Water used for dust suppression will reduce runoff from the site by 12% (or about 7,500 m^3 of runoff per year). Discharge from the site will be controlled by the existing outlet chamber and pipeline in the final basin. Use of this surface water will have a negligible impact on water reaching the Hunter River or flows in the river.

Water Sharing Plans consider that sedimentation basins are to be accounted in the maximum harvestable right on a site. A water licence can be required if basins extract more than 10% of the mean annual runoff from the property. These sharing plans are generally relevant to catchments supplying runoff to ephermal freshwater creeks which rely on runoff to maintain aquatic and riparian ecosystems. As such, it is considered that this condition is not relevant to the subject site which is discharging into a tidal section of the Hunter River which is saline and has a substantial upstream catchment for which the site runoff will represent a negligible component of the river flows.

Discharges to the Hunter River from the site were previously controlled by EPL 3278 held by Delta EMD. This included requirements for monitoring of water quality (manganese, pH, temperature and total suspended solids) and volume. It is proposed that these monitoring requirements be continued under the proposal to manage potential impacts to the Hunter River.

6.5.5 Groundwater impacts

There are two aquifers below the site: a fill aquifer 5 to 6 m beneath ground level and an estuarine aquifer 10 m beneath ground level. The perched water has been encountered about 1 m below the surface. The groundwater generally flows north towards the Hunter River. Some seepage has been observed from the fill that makes up the Hunter River embankment north of the site. The land between the site and the river is regulated by the EPA and will allow for remediation of groundwater impacted by historic activities on the site and surrounds. The proposal will not intercept groundwater or have impacts on groundwater quality.

6.6 Soils and contamination

As described in Section 2.1, a site audit statement under the Contaminated Land Management Act has been issued which determined that the site is suitable for commercial and industrial use. No significant ground excavation is anticipated so contaminated soil will not be disturbed. However, should excavation be required, the SMP for Subsurface Disturbance Activities (Appendix G) would be implemented. The proposal will not change the contamination status of the site.

The site is largely sealed, exposed soils are generally vegetated and no significant ground disturbing activities will be required. Therefore, little sediment generation from the existing ground surface is anticipated. However, should sediment be generated, it will report to the existing sedimentation pond via the drain surrounding the site.

The site is mapped as containing ASS Class 2. There will be no significant ground disturbance activities and the so an ASS management plan is not required for the proposed activities.

6.7 Socio-economic

The direct socio-economic benefits of the proposal include the full time employment of 12 persons in the recycling facility and potentially more for ancillary activities. These persons will be sourced from the local area, where possible, to help alleviate local unemployment. The current unemployment rate in Newcastle is 7.5%, which is higher than NSW's rate of 5.8%.

The proposal has wider socio-economic benefits as part of the Steel River site. A socio-economic impact assessment of the Steel River site (BBC Consulting Planners 1997) was undertaken as part of the Strategic Impact Assessment Statement for the Steel River Site (APT Peddle Thorp 1998). This assessment determined that the progressive industrial development of the site would result in the creation of 2,000 jobs. This was considered to mitigate, in part, the impact of the job losses created by the closure of industrial sites in Newcastle; in particular, the loss of 2,500 jobs at BHP's Steelworks.

Other socio-economic benefits of industrial development of the Steel River site include:

- improved environmental outcomes through implementation of site specific environmental criteria;
- stronger regional industrial activity;
- utilisation of suitable industrial land and resources;
- provision of community and recreation facilities and services; and
- improved public access and urban design.

Social amenity impacts of the proposal, including noise, air quality, and visual impacts, are discussed in the relevant chapters.

6.8 Ecology

An ecological assessment of the site and the surrounds was undertaken by Hunter Wetlands Research and Management (1997). The outcomes of this study were included in the *Strategic Impact Assessment Statement for the Steel River Site* (APT Peddle Thorp 1998) to assess the impacts to flora and fauna by future industrial development on the site. Information from this study and recent onsite observations have been used to assess the ecological impacts of the proposal.

The site is predominantly hardstand with some areas of vegetation along the site boundary and overgrown garden beds adjacent to existing site buildings. Vegetation along the site boundary largely consists of Casuarina sp. which provide screening of the site. Vegetation on the site has not been managed since the closure of Delta BMD's operations and is overgrown in some areas (Photograph 6.2). Vegetation within the site also includes trees planted by Delta BMD or earlier operators of the site (eg cedars), weeds such as lantana and grasses growing within gravel (Photograph 6.3). Surrounding off-site vegetation includes a narrow corridor of vegetation along the bank of the Hunter River approximately 20 m north of the site and sparse areas of vegetation on neighbouring industrial properties to the south, west and east.

The proposal will involve additional planting of Casuarina trees along the northern and western boundaries of the site to provide additional visual screening of the site (see sections 0 and 6.3, and Figure 2.4). Existing trees along the majority of the site boundary will remain though some pruning of overhanging branches and removal of some small Casuarinas may be required where they are impeding access to the site or where they are impeding the function of the perimeter drain. Some trees will be left in the drain as they reduce the velocity of water flow in the drain.

There are small areas of vegetation on the site that previously formed part of landscaping around Delta EMD offices and car parks. Generally, this vegetation will not be impacted by the proposal although some trimming may be required as there has been no management of this vegetation since closure of the site.

Extensive past modifications of the study area have effectively removed most native animal habitat. Some small areas of extant vegetation are proposed to be removed. However, this vegetation has minor habitat value and proposed landscape plantings will provide comparative replacement habitat.

No threatened fauna species have been recorded on the industrial site. Given the lack of significant animal habitat present on the site, the occurrence of threatened fauna species is unlikely. Derelict buildings on the site provide potential habitat for threatened bat species including the Common Bent-wing Bat which could forage in the remnant woodland habitats on the site and the Large-footed Myotis which is likely to forage over the adjacent Hunter River. The main building to be impacted under the proposal is the main processing shed. This building is unlikely to provide habitat for these species given it has large openings on the sides which offer little protection from wind, rain and sunlight (see Photograph 2.3). Further, onsite observations have found no traces of bats occupying this building. Hunter Wetlands Research and Management (1997) concluded that development of the site will not significantly affect these species.

Some bird and reptile species may also use the site, when moving to and from the wetlands on Kooragang Island north of the site. The Hunter Wetlands Research and Management (1997) study acknowledged the hazard to birds posed by existing electricity transmission lines and recommended no additional lines or aerials be installed. However, it is noted that a range of transmission lines and tall structures have been developed in the industrial estate since 1997. Electricity to the site will be supplied via an onsite generator or by reconnecting mains power which will require some above ground electricity cables.

No threatened plant species have been recorded on the site or are considered likely to occur.

Photograph 6.2 Overgrown vegetation either side of access road

Photograph 6.3 Grass growing through gravel (southern end of site)

6.9 Heritage

Two heritage studies of the Steel River site (Bonhomme 1996; Bonhomme Craib and Associates and Sue Rosen 1997) were undertaken as part of the Strategic Impact Assessment Statement for the Steel River Site. The studies included background research on the past land use in the area, an inspection of the National Parks and Wildlife Service (NPWS) register records and reports, field survey and consultation with the local Aboriginal Land Council (Awabakal) representative.

It was determined that there had formerly been considerable Aboriginal activity in the vicinity of the Tourle Street hill (south of the proposal site on the corner of Tourle Street and Industrial Drive, now Shell Beach Park) and middens (now destroyed) were located along the river foreshore and people were observed gathering, hunting and fishing nearby. After the occupation of the location in 1823, there was evidence of a continuing Aboriginal presence in the area. On the basis of the available historical evidence, the survey results and the assessment of the landscape modification which had taken place across the site the potential for the area to contain extant Aboriginal sites was rated as low but not nil.

The Steel River estate is considered regionally culturally significant because of its historic associations with the Australian Agricultural Company; because of the early industrial activities (milling and coal mining) undertaken there; as a picnic and recreation area valued for its aesthetic amenity; as a site linked with the Great Depression and World War 2; and latterly its links with Broken Hill Proprietary (BHP). The estate historic significance has been recognised by Newcastle historians from at least the 1930s.

The Steel River estate is the site of one of the first grants to a free settler at Newcastle, being granted in John Laurio Platt in 1823. Platt established a home and farm on the Tourle Street hill, in the position previously occupied by the old Orphanage buildings and grounds. The area on the top of the hill around the demolished former orphanage building was rated as having a high potential for the presence of subsurface historical material. The survey indicated that areas away from the building on the top of the hill could be rated as having low potential for containing subsurface historical material.

The proposal site has been heavily modified and the potential for extant archaeological sites is extremely low. Further, the proposal will not impact on any extant sites as it does not involve earthworks.

No historical heritage items are present on the site and the proposal will not impact on nearby historical sites. No demolition or alteration works are proposed to existing buildings on the site.

7 Statement of commitments

A site specific EMP will be prepared for the proposal that incorporates the site specific measures summarised in Table 7.1. All Benedict staff will be trained to understand and implement the EMP as it relates to the tasks that they are undertaking.

Table 7.1 Summary of mitigation measures to be included in the EMP

Key issue	Management measure
Air quality	Management measures that will be implemented during construction and operations to minimise air quality impacts will include: • all existing sealed/hardstand areas will be retained; • disturbance of unsealed areas by plant or vehicle movements will be prevented by surfacing areas with coarse crushed concrete/rock or asphalt (leaving only 4,000 m2 of the 89,000 m2 site unsealed); • water sprays will be used over any other bare or unsealed surfaces that have potential to generate unacceptable amounts of dust; • all vehicle movements will be restricted to designated routes marked out by appropriate signage and fencing using sealed internal roads; • access to unsealed areas will be prevented; • water sprays will be used at stockpiles, crushing and screening plants and during material handling; • a wheel wash in the weighbridge area will be used to clean truck tyres to prevent mud or sediment being carried to and deposited on the access road (and public roads); • existing sheds will be used to undertake particulate generating activities where possible; and • no composting will be undertaken on the site.
Greenhouse gases	Management measures that will be implemented during construction and operations to minimise greenhouse gas emissions will include: • on-site equipment will be regularly maintained and serviced to maximise fuel efficiency; • vehicle kilometres travelled on site will be minimised; • the mains power will be reconnected as soon as possible allowing access to electricity generated more efficiently than using an on-site generator; and • energy efficiency will be progressively reviewed and implemented throughout the life of the facility.
Noise	Management measures that will be implemented during construction and operations to minimise noise impacts will include: • plant with high noise emissions will generally be located on the northern side of the site, furthest away from potentially noise affected neighbours; • plant and equipment will be regularly maintained and serviced; • low-frequency reversing alarms (“growlers”) will be used rather than the standard high frequency beepers; • a site layout has been adopted that minimises the need for mobile plant to reverse; • plant and equipment will be switched off when not in use; • any vehicle queuing will be on site rather than on public roads; • material drop heights will be minimised and dragging materials along the ground will be minimised; • site contact details will be provided on a board at the front of the site; • any noise-related complaints will be handled promptly; and • a complaints register will be maintained.

Table 7.1 Summary of mitigation measures to be included in the EMP

Key issue	Management measure
Visual	Management measures that will be implemented during construction and operations to minimise visual impacts will include: • Casuarina sp. will be planted along the northern boundary and the northern section of the western boundary of the site to mitigate visual impacts from viewpoints to the north, north-east and west; • the visual appearance of the site entrance on McIntosh Drive will be improved and the area will be kept tidy (see Photograph 6.1); and • rubbish from around the site boundaries will be removed and further vandalism and graffiti within the site will be improved.
Water	The project design features to prevent impacts to groundwater include: • there will be no significant excavations within the site; • existing sheds will be used to house the majority of the processing activities, preventing generation of runoff from these activities; • the fuels storage area will be bunded; • sheds and the segregated heavy waste stockpiling and processing area will be outside of major overland flowpaths; • surface water captured within the runoff management system will be used for dust suppression so that mains water is not required for this purpose; • the majority of unsealed site areas will be sealed to minimise the requirement for dust suppression using water (see Section 2.10.1); • groundwater will not be used; and • water will not be used in the product processing, other than for dust suppression. The existing site runoff controls will be augmented with further controls including: • most of the site surface will be stabilised, and where it is not, access will be restricted; • a continuous line of sock filters will be placed along the perimeter channel in Area 1 to form a bund causing runoff to pond, sediments to accumulate and runoff to be filtered through the socks prior to discharge into the perimeter channel; • a continuous line of sock filters will be placed along the perimeter channel in the section of Area 2 between Area 1 and weighbridge area; • sock filters and basins will be regularly maintained to remove sediment and ensure they operate efficiently; • seven sediment basins will be formed along the perimeter channel; • the final sedimentation basin in the north-western corner of the site will continue to be used and will be maintained accordingly; • a flocculent will be used in the sedimentation basins if necessary; and • flows from the final sediment basin will be controlled to ensure that poor quality water is not discharged from site.
Soils and contamination	No significant ground excavation is anticipated (see Section 2.10.3) so contaminated soil will not be disturbed. However, should excavation be required, the SMP for Subsurface Disturbance Activities (Appendix G) would be implemented.

8 Conclusion and justification

8.1 Introduction

This chapter provides justification for the carrying out of the proposal against the principles of ecologically sustainable development (ESD). It also discusses the suitability of the site, any submissions made and whether the proposal is in the public interest as required by Section 79C(1)(c)–(e) of the EP&A Act.

Justification for the proposal based on biophysical, economic and social considerations is provided in Section 1.4.1.

8.2 Principles of ecologically sustainable development

The principles of ESD are defined in Clause 7(4) of Schedule 2 to the EP&A Regulation and include the following:

(a) the precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

(ii) an assessment of the risk-weighted consequences of various options,

(b) inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,

(c) conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

(d) improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:

(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,

(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,

(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

Consideration of the proposal against the four principles of ESD is given below.

8.2.1 The precautionary principle

Consideration of the precautionary principle requires two things. First, that the proponent properly assesses all potential impacts using plausible worst case assumptions and, either, avoids them in project planning or incorporates effective safeguards into the project design. Second, that the relevant authorities make a well-informed decision about the project based on a sound knowledge of the project's implications and impacts, including any limitations on the accuracy of impact predictions.

There are no "threats of serious or irreversible damage" from the proposal and the project's planning and design meets the first test above. These design and management measures are described in Chapters 2 and 6 this EIS. The Statement of Commitments (Chapter 7), highlights the main measures that will be implemented under the proposal to avoid, manage or mitigate predicted environmental impacts.

The second test will be satisfied by the comprehensive decision-making processes to be followed by the government, including the JRPP.

8.2.2 Inter-generational equity

The proposal will recycle waste materials that would otherwise be sent to landfill. The proposal will, therefore, extend the benefits provided by existing landfills for current and future generations. The recycled materials, will largely be used in construction projects that will also benefit current and future generations.

8.2.3 Conservation of biological diversity and ecological integrity

The ecological integrity of the site is poor given its location within an existing industrial area on land that has previously been used as an industrial site. Small amounts of existing vegetation will be removed to improve access to the site. However, there will be additional plantings along the site boundary. The proposal will not impact any threatened biodiversity on the site.

8.2.4 Improved valuation, pricing and incentive mechanisms

The proposal will use waste diverted from landfill to produce construction materials containing recycled material that have economic value. This will avoid the economic (and environmental) cost of disposing of the materials to landfill and, therefore, incorporates improved valuation, pricing and incentive mechanisms.

8.3 Suitability of the site

As described in Section 1.4, the site is considered suitable for the proposed activities given that it is within an industrial area, has existing site access and infrastructure, and minimal construction works are required. Existing vegetation provides suitable screening for the proposed operational activities with moderate additional plantings required. The proposal would secure and make use of an existing vacant industrial site which is subject to vandalism.

8.4 Submissions made

The EIS for the proposal will be placed on public exhibition for a determined period of time. During this period the public will be invited to provide submissions on the proposal. These submissions will be considered by NCC and the JRPP in their determination of the proposal.

8.5 Public interest

The proposal is considered to be in the public's interest for the following reasons:

- the proposal provides a suitable use for an existing industrial site;
- the proposal will provide socio-economic benefits through employment and stronger regional industrial activity;
- the materials received onsite will be recycled and reused where possible to minimise waste sent to landfills and provide material suitable for construction projects and other purposes; and
- the proposal's environmental and social amenity impacts are negligible with the implementation of the recommended mitigation and management measures.

8.6 Conclusion

There are currently no mixed waste recycling facilities in the region except for a small number of facilities accepting segregated loads and bricks, concrete and timber. The recycling facility will accept waste from businesses and the general public and would complement the activities of the Summerhill Waste Management Centre allowing additional waste generated in the Lower Hunter Region to be recycled, reducing the quantity of waste being land-filled at Summerhill. The recycling facility would therefore contribute to meeting the NSW Government's recycling strategies and targets.

The proposal site, 80 Tourle Street, Mayfield West, has been remediated following the previous use. A site audit statement under the NSW *Contaminated Land Management Act* determined that the site is suitable for commercial and industrial use provided that there is compliance with the Site Management Plan during any subsurface disturbance activities.

The site, is zoned IN1 General Industrial under the Newcastle LEP 2012 and the proposal is permissible with consent in a prescribed zone under Clause 121.

Benedict Recycling has purchased the site with the sole purpose of developing a recycling facility on the site. The site is ideally suited for the development of a recycling facility because it is: in an industrial area centrally located in Newcastle; readily accessible to light and heavy vehicles; distant from residences; already contains sheds ideal for receiving, processing and storing wastes; already has runoff controls; and will not result in any significant disturbance of the contaminated soil. Development of the proposal will provide an ongoing economic and social benefit from a site that is only suitable to a small range of uses.

This EIS has been prepared in accordance with the SEARs, Clauses 71 and 72 of the EP&A Regulation and advice provided by NCC following the pre-DA meeting. It describes the existing environment, the proposal, the legislative and policy context, proposed environmental management measures and the impacts of the project. Given the location and condition of the site, the proposed activities will only have minor environmental impacts.

It is therefore recommended that the proposed recycling facility, Mayfield West, is approved subject to the mitigation measures outlined in this EIS.

Abbreviations

APZ	Asset protection zone
ARI	Average recurrence interval
ASS	Acid sulfate soils
CCA	Copper chrome arsenate
CP Act	*Coastal Protection Act 1979*
DA	Development application
DCP	Development Control Plan
DoP	Department of Planning
DPE	Department of Planning and Environment
DPI	Department of Primary Industries
EECs	Endangered Ecological Communities
EIS	Environmental impact statement
EMM	EMGA Mitchell McLennan Pty Ltd
EMP	Environment management plan
EP&A	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment protection license
ESD	Ecologically sustainable development
GHG	Greenhouse gases
HCCREMS	Hunter and Central Coast Regional Environmental Management Strategy
HTC	High temperature creosate
JRPP	Joint Regional Planning Panel
LEP	Local Environmental Plan
LGA	Local government area
LOSP	Light organic solvent preservative
LPG	Liquid petroleum gas
mAHD	Australian Height Datum
MNES	Matter of national environmental significance
NCC	Newcastle City Council
NOW	NSW Office of Water
NPWS	National Parks and Wildlife Service
NSW	New South Wales
OEH	Office of Environment and Heritage
PEC	Pigmented emulsified creosate
PHA	Preliminary hazard analysis
POEO Act	*Protection of the Environment Operations Act 1997*
RDF	Refuse derived fuel
RMS	Roads and Maritime Services

RNP	Road Noise Policy
RTA	Roads and Traffic Authority
SEARs	Secretary's Environmental Assessment Requirements
SMP	Site management plan
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
SWMMP	Site waste management and minimisation plan
TSC Act	*Threatened Species Conservation Act 1995*
TSP	Total suspended particulates
VNEM	Virgin natural excavated material
WELS	Water Efficiency Labelling and Standards
WM Act	*Water Management Act 2000*

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Appendix A

Secretary's environmental assessment requirements

NSW GOVERNMENT | Planning & Environment

Industry Assessments
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Email: matthew.meyerson@planning.nsw.gov.au

14/20949

Mr Philip Towler
EMGA Mitchell McLennan
PO Box 21
ST LEONARDS NSW 1590

Dear Mr Towler

Waste Management Facility, Newcastle
Secretary's Environmental Assessment Requirements (SEAR) 889

Thank you for your request for the Secretary's Environmental Assessment Requirements (SEARs) for the preparation of an Environmental Impact Statement (EIS) for the above development proposal. I have attached a copy of these requirements.

In support of your application, you indicated that your proposal is both designated and integrated development under Part 4 of the *Environmental Planning and Assessment Act 1979* and requires an approval under the *Protection of the Environment Operations Act 1997* and *Water Management Act 2000*.

In preparing the SEARs, the Department has consulted with the Environment Protection Authority and the Department of Primary Industries. Copies of their requirements for the EIS are attached. The Department has also consulted with the Roads and Maritime Services as required under *State Environmental Planning Policy (Infrastructure) 2007* and also attaches its requirements for the EIS.

If other integrated approvals are identified before the Development Application is lodged, you must undertake your own direct consultation with the relevant agencies, and address their requirements in the EIS.

If your proposal contains any actions that could have a significant impact on matters of National Environmental Significance, then it will require an additional approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This approval is in addition to any approvals required under NSW legislation. If you have any questions about the application of the EPBC Act to your proposal, you should contact the Commonwealth Department of the Environment on (02) 6274 1111.

Should you have any further enquiries, please contact Matthew Meyerson, Planning Services, at the Department on (02) 9228 6378.

Yours sincerely

C. Ritchie

Chris Ritchie 5/2/15.
Manager
Industry Assessments
as delegate of the Secretary

Environmental Assessment Requirements

Section 78A (8) of the *Environmental Planning and Assessment Act 1979.*

Designated Development

SEAR Number	889
Proposal	Waste Management Facility, processing up to 90,000 tonnes of solid, non-putrescible waste annually and operation of a temporary rental storage area.
Location	80 Tourle Street, Mayfield West. (Lot 1 DP 874109)
Applicant	Benedict Recycling Pty Ltd
Date of Issue	February 2015
General Requirements	The Environmental Impact Statement (EIS) must meet the minimum form and content requirements in clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000.*
Key Issues	The EIS must include an assessment of all potential impacts of the proposed development on the existing environment (including cumulative impacts if necessary) and develop appropriate measures to avoid, minimise, mitigate and/or manage these potential impacts. As part of the EIS assessment, the following matters must also be addressed. • **strategic context** – including: - a detailed justification for the proposal and suitability of the site for the development; - a demonstration that the proposal is consistent with all relevant planning strategies, environmental planning instruments, development control plans (DCPs), or justification for any inconsistencies; and - a list of any approvals that must be obtained under any other Act or law before the development may lawfully be carried out. • **waste management** – including: - details of the type, quantity and classification of waste to be received at the site; - details of the resource outputs and any additional processes for residual waste; - details of waste handling including, transport, identification, receipt, stockpiling and quality control; and - the measures that would be implemented to ensure that the proposed development is consistent with the aims, objectives and guidelines in the NSW Waste Avoidance and Resource Recovery Strategy 2014-2021. • **hazards and risk** – including: - the Environmental Impact Statement must include a preliminary risk screening completed in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the project is "potentially hazardous" a Preliminary Hazard Analysis (PHA) must be prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011). • **air quality and odour** – including: - a description of all potential sources of air emissions and odour; - an air quality impact assessment in accordance with relevant Environment Protection Authority Guidelines; and

	- a description and appraisal of air quality impact mitigation and monitoring measures. • **noise and vibration** – including: - a description of all potential noise and vibration sources during construction and operation, including road traffic noise; - a noise and vibration assessment in accordance with the relevant Environment Protection Authority Guidelines; and - a description and appraisal of noise and vibration mitigation and monitoring measures. • **soil and water** – including: - a description of local soils, topography, drainage and landscapes; - the details of stormwater and wastewater management; - the details of sediment and erosion controls; - the details of water usage including water supply and licences; - an assessment of impacts to surface and groundwater resources, flooding impacts, and impacts to groundwater dependant ecosystems; and - a description and appraisal of impact mitigation and monitoring measures. • **traffic and transport** – including: - details of road transport routes and access to the site; - road traffic predictions for the development during construction and operation; and - an assessment of impacts to the safety and function of the road network; and the details of any road upgrades required for the development. • **biodiversity** – including: - accurate predictions of any vegetation clearing on site or for any road upgrades; - a detailed assessment of the potential impacts on any threatened species, populations, endangered ecological communities or their habitats, groundwater dependent ecosystems and any potential for offset requirements; and - a detailed description of the measures to avoid, minimise, mitigate and offset biodiversity impacts. • **visual** – including an impact assessment at private receptors and public vantage points. • **heritage** – including Aboriginal and non-Aboriginal cultural heritage.
Environmental Planning Instruments and other policies	The EIS must assess the proposal against the relevant environmental planning instruments, including but not limited to: • *Newcastle Local Environmental Plan 2012;* • *Newcastle Environmental Management Strategy 2014;* • *Hunter Central Coast Regional Environmental Management Strategy (HCCREMS);* • *State Environmental Planning Policy 55 – Remediation of Land;* • *State Environmental Planning Policy (Infrastructure) 2007; and* • Relevant development control plans and section 94 plans.
Guidelines	During the preparation of the EIS you should consult the Department's Register of Development Assessment Guidelines which is available on the Department's website at planning.nsw.gov.au under Development Proposals/Register of Development Assessment Guidelines. Whilst not exhaustive, this Register contains some of the guidelines, policies, and plans that must be taken into account in the environmental assessment of the proposed development.
Consultation	During the preparation of the EIS, you must consult the relevant local, State and Commonwealth government authorities, service providers and community groups, and address any issues they may raise in the EIS. In particular, you should consult with the: • Environment Protection Authority; • Office of Environment and Heritage; • Department of Primary Industries;

	• Roads and Maritime Services; • Newcastle City Council; and • The surrounding landowners and occupiers that are likely to be impacted by the proposal. Details of the consultation carried out and issues raised must be included in the EIS.
Further consultation after 2 years	If you do not lodge an application under Section 78A (8) of the *Environmental Planning and Assessment Act 1979* within 2 years of the issue date of these SEARs, you must consult with the Secretary in relation to any further requirements for lodgement.

Appendix B

Ausgrid correspondence (11 February 2015)

Phil Towler

From:	Ian Collier [Ian@benedict.com.au]
Sent:	Wednesday, 11 February 2015 12:46 PM
To:	Phil Towler
Subject:	Fwd: Ausgrid RoC Mc Intosh Drive Mayfield West -Steel River adjoining site - Benedict Recycling
Attachments:	mime-attachment.gif; mime-attachment.gif

Hi Phil,

I hope the email below is sufficient

Regards
Ian

Sent from my iPad

Begin forwarded message:

> **From:** Paul Mcdonald <pmcdonald@ausgrid.com.au>
> **Date:** 11 February 2015 12:06:39 pm AEDT
> **To:** <Ian@benedict.com.au>
> **Cc:** Grant Greene-Smith <ggreenes@ausgrid.com.au>, Paul Ryan <paul.ryan@ausgrid.com.au>, Richard Parker <richardparker@ausgrid.com.au>, <daynesteggles@bigpond.com>
> **Subject: Re: Fw: Ausgrid RoC Mc Intosh Drive Mayfield West -Steel River adjoining site - Benedict Recycling**
>
> Attention: Ian Collier
>
> Please accept this email as Ausgrid approval to your request below for the placement of a Robust Gate and double locking mechanism at Bendict recycling expense to align with the existing Right of carriageway.
> Could I please ask that a drawing showing design of gate and site plan indicating location be forwarded for our records.
> I await your reply.
>
> Please feel free to contact myself if you require further details or on-site meeting.
>
> Regards,
>
> **Paul Mcdonald | Facilities Manager - North | Property & Facilities | AUSGRID**
>
> Level BLOCK C, WEST, 145 Newcastle Road Wallsend NSW 2287 AUSTRALIA
> ☎: 02 4951 9325 (Extn 59325) | 🖷: 02 4951 9988 (Extn 59988) | : 0412 558 437 | ✉: pmcdonald@ausgrid.com.au |
>
> From: "Dayne Steggles" <daynesteggles@bigpond.com>
> To: <pmcdonald@ausgrid.com.au>,
> Cc: "'Ian Collier'" <ian@benedict.com.au>

Appendix C

Water assessment

management consultants &
project managers

PROPOSED RECYCLING FACILITY
80 TOURLE ST, MAYFIELD WEST, NEWCASTLE

DEVELOPMENT APPLICATION

ENVIRONMENTAL IMPACT STATEMENT

SOIL & WATER MANAGEMENT REPORT

MARCH 2015

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TABLE OF CONTENTS

FIGURES

1. INTRODUCTION

Benedict Industries Pty Ltd proposes a recycling facility and ancillary activities on a former industrial site at 80 Tourle St, Mayfield West (refer Figure 1). An environmental impact statement (EIS) has to accompany the development application (DA) to Newcastle City Council for the proposal under Part 4 of the Environmental Planning and Assessment Act (EP&A Act). The authority for the DA is Council while the determining authority is the Hunter and Central Coast Joint Regional Planning Panel.

This Soil and Water Management Report has been prepared to support the EIS and DA. It addresses the management of soil and water during the construction and operation of the facility as well as the related issues in the Secretary's environmental assessment requirements (SEARs) which were issued on the 5 February 2015 (SEAR 889).

The soil and water management strategy for the development has been based on the following guidelines:-

- Managing Urban Stormwater – Soils and Construction, Vol.1 (Landcom 2004);
- Managing Urban Stormwater – Soils and Construction, Vol.2E Mines and Quarries (DECC 2008); and
- Newcastle Development Control Plan Section 7.06 Stormwater.

2. EXISTING SITE DESCRIPTION

The former industrial site is adjacent to the Hunter River which is on its northern boundary (see Figure 1). It is a generally flat site and ground levels are around RL 10m which are a considerably above the level of the Hunter River and the level of Tourle Road along its eastern boundary.

The site was previously used as a heavy industry chemical plant which incorporated extensive controls for surface water management. These controls included exclusion of runoff entering the site from external areas, shaping of the site surface to drain evenly to the site perimeter channel, a large perimeter channel which was sealed with asphalt, a final basin, outlet control via a stop valve, pipe outlet to the river and a stabilised outlet structure. The site was, until recently, subject to an Environment Protection Licence from the EPA which explains the extensive surface water management facilities. These facilities will readily cater for the proposed recycling facility requirements for soil and water management.

The site has an area of approximately 89000m^2. It is graded so that it slopes generally from the centre of the site to the perimeter channel around the boundary. This channel is generally a V shape in cross section and is asphalt lined. It varies in depth from zero to 2m and a width from 3m to 10m. There are two channels draining the site into a basin located in the north western corner of the site (see Figure 2). The western channel starts near the mid point of the site's southern boundary and extends to the basin down the western boundary. The eastern channel starts near the mid point of the southern boundary and drains along the eastern and northern boundaries.

The basin in the north western corner has an overall depth of approximately 3m with a depth of 2m to the invert of the outlet chamber. This concrete chamber has a grated inlet and a screw stop valve to permit discharge to the river through a 250mm diameter pipe.

The pipe outlet is located within the intertidal area of the river bank with a headwall and rock scour protection.

The basin has a storage volume of approximately 1400m³ to the invert of the outlet chamber and 2100m³ up to the lip of the outlet weir. The weir is an asphalt and rock protected structure. The approximate storage volume in the perimeter channel is 3080m³.

There is no runoff onto the site from external areas. There is a bund wall along the southern site boundary and the remainder of the site is above the adjacent land levels.

The site has been remediated following its previous use and a site auditor has issued a certificate confirming the site is suitable for most industrial landuses.

The site surface has significant areas of buildings and concrete/asphalt pavements. The site was fully sealed during its previous use however its surface was disturbed in a number of locations during the site remediation works. The sealed areas cover an area of approximately 39000m² with 50270m² classified as having an unsealed surface. The actual area of disturbed surface is considerably less than this value of unsealed area as large areas have been stabilised with large gravel. The proposed development would stabilise the majority of the surface of the site leaving only 4000m² of disturbed area within Area 3 (refer Section 3).

Newcastle Council has advised that the site is not affected by the 100yr ARI or Probable Maximum flood in the Hunter River (refer Attachment A).

The groundwater level along the northern boundary of the site would generally correspond to the tidal levels in the river which would extend up to approximately 1m AHD. The groundwater would have a low slope upwards from this point heading south and be approximately 9 to 10m below ground level. This is because the catchment leading to the southern boundary of the site is relatively small.

The Site Management Plan for Subsurface Disturbance Activities report for the site by AECOM (2009) indicates that there is also a perched groundwater table within fill material about 5 to 6m below ground level. The groundwater flow direction was inferred to be towards the river to the north.

3. PROPOSED DEVELOPMENT

The proposed layout of the site and the designated areas for various uses are depicted on Figure 2. The main processing of materials will occur in the large building along the western boundary. Storage of materials and some processing will occur in the north western area classified as the segregated heavy waste processing and stockpiling area. Trucks will mainly deliver and transport materials to and from the site via the access and general use area along the southern and western boundaries as indicated in Figure 2.

The approximate area of these three areas are:-

- segregated heavy waste processing and stockpiling area (Area 1) – 13880m²
- recycling facility access area (Area 2) – 7130m²
- ancillary waste activities area (Area 3) – remainder of site.

The proposed activities on each area will be (refer Figure 2):-

Area 1 – Segregated heavy waste processing and stockpiling. The area will be used for the storage of segregated concrete (including tiles, bricks, asphalt etc) and segregated timber waste and for recycled products derived from these materials.

Area 2 - Access and general use

Area 3 - an ancillary waste activities area on the east of the site for activities including:
- temporary storage of plant, equipment, machinery, commercial vehicles, bins and containers;
- some waste storage and processing (eg recyclable glass crushing and refuse derived fuel (RDF) biochar production may occur within an existing building or a new building).

The recycling facility will have two main components (refer Figure 2):-

- the main recycling facility on the west of the site that will accept and process segregated and co-mingled inert waste includes Areas 1 and 2; and

- ancillary activities on the east of the site (includes Area 3) that will include:

  - parking for trucks, and employee and visitor light vehicles generally in the existing car park in the south-east corner of the site;

  - temporary rented storage for:

    + light and heavy vehicles;
    + bins and containers;
    + construction and demolition plant and equipment;
    + general machinery storage; and
    + temporary demountable offices and sheds.

  - recyclable glass crushing within one of the existing buildings.

The majority of waste storage, processing and product storage will occur within the main processing shed on the western boundary. Any additional waste processing will be conducted within a building.

The main processing shed will contain:

- a marked roadway for vehicles delivering waste and picking up recycled products;
- Flip-Flow screen waste sorter (eg Finlay 883 flip flow);
- two picking lines; and
- waste/product stockpiles and bins.

Areas 1 and 2 will have the greatest potential to generate sediment in runoff and would be watered as required to suppress dust production. The remainder of the site would have little potential to produce dust and would have a stabilised surface.

Trucks would be washed in the building located on the northern boundary. A commercially available self-contained truck wash would be installed similar to the regular commercial car wash facilities. This water would be retained in this building and recycled after treatment to remove sediment and oils/grease. Excess treated water would be discharged to the perimeter channel and basin.

The weighbridge area will consist of two weighbridges with one each for incoming and outgoing trucks. There would be a wheel wash facility for outgoing trucks immediately before the weighbridge.

The site surface not stabilised at present would be stabilised with asphalt or gravel leaving only approximately 4000m² not stabilised within Area 3.

Area 1 has the greatest potential for collection of sediments in runoff. This area drains towards the perimeter channel. A continuous line of sock filters would be placed along the perimeter channel to form a bund causing runoff to pond, sediments to accumulate and runoff to be filtered through the socks prior to discharge into the perimeter channel (refer Figure 3).

The section of Area 2 between Area 1 and the wheel wash at the outbound weighbridge has a lower potential for collection of sediments in runoff. Similarly, sock filters will also be placed along the edge of the perimeter channel to maximise the trapping of sediments prior to runoff discharging into the channel.

The activities in Area 3 and the sealed nature of the surface means that the perimeter channel and basins will be adequate for treatment of runoff from this area.

Water for the amenities will be sourced from the 300mm diameter high capacity water main that is outside of the south-eastern corner of the site. It previously supplied the site but was disconnected during site decommissioning. Dust suppression water will be sourced from runoff stored in the perimeter channel or basin.

No water will be sourced from the groundwater.

About 12 people will work in the main recycling facility. Initially, sewage will discharge to an onsite storage system with tankers disposing of the sewage to an approved facility offsite, before a connection to the mains sewer outside of the south-western corner of the site is established.

The construction activities in establishing the facility will include:-

- stabilise unsealed site surfaces except for a small area (4000m²) in Area 3;
- provision of services;
- installing gates and fences;
- installing weighbridge;
- line marking for access roads, parking, etc;
- building repairs;
- installation of demountable offices/amenities; and
- installation of erosion and sediment control measures.

Graded crushed concrete and rock would be placed in the perimeter channel to form bund walls at four locations along the eastern channel and at three locations along the western channel (refer Figure 3). This would provide bunds to form progressive sediment basins to aid settling of suspended sediment prior to discharge into the final basin in the north western corner of the site. These bunds would be porous allowing temporary storage of water and a filtering effect as water passes through the rock bund.

4. RISK ASSESSMENT

4.1 Stormwater

4.1.1 Government Policy and Guidelines

There is a hierarchy of water management government policy and guidelines which at the highest level provide overarching principles and then proceed down the hierarchy to provide every increasing specificity to the type of project proposed. An outline of this hierarchy is described below with a primary focus on the most project specific guideline which is Managing Urban Stormwater.

National Water Quality Management Strategy

The strategy provides an overarching national policy objective which is to achieve sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development.

State Water Management Outcomes Plan

At a state level, this plan addresses the aims of the Water Management Act (2000) and sets desired outcomes for water management. The plan is expected to:-

- improve the quality of water sources and the health, productivity and diversity of their dependent ecosystems;
- increase the economic value of water extracted from water sources and used;
- protect the long term interests of regional communities.

This links them with regional plans for water management.

Water Sharing Plans

This is another regional plan to assist with coordinated water management. The Plan sets management rules for water access and sharing to meet all the competing environmental and extractive needs in a catchment. This is based on the Water Management Act 2000 principles of protecting the water source and its dependent ecosystems such as wetlands and flood plains. Water sharing plans also recognise the economic benefits that commercial users can bring to a region. This water use is regulated via water access licences.

Under the WMA 2000, extraction of water for basic landowner rights (BLR) does not require a licence. The maximum harvestable right dam capacity for a property is an ability to capture 10% of the mean annual runoff from their property. The ability to capture more runoff would require a licence.

This is not relevant to the subject site because:-

- extraction of water from this section of the Hunter River is not viable (or required) because of its salinity;
- the subject site is at the downstream end of the catchment and no other landowners are being deprived of runoff;
- the volume of runoff from the subject site is negligible when compared to the volume of runoff in the Hunter River at the subject site location.

Managing Urban Stormwater

The Managing Urban Stormwater guidelines provide a local and activity specific guide to water management.

These guidelines relevant to the proposed development are:-

- Managing Urban Stormwater: Soils & Construction, Vol.1, Landcom 2004
- Managing Urban Stormwater: Mines & Quarries, Vol.2E, DECC 2008

These guidelines are known as the “Blue Book” which are an industry and government authority best practice guide for managing urban stormwater. This guideline methodology was adopted to prepare the soil and water management plan for the site.

4.1.2 Soil & Water Management Strategy

The existing soil and water management controls on the site which were implemented for the previous heavy industrial chemical production readily exceed the requirements for the proposed recycling facility. It is proposed to install specific controls related to the needs of the proposed uses which will further improve the performance of the existing controls.

These existing controls consist of:-

- prevention of runoff from external areas discharging across the site;
- perimeter sealed channel;
- final basin with outlet controls.

These existing controls will be augmented with further controls such as:-

- no significant excavations over the site;
- stabilising most of the site surface;
- sock filters treating runoff from Areas 1 & 2 prior to discharge into the perimeter channel;
- formation of seven sediment basins along the perimeter channel and ongoing use of the final basin in the north-western corner of the site;
- regular maintenance of sock filters and basins to remove sediment and ensure good operating condition;
- flocculation of stored water in the basins as necessary; and
- control of flows from the final sediment basin.

The soil and water management strategy adopted for the Recycling Facility is based on the Blue Book which represents industry best management practice formulated within the national and state policy and guideline documents discussed in Section 4.1.1.

Runoff from the site will be controlled by a range of measures implemented for the Recycling Facility (refer to Figure 3). The derivation and sizing of these controls is detailed in Appendix 1.

The soil and water management strategy will consist of at source controls where runoff is filtered and detained to remove pollutants prior to discharging into the perimeter channel basins and the final basin in the north western corner of the site. The storage volume available is 5180m^3. The basins are designed to incorporate a sediment accumulation zone and a water storage zone. The volume of these zones has been based on a worst case sediment type, site slope and settling time. The basins will allow time for sediment and pollutants to settle from captured runoff. Flocculation of the basins can accelerate the settling of suspended materials.

The basins can store the 90th percentile 5 day rainfall runoff from the site (4370m^3) to allow settling. The captured runoff will be pumped out within 5 days in order to provide storage for the next storm. Any water released after the storm in dry weather has to have a suspended solids content of less than 50 mg/L.

The source controls will be maintained after each storm and at regular intervals to remove accumulated sediment and ensure the controls are in good working order.

The majority of the site will have a stabilised surface and will not produce significant quantities of sediment or solids in runoff from the site. The main source of sediments in runoff will be from Areas 1 and 2 which are the stockpile area and main truck transport route. These areas will be regularly watered to minimise the production of dust and transport of sediment elsewhere on the site. As such, the concentration of source controls will be in Areas 1 and 2 on the site.

The soil and water management strategy design for the Recycling Facility will be conservative because it assumes:-

- the entire site has a disturbed surface; and
- soils in the disturbed areas are the worst type re highly dispersible Type F soils.

This means that in practice the runoff water quality from the proposed Recycling Facility will be much better than quality proposed by the government authority best practice guidelines.

The construction of the Recycling Facility will not involve any significant excavations on the site. In fact, it will involve stabilisation of the surface so that a majority of the site has a stabilised surface. The first activities during the construction will be the formation of the channel sediment basins by placement of the rock bunds and placement of the sock filters along the perimeter channel in Areas 1 and 2. The source controls and sediment basins will be operated during the facility construction in the same manner described above for the operational phase.

The soil and water management strategy proposed for the site readily meets the governments' best practice guidelines. In fact the soil and water management facilities far exceed what is required because:

- the majority of the site surface will be stabilised and the main sources of sediment in runoff will be limited to about 15% of the site area (Areas 1 and 2); and

- the soil and water management facilities have been designed assuming the entire site area has a disturbed surface.

4.1.3 Site Water Balance

An annual site water balance has been estimated for the proposed Recycling Facility (refer Appendix 1).

The site water balance has been estimated for the long term mean annual rainfall taking account of the site surface conditions and rainwater reuse for dust suppression. Drinking water will be sourced from the mains water supply. Initially, sewage will be trucked off the site. As such, these uses will not contribute to discharges from the site. Similarly, water will not be used in the Recycling Facility processes other than for dust suppression. There will be no use of groundwater from the site. The runoff used for the dust suppression represents approximately 12% of the site average annual runoff.

The average annual rainfall for the area is approximately 1124 mm. The average quantity of water required for dust suppression was estimated based on the typical area to be treated of 2.1 ha (Areas 1 and 2) on 266 days (based on average number of dry days). This will require an average of 7485m^3 of dust suppression water each year. The volume of runoff available from the site is approximately 63190m^3.

The reduction in runoff from the site due to reuse for dust suppression (12%) will have a negligible impact on flows in the Hunter River. At this location, the Hunter River has substantial tidal flows (up to 400m^3/s) as well as freshwater runoff contributed by its very large catchment (catchment area – 21367km^2). The loss of 7485m^3 of runoff per year to the river for dust suppression represents about 20 seconds of tidal flow.

4.2 Wastewater

Initially, sewage generated from the site amenities will be pumped out into tankers and disposed off-site at an approved facility. It will be connected to the sewer system at the site boundary in the future.

There will be no wastewater discharges from the site.

4.3 Potable Water

Potable water will be sourced from mains water by reconnecting to the water main supply at the site boundary.

4.4 Acid Sulphate Soils

The site has been extensively filled in the past to form the existing building pad. The pad has been formed with engineering materials over the natural soils which invariably would have had acid sulphate soil potential. The filling to form the building pad has isolated the acid sulphate potential soils.

It is not proposed to undertake any significant excavations on the site for the Recycling Facility. As such, acid sulphate soils will not represent a risk for this development.

4.5 Flooding

A Flood Information Certificate No.2105/23 (see Attachment A) was obtained from Newcastle City Council for the subject site which noted that the site was not affected by the 100yr ARI or Probable Maximum Flood levels in the Hunter River. As such, the site does not have a flood hazard.

4.6 Watercourses

There are no watercourses on the site nor are there any flows from external areas which cross the site.

The runoff from the site flows into the Hunter River and these flows will be managed to comply with the industry and government best practice guidelines discussed in Sections 4.1.1 and 4.1.2. Discharge from the site will be controlled by the existing outlet chamber and pipeline in the final basin.

Runoff from the site will be reused for dust suppression in parts of the Recycling Facility. This will reduce runoff volumes by up to 12% over a year and this is considered to have negligible impact on the Hunter River flows.

4.7 Water Sharing Plan, Harvestable Rights

Water Sharing Plans consider that water management strategies incorporating basins (as proposed on the subject site) are accountable in the maximum harvestable right on a site. It is noted that a licence can be required if basins extract more than 10% of the mean annual runoff from the property.

These sharing plans are generally relevant to catchments supplying runoff to ephermal freshwater creeks which rely on runoff to maintain aquatic and riparian ecosystems. As such, it is considered that this condition is not relevant to the subject site which is discharging into a tidal section of the Hunter River which is saline and has a substantial upstream catchment for which the site runoff would represent a negligible component of the river flows.

As such, it is considered that this requirement is not relevant to the subject site. Notwithstanding this, the proposed sediment basins and reuse of runoff for dust suppression represent the following:-

- sediment basin storage (4480m^3) represents less than 10% of the average site runoff (63190m^3);
- reuse of site runoff for dust suppression (7485m^3/yr) represents approximately 12% of the site average annual runoff (63190m^3).

Under both considerations, the proposed soil and water management strategy should not require a licence under the National Water Initiative.

5. SUMMARY OF MITIGATION MEASURES

The mitigation measures proposed to minimise the impact of the proposal works on the water related aspects of the environment are:-

- runoff water management strategy to manage runoff which conforms to government authority best practice guidelines;
- specific runoff controls around the proposed recycling processing area and stockpiles;

- use of sheds to house the majority of the processing activities to prevent runoff generated from these activities;
- bunding of fuels storage area;
- location of sheds and processing area outside of major overland flowpaths;
- no use of groundwater; and
- no use of water in the product processing, other than for dust suppression.

6. CONCLUSIONS

The existing site has the benefit of a fully constructed and operational, previously EPA licensed, stormwater runoff control system which, if maintained, will be sufficient to cater for the proposed Recycling Facility.

The proposed recycling processing facility and mitigation measures have been formulated to minimise the impact on water related aspects of the site and the Hunter River. As such, the proposed development will not have a significant adverse impact on the:-

- stormwater runoff;
- wastewater disposal;
- potable water demand;
- contamination of runoff;
- flooding;
- acid sulphate soils; and
- watercourses.

APPENDIX 1

Soil & Water Management Plan
and Annual Water Balance

1.	**Soil & Water Management**	
	Location: Newcastle East	
	Annual Average Rainfall	1123.7mm
	90th Percentile 5 day rainfall	51.8mm
	Annual runoff coefficient	0.63
	Soil Type	Type F
	Site Area	8.926ha
	Water Storage Volume (10x0.63x51.8x8.926)	2913m^3
	Sediment Storage Volume (50% of water storage volume)	1457m^3
	Total Sediment Basin Volume (2913+1457)	4370m^3
	Basin Volume Available	4480m^3
2.	**Annual Water Balance**	
a.	Annual Average Rainfall	1123.7mm
	Site Area	89260m^2
	Annual average site runoff volume (1.1237x89260x0.63)	63190m^3
b.	**Dust Suppression**	
	1.	
	Water application rate based on 75% dust control	
	• high use areas (Area 2)	2 L/m^2/day
	• normal use areas (Area 1)	1 L/m^2/day
	Area 1	13880m^2
	Area 2	7130m^2
	Mean number of dry days per year	266 days
	Annual average dust suppression water use	
	(13880x1x266+7130x2x266)10^{-3}	7485m^3
	2.	
	Annual average dust suppression	
	water use with chemical additive (50%)	3745m^3

ATTACHMENT A

Flood Certificate

12 February 2015

The City of Newcastle

PO Box 489, Newcastle
NSW 2300 Australia
Phone 02 4974 2000
Facsimile 02 4974 2222
Email mail@ncc.nsw.gov.au
www.newcastle.nsw.gov.au

EMGA Mitchell McLennon Pty Ltd
Po Box 21
ST LEONARDS NSW 1590

Dear Sir/Madam

Flood Information Certificate No:	2015/23
Property:	LOT: 1 DP: 874109
	80 Tourle Street Mayfield West

Thank you for your recent enquiry regarding flood behaviour at the above property. This letter confirms the property is located in a flood prone area. The pertinent features of the flood behaviour are estimated as follows:

Hunter River Flooding

Is any part of the site affected by a floodway?	No
Is any part of the site affected by a flood storage area?	No
Estimated 1% Annual Exceedence Probability event level: (equivalent to the "*Defined Flood Level*" in the Building Code of Australia)	2.95m AHD (slightly affected along the eastern boundary)
Highest Property Hazard Category	Not Affected
Estimated Probable Maximum Flood Level	5.45m AHD (slightly affected along the eastern boundary)
Highest Life Hazard Category	Not Affected

The flood study from which the above information is derived is part of a Newcastle City Wide Floodplain Management Plan. The above advice may change in the future, however the advice is based on the best information held by Council at the time of issue of this certificate.

The Newcastle Development Control Plan 2012 addresses the issues of flood management for new development. You can view the development control plan at www.newcastle.nsw.gov.au. In summary, the following requirements apply for all future development applications on the site.

Great Place, Great Lifestyle, Great Future

Development in a floodway is not generally allowable due to likely redistribution of flood water.	Not Applicable
Filling of a flood storage area by more than 20% is not generally allowable due to redistribution of flood water.	Not Applicable
Minimum floor level for occupiable rooms in a new development on this site is: (equivalent to the "*Flood Hazard Level*" in the Building Code of Australia)	Not Applicable
Is onsite flood refuge required?	No

Please note that:

1. No assessment of the lot's suitability for the purposes of making an application for a complying development certificate under the General Housing Code or Rural Housing Code of *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*, or for a Secondary Dwelling under *State Environmental Planning Policy (Affordable Rental Housing) 2009,* has been made. This type of flood information can also be obtained from Council via a Flood Information Application. There are two services provided by Council relating to Complying Development flood criteria, as follows:

   a) Identification of lots affected by any of the flood control lot exclusions identified in subclause 3.36C(2) or 3A.38(2) of *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.* If this information is required, select Box 4. b) (i) on the Flood Information Application form and pay the required fee.

   b) An assessment of a proposal for development of the lot for compliance with the requirements of subclause 3.36C(3) or 3A.38(3) of *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.* If this information is required, select Box 4. b) (ii) on the Flood Information Application form, submit plans and other relevant documentation for the proposal and pay the required fee.

2. The information contained in this certificate may alter in the future. The applicant should at all times ensure the currency of this information.

Should you require any further clarification please contact B Cameron on 4974 2637.

Brian Cameron
Senior Development Officer (Engineering)

FIGURES


FIGURE 1
Hunter River
Kooragang
Island
Site
Tourle Road
McIntosh
Drive
LOCALITY PLAN
nearmap

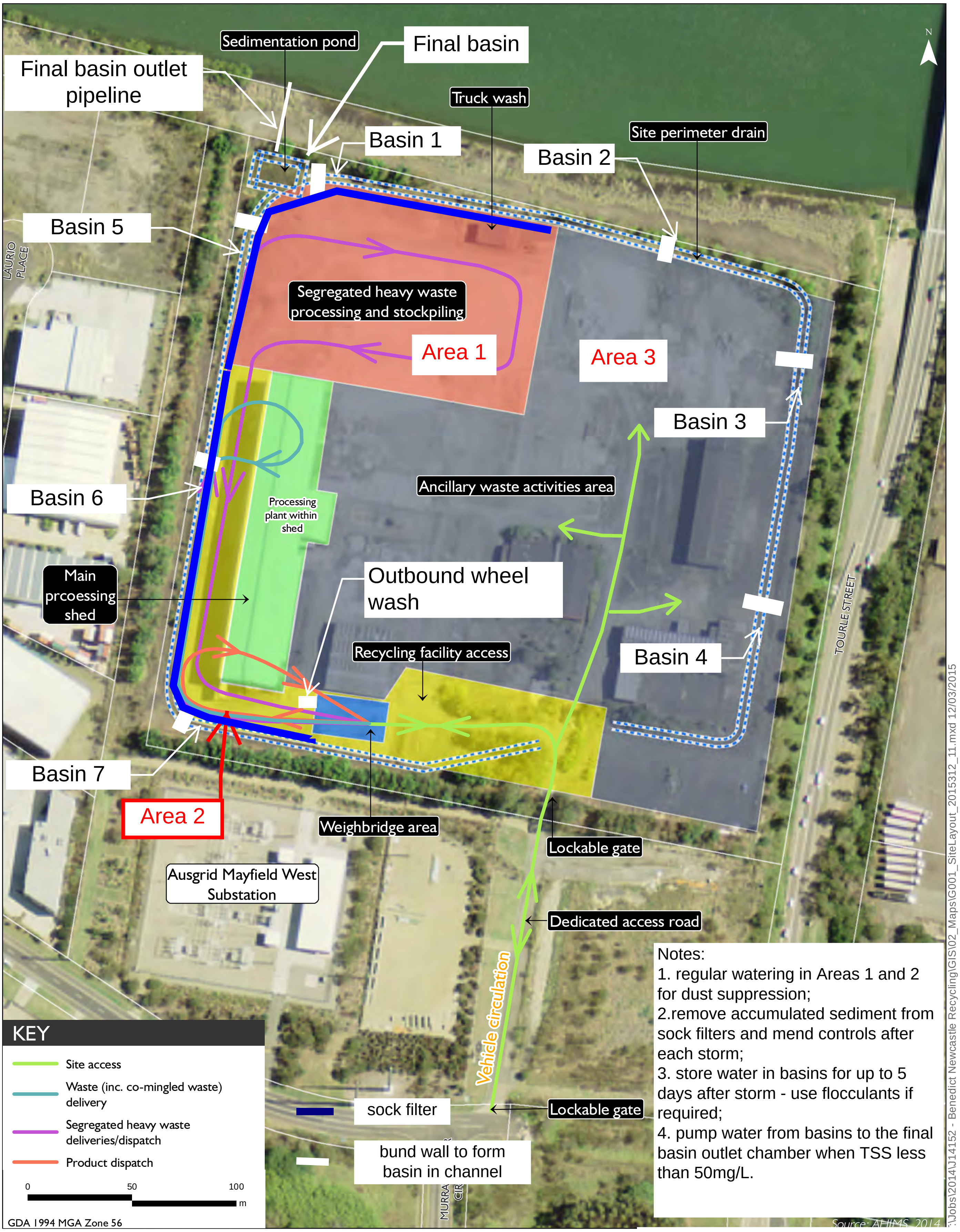
FIGURE 2

EMM
EMGA Mitchell McLennan

Proposed site layout
Recycling Facility, Mayfield West
Environmental Impact Statement

Figure 2.1

FIGURE 3



EMM

Soil and Water Management Plan

Appendix D

Air quality assessment

Mayfield West Recycling Facility - Air Quality and Greenhouse Assessment

Prepared for:
EMGA Mitchell McLennan

Prepared by:
ENVIRON Australia Pty Ltd

Date:
19 March 2015

Project Number:
AS121817

Prepared by:				**Authorised by:**		
Name:	Scott Fishwick			Name:	Scott Fishwick	
Title:	Manager – Air Quality			Title:	Manager – Air Quality	
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Email:	sfishwick@environcorp.com			Email:	sfishwick@environcorp.com	
Signature:		Date:	19.03.2015	Signature:		19.03.2015

This document is issued in confidence to EMGA Mitchell McLennan for the purposes of the assessment of air quality impacts associated with the proposed Mayfield West Recycling Facility. It should not be used for any other purpose.

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VERSION CONTROL RECORD

Document File Name	**Date Issued**	**Version**	**Author**	**Reviewer**
AS121817_MayfieldWest_AQIA_Final_190315	19 March 2015	Final	Scott Fishwick	Ronan Kellaghan

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Executive Summary

ENVIRON Australia Pty Ltd (ENVIRON) was commissioned by EMGA Mitchell McLennan (EMM) on behalf of Benedict Recycling Pty Ltd (Benedict Recycling) to undertake an Air Quality Impact Assessment for the proposed recycling facilityat 80 Tourle Street, Mayfield West (the Recycling Facility). Benedict Recycling propose to receive and process up to 90,000 tonnes per annum (tpa) of general solid waste and selected commercial and industrial wastes, for processing to produce saleable recycled materials.

Emissions of particulate matter were estimated for peak proposed operations. Atmospheric dispersion modelling predictions of air pollution emissions was undertaken using the CALPUFF dispersion model.

The results of the dispersion modelling conducted for the proposed operational scenario highlight the following:

- Facility increment-only (excluding ambient background) particulate concentrations, odour concentrations and deposition levels from the proposed operations are low relative to applicable assessment criterion at surrounding receptors;
- The magnitude of short-term (24-hour average) concentrations of PM_{10} and $PM_{2.5}$relative to ambient local background concentrations is very low. The potential for cumulative exceedance of short-term criterion is considered unlikely; and
- Taking background ambient air quality concentrations into account, including elevated natural events, annual average TSP, PM_{10} and $PM_{2.5}$ concentrations are predicted to comply with applicable assessment criterion at all surrounding receptors.

The potential for adverse impact upon the surrounding environment due to air emissions from the proposed Recycling Facility is therefore low. On the basis of the modelling conducted within this assessment, it is considered unlikely that emissions from the Recycling Facility would negatively impact upon the surrounding area.

To evaluate the proposal's greenhouse gas (GHG) emissions and determine the Recycling Facility's contribution to NSW and Australian annual GHG emissions, emissions were estimated based on information provided by Benedict Recycling and relevant GHG emission factors.

GHG emissions were calculated for:

- Direct emissions produced from sources within the boundary of the facility and as a result of activities at the facility (Scope 1 emissions); and
- Indirect emissions generated in the wider economy as a consequence of the Proposal activities, but which are physically produced by the activities of another organisation indirectly (Scope 2 and 3 emissions).

Key findings are as follows:

- Total Facility GHG emissions (from direct and indirect sources) from the proposal were estimated to be 415t of Carbon Dioxide Equivalent per year (CO_2–e/yr) for proposed operations;

- Emissions generated by the proposal represent 0.00025% and 0.00007% of annual NSW and Australian GHG emissions (relative to year 2011-2012) respectively.

1 Introduction

Benedict Recycling Pty Ltd (Benedict Recycling) proposes to develop a recycling facility and undertake a range of ancillary activities at 80 Tourle Street, Mayfield West, approximately 6.5km northwest of the central business district of Newcastle, NSW. The setting of the Recycling Facility is illustrated in**Figure 1**.

The Recycling Facility will import inert pre-classified general solid waste (non-putrescible), such as construction and demolition wastes, and selected commercial and industrial wastes, for processing (e.g. crushing, shredding and sorting) to produce saleable recycled materials. Benedict Recycling propose to receive and process up to 90,000 tonnes per annum (tpa) of material.

ENVIRON Australia Pty Limited (ENVIRON) was commissioned by EMGA Mitchell McLennan (EMM) to undertake an Air Quality Impact Assessment (AQIA) for the proposed Recycling Facility.

The AQIA is guided by the NSW Environment Protection Authority (NSW EPA) document *The Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* ("the Approved Methods for Modelling", EPA 2005).

1.1 Secretary's Environmental Assessment Requirements

A summary of the NSW Department of Planning and Environment Secretary's Environmental Assessment Requirements (SEAR's) relevant to this report are presented in **Table 1**. The relevant sections of the report where the SEAR's are addressed is also presented in **Table 1**.

Table 1: Summary of SEAR's for the Proposal

SEAR	Section Addressed
Description of all potential air emission and odour sources	**Section 7** and **Appendix B**
An air quality assessment in accordance with relevant Environment Protection Authority guidelines	**Section 7, Section 8, Section 9** and **Section 10**
A description and appraisal of air quality mitigation and monitoring measures	**Section 7, Section 9**

Figure 1: Site Location

Source: EMM, 2015

2 Overview of Project

The Recycling Facility will accept ‘Pre-classified general solid waste (non-putrescible)’. Up to 90,000 tpa of waste will be accepted by the Recycling Facility. While the exact proportions of each waste type are unknown and will be variable, material received will mainly consist of the following wastes:

- co-mingled and segregated building and demolition waste — soils, bricks, concrete, paper/cardboard, cloth, plastics, rubber, plasterboard, ceramics, glass, metal and timber, and the like;
- vegetation and uncontaminated soils;
- tiles, asphalt, suitable slags and concrete batching waste;
- excavated natural materials including virgin natural excavated material (VNEM) such as sand and sandstone which are generated during bulk earthworks and road and infrastructure repair; and
- rail ballast and spoils.

Recycling Facility processing will include the following steps:

- Waste will be inspected prior to being accepted on site and any loads suspected to contain material that cannot be accepted by the site will be rejected;
- Wastes will generally be stored undercover in the main processing shed prior to processing. However, some segregated heavy materials (eg concrete and timber) will be stored on the hardstand north of the main processing shed;
- Waste processing will include sorting, picking, crushing (eg concrete and bricks) and shredding (eg timber);
- Sorting will mostly occur within the main processing shed. A range of mobile plant (eg excavators, crushers, front-end loaders) and two picking lines, will be used to handle and process the waste and products in the shed. Material processed in the shed will be stockpiled in the shed prior to quality testing and dispatch;
- Segregated heavy waste requiring crushing or shredding (eg concrete, bricks or timber) will be processed outside in a series of two to three campaigns during the year, each lasting about two weeks. Additional mobile equipment will be brought to site during these campaigns;
- Some waste (less than 20%) will not able to be recycled (referred to as ‘non-recyclable residues’). Non-recyclable residues will be stockpiled undercover prior being sent for disposal at an EPA licensed facility, most likely the Summerhill Waste Management Centre. However when economic, this waste may be further processed within a custom-built shed on the site and be sold to a licensed facility for use as RDF or biochar;
- Recycled products generally will be dispatched to customers in the Lower Hunter Region, including Newcastle, by heavy vehicle; and

Non-recyclable residues will generally be dispatched to a landfill by heavy vehicle. The site layout and overview of the Recycling Facility is shown in **Figure 2**.

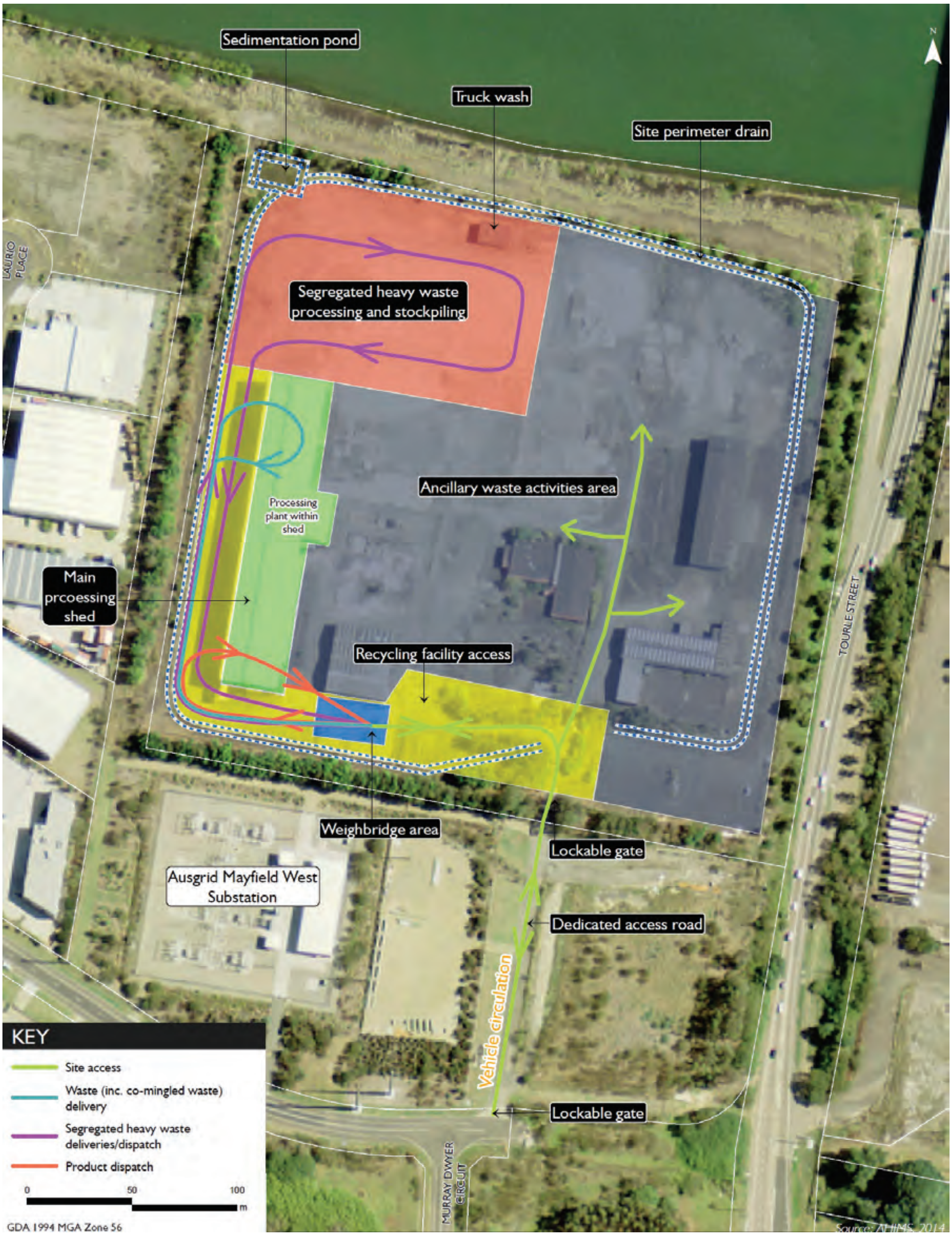

Figure 2: Proposed Site Layout

Source: EMM, 2015

3 Project Setting

3.1 Existing Land Use and Topography

The Recycling Facility is proposed to be located at Mayfield West, in the Newcastle local government area, approximately 6.5km northwest of the Newcastle central business district. The site is bounded by the Hunter River South Arm to the north, Steel River Industrial Estate to the west and south, and the former BHP Steelworks site and Tourle Street to the east. The site was formerly a chemical manufacturing plant operated by Delta EMD, with abandoned buildings and structures associated with the former facility still in place.

The topography of the site is generally flat, dominated by the river flatlands of the Hunter River. **Figure 3** illustrates the topography of the area surrounding the facility.

3.2 Nearest Residences

The Recycling Facility is located in the immediate vicinity of a number of industrial and commercial operations, principally to the immediate west in the Steel River Industrial Estate. Further afield to the south are the residential areas of Mayfield West, Mayfield and Warabrook. A mixture of residential and industrial receptors, representative of the surrounding region, have been selected as assessment locations for this report. Relevant details of these receptors are listed within **Table 2**.

Figure 4 illustrates the location of these sensitive receptor locations relative to the facility.

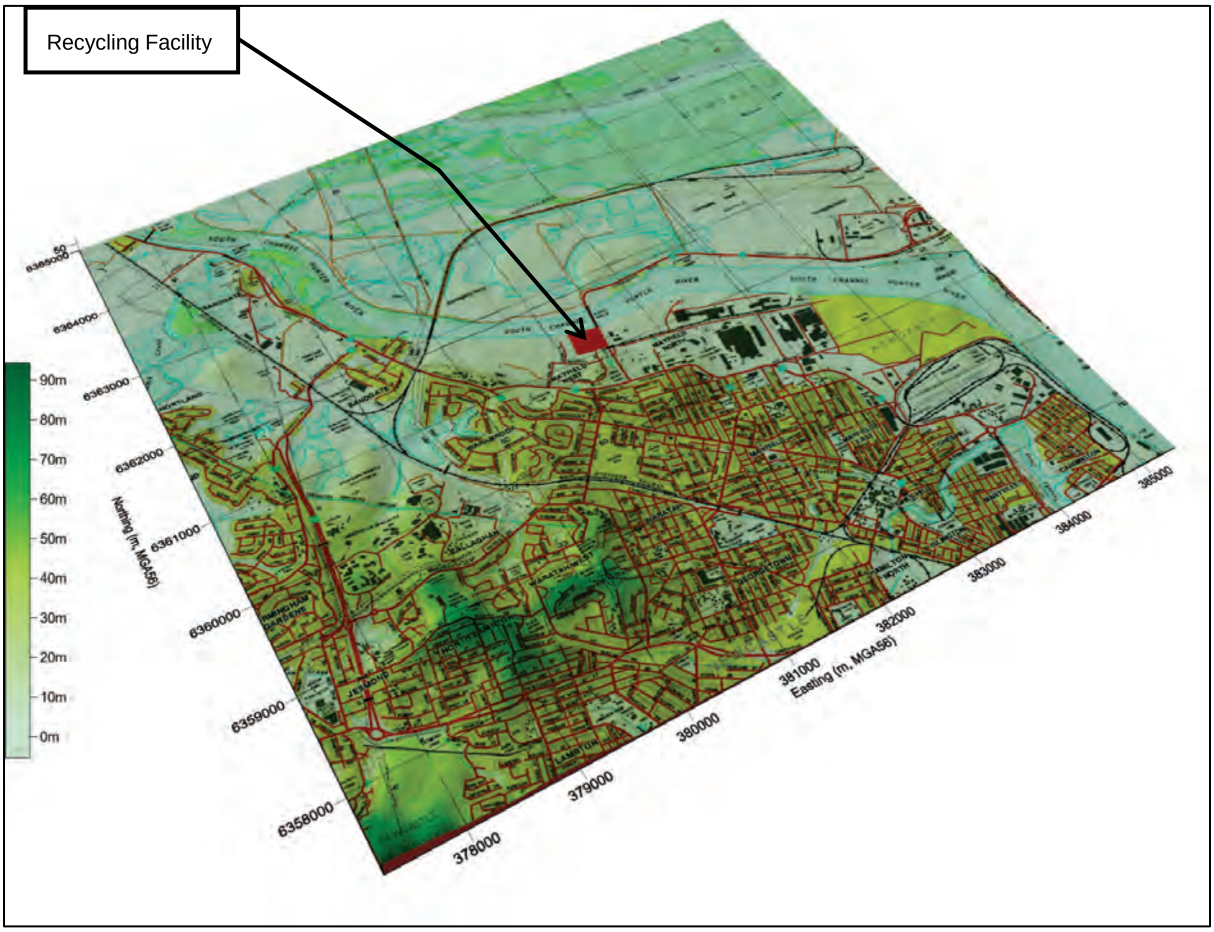

Figure 3: Topography Surrounding the Recycling Facility

Note: Vertical Exaggeration of 2 applied

Table 2: Selected Surrounding Sensitive Receptor Locations

ID	Location (m, MGA56)		Distance (km) / Direction from facility Boundary	Elevation (m, AHD)
	Easting	Northing		
R1	381977	6360373	0.85 / SE	13
R2	381723	6360432	0.66 / SSE	17
R3	381354	6360489	0.54 / S	14
R4	381185	6360515	0.54 / S	12
R5	381051	6360548	0.53 / S	13
R6	380959	6360594	0.51 / SSW	14
R7	380726	6360721	0.53 / SW	15
R8	380310	6360853	0.84 / WSW	21
R9	380107	6361052	1.01 / W	17
R10	381099	6361201	0.04 / W	10
R11	381085	6361052	0.04 / SW	11
R12	381073	6360905	0.18 / SSW	14
R13	381494	6361128	0.05 / E	8

Note: Receptors10 and 12 are neighbouring industrial properties, receptor 12 is the CSIRO Energy Centre and receptor 13 is a potential future industrial receptor location at the old BHP Steelworks site.

Figure 4: Surrounding Receptor Locations

4 Air Quality Criteria

The proposal must demonstrate compliance with the impact assessment criteria outlined in the Approved Methods for Modelling. The impact assessment criteria are designed to maintain ambient air quality that allows for the adequate protection of human health and well-being.

The primary emissions to air from the Recycling Facility are particulate matter (PM) from material handling and processing. For this assessment, focus has been given to the primary PM size fractions of Total Suspended Particulate (TSP) matter, particulate matter with an equivalent aerodynamic diameter of 10 microns (PM_{10}) and particulate matter with an equivalent aerodynamic diameter of 2.5 microns ($PM_{2.5}$). Dust deposition is also considered based on TSP emissions.

In addition to PM, the Recycling Facility has the potential to generate odourous emissions, particularly associated with the storage of green waste, although no composting is proposed. Odour emissions are therefore quantified and assessed in this report.

4.1 Goals Applicable to Airborne Particulate Matter

Ambient air quality limits for particulates are typically given for various particle size fractions, including TSP, PM_{10} and $PM_{2.5}$. Although TSP is defined as all particulates with an aerodynamic diameter of less than 50-100 µm, an effective upper limit of 30 µm aerodynamic diameter is frequently assigned. PM_{10} and $PM_{2.5}$ are of particular concern due to potential health impacts (Pope and Dockery, 2006; WHO, 2007).

Air quality limits issued by the Federal and NSW government for particulates are given in **Table 3**.

Table 3: Impact Assessment Goals for Airborne Particulates

Pollutant	Averaging Period	Concentration (µg/m³)	Reference
TSP	Annual	90	NSW EPA(1)(2)
PM_{10}	24 hours	50	NSW EPA(1)
	24 hours	50(4)	NEPM(3)
	Annual	30	NSW EPA(1)
$PM_{2.5}$	24 hours	25	NEPM(5)
	Annual	8	NEPM(5)

Note 1: NSW EPA *Approved Methods for Modelling (DEC 2005)*

Note 2: NSW EPA impact assessment criterion based on the subsequently rescinded National Health and Medical Research Council (NHMRC) recommended goal

Note 3: NEPC, 2003, *National Environment Protection (Ambient Air Quality) Measure,* as amended

Note 4: Provision made for up to five exceedances of the limit per year

Note 5: Advisory reporting goal issued by the NEPC (NEPC, 2003)

Note: Concentrations referenced to standard temperature and pressure (STP - 0°C, 1ATM)

The NEPM goals were developed by the National Environmental Protection Council (NEPC) in 1998, with compliance to be achieved by 2008. All State jurisdictions commenced formal reporting against the NEPM standards in 2002.

The NSW 24-hour PM_{10}impact assessment criterion of 50µg/m^3 is numerically identical to the equivalent National Environment Protection Measure (NEPM) reporting standard except that the NEPM reporting standard allows for five exceedances per year. It is noted, that the NSW EPA requires assessment of predicted 24-hour average PM_{10} against the maximum predicted concentration and that no additional exceedances occur as a results of a project.

The NSW EPA does not prescribe ambient air quality criteria for $PM_{2.5}$. Reference may, however, be made to the $PM_{2.5}$ advisory reporting goals issued by the NEPC (NEPC, 2003), as referenced in **Table 3**.

The air quality impact assessment criteria for airborne particulate concentrations are applicable at sensitive receptors. These are defined by the Approved Methods for Modelling as the nearest existing, or likely future, off-site dwellings or school, hospital, office or public recreational area. In assessing against these criteria, the total air pollutant concentration (incremental plus background concentration) must be reported as the 100th percentile (i.e. maximum) concentration in units consistent with the impact assessment criteria. These must then be compared with the relevant impact assessment criteria.

4.2 Dust Deposition Criteria

Nuisance dust deposition is regulated through the stipulation of maximum permissible dust deposition rates. The NSW EPA impact assessment goals for dust deposition are given in **Table 4** illustrating the allowable increment in dust deposition rates above ambient (background) dust deposition rates which would be acceptable so that dust nuisance could be avoided.

Table 4: DECC Goals for Allowable Dust Deposition

Averaging Period	Maximum Increase in Deposited Dust Level	Maximum Total Deposited Dust Level
Annual	2 g/m^2/month	4 g/m^2/month

Source: Approved Methods for Modelling, DEC 2005

4.3 Criteria for Odour Mixtures

The odour performance criteria are expressed in terms of odour units. The detectability of an odour is defined as 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 (OU). An odour criterion of less than 1 OU would theoretically result in no odour impact being experienced.

A concentration of 7 OU means that the sample requires a dilution with clean air 7 times to become odour free; thus an odour concentration expressed as 7 OU coincides with a dilution-to-threshold (D/T) ratio of 7, and 2 OU equates to a D/T ratio of 2 (and so on).

The NSW Technical Framework -Assessment and Management of Odour from Stationary Sources recommends that, as design goal, no individual be exposed to ambient odour levels of greater than 7 OU (NSW DEC, 2006). Although the level at which an odour is perceived to be a nuisance can range from 2 OU to 10 OU, experience gained through odour assessments from proposed and existing facilities in NSW indicates that an odour performance goal of 7 OU is likely to represent the level below which “offensive” odours should not occur (for an individual with a ‘standard sensitivity’ to odours) (NSW DEC 2006).

Odour performance criteria are 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 criteria 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.

Where a number of the factors simultaneously contribute to making an odour "offensive", an odour goal of 2 OU at the nearest residence (existing or any likely future residences) is appropriate, which generally occurs for affected populations equal or above 2000 people. The EPA odour performance criteria are therefore based on considerations of risk of odour impact rather than on differences in odour acceptability between urban and rural areas.

Odour performance goals for various population densities are outlined in Table 7.5 of the Approved Methods for Modelling (EPA, 2005), and summarised in **Table 5**. They are expressed as the 99th percentile value, nose response time average (approximately one second).

Table 5: OEH Odour Performance Criteria vs. Population Density

Population of Affected Community	Odour Performance Criteria OU(1)
Urban area (> 2000)	2.0
500 – 2000	3.0
125 – 500	4.0
30 – 125	5.0
10-30	6.0
Single residence (< 2)	7.0
Source: EPA, 2005, Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales	

Note 1 :Odour concentration over a nose response time averaging period (1 second), with permissible frequencies of occurrence at 99^{th} percentile for Level 2 assessments

For this assessment, an odour performance criteria of 2OU will be adopted.

4.4 Steel River Industrial Estate Criteria

In addition to the NSW EPA assessment criteria listed in the previous sections, the proposed Recycling Facility is also subject to a Strategic Impact Assessment Study (SIAS) prepared for the adjoining Steel River Industrial Estate (APT Peddle Thorpe, 1998). The SIAS includes criteria for an 'environmental envelope' which is considered to have an acceptable level of impact for industrial development in the area.

The SIAS criteria for Steel River Industrial Estate are presented in **Table 6**. It can be seen that for TSP and PM_{10}, the criteria is equal to or greater than the NSW EPA assessment criteria. Consequently, if the NSW EPA assessment criteria are satisfied, the SIAS criteria for Steel River Industrial Estate will also be satisfied. These criteria have not been considered further in this report.

It is noted that lead, nitrogen dioxide and sulphur dioxide are not considered significant high risk pollutants from the proposed Recycling Facility and have not been addressed further within this assessment.

Table 6: Steel River Industrial Estate SIAS Criteria

Pollutant	Criteria	Averaging Time
TSP	90µg/m³	Annual
PM_{10}	150µg/m³ 50µg/m³	24-hour Annual
Lead	1.5µg/m³	Annual
Nitrogen Dioxide	16pphm 5pphm	1-hour Annual
Sulphur Dioxide	25pphm 20pphm 2pphm	10-minutes 1-hour Annual

5 Climate and Meteorology

Meteorological mechanisms affect the generation, dispersion, transformation and eventual removal of pollutants from the atmosphere.

The extent to which pollution will accumulate or disperse in the atmosphere is dependent on the degree of thermal and mechanical turbulence within the boundary layer (the general term for the layer of the atmosphere adjacent to the earth's surface) and other factors such as wind speed and direction.

Thermal turbulence is driven by incoming solar radiation during daylight hours. Mechanical turbulence is associated with wind speed, in combination with the surface roughness of the surrounding area. The stability of the atmosphere increases with a decrease in thermal and mechanical turbulence.

Air pollutant dispersion consists of vertical and horizontal components of motion. Vertical motion is defined by the stability of the atmosphere (e.g. a stable atmosphere has low vertical dispersion potential) and the depth of the surface-mixing layer, typically the vertical distance between the earth's surface and a temperature inversion during the day.

The horizontal dispersion of pollution in the boundary layer is primarily a function of the wind field (i.e. wind speed and direction). The wind speed determines both the distance of downwind transport and the rate of dilution as a result of plume 'stretching'. The wind direction, and the variability in wind direction, determines the general path that the pollutants will follow.

Airborne particulate concentration levels therefore fluctuate in response to changes in atmospheric stability, mixing depth and winds (Oke, 2003; Sturman and Tapper, 2006; Seinfeld and Pandis, 2006).

In order to characterise the dispersion meteorology of the region surrounding the facility, long-term climate records, time-resolved meteorological monitoring data and meteorological modelling for the region was drawn upon, as documented in the following sections.

5.1 Meteorological modelling

In 2012, ENVIRON undertook a detailed meteorological modelling exercise for the Newcastle region as part of an air quality impact assessment in the region. This modelling was conducted using a combination of the TAPM regional meteorological model and the CALMET diagnostic meteorological model, utilising local and regional meteorological monitoring datasets to refine model calculations. Modelling was conducted for a 50km x 55km modelling domain centred over the Mayfield/Kooragang Island area. The meteorological modelling focused on the 2010 calendar year, which was shown to be representative of the Newcastle region based on analysis of annual, seasonal and diurnal trends in local monitoring data. The modelling underwent thorough independent peer review as well as review by the NSW EPA. Full details of the meteorological modelling conducted are presented in that report (ENVIRON, 2012).

The outputs of that ENVIRON meteorological modelling have been accessed for use in this assessment. Hourly-varying meteorological predictions were extracted from the model at the proposed Recycling Facility site for analysis within this report.

5.2 Prevailing annual wind regime

5.2.1 Inter-annual variability

In order to understand the interannual variability in the Newcastle area, hourly weather observations were collected from the closest Bureau of Meteorology (BoM)automatic weather station (AWS) to the proposed Recycling Facility site. This station is the Nobbys Signal AWS, located approximately 7km east-southeast of the site. Annual wind roses generated from hourly wind speed and direction recorded between 2010 and 2014 are presented in **Appendix A**.

The wind roses generated from the Nobbys Signal AWS highlight consistency in wind speed and direction patterns across the five years analysed. All years exhibit dominant flow from the northwest with more variable flow from the northeast to south-southwest. Annual average wind speed and percentage calm conditions (winds less than 0.5m/s) are also similar across the five years.

From the above analysis, it is considered that there is limited recent inter-annual variability in wind speed and direction experienced in the Newcastle region and it was considered appropriate to apply to 2010 meteorological model developed by ENVIRON, and described in **Section 5.1**, as the basis for meteorological analysis at the Recycling Facility.

5.2.2 Annual, seasonal and diurnal wind regime – Recycling Facility

The wind rose of recorded wind speed and direction extracted from the Newcastle region meteorological model at the Recycling Facility is presented in **Figure 5**. The annual wind pattern is dominated by west-northwesterly flow, with a secondary easterly quadrant flow also evident. The highest wind speeds predicted at the site are most frequently experienced from the west-northwest direction. The average wind speed for the dataset is 2.8m/s, with a frequency of calm conditions occurring in the order of 3% of the time. It is noted that wind speeds are lower than those recorded at the BoM Nobbys Station AWS, however this difference is expected considered the coastal location of that station.

Seasonal and diurnal (dividing the day into four periods) wind roses for the Recycling Facility site dataset are also presented within **Appendix A**.

Seasonal variation is evident in the data predicted at the site. The dominant west-northwest component evident in the annual wind direction profile is most defined during the winter, while summer experiences a higher proportion of flow from the easterly quadrant. Wind speed is typically highest during summer, while the incidence of calms is highest during the autumn months.

Diurnal variation in the recorded wind regime is also notable in the data predicted at the site. Wind speeds are greatest during the daylight periods, peaking during the period between noon and 6pm. The occurrence of easterly flow is greatest in the afternoon hours, with the earlier hours of the day experiencing flow from the western half of the directional spectrum. Wind speeds are notably lower between the evening and early morning hours, with the southwesterly component the dominant wind direction.

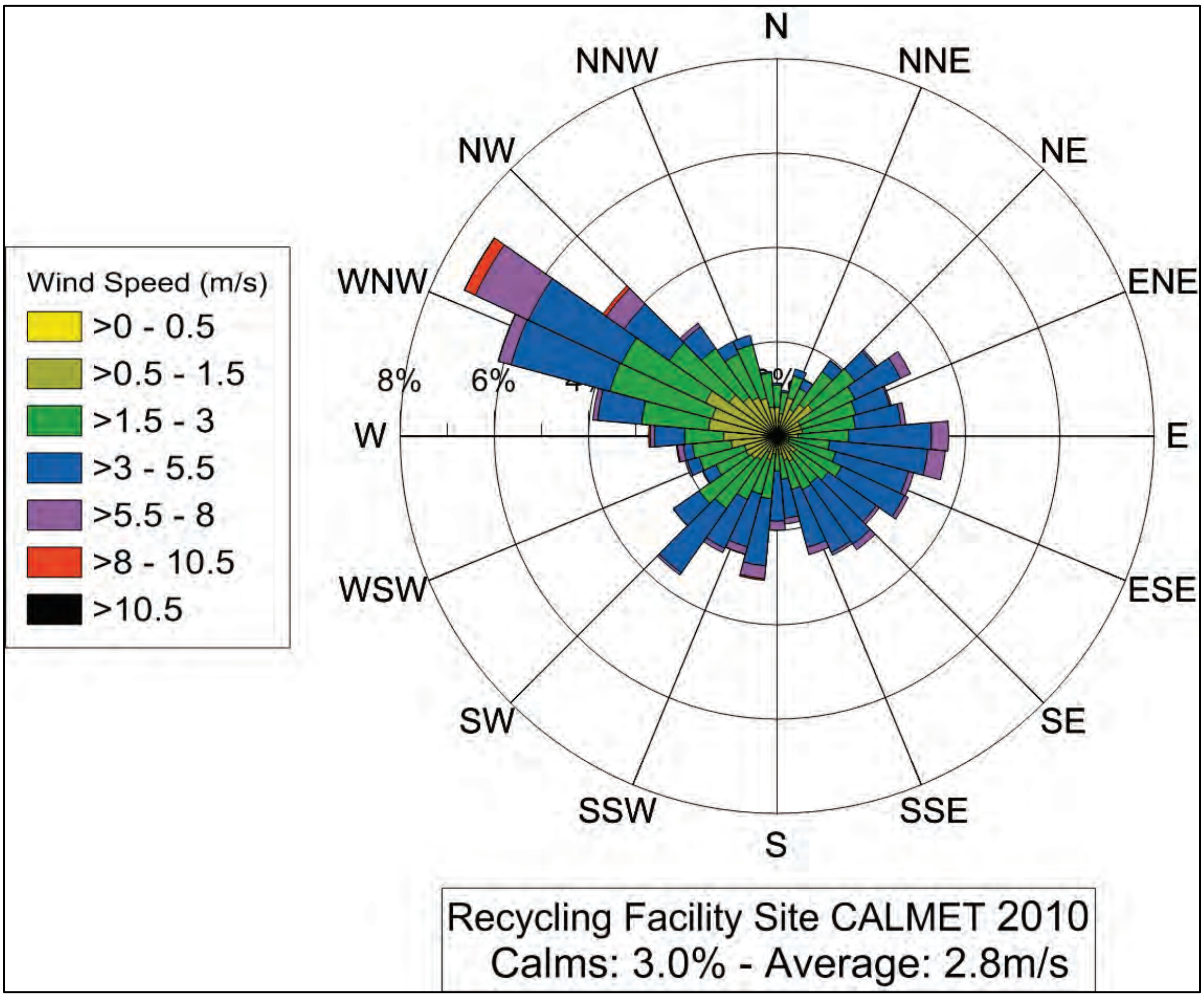

Figure 5: Annual Wind Rose – Recycling Facility site – 2010

5.3 Ambient temperature

Monthly mean minimum temperatures are in the range of 7°C to 19°C, with mean maximum of 18°C to 29°C, based on the long-term average record from the BoM Newcastle University climate station, the closest long-term climate monitoring station to the site (2.5km southwest). Peak temperatures occur during summer months with the highest temperatures typically being recorded between November and March. The lowest temperatures are usually experienced between June and August.

The CALMET-generated temperature for the Recycling Facility site during 2010 has been compared with long-term trends recorded at the BoM Newcastle University climate station to determine the representativeness of the dataset. **Figure 6** presents the monthly variation in predicted temperature during 2010 compared with the recorded regional mean, minimum and maximum temperatures. There is good agreement between temperatures predicted during 2010 and the recorded historical trends, indicating that the dataset is representative of conditions likely to be experienced in the region.

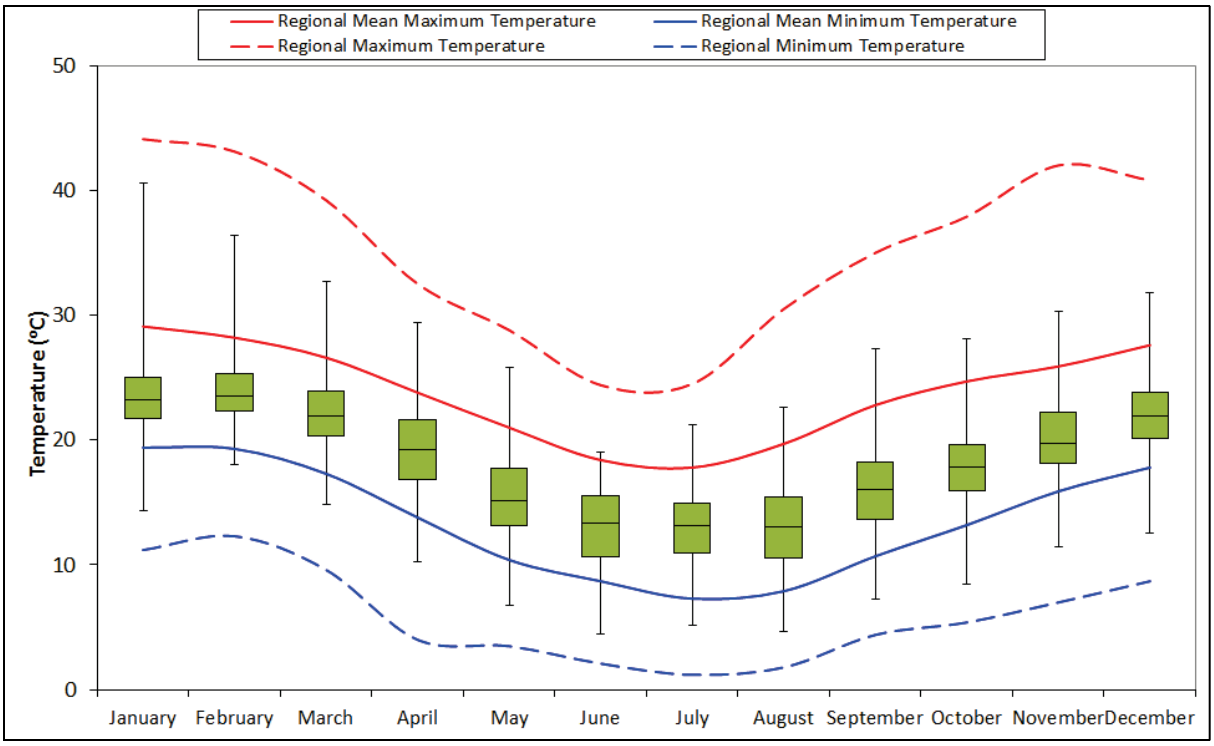

Figure 6: Temperature Comparison between CALMET-generated Recycling Facility 2010 dataset and Historical Averages (1998-2015) – Newcastle University

Note: CALMET-generated temperatures for the site are illustrated by the 'box and whisker' indicators. Boxes indicate 25th, median and 75th percentile temperature values while upper and lower whiskers indicate maximum and minimum values. Maximum and minimum temperatures from long-term measurements at Newcastle University are depicted as line graphs.

5.4 Rainfall

Precipitation is important to air pollution studies since it impacts on dust generation potential and represents a removal mechanism for atmospheric pollutants.

Based on historical data recorded since 1998 at Newcastle University, the region is characterised by high rainfall, with a mean annual rainfall of 1,130mm, and an annual rainfall range between 914mm and 1,516mm. There is significant variation in monthly rainfall throughout the year, with the period between January and June typically experiencing higher falls than the remainder of the year.

To provide a conservative (upper bound) estimate of the airborne particulate matter concentrations occurring due to the Recycling Facility, wet deposition (removal of particles from the air by rainfall) was excluded from the dispersion modelling simulations undertaken in this report.

5.5 Atmospheric stability

Atmospheric stability refers to the degree of turbulence or mixing that occurs on the atmosphere and is a controlling factor in the rate of atmospheric dispersion of pollutants. The Pasquill-Turner assignment scheme identifies six Stability Classes, "A" to "F", to categorise the degree of atmospheric stability prevailing at a given time (defined in **Table 7**).

Table 7: Description of atmospheric stability classes

Atmospheric Stability Class	Category	Description
A	Very unstable	Low wind, clear skies, daytime conditions
B	Unstable	Light to moderate winds, clear skies, daytime conditions
C	Slightly unstable	Moderate wind, slightly overcast daytime conditions
D	Neutral	High winds, cloudy days and nights, transition between day and night (and vice versa)
E	Stable	Moderate wind, slightly overcast, night-time conditions
F	Very stable	Low winds, clear skies, night-time conditions

The frequency of occurrence of each atmospheric stability class predicted by CALMET at the Recycling Facility site for the modelling period is illustrated in **Figure 7**. Stability classes E and F, corresponding to a stable atmosphere, were predicted to occur cumulatively 48% of the time. Stability class D, corresponding to a neutral atmosphere, was predicted to occur approximately 15% of the time.

The predicted seasonal variation in atmospheric stability at the Recycling Facility site is presented in **Figure 8**. Autumn and winter typically experience a higher occurrence of neutral to stable atmospheric conditions than spring and summer.

The diurnal variation in CALMET predicted atmospheric stability is presented in **Figure 9**. The presented profiles illustrate that atmospheric instability increases during daylight hours as convective energy increases, while stable atmospheric conditions prevail during night periods due to the occurrence of lower wind speeds and reduced convective mixing.

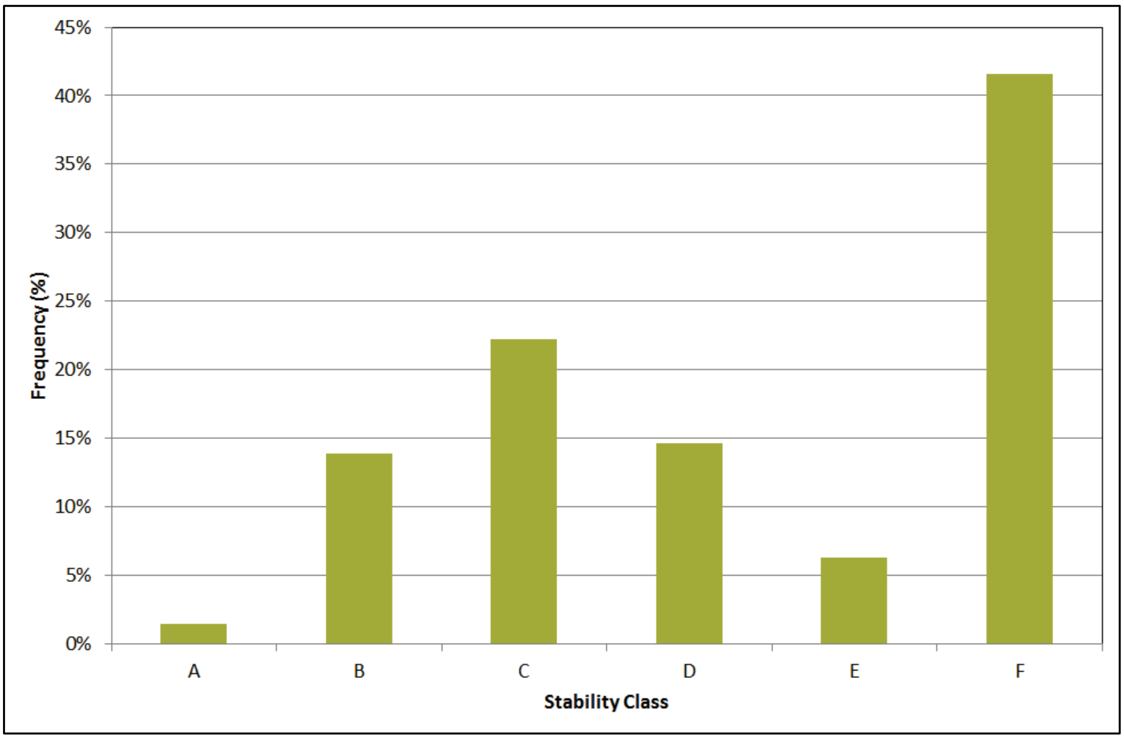

Figure 7: CALMET-predicted annual occurrence of atmospheric stability classes at the Recycling Facility site

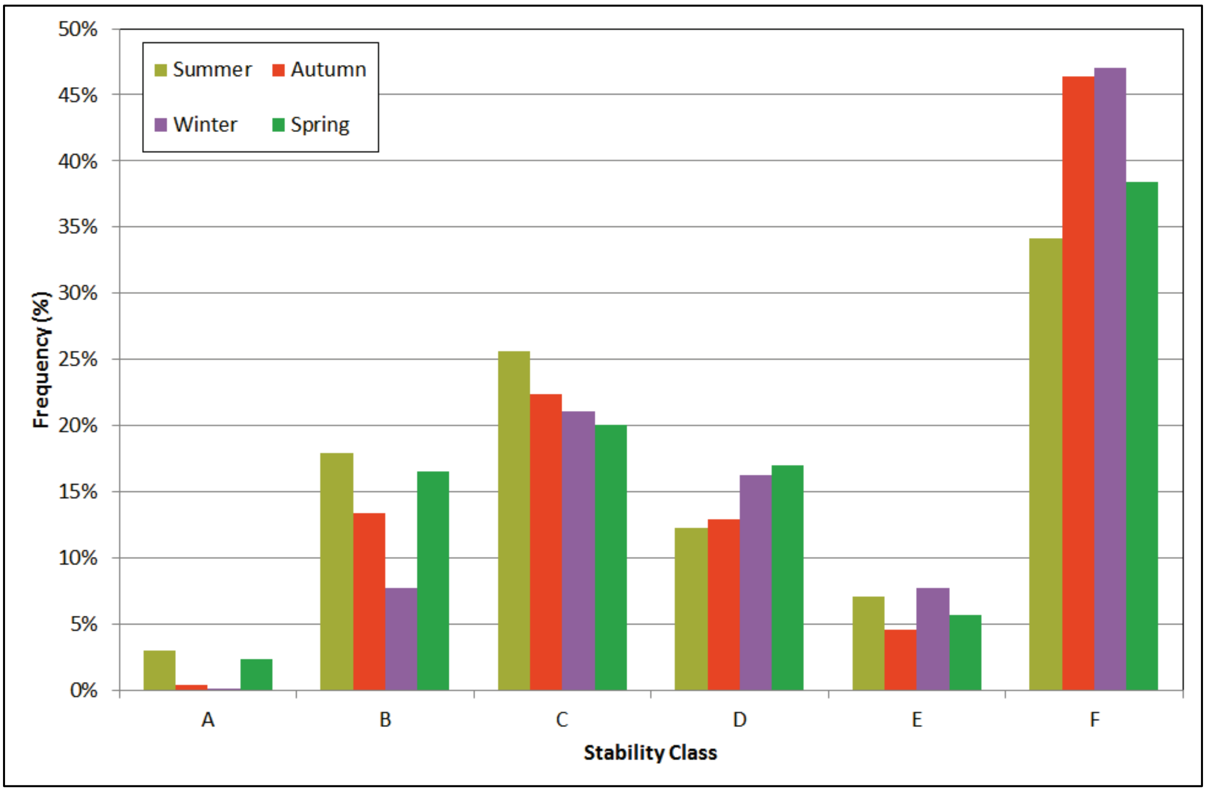

Figure 8: CALMET-predicted seasonal occurrence of atmospheric stability classes at the Recycling Facility site

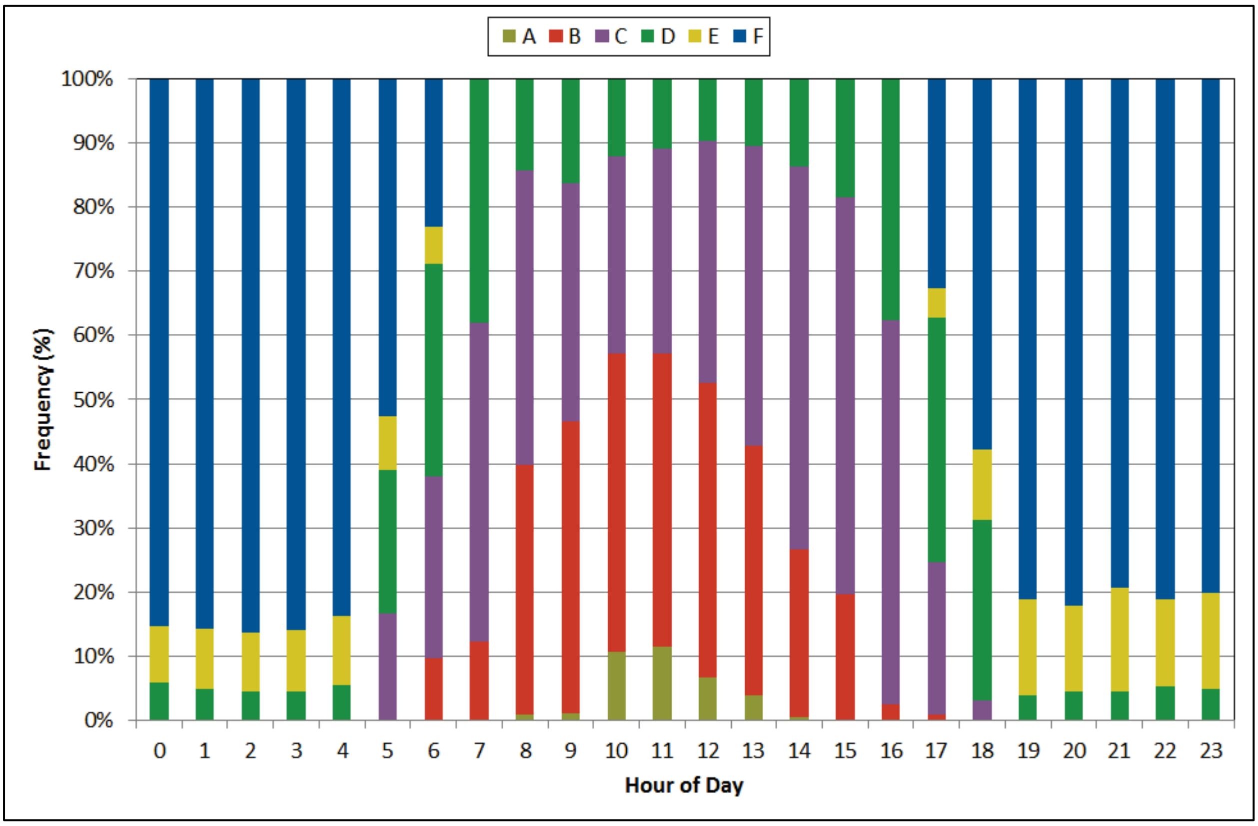

Figure 9: CALMET-predicted diurnal variation in atmospheric stability classes at the Recycling Facility site

5.6 Mixing depth

The diurnal variation in CALMET-predicted atmospheric mixing depth for the Recycling Facility site is illustrated in **Figure 10**. The atmospheric mixing depth increases during the day as the heat from the sun promotes convective mixing with maximum depths occurring in the afternoon coinciding with peak solar energy. Mixing depth reduces as the sun sets, removing solar energy, and mechanical mixing becomes more dominant.

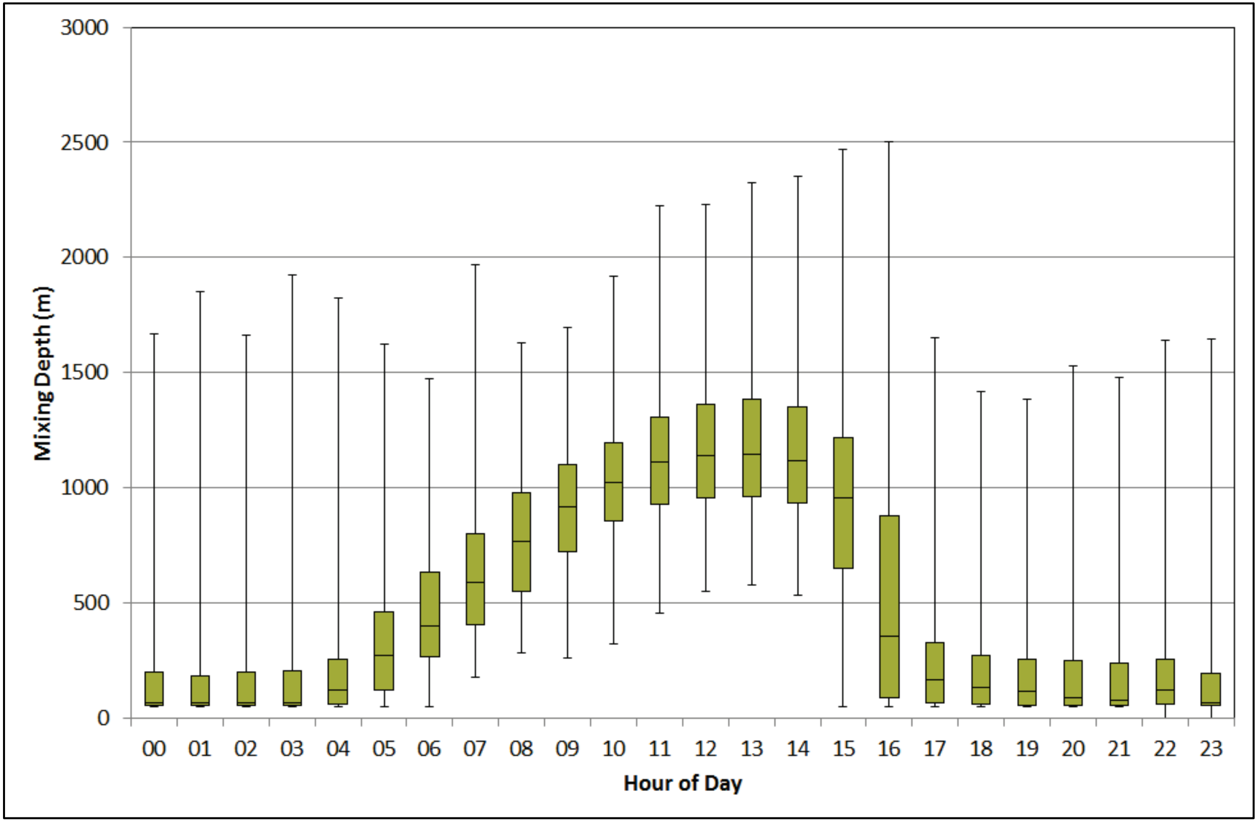

Figure 10: CALMET Predicted diurnal variation in atmospheric mixing depth – Recycling Facility site – 2010

Note: Boxes indicate 25th, Median and 75th percentile of CALMET-predicted mixing height data while upper and lower whiskers indicate maximum and minimum values.

6 Ambient Air Quality Characterisation

The quantification of cumulative air pollution concentrations and the assessment of compliance with ambient air quality criteria necessitate the characterisation of baseline air quality. The following sections provide a review of surrounding air pollution sources and air quality monitoring data.

6.1 Existing Sources of Air Emissions

Air quality in the Newcastle area is affected by a number of air emission sources including:

- industrial operations, including NSW EPA-licensed premises;
- mobile sources, such as emissions from road, rail and marine transport;
- emissions from light industrial, commercial and residential activity;
- construction and demolition activities;
- wind entrained dust from exposed areas; and
- biogenic (natural) sources, including the contribution of sea salt to airborne aerosol concentrations.

More remote sources which contribute episodically to suspended particulates in the region include dust storms and bushfires. Whereas dust storms generate primary particles from mechanical attrition, bushfires are a source of both primary and secondary fine particles, occurring from atmospheric gas to particle conversion processes. Long-range transport of emissions from power generation within the Upper Hunter Valley and on the Central Coast may also contribute to secondary fine particulate concentrations within the region.

6.2 Monitoring Data Available for Baseline Air Quality Characterisation

No air quality monitoring is conducted at the proposed Recycling Facility site. The NSW Office of Environment and Heritage (OEH) maintain a network of six air quality monitoring stations across the Newcastle region, referred to as the Lower Hunter Air Quality Monitoring Network (LHAQMN). These are located at:

- Mayfield – established in mid-2014, approximately 400m south-southwest of the site;
- Carrington – established in mid-2014, approximately 4.3km east-southeast of the site;
- Stockton – established in mid-2014, approximately 5.4kmeast-southeast of the site;
- Wallsend – established in 1992, approximately 5.8km west-southwest of the site;
- Newcastle – established in 1992, approximately 6.2m southeast of the site; and
- Beresfield – established in 1993, approximately 11.5kmnorthwest of the site.

All available daily-varying PM_{10} and $PM_{2.5}$ monitoring data from the LHAQMN recorded since January 2009 was obtained in order to analyse existing ambient particulate matter concentrations in the Newcastle region.

In addition to these OEH monitoring stations, the Newcastle Coal Infrastructure Group (NCIG) maintain a network of monitoring locations surrounding the NCIG Coal Export Terminal at Kooragang Island. Relevant to the study area, NCIG record PM_{10} and TSP concentrations at a location within the Steel River Industrial Estate (approximately 500m west-southwest of the site) and dust deposition levels at a location in Mayfield West (approximately 800m southwest of the site). Results from these monitoring locations are reported by NCIG in publicly available Annual Environmental Monitoring Reports (AEMR). To supplement the data recorded by LHAQMN, NCIG monitoring results reported in AEMR documentation have been accessed.

6.2.1 PM_{10}

Daily-average PM_{10}concentrations were collated from the NSW OEH LHAQMN station for the period between January 2010 and February 2015.

A time-series of 24-hour average PM_{10} concentrations recorded by the LHAQMN stations between 2010 and 2015 is presented in **Figure 16**. Additionally, a time-series of 24-hour average PM_{10} concentrations recorded by the LHAQMN stations between August 2014 (the commencement of monitoring at Carrington and Mayfield stations) is presented in **Figure 12**.

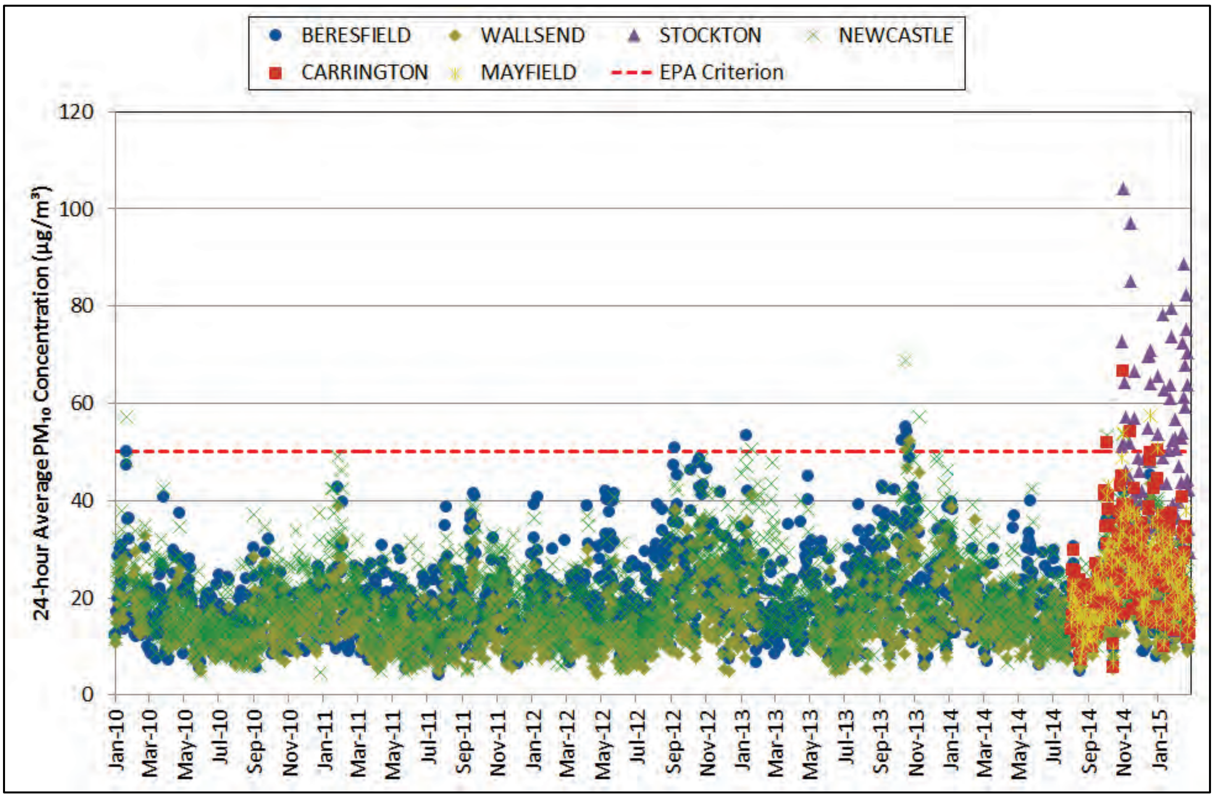

Figure 11: Time series comparison of 24-hour average PM_{10} concentrations between 2010 and 2015 – NSW OEH LHAQMN

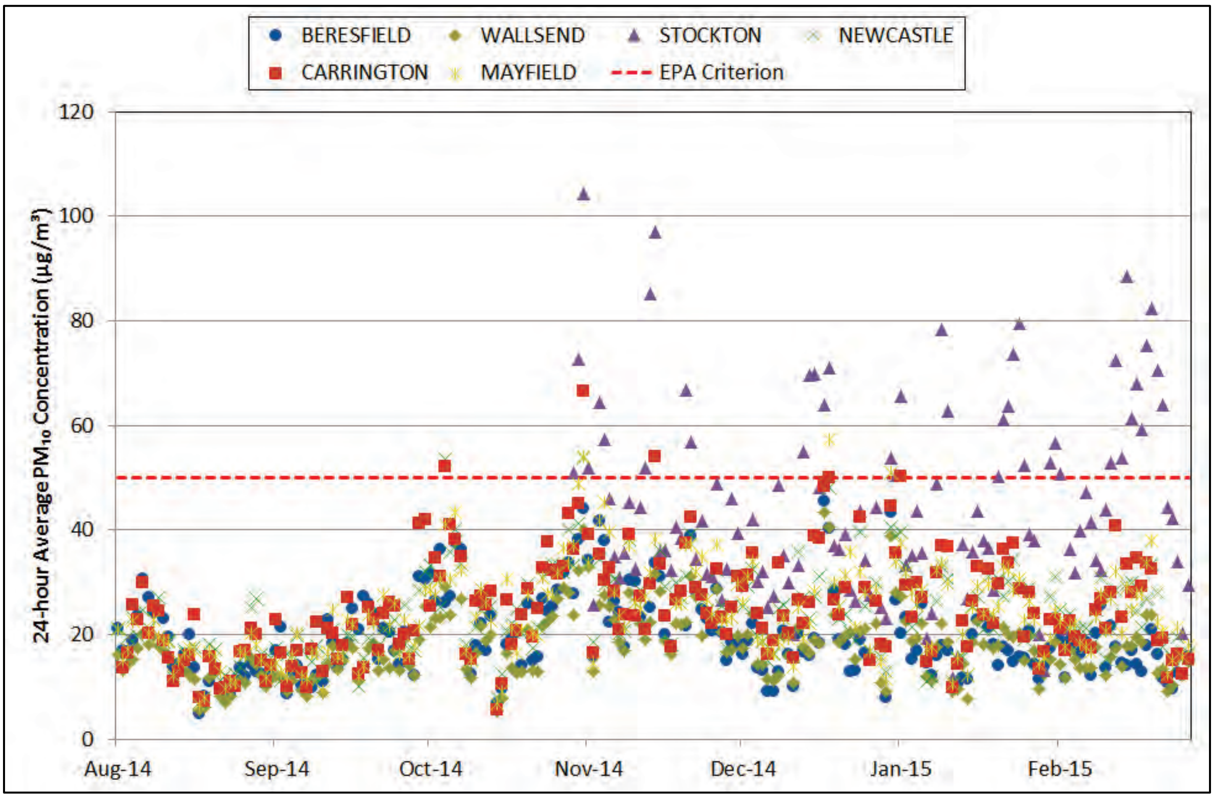

Figure 12: Time series comparison of 24-hour average PM_{10} concentrations between 2014 – NSW OEH LHAQMN

To further understand the relationship in PM_{10} concentrations recorded across the LHAQMN monitoring stations, the Pearson product moment correlation coefficient, *r*, was calculated for each dataset pairing. A value of 1 for *r* indicates a significant linear relationship between two datasets. The calculated *r* for each PM_{10} dataset pairing is presented within **Table 8**.

Table 8: Relationship Between PM_{10} Monitoring Datasets – LHAQMN – August 2014 to February 2015

	Pearson Product Moment Correlation Coefficient (r)					
	Wallsend	**Carrington**	**Stockton**	**Newcastle**	**Mayfield**	**Beresfield**
Wallsend	**1**					
Carrington	0.86	**1**				
Stockton	0.51	0.72	**1**			
Newcastle	0.90	0.91	0.63	**1**		
Mayfield	0.93	0.89	0.63	0.89	**1**	
Beresfield	0.88	0.72	0.40	0.76	0.78	**1**

The following key points are identified from the table and figures:

- With the exception of concentrations recorded at the Stockton air quality monitoring station, daily varying PM_{10} concentrations recorded across the LHAQMN exhibit a highly linear relationship (*r* greater than 0.76 at all stations). Concentrations recorded by these stations show consistency, both with regards to magnitude and the daily-varying profile;
- Data at the Stockton station is consistently higher than both the concentrations recorded at the other stations in the LHAQMN and the NSW EPA assessment criterion. Analysis of the dominant meteorological conditions concurrent with these conditions indicates that the Stockton station is heavily influenced by sea salt aerosol (i.e. winds from the easterly quadrant correspond to highest concentrations);
- Exceedance of the NSW EPA 24-hour average impact assessment criterion occurs at all LHAQMN stations. The driving influence behind these elevated concentrations is typically natural events such as dust storms and bushfires. In particular, the elevated concentrations illustrated during late 2013 are directly attributable to extensive bushfire events in NSW during that time; and

The frequency of 24-hour average PM_{10} concentrations recorded across the LHAQMN between 2010 and 2015 has been analysed to determine the likelihood of ambient concentrations in the area surrounding the proposed Recycling Facility. A frequency histogram of recorded PM_{10} concentrations is presented in **Figure 13**.

The frequency distribution presented in **Figure 13** highlights that 24-hour average PM_{10} concentrations recorded by the LHAQMN were less than 30µg/m^3 approximately 89% of the time between January 2010 and February 2015. The likelihood of a 24-hour average PM_{10} concentration greater than 50µg/m^3 was 1.1%, equating to four days in a calendar year.

To assess the cumulative 24-hour average PM_{10} impacts of emissions from the Recycling Facility, each 24-hour average PM_{10} concentration recorded across all LHAQMN stations, between January 2010 and February 2015, is paired with each daily model prediction. The frequency distribution of the resultant cumulative (project contribution plus background contribution) concentrations is compared with the frequency distribution of the background (presented in **Figure 13**) to gain an understanding of the probability of additional exceedances that are attributable to the Project. Further discussion will be made in **Section 9.2.2**.

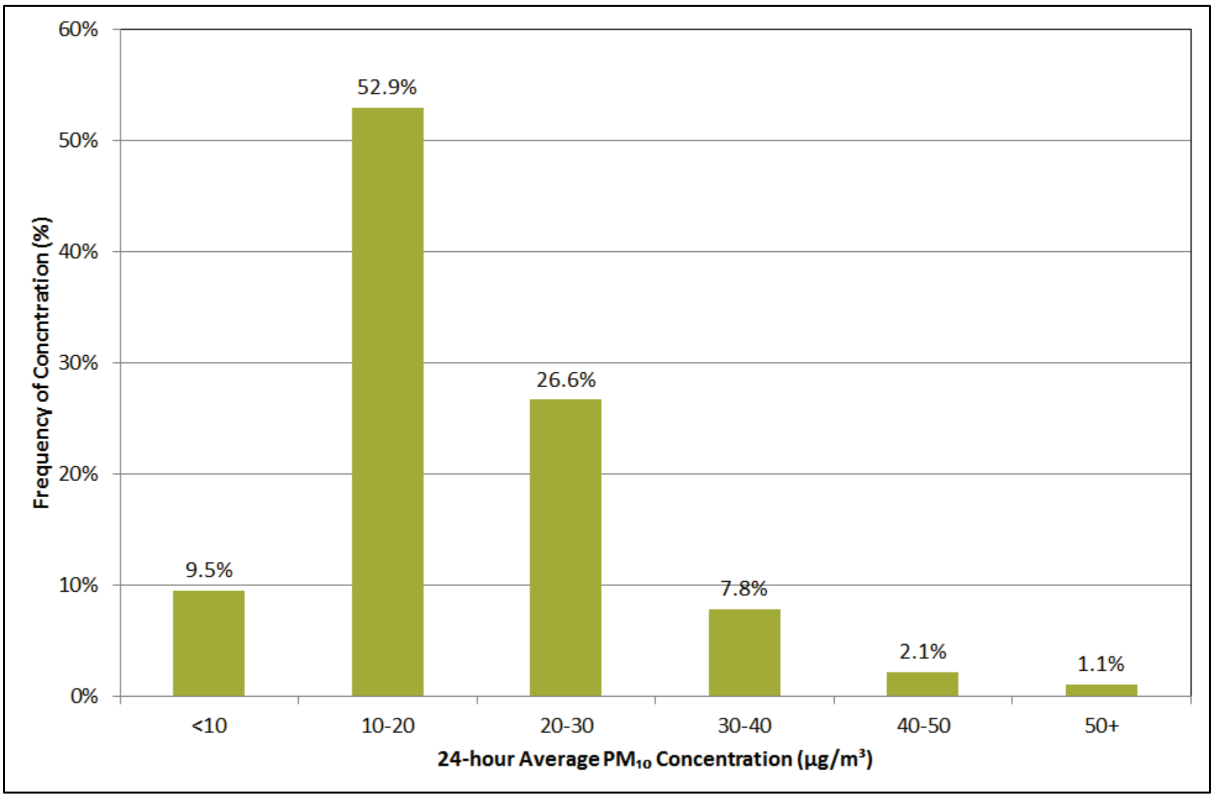

Figure 13: Frequency of 24-hour average PM_{10} concentrations – NSW OEH LHAQMN – 2010 - 2015

The LHAQMN-wide average PM_{10} concentration for the five years of monitoring data was 20.5µg/m^3. It is noted that the annual average PM_{10} concentrations reported by NCIG at the Steel River monitoring station ranged from 16.4µg/m^3 and 17.6µg/m^3 between 2010 and 2012. Consequently, it is considered that the LHAQMN-wide annual average PM_{10} concentration is conservative for the assessment of cumulative annual average concentrations from the proposed Recycling Facility.

6.2.2 $PM_{2.5}$

Daily-average $PM_{2.5}$concentrations were collated from the LHAQMN station for the period between January 2010 and February 2015.

A time-series of 24-hour average $PM_{2.5}$ concentrations recorded by the LHAQMN stations between 2010 and 2015 is presented in **Figure 16**. Additionally, a time-series of 24-hour average $PM_{2.5}$ concentrations recorded by the LHAQMN stations between August 2014 (the commencement of monitoring at Carrington and Mayfield stations) is presented in **Figure 12**. The relationship between the monitoring locations in the LHAQMN is demonstrated by the calculated *r*-values for each $PM_{2.5}$ dataset pairing as presented in **Table 8**.

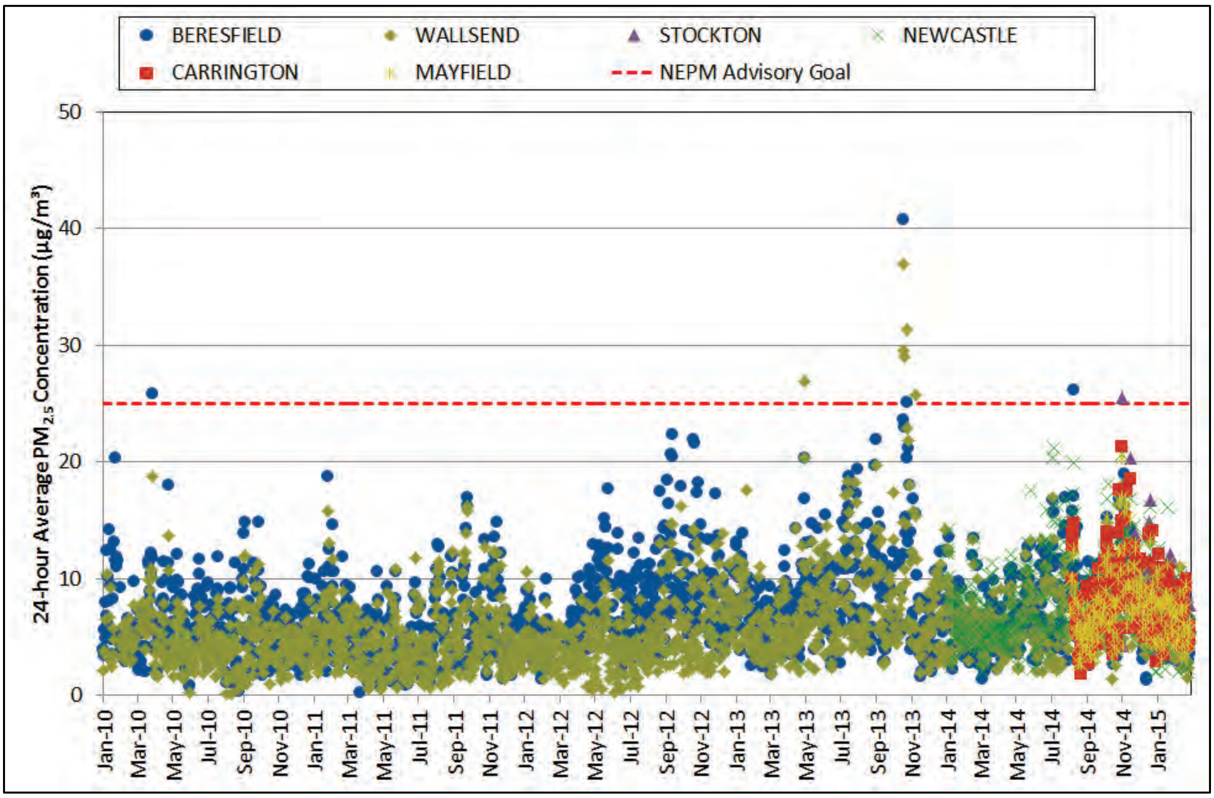

Figure 14: Time series comparison of 24-hour average $PM_{2.5}$ concentrations between 2010 and 2015 – NSW OEH LHAQMN

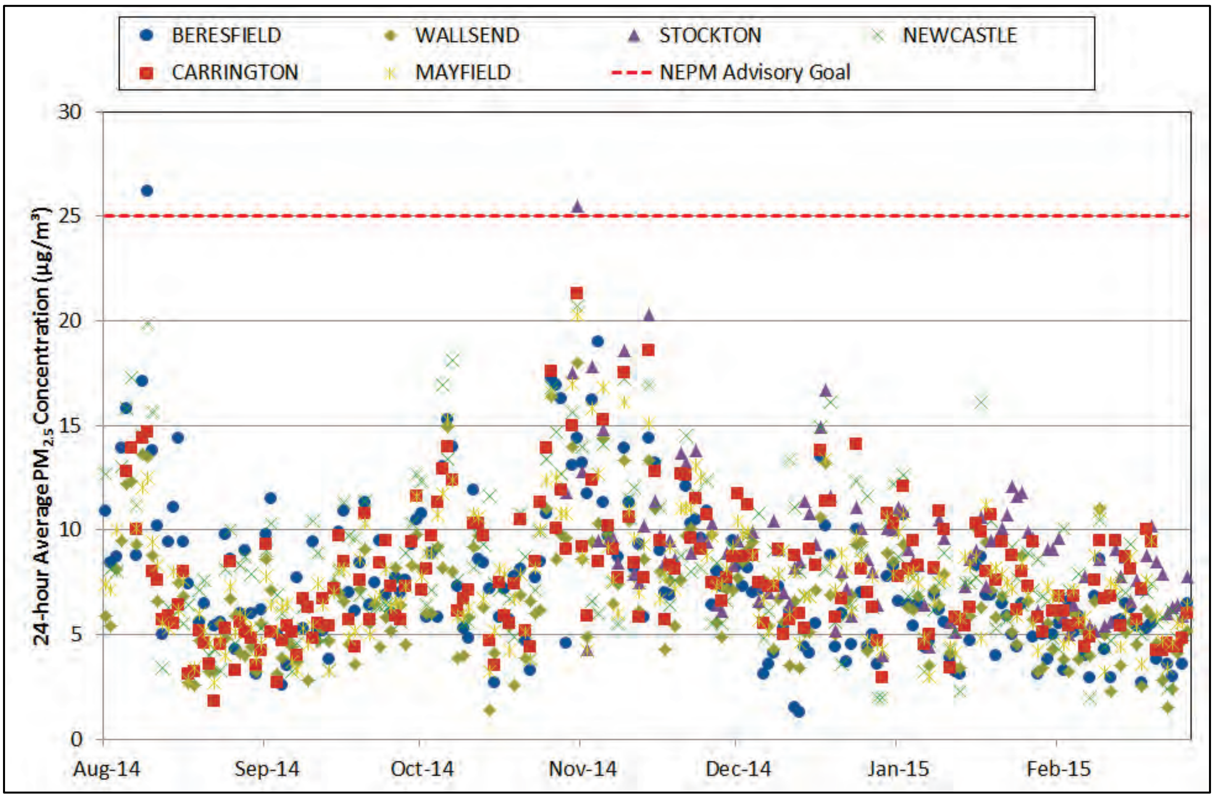

Figure 15: Time series comparison of 24-hour average $PM_{2.5}$ concentrations in2014 – NSW OEH LHAQMN

Table 9: Relationship Between $PM_{2.5}$ Monitoring Datasets – LHAQMN – August 2014 to February 2015

	Pearson Product Moment Correlation Coefficient (r)					
	Wallsend	**Carrington**	**Stockton**	**Newcastle**	**Mayfield**	**Beresfield**
Wallsend	**1**					
Carrington	0.85	**1**				
Stockton	0.78	0.85	**1**			
Newcastle	0.74	0.76	0.69	**1**		
Mayfield	0.89	0.86	0.81	0.65	**1**	
Beresfield	0.84	0.68	0.65	0.78	0.67	**1**

The following key points are identified from the table and figures:

- Daily varying $PM_{2.5}$ concentrations recorded across the LHAQMN exhibit a moderate to strong linear relationship (*r* greater than 0.65 at all stations). As was the case with

PM_{10} data, concentrations recorded by these stations show consistency, both with regards to magnitude and the daily-varying profile;

- Exceedance of the NSW EPA 24-hour criterion occurs at all LHAQMN stations. The driving influence behind these elevated concentrations is typically natural events such as dust storms and bushfires. In particular, the elevated concentrations illustrated during late 2013 are directly attributable to extensive bushfire events in NSW during that time. Additionally, an exceedance occurs in late-October 2014 attributable to bushfires in the local area;

The frequency of 24-hour average $PM_{2.5}$ concentrations recorded across the LHAQMN between 2010 and 2015 has been analysed to determine the likelihood of ambient concentrations in the area surrounding the proposed Recycling Facility. A frequency histogram of recorded $PM_{2.5}$ concentrations is presented in **Figure 16**.

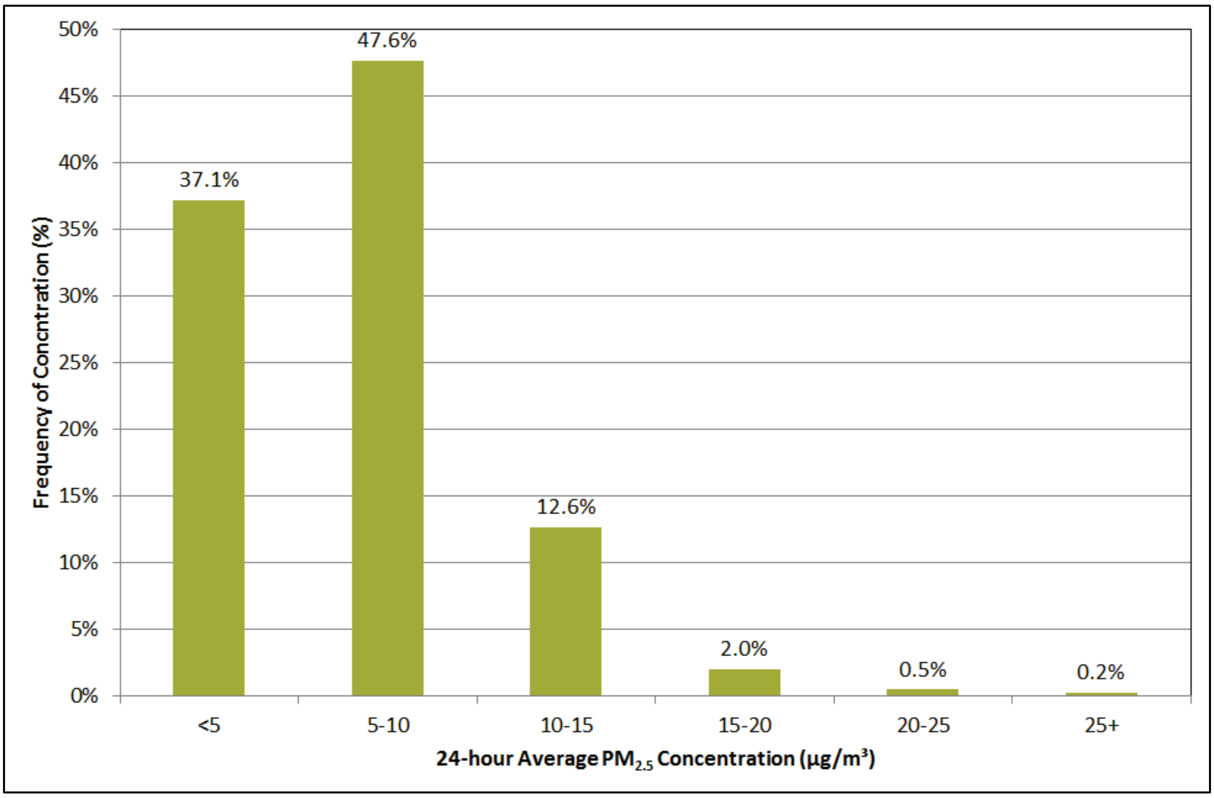

Figure 16: Frequency of 24-hour average $PM_{2.5}$ concentrations – NSW OEH LHAQMN – 2010 - 2015

The frequency distribution presented in **Figure 16** highlights that 24-hour average $PM_{2.5}$ concentrations recorded by the LHAQMN were less than 15µg/m^3 approximately 97% of the time between January 2010 and February 2015. The likelihood of a 24-hour average $PM_{2.5}$ concentration greater than the NEPM Advisory Goal of 25µg/m^3 was 0.2%, equating to approximately one day (0.73 days) in a calendar year.

Cumulative 24-hour $PM_{2.5}$ concentrations will be assessed in the same manner as 24-hour PM_{10} concentrations (see **Section 6.2.1**).

The LHAQMN-wide average $PM_{2.5}$ concentration for the five years of monitoring data was 6.7µg/m^3, which will be adopted for the assessment of cumulative annual average $PM_{2.5}$ concentrations from the proposed Recycling Facility.

6.2.3 TSP

As stated, NCIG record TSP and PM_{10} concentrations at a location within the Steel River Industrial Estate. Based on results presented within NCIG AEMR for 2010, 2011 and 2012, annual average TSP concentrations at Steel River ranged from 33.6µg/m^3 to 37.7µg/m^3. The ratio between concurrent PM_{10} and TSP concentrations at Steel River ranged from 0.47 to 0.51.

In the absence concurrent TSP monitoring data for the LHAQMN, the ratio of 0.47 from the NCIG Steel River monitoring station will be applied to the five-year annual average PM_{10} concentration to derive a corresponding TSP concentration. The derived annual average TSP concentration for the LHAQMN is 43.9µg/m^3, which will be adopted for the assessment of cumulative annual average TSP concentrations from the proposed Recycling Facility.

6.2.4 Dust deposition

NCIG maintain a dust deposition gauge at Mayfield West. Annual average monthly deposition levels are reported in NCIG AEMR for 2010, 2011 and 2012. Dust deposition levels ranged from 1.2g/m^2/month to 1.5g/m^2/month. A value of 1.5g/m^2/month will be adopted for the assessment of cumulative annual average dust deposition levels from the proposed Recycling Facility.

6.2.5 Odour

It is noted that the odour impact criterion specified by the NSW EPA is applicable to incremental (i.e. from the proposed recycling facility alone). Consequently, no consideration has been given to cumulative impacts with surrounding odourous emission sources.

7 Emission Estimation

Fugitive dust sources associated with the operation of the proposed Recycling Facility were principally quantified through the application of NPI emission estimation techniques (specifically the Emission Estimation Technique Manual for Mining) and United States Environmental Protection Agency (US-EPA) AP-42 emission factor equations. Particulate matter emissions were quantified for various particle size fractions, with the TSP fraction being estimated to provide an indication of dust deposition rates. Coarse particles (PM_{10}) and fine particle ($PM_{2.5}$) were estimated using ratios for the different particle size fractions available within the literature (principally the US-EPA AP-42).

Odour emission rates were quantified using publically available odour monitoring results relevant to green waste storage at similar recycling facilities. It is noted that there is expected to be relatively small quantities of green waste delivered to the proposed facility or stored at the facility and there will be no composting.

7.1 Sources of Operational Emissions

Sources of atmospheric emissions associated with the proposal include:

- Vehicle entrainment of particulate matter due to the haulage of material along the sealed roads in the Recycling Facility;
- Unloading of material to the raw material storage areas within the main shed and in the external yard;
- Crushing and screening of larger material in the external yard;
- Transport of broken materials to the main shed for processing;
- Crushing and screening plant operations within the main shed;
- Loading and transfer of crushed material to stockpiles;
- Loading of product to truck for dispatch;
- Odour emissions from the storage of certain materials (assumed to be 100% green waste for this assessment);
- Diesel fuel combustion by on-site plant and equipment; and
- Wind erosion associated with the external yard (conservatively assumed to be from the portion of the site that is currently unsealed although much of this will eventually be sealed or armoured).

Emissions of non-particulate matter pollutants (including oxides of nitrogen, carbon monoxide and sulphur dioxide) associated with diesel fuel combustion are likely to be minor in nature relative to particulate matter emissions. Such emissions were not included in this assessment.

7.2 Emission Scenario

To assess the potential change in emissions associated with the proposal, one emission scenario representative of peak operations was assessed. The modelling assumptions made in this assessment are listed within **Appendix B.**

The peak emissions scenario incorporates a number of conservative assumptions, including:

- Continuous processing of heavy material in the external yard. Typically these activities would occur on an infrequent campaign basis;
- It is assumed that 100% of heavy material processed in the external yard is transferred into the main shed and processed again through the crushing and screening plant, prior to loading and dispatch from site. This would be unlikely during actual operations.

Activities in the ancillary waste activities area in the east of the site have not been modelled. While exact details of activities are unknown at this time, it is expected that activities in this area will be infrequent in occurrence and have a lower emission potential than those associated with the recycling facility, particularly campaign crushing in the heavy waste yard. Emissions from the ancillary waste activities area are considered to be a minor and have not been considered further within this assessment.

It is noted that the construction phase at the site would involve minimal earthworks or material handling. Consequently, emissions from this phase have been excluded from this assessment.

7.3 Emission Reduction Factors

Based on information provided by EMM, the following emission reduction factors were applied to account for controls that are currently in place at the facility:

- Paved internal roads – 30% reduction for water application (US-EPA, 2011);
- Water spraying at stockpiles, crushing and screening plant and material handling - 50% reduction for water sprays (NPI, 2012); and
- Activities occurring within the main shed – 30% reduction for wind breaks (NPI, 2012).

7.4 Particulate Matter Emissions

Annual particulate matter emission estimates for the Recycling Facility from fugitive emission sources are presented within **Table 10**. The significance of each primary source category to annual emissions is illustrated in **Figure 17**.These tables and figures highlight that paved road and diesel combustion are key sources of particulate matter emissions from the Recycling Facility.

Further details regarding emission estimation factors and assumptions are provided in **Appendix B**.

Table 10: Calculated Annual TSP, PM_{10} and $PM_{2.5}$ Emissions			
Emission Source	**Annual Emissions (kg/annum)**		
	TSP	**PM_{10}**	**$PM_{2.5}$**
Material Delivery - Shed	415.3	79.7	19.3
Truck Unloading - Shed	31.5	11.6	1.7
Raw Material Handling - Shed	31.5	11.6	1.7
Material Delivery - Heavy Waste	346.1	66.4	16.1
Truck Unloading - Heavy Waste	22.5	8.3	1.2
Raw Material Handling - Heavy Waste	22.5	8.3	1.2
Concrete breaking - Heavy Waste	81.0	36.0	5.4
Transfer to Shed - Heavy Waste	115.4	22.2	5.4
Crushing - Shed	18.9	8.5	1.6
Screening - shed	34.7	11.7	0.8
Crushed material Handling - shed	47.3	17.3	2.6
Product Truck Loading - shed	47.3	17.3	2.6
Product Transportation from site	41.5	8.0	1.9
Wind Erosion - Exposed surfaces and stockpiles	127.5	63.8	9.6
Diesel Combustion	486.0	486.0	445.5
TOTAL	**1,868.8**	**856.4**	**516.6**

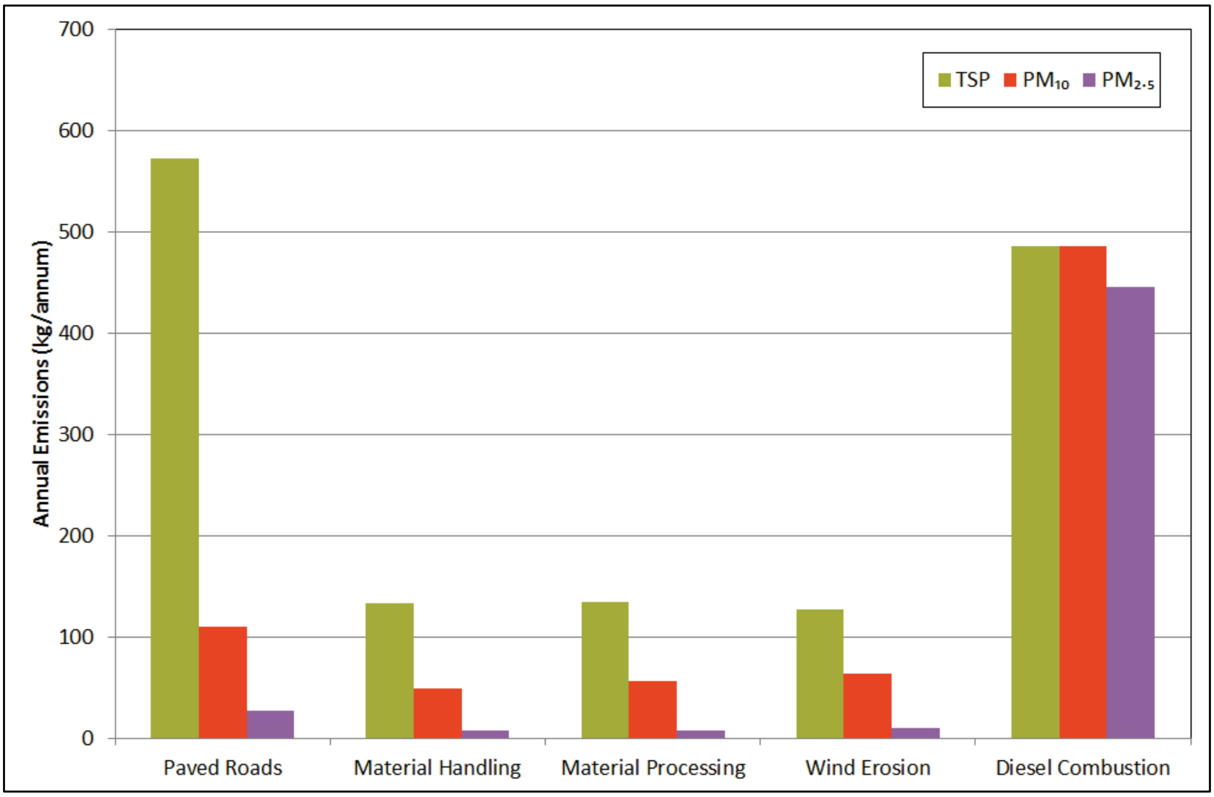

Figure 17: Comparison of Calculated Annual Emissions by Source Type

7.5 Odour Emissions

Given that that majority of material received by the Recycling Facility would be inert building waste, the potential for odour emissions arising from the proposed operations would be low.

Nevertheless, odour emissions have been quantified for this assessment for the waste streams with the highest odour potential, being green waste and glass material, although there will be no composting on site.

To quantify odour emission rates from the storage of odourous materials, a literature review of recent odour impact assessments involving green waste storage in NSW was undertaken. A summary of relevant odour emission rates are presented in **Table 11**. There were no data in the literature applicable to glass material.

Table 11: Odour Emission Rates – Green Waste Storage

Site	Specific Odour Emission Rate ($OU.m^3/m^2$/second)	Type	Reference
SITA Kemps Creek	0.134	Greenwaste area	Holmes Air Science, 2007
Spring Farm Advanced Resource Recovery Technology Facility	1.279	Greenwaste area	Pacific Environment, 2013
Veolia Camellia Recycling Facility	0.28	Dry Waste	CH2M Hill, 2013
Euchareena Road Resource Recovery	0.2	Green waste delivery bays	Heggies, 2009

It can be seen from the odour emissions rates presented in **Table 11**that a range of variability exists for green waste storage. The maximum odour emission rate presented in **Table 11**, 1.279$OU.m^3/m^2$/second, will be adopted in this assessment as a conservative assumption.

In order to quantify odour emissions, a green waste stockpile volume of up to $500m^3$ and height 2m has been assumed. It is noted that while all odour generating materials would be stored and processed within the main shed, no control factors have been applied to emission calculations.

8 Dispersion Modelling Methodology

8.1 Dispersion Model Selection and Application

As discussed in **Section5**, the CALPUFF modelling system has been selected to conduct dispersion modelling for the assessment of the Recycling Facility, drawing on a meteorological model developed for the Newcastle region by ENVIRON.

CALPUFF is a transport and dispersion model that advects “puffs” of material emitted from modelled sources, simulating dispersion and transformation processes along the transport pathway. In the simulation of pollutant dispersion, CALPUFF uses the 3-Dimensional meteorological field generated by CALMET as discussed in **Section5**. 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 assessment locations and at grid intercepts across the modelling domain. CALPOST is then used to process these files, producing tabulations that summarise results of the simulation (Scire et al., 2006).

Ground level concentrations (GLCs)are predicted for a regular Cartesian receptor grid covering a 2.5km (east-west) by 2.5km (north-south) computational domain, set within the CALMET modelling domain and centred over the Project area, with a grid resolution of 250m. GLCs were also predicted at the various discrete assessment locations listed in **Table 2**.

Modelling simulations were undertaken for the 12 month period between 1 January 2010 and 31 December 2010 using the CALMET meteorological model dataset generated for the Newcastle region (see **Section** 5 for description of input meteorology).

8.2 Source and Emissions Data

The methodology and results of the emissions inventory developed for this study are presented in **Section 7** and **Appendix B**. Emissions were allocated spatially in accordance with the site layout illustrated in **Figure 2**.Wind erosion and wind sensitive material handling emissions are varied relative to hourly wind speed. Further details are provided in **Appendix B**.

8.3 Model Results

Dispersion simulations were undertaken to predict concentrations of TSP, PM_{10}, $PM_{2.5}$, odour and dust deposition rates. Model results are expressed as the maximum predicted concentration for each averaging period at the selected assessment locations over the 2010 modelling period.

The results are presented in the following formats:

- Tabulated results of particulate concentrations, odour concentrations and dust deposition rates at the selected assessment locations are presented and discussed in **Section 9**.
- Isopleth plots, illustrating spatial variations in facility-related incremental TSP, PM_{10}, $PM_{2.5}$, odour and dust deposition are provided in **Appendix C**.

Odour impacts are expressed as a maximum 1-second (nose response) concentration for comparison with the EPA odour performance criterion of 2OU. Predicted 1-hour average concentrations were converted using the peak-to-mean ratio of 2.3, as per Table 6.1 of the NSW EPA Approved Methods for Modelling.

Isopleth plots of the maximum 24-hour average concentrations presented in **Appendix C** do not represent the dispersion pattern on any individual day, but rather illustrate the maximum daily concentration that was predicted to occur at each model calculation point given the range of meteorological conditions occurring over the 2010 modelling period.

9 Dispersion Modelling Results

9.1 Incremental (Recycling Facility-only) concentration and deposition rates

Table 12 presents the incremental concentrations and deposition rates predicted attributable to operations at the Recycling Facility (in isolation) at each of the surrounding sensitive receptors.

It can be seen from the results presented within **Table 12** that the predicted incremental concentrations are low relative to the existing background and the corresponding cumulative EPA assessment criterion or NEPM advisory goal. The deposition rates and odour concentrations predicted are well below the applicable incremental assessment criterion.

Incremental annual average dust deposition level isopleth plots for proposed operations are presented in **Appendix C**.

9.2 Cumulative (Recycling Facility plus background) concentration and deposition rates

9.2.1 Annual Average Concentrations

Table 13 presents the cumulative annual average concentrations for TSP, PM_{10} and $PM_{2.5}$ and cumulative annual average dust deposition. It can be seen from the results presented that the cumulative impacts from the Recycling Facility will be below the applicable criterion or advisory goal across all sensitive receptor locations.

9.2.2 24-hour Average Concentrations

From the incremental results presented in **Table 12**, receptor R5has the highest predicted 24-hour average impact for PM_{10} and $PM_{2.5}$.

To provide an analysis of the likelihood of compliance with the NSW EPA assessment criterion for 24-hour average PM_{10} (50µg/m^3) and NEPM Advisory Goal Criterion for 24-hour average $PM_{2.5}$ (25µg/m^3), the change in concentration frequency distribution was calculated.

Each predicted 24-hour average concentration for receptor R5 (365 individual concentrations) was paired with each recorded 24-hour average concentration recorded by the LHAQMN between January 2010 and February 2015 (5,914 and 4,557 individual concentrations for PM_{10} and $PM_{2.5}$ respectively). Each combination of model prediction and recorded concentration (2,152,969 potential combinations for PM_{10} and 1,658,748 potential combinations for $PM_{2.5}$) was collated, with the resultant frequency distribution presented in **Figure 18** for PM_{10} and **Figure 19** for $PM_{2.5}$.

The frequency histograms presented in **Figure 18** and **Figure 19**show that the addition of the Recycling Facility generated impacts predicted at receptor R5 to ambient background levels in the local area would not result in a discernible change to existing PM_{10} or $PM_{2.5}$ concentrations.

On the basis of this cumulative analysis and given that receptor R5 had the highest predicted 24-hour average PM_{10} and $PM_{2.5}$ concentrations of the surrounding receptors, it is concluded that Recycling Facility emissions would have a very low potential for adverse impacts in the surrounding environment.

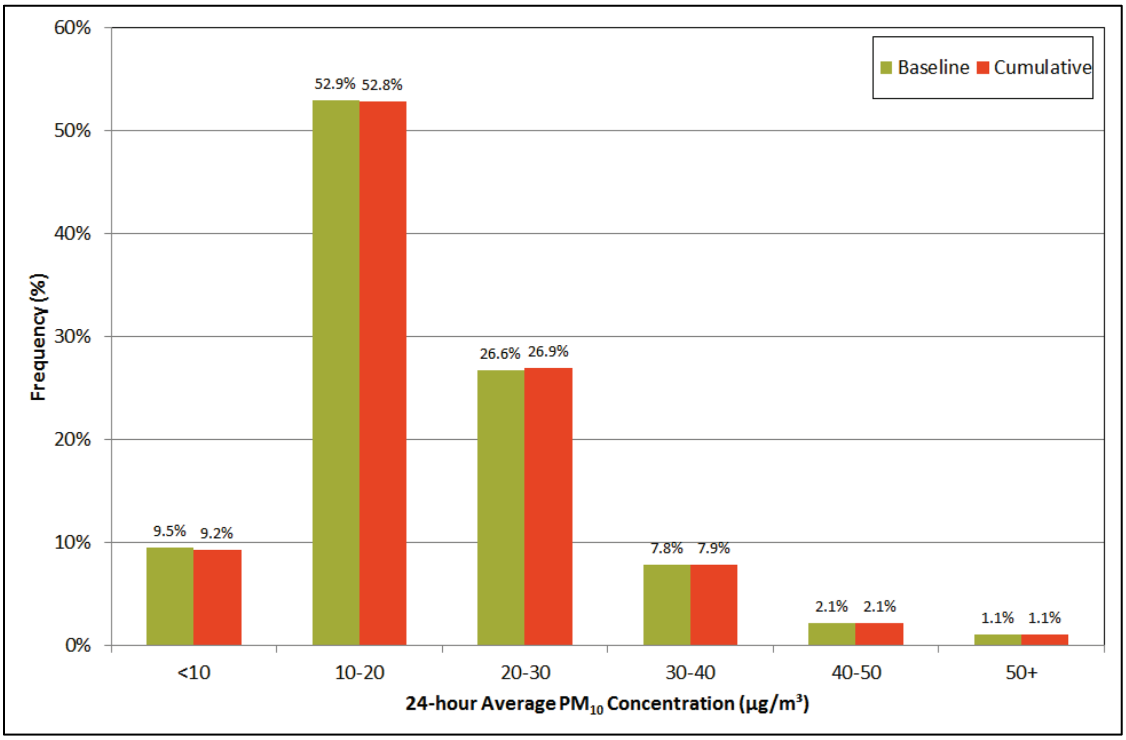

Figure 18: Frequency Distribution of All Potential Cumulative 24-hour Average PM_{10} Concentration Combinations – Receptor R5

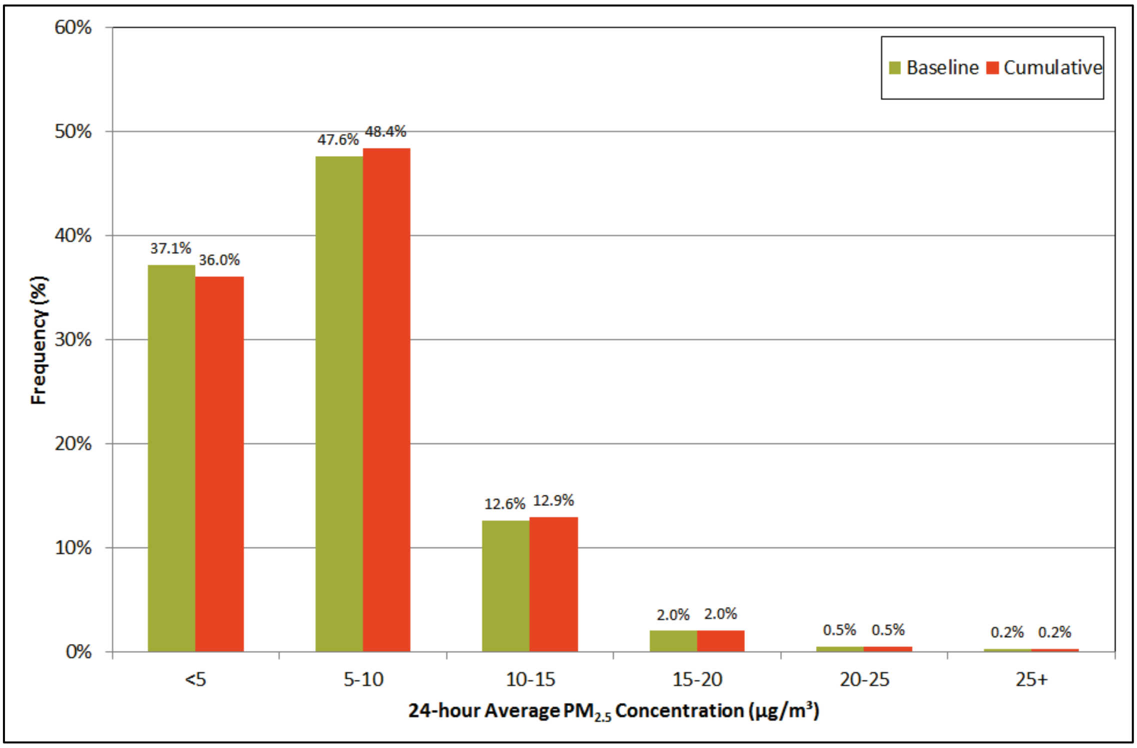

Figure 19: Frequency Distribution of All Potential Cumulative 24-hour Average $PM_{2.5}$ Concentration Combinations – Receptor R5

Table 12: Predicted Incremental (Recycling Facility-Only) Concentrations and Deposition Rates at Surrounding Receptors

Receptor Location	Modelled Pollutant						
	Annual Average TSP	24-hour Average PM_{10}	Annual Average PM_{10}	24-hour Average $PM_{2.5}$	Annual Average $PM_{2.5}$	Annual Average Dust Deposition	Maximum 1-second Odour
Unit	µg/m³					g/m^2/month	OU
R1	<0.1	0.1	<0.1	0.1	<0.1	<0.1	0.1
R2	<0.1	0.1	<0.1	0.1	<0.1	<0.1	0.1
R3	<0.1	0.1	<0.1	0.1	<0.1	<0.1	0.1
R4	<0.1	0.2	<0.1	0.2	<0.1	<0.1	0.1
R5	<0.1	0.3	<0.1	0.2	<0.1	<0.1	0.1
R6	<0.1	0.3	<0.1	0.2	<0.1	<0.1	0.1
R7	<0.1	0.3	<0.1	0.2	<0.1	<0.1	0.1
R8	<0.1	0.3	<0.1	0.2	<0.1	<0.1	0.1
R9	<0.1	0.2	<0.1	0.1	<0.1	<0.1	0.1
R10	<0.1	0.2	<0.1	0.1	<0.1	0.2	0.1
R11	<0.1	0.1	<0.1	0.1	<0.1	0.1	0.4
R12	<0.1	0.2	<0.1	0.1	<0.1	<0.1	0.4
R13	<0.1	0.2	<0.1	0.2	<0.1	<0.1	0.3
Criterion / Advisory Goal	**90**[1]	**50**[1]	**30**[1]	**25**[1]	**8**[1]	**2**	**2**

Note: 1 – Criterion or Advisory Goal for pollutant is applicable to cumulative concentrations

Table 13: Predicted Cumulative Annual Average Concentrations and Deposition Rates at Surrounding Receptors

Receptor Location	Modelled Pollutant			
	Annual Average TSP	Annual Average PM_{10}	Annual Average $PM_{2.5}$	Annual Average Dust Deposition
Unit	µg/m³			g/m^2/month
R1	43.9	20.5	6.7	1.5
R2	43.9	20.5	6.7	1.5
R3	43.9	20.5	6.7	1.5
R4	43.9	20.5	6.7	1.5
R5	43.9	20.5	6.7	1.5
R6	43.9	20.5	6.7	1.5
R7	43.9	20.5	6.7	1.5
R8	43.9	20.5	6.7	1.5
R9	43.9	20.5	6.7	1.5
R10	43.9	20.5	6.7	1.7
R11	43.9	20.5	6.7	1.6
R12	43.9	20.5	6.7	1.5
R13	43.9	20.5	6.7	1.5
Criterion / Advisory Goal	**90**	**30**	**8**	**4**

10 Air Quality Mitigation Techniques

The modelling results show that there is unlikely to be an adverse impact associated with emissions from the Recycling Facility in the surrounding environment. The following management measures were integrated into the dispersion modelling process and will be implemented during construction and operations to minimise air quality impacts:

- all existing sealed/hardstand areas will be retained;
- disturbance of unsealed areas by plant or vehicle movements will be prevented by surfacing areas with coarse crushed concrete/rock or asphalt (leaving only 4,000 m^2 of the 89,000 m^2 site unsealed);
- water sprays will be used over any other bare or unsealed surfaces that have potential to generate unacceptable amounts of dust;
- all vehicle movements will be restricted to designated routes marked out by appropriate signage and fencing using sealed internal roads;
- access to unsealed areas will be prevented;
- water sprays will be used at stockpiles, crushing and screening plants and during material handling;
- a wheel wash in the weighbridge area will be used to clean truck tyres to prevent mud or sediment being carried to and deposited on the access road (and public roads);
- existing sheds will be used to undertake particulate generating activities where possible; and
- no composting will be undertaken on the site.

11 Greenhouse Gas Assessment

Operation of the Recycling Facility will generate greenhouse gas (GHG) emissions. The NSW Department of Planning and Environment Secretary's environmental assessment requirements (SEARs) for the proposal specify the requirement to undertake a quantitative assessment of the potential Scope 1, 2 and 3 greenhouse gas (GHG) emissions from the proposal.

This section of the report presents results from the quantification of Scope 1, 2 and 3GHG emissions from a range of sources related to the facility. The extent of such emissions is presented relative to the total NSW and Australian GHG emissions, and the implications of such emissions qualitatively considered.

11.1 Greenhouse Gases and Climate Change

GHGs are gases present in the atmosphere that have the ability to absorb long-wave radiation reflected from the Earth's surface, adding heat to the atmosphere. GHGs include water vapour, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

With the exception of water vapour, atmospheric concentrations of GHGs are influenced by human activities. The Intergovernmental Panel on Climate Change (IPCC, 2007) states that over the past 250 years, atmospheric concentrations of CO_2, CH_4, N_2O and other GHGs have notably increased and are attributable to human activities since the Industrial Revolution. The extra heat absorbed by increasing quantities of GHGs in the atmosphere has been linked to observed changes in the climate system over recent decades by the Intergovernmental Panel on Climate Change (IPCC).

11.2 Methodology Adopted

This section sets out the boundaries for the Facility, both organisational and operational and provides methodology adopted to derive Scope 1, 2 and 3 GHG emissions for the proposal and the types of GHG emissions reported in this assessment.

11.2.1 Organisational Boundary

The organisational boundary for this assessment has been defined using the Operational Control approach, which is defined in the National Greenhouse and Energy Reporting Act (NGERS Act - Australian Government, 2007). In the case of the proposal, Benedict Recycling will account for 100% of GHG emissions over which it has operational control. It will not account for emissions in which it owns an interest but does not have operational control.

Section 11 of the NGERS Act defines Operational Control as follows:

> *A corporate group member has operational control of a facility if it has the authority to introduce and implement any or all of the operating, health and safety and environmental policies for the facility. Only one corporation or group member can have operational control of a facility at a time.*
>
> *If there is uncertainty as to which corporation or member has operational control of a facility, the corporation or member deemed to have operational*

control will be the one with the greatest authority to introduce and implement operating and environmental policies.

11.2.2 Operational Boundary (Emission Scopes)

Direct and indirect GHG emissions are defined by the Department of Environment (DoE, then Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education) within the National Greenhouse Gas Accounting Factors 2013 workbook (NGAF 2013 – DIICCSRTE, 2013), as the following:

Direct emissions are produced from sources within the boundary of an organisation and as a result of that organisation's activities. These emissions mainly arise from the following activities:

- *generation of energy, heat, steam and electricity, including carbon dioxide and products of incomplete combustion (methane and nitrous oxide);*
- *manufacturing processes which produce emissions (for example, cement, aluminium and ammonia production);*
- *transportation of materials, products, waste and people (for example, use of vehicles owned and operated by the reporting organisation);*
- *fugitive emissions: intentional or unintentional GHG releases (such as methane emissions from coal mines, natural gas leaks from joints and seals); and*
- *on-site waste management, such as emissions from landfill sites.*

Indirect emissions are emissions generated in the wider economy as a consequence of an organisation's activities (particularly from its demand for goods and services), but which are physically produced by the activities of another organisation. Examples of indirect emission sources include:

- *consumption of purchased electricity;*
- *upstream emissions generated in the extraction and production of fossil fuels;*
- *downstream emissions from transport of an organisation's product to customers; and*
- *emissions from contracted/outsourced activities.*

On the basis of the above definitions, the NGAF 2013 workbook prescribes a range of emission factors to estimate associated GHG emissions. These emissions factors are activity-specific, with the scope of the activity determining the emission factor used. Specifically, the scope that emissions are reported under is determined by whether the activity is within the organisational boundary (direct—Scope 1) or outside it (indirect—Scope 2 and 3). The NGAF 2013 workbook defines the scope of emissions through the following:

- **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.
- **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.

- Various emission factors can be used to calculate ***Scope 3 emissions***. For ease of use, the NGAF workbook reports specific scope 3 emission factors for organisations that:
  - burn fossil fuels: to estimate their indirect emissions attributable to the extraction, production and transport of those fuels; or
  - consume purchased electricity: to estimate their indirect emissions from the extraction, production and transport of fuel burned at generation and the indirect emissions attributable to the electricity lost in delivery in the transmission and distribution network.

11.3 Emission Sources

Direct (Scope 1) and indirect (Scope 2) GHG emissions have been defined for the proposal as follows:

- Scope 1 – Diesel fuel combustion by mobile plant;
- Scope 2 – Consumption of purchased electricity; and
- Scope 3 – Upstream emissions generated from supply of raw materials, downstream emissions generated from off-site transportation of product and employee travel;

It is considered that the emissions sources listed above represent the most significant GHG associated with the facility. Other minor sources of GHG emissions may be associated with the facility, including those generated by waste disposal. These emissions are anticipated to be relatively negligible in comparison with the emission sources listed above and have therefore not been considered further in this assessment.

11.4 Reporting of GHG

The assessment has calculated annual emissions for the following GHGs, emitted by the emission sources identified in **Section 11.3**:

- CO_2;
- CH_4; and
- N_2O.

The relative importance of a GHG is measured in terms of its Global Warming Potential (GWP). The GWP is an index used to convert relevant non-CO_2 gases to a carbon dioxide equivalent (CO_2-e) by multiplying the quantity of the gas by its GWP. The GWP for each type of GHG has been taken from NGAF 2013. The GWPs of relevance to this assessment are:

- CH_4: GWP of 21 (21 times more effective as a GHG than CO_2); and
- N_2O: GWP of 310 (310 times more effective as a GHG than CO_2).

Emissions from each of the assessed GHG have been reported in units of tonnes of carbon dioxide equivalents (t CO_2-e).

11.5 Operational Details

GHG emissions generated by the facility have been calculated for peak operations, consistent with the air quality assessment conducted within this report. Peak production relates to a waste delivery rate of 90,000 tpa.

Estimated annual diesel consumption is135kL/annum, which would include consumption by mobile plant and electricity generation by onsite generator. Electricity consumption (from the grid) is unknown at this time, but is anticipated to be very minor relative to diesel consumption and has not been included in calculations.

11.6 GHG Emission Factors

11.6.1 Scope 1 - Diesel Fuel Combustion

Emissions from diesel fuel consumption have been calculated based on equations provided in NGAF 2013 workbook.

The following equation is used to calculate fuel-related emissions for solid, liquid and gaseous fuels.

$$\textit{GHG Emissions}_{\textit{fuel}} = (\textit{Fuel Quantity x Energy Content}) \text{ x } (\textit{Emission Factor}) / 1000$$

where,

GHG Emissions $_{fuel}$ is the emissions attributed to a particular GHG (CO_2, CH_4 or N_2O), in tonnes of carbon dioxide equivalent (t CO_2-e), due to the combustion of a particular fuel;

Fuel Quantity is the quantity of fuel combusted in one year (kL/yr);

Energy Content is the energy content of the fuel combusted (GJ/kL); and

Emission Factor is the GHG emission factor (kg CO_2-e/GJ) for the relevant GHG (CO_2, CH_4 or N_2O), emitted due to fuel combustion.

Table 14 shows the energy content and GHG emission factor for diesel fuel.

Table 14: Fuel Energy Content and GHG Emission Factors

Types of fuel combusted (Stationary and Non-Stationary)	Energy Content Factor (GJ/kL)	Emission Factor for GHG Assessed from Fuel Combustion (kg CO_2-e/GJ)		
		CO_2	CH_4	N_2O
Diesel	38.6	69.2	0.1	0.2

11.7 Scope 3 emissions - upstream

The upstream activities that contribute to Scope 3 emissions at the Recycling Facility include the production and supply of fuel (diesel oil).

Scope 3 emissions for fuel consumption are quantified in the same way as Scope 1 emissions, however the emission factors differ and are presented in **Table 15**.

Table 15. Emission factor for Scope 3 emissions from consumption of fuel	
Diesel	5.3 (kg CO_2-e/GJ)

11.8 Scope 3 emissions - downstream

Downstream emissions are estimated for the transportation of product to local markets. In estimating GHG emissions from transportation, the following assumptions are made:

- All product will be transported by road truck to a distance of 25km from site;
- Product dispatch will involve 2,800 truck trips from site; and
- Generic truck diesel consumption of 2L/km assumed.

11.9 Scope 3 emissions –employee travel

Emissions are estimated for the travel of employees to and from site each day. In estimating GHG emissions from employee travel, the following assumptions are made:

- All employees travel 10km each way to site;
- A total of 12 employees will be required for the operation of the site; and
- A generic car petrol consumption of 8km/L is assumed.

11.10 Calculated Greenhouse Gas Emissions and Environmental Impact

11.10.1 Calculated Annual GHG Emissions

Table 16 provides the calculated annual greenhouse gas emissions (as CO_2-e) for each source detailed above, based on peak operations of the facility.

Table 16: Calculated Annual GHG Emissions

Emission Scope / Source	Annual GHG Emissions (t CO_2-e / year)
Scope 1 – Diesel Fuel	364.2
Scope 2 – Purchased Electricity	N/A
Scope 3 – Upstream emissions	27.6
Scope 3 – Downstream emissions	12.3
Scope 3 – Employee travel	10.9
Total	**415.0**

11.10.2 Impacts of Emissions on Environment

The extent of the warming produced by a given rise in GHG concentrations depends on ‘feedback’ processes in the climate system, which can either amplify or dampen a change (CSIRO, 2011, p.15). According to the CSIRO (2011) the net effect of all climate feedbacks, given global GHG emissions, is to amplify the warming caused by increasing CO_2 and other GHGs of human origin. The best estimate of annual average warming by 2030 (above 1990 temperatures) is given as being around 1.0ºC across Australia, with warming of 0.7°C to 0.9ºC in coastal areas and 1°C to1.2ºC inland (CSIRO, 2011, p. 35). In regard to rainfall, the CSIRO notes that drying is likely in southern areas of Australia, especially in winter, and in southern and eastern areas in spring, due to a contraction in the rainfall belt towards the higher latitudes of the southern hemisphere. More extreme intense rainfall events are predicted for most locations, with the drying and increased evaporation resulting in a decline in soil moisture over parts of Australia. An increase in fire-weather risk is given as being likely with warmer and drier conditions (CSIRO, 2011).

Potential environmental effects in Australia associated with climate change due to global GHG emissions, are documented to include loss of biodiversity, water security issues in parts of Australia, increased drought and fire incidents, and risks of sea level rise and coastal flooding (IPCC, 2007). Given the complexity of climate feedback processes, the non-linear relationship between GHG emissions and climate changes, and uncertainties in climate change projections, the specific impact of GHG emissions from the facility on the climate system, and as a consequence the broader environment, cannot be quantified with any certainty. The relative significance of GHG emissions from the facility may however be qualitatively evaluated by considering the magnitude of such emissions compared to total GHG emissions released within NSW and Australia.

The most recently published annual GHG emissions for NSW and Australia have been resourced from the State and Territory Greenhouse Gas Inventories 2011-2012 (DoE, 2014). According to this Inventory, annual GHG emissions for NSW and Australia in 2011-2012 totalled 165.6 Mt and 554.9 Mt CO_2-e/yr respectively. The significance of Facility-related GHG emissions with regards to NSW and Australian annual GHG emissions is presented within **Table 17**.

Table 17: Comparison of Annual Facility-generated GHG Emissions with NSW and Australian GHG Emissions

	Significance of Annual GHG Emissions from Facility
NSW	0.00025%
Australia	0.00007%

It can be seen from the results presented within **Table 17** that GHG emissions generated by the facility represent 0.00025% and 0.00007% of annual NSW and Australian GHG emissions for proposed peak operations.

11.11 Energy management & greenhouse gas emission mitigation

As identified above, the most significant contributor to direct emissions from the facility is the consumption of diesel fuel by mobile plant and equipment and onsite power generation. The following recommendations are made for direct emission reductions:

- on-site equipment will be regularly maintained and serviced to maximise fuel efficiency;
- vehicle kilometres travelled on site will be minimised;
- the mains power will be reconnected as soon as possible allowing access to electricity generated more efficiently than using an on-site generator; and
- energy efficiency will be progressively reviewed and implemented throughout the life of the facility.

12 Conclusions

ENVIRON was commissioned by EMM on behalf of Benedict Recycling to prepare an AQIA for the proposed the Recycling Facility.

Emissions of particulate matter were estimated for peak proposed operations. Atmospheric dispersion modelling predictions of air pollution emissions was undertaken using the CALPUFF dispersion model.

The results of the dispersion modelling conducted for the proposed operational scenario highlight the following:

- Facility increment-only (excluding ambient background) particulate concentrations, odour concentrations and deposition levels from both proposed operations are very low relative to existing background and the applicable assessment criterion at surrounding receptors;
- The magnitude of short-term (24-hour average) concentrations of PM_{10} and $PM_{2.5}$relative to ambient local background concentrations is very low. The potential for cumulative exceedance of short-term criterion is considered unlikely; and
- Taking background ambient air quality concentrations into account, including elevated natural events, annual average TSP, PM_{10} and $PM_{2.5}$ concentrations are predicted to comply with applicable assessment criterion at all surrounding receptors.

The potential for adverse impact upon the surrounding environment due to air emissions from the proposed Recycling Facility is therefore low. On the basis of the modelling conducted within this assessment, it is considered unlikely that emissions from the Recycling Facility would negatively impact upon the surrounding area.

To evaluate the proposal's greenhouse gas (GHG) emissions and determine the Recycling Facility's contribution to NSW and Australian annual GHG emissions, emissions were estimated based on information provided by Benedict Recycling and relevant GHG emission factors. GHG emissions were calculated for:

- Direct emissions produced from sources within the boundary of the facility and as a result of activities at the facility (Scope 1 emissions); and
- Indirect emissions generated in the wider economy as a consequence of the Proposal activities, but which are physically produced by the activities of another organisation indirectly (Scope 2 and 3 emissions).

Key findings are as follows:

- Total Facility GHG emissions (from direct and indirect sources) from the proposal were estimated to be 415t of Carbon Dioxide Equivalent per year (CO_2–e/yr) for proposed operations;
- Emissions generated by the proposal represent 0.00025% and 0.00007% of annual NSW and Australian GHG emissions (relative to year 2011-2012) respectively.

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14 Glossary of Acronyms And Symbols

AEMR Annual Environmental Monitoring Report

AHD Australian Height Datum

Approved Methods for Modelling Approved Methods for the Modelling and Assessment of Air Pollutants in NSW

AWS Automatic Weather Station

BoM Australian Bureau of Meteorology

CH_4 Methane

CO_2-e CO2 equivalent

CSIRO Commonwealth Scientific and Industrial Research Organisation

D/T dilution-to-threshold

DCCEE Department of Climate Change and Energy Efficiency

DEC NSW Department of the Environment and Conservation

DIICCSRTE Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education

DGRs Director General's Assessment Requirements

DoE Department of Environment

EMM EMGA Mitchell McLennan

ENVIRON ENVIRON Australia Pty Ltd

EPL Environmental Protection Licence

GHG Greenhouse Gas

GWP Global Warming Potential

HFCs Hydrofluorocarbons

IPCC Intergovernmental Panel on Climate Change

LGA Local government area

µg Microgram (g x 10-6)

µm Micrometre or micron (metre x 10-6)

m^3 Cubic metre

NCIG Newcastle Coal Infrastructure Group

NEPC National Environment Protection Council

NEPM National Environment Protection Measure

NHMRC National Health and Medical Research Council

NGAF National Greenhouse Accounts Factors

NPI National Pollutant Inventory

N_2O Nitrous Oxide

OU Odour unit

PFCs perfluorocarbons

PM_{10} Particulate matter less than 10 microns in aerodynamic diameter

$PM_{2.5}$ Particulate matter less than 2.5 microns in aerodynamic diameter

OEH Office of Environment and Heritage

SIAS Strategic Impact Assessment Study

SEARs Secretary's Environmental Assessment Requirements

TAPM "The Air Pollution Model"

The Recycling Facility The proposed Mayfield West Recycling Facility

tpa Tonnes per annum

TSP Total Suspended Particulate

US-EPA United States Environmental Protection Agency

VOC Volatile Organic Compounds

VKT Vehicle Kilometres Travelled

Appendix A

Seasonal and Diurnal Wind Roses

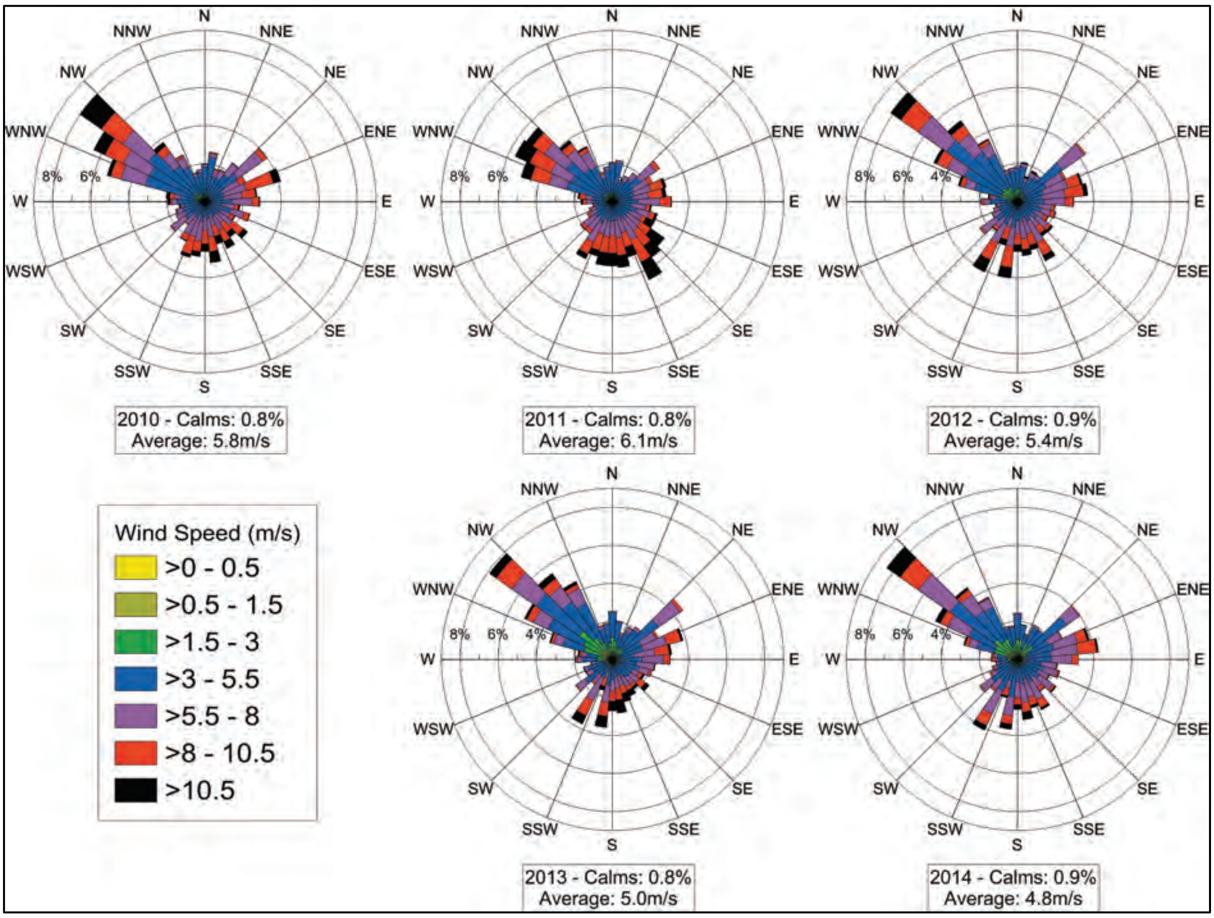


Figure A1 – Inter-annual Wind Rose Comparison – BoM Nobbys Signal Station – 2010 to 2014

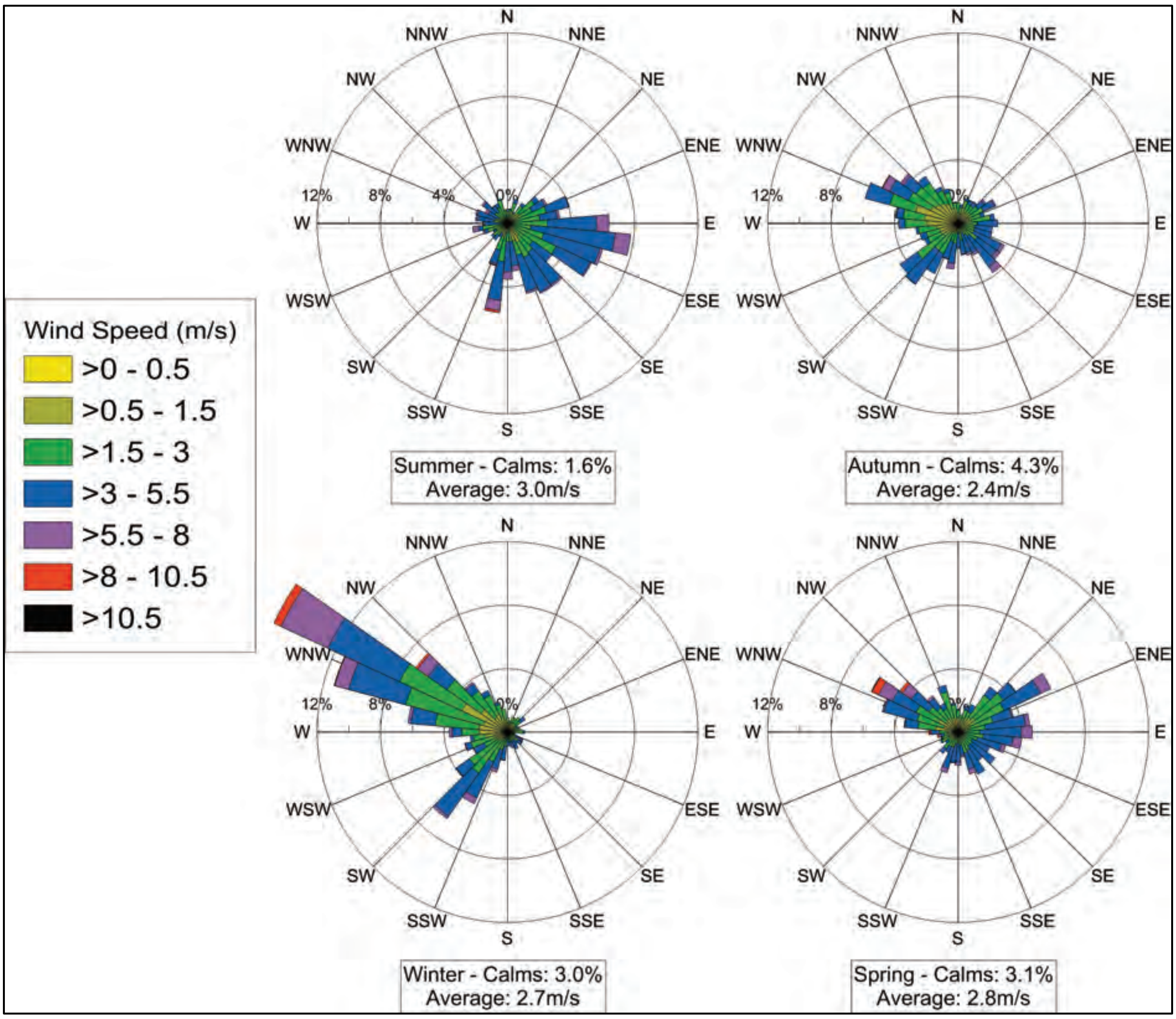


Figure A2 – Seasonal Wind Roses – Recycling Facility site - 2010

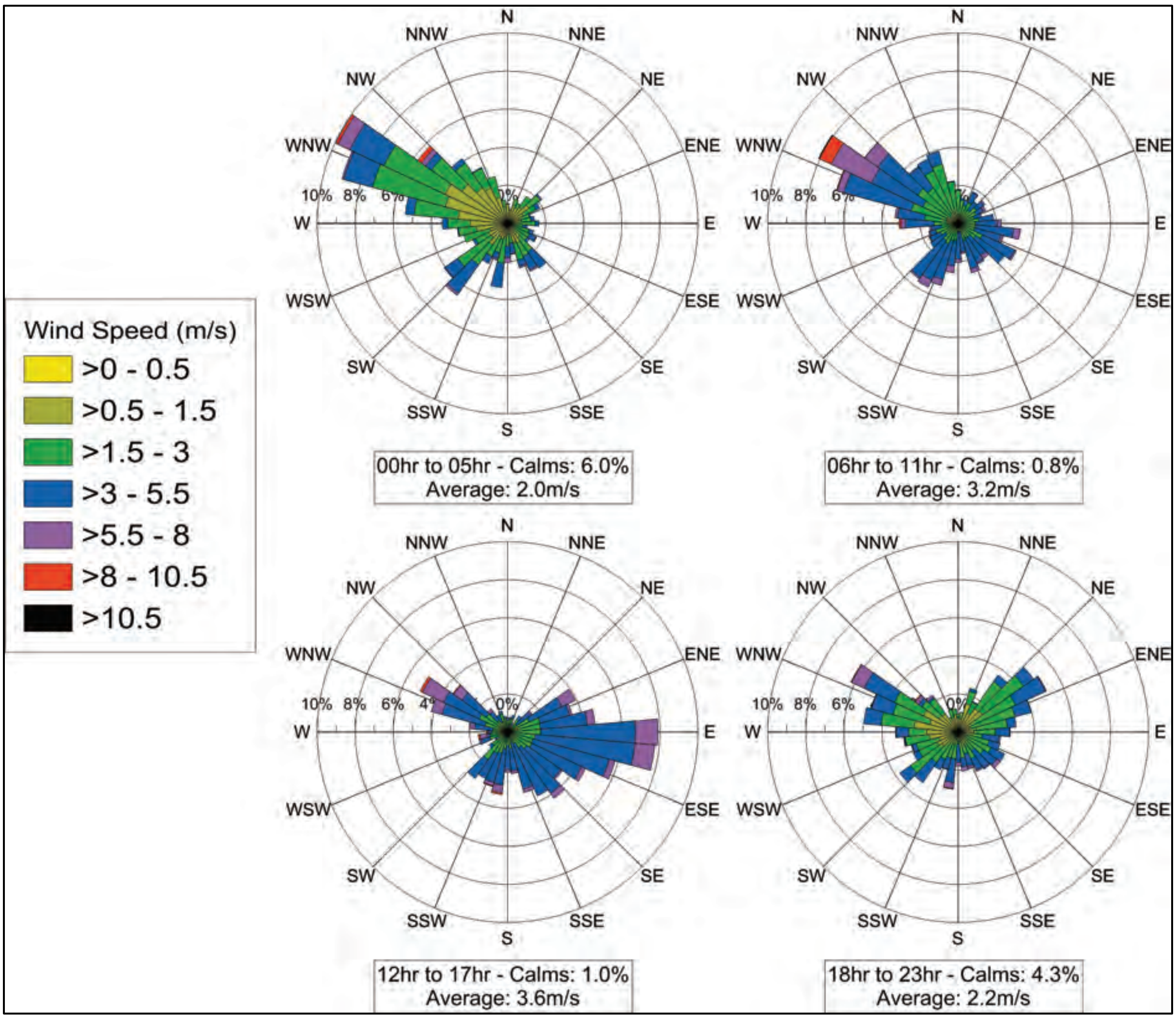


Figure A3 – Diurnal Wind Roses – Recycling Facility site - 2010

Appendix B

Emissions Inventory Background

Introduction

Air emission sources associated with the various phases of the Project were identified and quantified through the application of accepted published emission estimation factors, collated from a combination of United States Environmental Protection Agency (US-EPA) AP-42 Air Pollutant Emission Factors and NPI emission estimation manuals, including the following:

- NPI Emission Estimation Technique Manual for Mining (NPI, 2012);
- AP-42 Chapter 11.19.2 –Crushed Stone Processing and Pulverized Mineral Processing (US-EPA, 2004);
- AP-42 Chapter 13.2.1 – Paved Roads (US-EPA 2011); and
- AP-42 Chapter 11.9 - Western Surface Coal Mining (US-EPA 1998).

Particulate emissions were quantified for various particle size fractions. TSP emissions were estimated and modelled to predict dust deposition rates and TSP concentrations. PM_{10} and $PM_{2.5}$ emissions were estimated using ratios for the different particle size fractions available within the literature, as documented in subsequent sections.

Sources of Particulate Matter Emissions

Air emissions associated with the facility will primarily comprise of fugitive particulate matter releases. Sources of atmospheric emissions associated with the facility include:

- Vehicle entrainment of particulate matter due to the haulage of material along the sealed roads in the Recycling Facility;
- Unloading of material to the raw material storage areas within the main shed and in the external yard;
- Crushing and screening of larger material in the external yard;
- Transport of broken materials to the main shed for processing;
- Crushing and screening plant operations within the main shed;
- Loading and transfer of crushed material to stockpiles;
- Loading of product to truck for dispatch;
- Odour emissions from the storage of certain materials (assumed to be 100% green waste for this assessment);
- Diesel fuel combustion by on-site plant and equipment; and
- Wind erosion associated with the external yard (conservatively assumed to be from the portion of the site that is currently unsealed although much of this will eventually be sealed or armoured).

Operational Assumptions

To compile an emissions inventory for current and proposed operations at the facility, the following general assumptions were made:

- Operational activities, occur between 6am and 6pm[1];
- Delivery, processing and dispatch rate of material is 90,000tpa;
- Areas for wind erosion sources in the external yard were assumed to be 0.3ha;
- Haul distances for both scenarios are as follows:

Road	Length
Material delivery to shed	1.0km
Material delivery to yard	0.6km
Transfer from yard to shed	0.1km
Paved material dispatch	0.5km

- Average truck weights (accounting for loaded and unloaded weights) is assumed to be 30t. This is considered conservative as delivery vehicles may range from light vehicles with box trailers to truck and dog heavy vehicles.

Particulate Matter Emission Factors Applied

The emission factor equations applied within the assessment are documented in this subsection. **Table B1** lists the uncontrolled emission factors that were applied for the two emission scenarios, references the source of the listed factors and whether the factor is derived from a specific equation or published default.

Table B1 Emission Estimation Factors Applied for All Scenarios

Emission Source	Emission Factor			Emission Factor Unit	Source of Factor
	TSP	PM_{10}	$PM_{2.5}$		
Material Delivery - Shed	0.04237	0.00813	0.00197	kg/Vehicle KM Travelled	AP-42 13.2.1 - Paved Road Equation
Truck Unloading - Shed	0.00150	0.00055	0.00008	kg/tonne	USEPA AP-42 11.19.2 – Material Transfer Factor
Raw Material Handling - Shed	0.00150	0.00055	0.00008	kg/tonne	USEPA AP-42 11.19.2 – Material Transfer Factor
Material Delivery - Heavy Waste	0.04237	0.00813	0.00197	kg/Vehicle KM Travelled	AP-42 13.2.1 - Paved Road Equation
Truck Unloading - Heavy Waste	0.00150	0.00055	0.00008	kg/tonne	USEPA AP-42 11.19.2 – Material Transfer Factor
Raw Material Handling - Heavy Waste	0.00150	0.00055	0.00008	kg/tonne	USEPA AP-42 11.19.2 – Material Transfer Factor
Concrete breaking - Heavy Waste	0.00270	0.00120	0.00018	kg/tonne	USEPA AP-42 11.19.2 - Tertiary Crushing Factor
Transfer to Shed - Heavy Waste	0.54954	0.10548	0.02552	kg/Vehicle KM Travelled	AP-42 13.2.1 - Paved Road Equation
Crushing - Shed	0.00060	0.00027	0.00005	kg/tonne	USEPA AP-42 11.19.2 -

[1] The recycling facility will accept waste deliveries (from businesses and the public) and dispatch materials between 6 am and 6 pm Monday to Friday and between 6 am and 5 pm on Saturday. It will also accept deliveries from 7 am to 3 pm on Sunday, providing an additional day on which the public could deliver recyclable waste to the facility. However, waste processing will only occur at the site from 7 am to 6 pm Monday to Saturday. There will be no processing on Sundays or public holidays.

Table B1 Emission Estimation Factors Applied for All Scenarios

Emission Source	Emission Factor			Emission Factor Unit	Source of Factor
	TSP	PM_{10}	$PM_{2.5}$		
					Tertiary Crushing Factor
Screening - shed	0.00110	0.00037	0.00003	kg/tonne	USEPA AP-42 11.19.2 - Screening Factor
Crushed material Handling - shed	0.00150	0.00055	0.00008	kg/tonne	USEPA AP-42 11.19.2 – Material Transfer Factor
Product Truck Loading - shed	0.00150	0.00055	0.00008	kg/tonne	USEPA AP-42 11.19.2 – Material Transfer Factor
Product Transportation from site	0.04237	0.00813	0.00197	kg/Vehicle KM Travelled	AP-42 13.2.1 - Paved Road Equation
Wind Erosion - Exposed surfaces and stockpiles	850.0	425.0	63.8	kg/tonne	AP-42 11.9 - Wind erosion of exposed areas factor
Diesel Combustion	0.0036	0.0036	0.0033	kg/litre	NPI Combustion Engines - Miscellaneous Industrial Vehicles

Details relating to the emission equations referenced in Table B1 are presented in the following sections.

Paved Roads Equation

The emissions factors for paved roads, as documented within *AP42 Chapter 13.2.2 -"Paved Roads"* (US-EPA 2011), was applied as follows:

$$E = k\,(sL)^{0.91}(W)^{1.02}$$

Where:

E = Emissions Factor (g/VKT)

sL = road surface silt loading (g/m^2)

W = mean vehicle weight (tonnes)

The following constants are applicable:

Constant	TSP (assumed from PM_{30})	PM_{10}	$PM_{2.5}$
k (g/VKT)	4.9	1.5	0.15

Material parameters are listed in **Table B2**.

Distribution of Wind Erosion Emissions by Wind Speed

Annual wind erosion emissions were varied by hour to reflect the increase in wind erosion potential with increasing wind speed. Proportion of annual emissions by wind speed was determined by applying the US-EPA's erosion potential equation (US-EPA 2006, Chapter 13.2.5). A friction threshold velocity value of 5.4 m/s was adopted, based on the wind speed referenced within the NPI Mining Active Coal Stockpile equation (considered to be conservative for material at the Recycling Facility).

Erosion potential (P) corresponding to the hourly fastest mile of wind (derived by increase hourly wind speed by factor of 1.3 - Pitts (2005)) for the ith period between disturbances (g/m^2), calculated by:

$$P\ (g/m^2) = 58(u^* - u_t^*) + 25(u^* - u_t^*)$$

$$P = 0 \text{ for } u^* \leq u_t^*$$

Where,

u^* = friction velocity (m/s)

u_t^* = threshold friction velocity (m/s)

Materials Input Data

Material property inputs used in the emission equations presented in **Table B1** and following subsections are detailed in **Table B2**.

Table B2 Material Parameters Applied for All Scenarios

Material Properties	Units	Value	Source of Information
Silt loading of paved road surfaces - road	g/m^2	0.6	Default loading value for low traffic roads - US-EPA AP42 (2011)
Silt loading of paved road surfaces – yard	g/m^2	7.4	Default loading value for landfill - US-EPA AP42 (2011)

Appendix C

Incremental Pollutant Isopleths

Figure C1 – Predicted Incremental Annual Average TSP Concentrations (µg/m³)

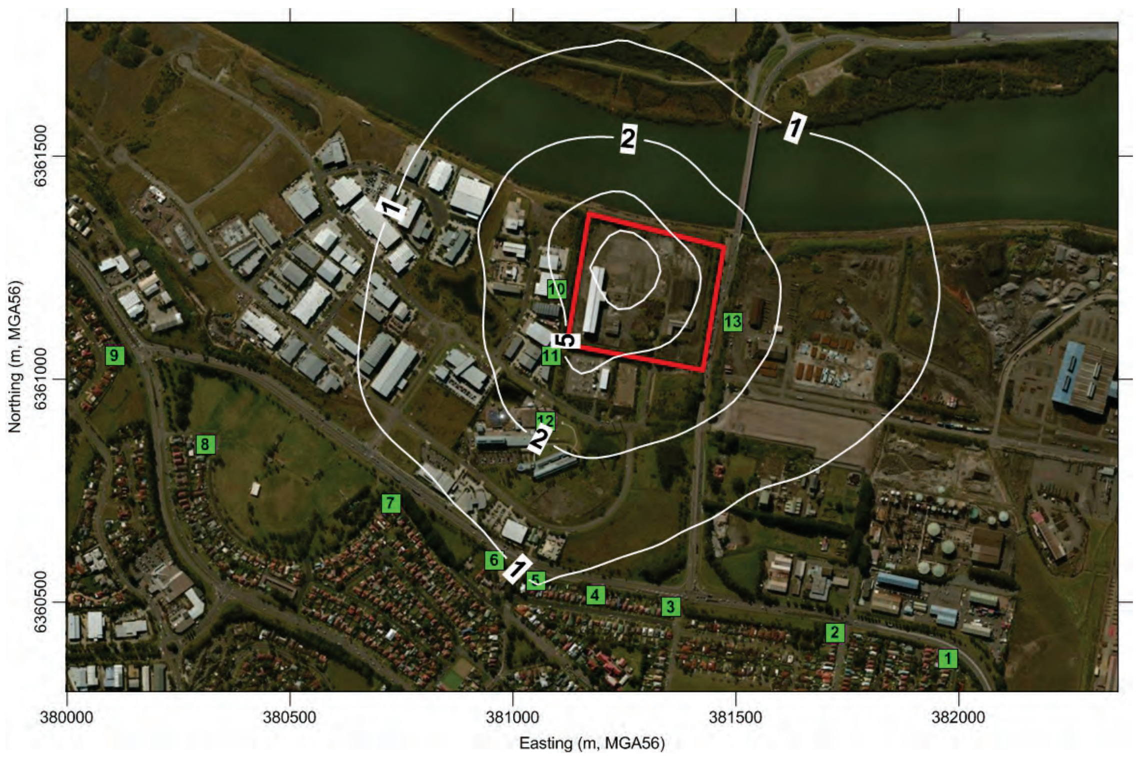


Figure C2 – Predicted Incremental Maximum 24-hour Average PM_{10} Concentrations (µg/m³)

Figure C3 – Predicted Incremental Annual Average PM_{10} Concentrations ($\mu g/m^3$)

Figure C4 – Predicted Incremental 24-hour Average $PM_{2.5}$ Concentrations ($\mu g/m^3$)

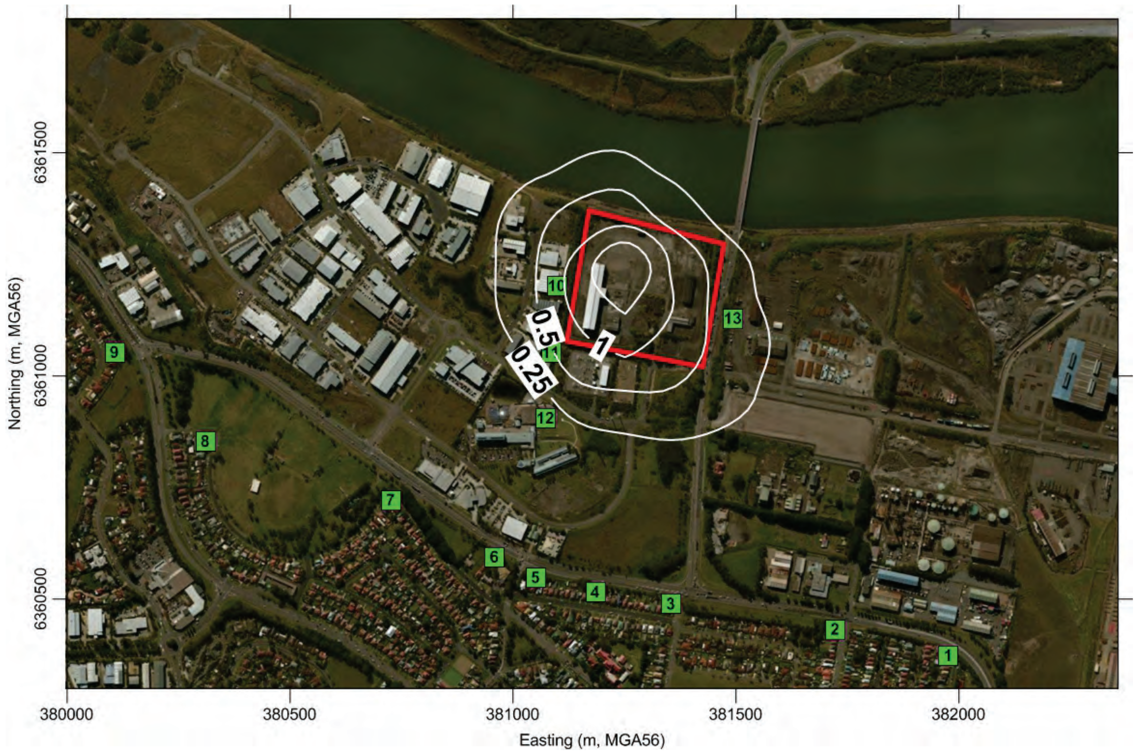


Figure C5 – Predicted Incremental Annual Average $PM_{2.5}$ Concentrations (µg/m³)

Figure C6 – Predicted Incremental Annual Average Dust Deposition Levels (g/m^2/month)

Figure C7 – Predicted Incremental 1-Second (Nose Response) Average Odour Concentrations (OU)

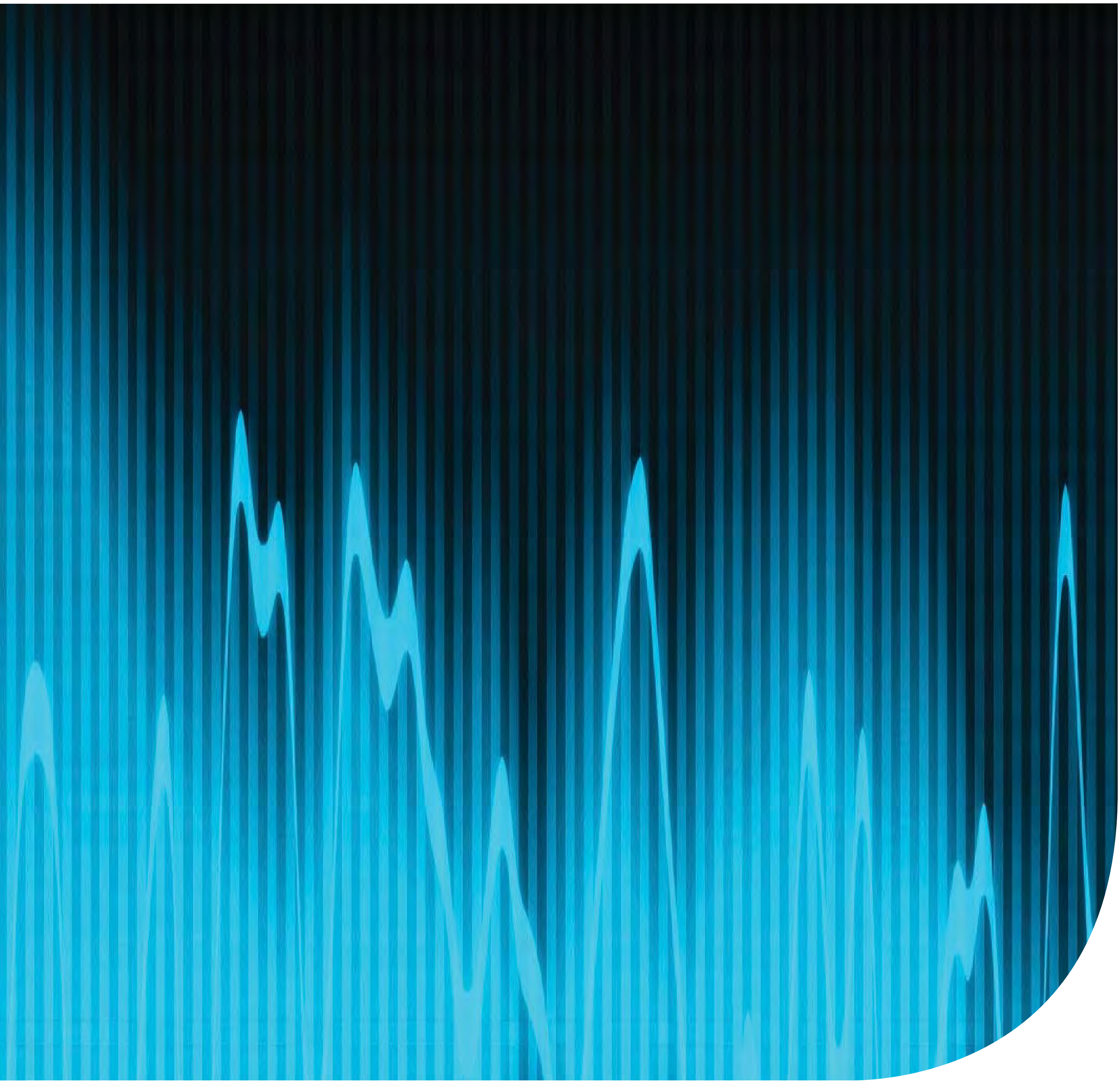
Appendix E

Noise assessment

Recycling Facility, Mayfield West

80 Tourle Street, Mayfield West | Noise Impact Assessment

Prepared for Benedict Recycling Pty Ltd | 26 March 2015



Planning + Environment + Acoustics

Recycling Facility, Mayfield West

80 Tourle Street, Mayfield West | Noise Impact Assessment

Prepared for Benedict Recycling Pty Ltd | 26 March 2015

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Recycling Facility, Mayfield West

Final

Report J14152RP1 | Prepared for Benedict Recycling Pty Ltd | 26 March 2015

Prepared by	**Katie Teyhan**	Approved by	Philip Towler
Position	Manager Acoustics – Newcastle	Position	Associate Director
Signature		Signature	
Date	26 March 2015	Date	26 March 2015

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Document Control

Version	Date	Prepared by	Reviewed by
v1	13 March 2015	Katie Teyhan	Daniel Weston Philip Towler
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Executive Summary

EMM has completed a NIA to quantify potential noise impacts associated with the Project.

Operational noise levels have been assessed for the daytime, evening and night periods during calm and prevailing weather conditions. 'Worst-case' predictions assumed that all plant is operating simultaneously for the proposed operations. In all cases, noise levels from the Project were predicted to comply with the relevant PSNLs.

Sleep disturbance from operation of the Project during the night-time has been assessed. Maximum noise level events are predicted to be below the EPA screening criteria at all residential assessment locations.

An assessment of cumulative industrial noise from the Project together with other industrial noise sources in the vicinity was also conducted. The Project is predicted to have a negligible impact on the existing ambient acoustic environment and is not predicted to increase industrial noise levels above the relevant amenity criteria.

A qualitative approach has been taken regarding assessment of construction noise from the Project due to the limited proposed construction activity. It is very unlikely that the proposed construction activity will be noticed at the assessment locations. Notwithstanding this, recommendations have been provided regarding work practices to be considered to minimise construction noise from the Project.

The Project will result in additional traffic movements on Industrial Drive. This increase is minor in comparison to existing traffic volumes on Industrial Drive and the overall increase in road traffic noise level at residents will be negligible.

In summary, noise levels from the Project have been found to comply with current EPA noise criteria. Further, noise levels from the Project are predicted to be significantly less than existing ambient noise levels at the assessment locations which are primarily due to high road traffic noise. Noise levels from the Project are therefore not expected to cause adverse impacts at the assessment locations.

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Appendices

Tables

Tables

Figures

1 Introduction

EMGA Mitchell McLennan Pty Ltd (EMM) has been commissioned by Benedict Recycling Pty Ltd (Benedict) to prepare a noise impact assessment (NIA) suitable to accompany a Development Application (DA) for the proposed Recycling Facility, Mayfield West (the Project).

The development is located at Lot 1 DP 874109 (80 Tourle Street, Mayfield West), within the Newcastle Local Government Area (LGA). The Project will have two main components:

- the main recycling facility on the west of the site that will accept and process segregated and co-mingled inert waste; and
- an ancillary waste activities area on the east of the site, for activities including:
  - temporary storage of plant, equipment, machinery, commercial vehicles, bins and containers;
  - some waste storage and processing (eg recyclable glass crushing within an existing building); and
  - refuse derived fuel (RDF) or biochar production within a building if a market for this product develops.

Secretary's Environmental Assessment Requirements (SEARs) were issued by the Department of Planning and Environment (DPE) in February 2015 for the Project. The Environment Protection Authority (EPA) has also provided details of key issues requiring assessment for the Project. Table 1.1 provides the relevant assessment requirements and the section of the NIA report relevant to the specific requirement.

Table 1.1 Noise impact assessment requirements

Relevant authority and assessment requirement	Relevant section of NIA report
DPE	
The EIS must include an assessment of all potential impacts of the proposed development on the existing environment (including cumulative impacts if necessary) and develop appropriate measures to avoid, minimise, mitigate and/or manage these potential impacts. As part of the EIS assessment, the following matters must also be addressed.	Refer entire NIA
Noise and vibration – including	
- a description of all potential noise and vibration sources during construction and operation, including road traffic noise;	Chapter 3
- a noise and vibration assessment in accordance with the relevant Environment Protection Authority guidelines; and	Refer entire NIA
- a description and appraisal of noise and vibration mitigation and monitoring measures.	Chapter 9

Table 1.1 Noise impact assessment requirements

Relevant authority and assessment requirement	Relevant section of NIA report
EPA	
In relation to noise, the following matters should be addressed (where relevant) as part of the Environmental Assessment.	
General	
1. Construction noise associated with the proposed development should be assessed using the *Interim Construction Noise Guideline* (DECC 2009)	Chapter 7
2. Vibration from all activities (including construction and operation) to be undertaken on the premises should be assessed using the guidelines contained in the *Assessing Vibration: a technical guideline* (DEC 2006)	No significant vibration-generating activities are proposed during construction or operation of the Project.
Industry	
3. Operational noise from all industrial 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*. In particular, the acceptability of residual noise impacts (noise above the Project Specific Noise Levels) should be assessed in accordance with Chapters 8 and 9 of the Industrial Noise Policy.	Chapter 6
Road	
4. Noise on public roads from increased road traffic generated by land use developments should be assessed using guidelines contained in the *Environmental Criteria for Road Traffic Noise* (EPA, 1999).	Chapter 8
5. Noise from new or upgraded public roads should be assessed using the *Environmental Criteria for Road Traffic Noise* (EPA, 1999).	Not relevant to this assessment
Monitoring Programs	Chapter 9
The EIS should include a detailed assessment of any noise monitoring required during construction/development phase and on-going operation of the site to ensure that the development achieves a satisfactory level of environmental performance. The evaluation should include a detailed description of the monitoring locations, sample analysis methods and the level of reporting proposed.	

2 Glossary of acoustic terms

A number of technical terms are required for the discussion of noise and vibration. These are explained in Table 2.1.

Table 2.1 Glossary of acoustic terms

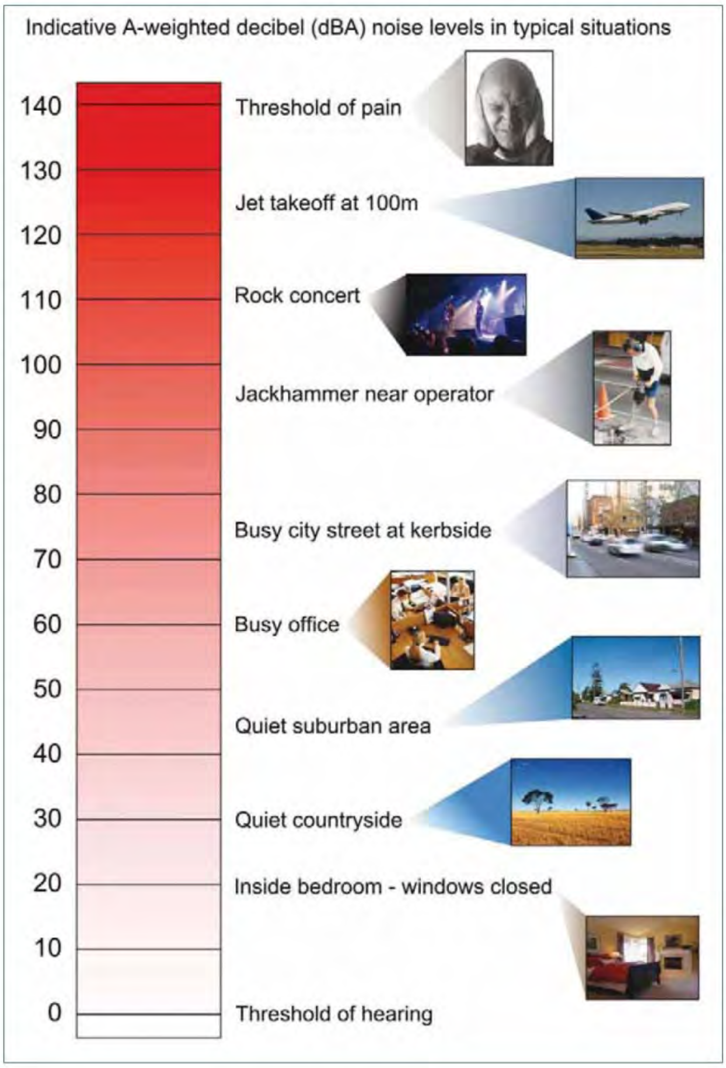
Term	Description
dB(A)	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
L_1	The noise level exceeded for 1% of a measurement period.
L_{10}	A noise level which is exceeded 10% of the time. It is approximately equivalent to the average of maximum noise levels.
L_{90}	Commonly referred to as the background noise, this is the level exceeded 90% of the time.
L_{eq}	It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period. The $L_{eq,15min}$ descriptor refers to an Leq noise level measured over a 15 minute period.
L_{max}	The maximum root mean squared sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single value background level representing each assessment period over the whole monitoring period.
Sound power level	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental property of the source and is independent of the surrounding environment.
Temperature inversion	A positive temperature gradient. A meteorological condition where atmospheric temperature increases with altitude.

It is useful to have an appreciation of decibels, the unit of noise measurement. Table 2.2 gives an indication as to what an average person perceives about changes in noise levels:

Table 2.2 Perceived change in noise

Change in sound level (dB)	Perceived change in noise
1–2	typically indiscernible
3	just perceptible
5	noticeable difference
10	twice (or half) as loud
15	large change
20	four times as loud (or quarter) as loud

Examples of common noise levels are provided in Figure 2.1.



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

Figure 2.1 Common noise levels

3 Project and site description

3.1 Site operations and equipment

The proposed project site layout is shown in Figure 3.1. The site will include the following components:

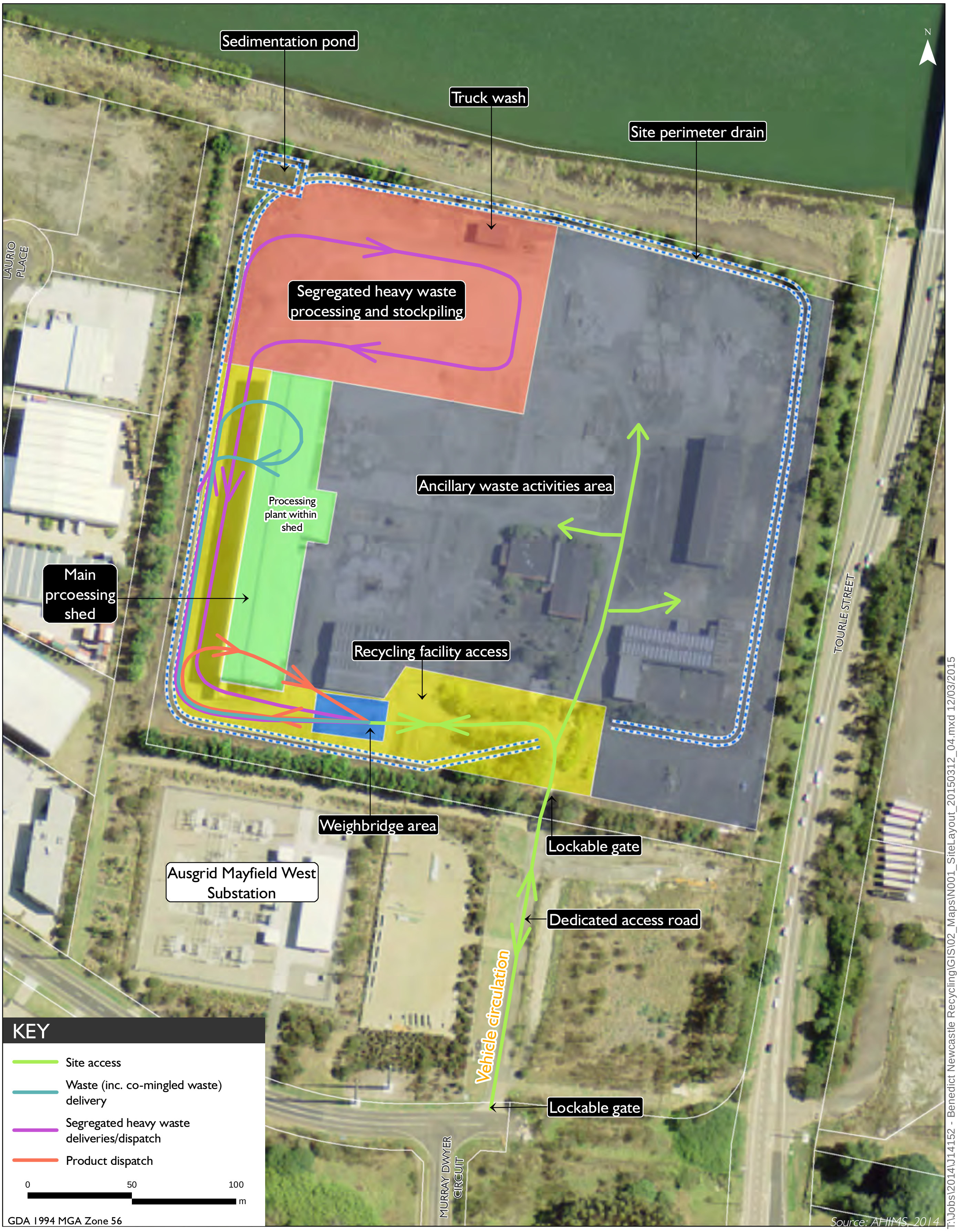
- a weighbridge area with two weighbridges, a wheel wash, demountable offices and amenities;
- the main processing shed (previously the EMD Delta Electrolysis Building) which will contain the majority of waste processing activities;
- a segregated heavy waste processing and stockpiling area north of the main processing shed;
- vehicle repair and maintenance facilities in an existing shed;
- a truck wash in an existing shed;
- access and internal roads; and
- an ancillary activity area for storage, parking and other ancillary uses.

The weighbridge and office area in the south of the site will contain above-ground weighbridges, an above-ground wheel wash for outbound vehicles, site offices and amenities. The offices and amenities will be demountables that will not require foundations.

Initially, a single weighbridge will be used for incoming and outgoing vehicles. It is anticipated that a second weighbridge will be installed later to improve segregation of incoming and outgoing vehicles. The weighbridges will be installed on an existing site road and will not require any excavation.

The majority of waste storage, processing and product storage will occur within the main processing shed. The main processing shed will contain:

- a marked roadway for vehicles delivering waste and picking up recycled products;
- a flip-flow screen waste sorter (eg Finlay 883 flip flow);
- two picking lines; and
- waste/product stockpiles and bins.



EMM

Proposed site layout

Benedict Recycling Facility, Mayfield West
Noise Impact Assessment

Figure 3.1

Initially, a small generator will be used to provide power to the weighbridge area and to provide lighting in the main processing shed prior to reconnecting mains power as soon as possible.

The heavy waste processing and stockpiling area is in the north-west of the site. There will be no modification of this area other than ensuring that the surface is stabilised to ensure that the ground surface is not disturbed by plant or vehicles. The area will be used for the storage of segregated concrete (including tiles, bricks, etc) and segregated timber waste and for recycled products derived from these materials. These materials will be processed (shredded or crushed) on a campaign basis.

An existing shed will be used for vehicle repair and maintenance activities. A truck wash area will be established in an existing building in the north of the site.

The existing sealed site access road from McIntosh Drive will be used. A two-lane access road will be delineated by concrete blocks, line markings and signage. The existing intersection of McIntosh Drive and the access road will not need to be modified other than by installing a robust gate to control site access.

The indicative internal road layout is provided in Figure 3.1. The main processing building and yard will be accessed via the weighbridge area and from the existing road west of the building. Vehicle circulation within the ancillary activity area will be dependent on the uses of this area. Road vehicle traffic will be restricted to existing internal roads.

The ancillary waste activity areas will be used for a range of uses, including:

- parking for trucks, and employee and visitor light vehicles generally in the existing car park in the south-east corner of the site;
- temporary storage for:
  - light and heavy vehicles;
  - bins and containers;
  - construction and demolition plant and equipment;
  - general machinery storage; and
  - temporary demountable offices and sheds.
- recyclable glass crushing within one of the existing buildings.

Any additional waste processing (such as refuse derived fuel (RDF) or production) will be conducted within a building/shed.

The site will accept inert waste from businesses and the general public. Accordingly, waste will be delivered to site by a variety of vehicles including:

- light vehicles such as cars with box trailers, and utilities;
- single or dual axle heavy vehicles such as ‘Daihatsu’s’ and skip-bin trucks; and
- multiple axle combination heavy vehicles.

Vehicles will access the site from Industrial Drive via Steel River Boulevard and McIntosh Drive. Industrial Drive is a major heavy vehicle route. Steel River Boulevard and McIntosh Drive are wholly within the IN1 General Industrial zone and are also suitable for heavy vehicles.

Indicative equipment to be utilised by the Project is listed in Table 3.1 and have been used in this assessment.

Table 3.1 Indicative equipment and activities

Plant (or equivalent)[1]	Quantity	Typical activities
Equipment used across the site		
Front end loader (eg Volvo L150)	1	Unloading and loading trucks Moving waste and products
Generator	1	Power for weighbridge, offices, amenities and lighting
Trucks (customers)	4	Delivering waste and dispatching products Returning to/leaving the site
Equipment used in a processing shed		
Excavator (eg Komatsu PC120)	1	Sorting waste using a variety of excavator attachments Loading feed to processing plant Loading trucks
Flip-flow screen waste sorter (eg Finlay 883 flip flow)	1	Sorting co-mingled waste
Picking line	2	Sorting co-mingled waste from flip flow
Campaign processing in yard		
Excavator (eg Komatsu PC220) and secondary crusher/screen (eg Metso LT1213)	1	Loading material to crusher Crushing/screening material
Timber shredder (eg Komptech Crambo)	1	Shredding timber and vegetation

3.2 Workforce and hours of operation

The Project will normally accept waste deliveries (from businesses and the public) and dispatch materials between 6 am and 6 pm Monday to Friday and between 6 am and 5 pm on Saturday. It will also normally accept deliveries from 7 am to 3 pm on Sunday, providing an additional day on which the public could deliver recyclable waste to the facility if there is sufficient demand.

At times waste is generated by major infrastructure projects at night, particularly from road and rail works. This application therefore seeks approval for the facility to accept (but not process) waste 24 hours per day on occasion. The NCC will be notified prior to these occasions. Waste processing will only occur at the site from 7 am to 6 pm Monday to Saturday. There will be no processing on Sundays or public holidays.

The Project is expected to be operated by approximately 12 employees. There will be additional contractors operating on the site during campaign processing of concrete and timber. There may also be additional employees or contractors operating in the ancillary activities area or operating the RDF/biochar plant should this be constructed in the future.

3.3 Construction activities

Project construction will require marking existing internal roads; re-installing some gates and fencing; installing the weighbridges and demountable offices/amenities; ensuring runoff controls are operating efficiently; sealing/armouring unsealed areas and restoring services (electricity, water, gas and sewerage) to the site. No significant ground excavation is anticipated so contaminated soil will not be disturbed although there may be very minor ground disturbance such as installing signage poles and anchors for demountables.

3.4 Site location and surroundings

The site is located at 80 Tourle Street, Mayfield West and is legally described as Lot 1 in DP 874109. It is within the Steel River industrial estate and covers about 8.9 ha. The site is flat and is approximately 10 m Australian Height Datum (mAHD). The site is largely devoid of vegetation except for trees around the boundary and patches of planted vegetation near old office buildings.

The site is located south of the Hunter River and has Tourle Street to the east, light industrial buildings to the west and Ausgrid Mayfield West Substation to the south. Further to the south, the land rises to about 24 mAHD before dropping to about 20 mAHD along Industrial Drive.

The nearest residential properties are on the far side of a hill and Industrial Drive, about 550 m south of the site. The nearest residential properties are currently exposed to significant levels of road traffic noise from Industrial Drive.

3.5 Key noise issues

The broad potential noise issues for Project are as follows:

- noise associated with construction — the project will only require minor construction works;
- noise associated with the main operations, which is expected to be dominated by on-site waste recycling within the main building;
- noise associated with campaign heavy waste crushing and recycling, which would occur in the segregated heavy waste yard in the north of the site;
- noise associated with the increased traffic to/from the site during construction and operation; and
- cumulative noise from all existing and proposed industrial operations part of the larger development precinct.

The noise assessment has focussed on these potential issues. Its preparation included noise measurements, derivation of suitable criteria in accordance with the INP and comparison of predicted noise emission levels to appropriate noise criteria.

4 Existing Environment

4.1 Assessment locations

Representative assessment locations considered in the noise assessment are shown in Figure 4.1. Nearest residential assessment locations are located south of the Project within the residential area of Mayfield West, approximately 550 m from the site. Other non-residential assessment locations in the vicinity are:

- Mayfield Church of Christ, 31 Gregson Avenue, approximately 600 m south of the Project;
- Mayfield West Public School, Gregson Avenue east located approximately 700 m south of the Project;
- 3rd Mayfield Scouts Hall, Gregson Avenue, Mayfield West located approximately 560 m south of the Project; and
- CSIRO research facilities located within the Steel River estate approximately 200 m south of the Project.

The assessment locations represent those most likely to be affected by the Project. Adherence with noise criteria at these locations would indicate that noise criteria will be met at other surrounding noise-sensitive locations.

4.2 Existing noise levels

A key element in assessing environmental noise impact from industry is to quantify the existing ambient acoustic environment, including any existing industrial noise where present. The locations of ambient noise monitoring used in this assessment are provided in Figure 4.2.

Based on previous noise assessments completed in the area, historical data and EMM field observations, road traffic on Industrial Drive and Tourle Street is the dominant noise source at residential areas south of the project site.

Assessment locations

Benedict Recycling Facility, Mayfield West

Noise Impact Assessment

Figure 4.1

Z:\01_Data\08_ArcReader\N003_NoiseMonitoringLocations_20150309_02.mxd 9/03/2015

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EMGA Mitchell McLennan

Noise monitoring locations

Benedict Recycling Facility, Mayfield West

Noise Impact Assessment

Figure 4.2

The existing acoustic environment (ie ambient noise) was characterised by long-term unattended and short-term attended noise monitoring. This was supplemented by a review of historical unattended noise monitoring data from publically available noise assessments to quantify the existing industrial noise at assessment locations.

Attended 15-minute attended noise measurements were completed at four locations in January and February 2015, including at the unattended noise monitoring location (Table 4.1).

The attended noise surveys were conducted using a Brüel and Kjær Type 2250 one-third octave hand-held sound level meter (s/n 2759405). Field calibration of the instrument was undertaken before and after the survey using a Brüel and Kjær type 4230 calibrator with the variation in calibrated levels not greater than ±0.5dB. Attended measurements were conducted in general accordance with Australian Standard (AS) 1055-1997 *Description and Measurement of Environmental Noise,* Parts 1, 2 and 3. Meteorological conditions throughout the survey period generally consisted of winds at 2 to 4 m/s from the east to north-east with some cloud cover. There were no winds above 5 m/s or rain events during the attended surveys. A summary of the results of the attended measurements is presented in Table 4.1.

Table 4.1 Attended noise monitoring summary

Location	Date	Start time	Measurement result, dB(A)			Comments
			L_{eq}	L_{90}	L_{max}	
A1. 28 Groongal St	31/01/15	3 pm	53	48	72	Traffic on Industrial Dr dominant. Occasional car passby. Aeroplane. Birds occasionally audible. Whipper snipper nearby. Existing industrial noise inaudible.
A2. Cnr Groongal and Tourle St	13/02/15	10.15 am	63	57	74	Traffic on Industrial Dr dominant. Insects and birds. Frequent traffic on Groongal St. Existing industrial noise inaudible.
A3. 15 Shelley Close	13/02/15	10.45 am	45	42	61	Traffic on Industrial Dr dominant. Some industrial noise – general hum, dropping load (or similar) < 40 dB(A). Insects and birds occasionally audible.
A4. Gregson Avenue (opposite scout hall)	13/02/15	11.15 am	59	51	73	Traffic on Industrial Dr dominant. Insects and birds constant. Helicopter briefly audible. Nearby residential activity audible. Existing industrial noise inaudible.

The ambient noise environment is dominated by road traffic from Industrial Drive at all monitoring locations. It was noted that noise levels from existing industrial operations were generally inaudible at all attended monitoring locations with the exception of 15 Shelley Close (A3) where an existing industrial noise 'hum' was measured at less than 40 dBA.

Long-term noise monitoring was completed by EMM at one location in Mayfield West from 31 January to 13 February 2015 as described in Table 4.2. The long-term monitoring was complete using an ARL EL 316 Type 1 environmental noise logger (s/n 130209).

Table 4.2 EMM noise logging details

Location	Approximate position with respect to the project site
L1. 28 Groongal Street	700 m south-west

The Rating Background Levels (RBL) and ambient $L_{eq,period}$ noise levels derived from EMM's long-term noise monitoring are summarised in Table 4.3. The daily noise data and charts from EMM's noise logging are provided in Appendix A. The logging data was analysed in accordance with the INP, whereby data was excluded where rainfall and/or winds of greater than 5 m/s were recorded. This analysis was completed using weather data from the Bureau of Meteorology's Automatic Weather Station at Nobbys Beach in Newcastle, NSW.

Table 4.3 Summary of measured ambient noise levels

Location	RBL, dB(A)			Ambient (L_{eq}) noise level, dB(A)		
	Day	Evening	Night	Day	Evening	Night
L1. 28 Groongal Street	48	46	42	59	55	50

Note: 1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; evening: 6 pm to 10 pm; night is the remaining periods.

Several industrial developments currently operate in the area surrounding the Project site. Based on the results of operator-attended noise measurements, ambient noise at the logger location was primarily influenced by road traffic noise on Industrial Drive and is not expected to have been significantly influenced by existing industrial noise.

Information regarding the existing noise environment surrounding the Project is readily available from environmental assessments from adjacent industrial sites, most recently the Port Waratah Coal Services (PWCS) Terminal 4 (T4) Project *Environmental Assessment* (EMM 2012). A review of this information has been completed to supplement EMM's background noise data. Noise monitoring for this project was conducted by SLR Consulting Australia Pty Ltd (SLR) and is considered applicable to the project site.

A summary of the results relevant to this study are presented in Table 4.4.

Table 4.4 Summary of ambient noise levels from T4 Environmental Assessment (EMM 2012)

Location	RBL, dB(A)			Estimated $L_{eq(period)}$ industrial noise only, dB(A)		
	Day	Evening	Night	Day	Evening	Night
Mayfield West[1,2] (W1, W2)	45	46	41	<54	45	43
Warabrook[1,3] (W4)	45	43	39	<54	<49	<39

Notes: 1. Noise data obtained from the PWCS T4 Environmental Assessment (EMM 2012).

2. These noise levels are considered representative of the residential assessment locations in Mayfield West (ie R1–R11).

3. These noise levels are considered representative of the residential assessment locations in the north of Mayfield West and Warabrook (ie R12–R13).

4.3 Meteorology

Noise propagation over distance can be significantly affected by the prevailing weather conditions. Of most interest are source to receiver winds, the presence of temperature inversions and drainage flow effects, as these conditions can enhance received noise levels. To account for these phenomena, the INP specifies meteorological analysis procedures to determine the prevalent weather conditions that enhance noise propagation in a particular area, with a view to determining whether they can be described as a feature of the project area.

4.3.1 Wind

Wind has the potential to increase noise impacts at a receiver when it is light and stable, and blows from the direction of the noise source. As the wind strength increases, the noise produced by the wind usually obscures noise from most industrial and transport sources.

The prevailing wind directions in the area have been determined in accordance with Section 5 of the INP. The NSW INP requires that winds of speeds up to 3 m/s with an occurrence greater than 30% of the time during any period (day, evening or night) in any season be assessed.

4.3.2 Analysis of prevailing winds for the area

Detailed analysis of winds was undertaken for the T4 EA (EMM 2012) using weather data from the Port Waratah Coal Services (PWCS) automatic weather station. This weather station is the nearest available to the subject site.

The prevailing winds analysis considered weather data over a one year period (CY2011). The analysis determined that prevailing winds are dominant in the area during the evening and night periods from most directions. The detailed analysis of winds is provided in the wind roses provided in Appendix B.

4.3.3 Temperature inversions

The data required to determine if temperature inversions are a feature of the area were not available. The default inversion parameter of $3^{o}C/100$ m has therefore been adopted for this assessment.

4.3.4 Drainage winds

The INP states that a default wind drainage value should be applied where sources are at a higher altitude than the assessment location with no intervening topography. All assessment locations are at a similar or higher elevation than the subject site. Therefore, drainage winds have not been adopted in this assessment.

4.3.5 Modelled meteorological conditions

The relevant site specific meteorological conditions adopted in the NIA based on the meteorological data analysis are presented in Table 4.5.

Table 4.5 Weather conditions considered in noise modelling

Assessment period	Meteorological condition	Air temperature	Relative humidity	Wind speed[1]	Temperature gradient
Day	Calm	20°C	70%	0 m/s	0°C/100 m
	Wind	20°C	70%	2.7 m/s[2]	0°C/100 m
Evening/Night	Calm	10°C	90%	0 m/s	0°C/100 m
	Wind	10°C	90%	2.4 m/s[3]	0°C/100 m
	Temperature inversion	10 °C	90%	0 m/s	3°C/100 m

Note *1: Based on the 10th percentile wind speed of all winds present for 30% of the time during the day or morning shoulder period.*

2: Wind directions considered include 315° and 337.5° from north.

3: Wind direction considered include 22.5° to 135° (22.5° increments), 315°, 337.5° and 360° from north.

5 Noise criteria

5.1 Strategic Impact Assessment Study, Steel River Project

The Strategic Impact Assessment Study (SIAS) (City of Newcastle 1998) for the Steel River Project provides noise limits which apply to the Project site. The SIAS states that the noise limits provided are based on the EPA Environmental Noise Control Manual (ENCM). The ENCM is now superseded by the EPA 2000 Industrial Noise Policy (INP) which provides a more comprehensive noise assessment approach for industrial sites in terms of both intrusive and amenity noise levels. The contemporary INP assessment methodology has therefore been adopted for the Project, as also required by the EPA (refer Table 1.1), and is discussed in the following sections.

5.2 Operational noise

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

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

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

Assessment criteria depend on the existing amenity of areas potentially affected by a proposed development. Noise assessment criteria for industry are based on the following objectives:

- protection of the community from excessive intrusive noise; and
- preservation of amenity for specific land uses.

To ensure these objectives are met, the EPA provides two separate criteria: intrusiveness criteria and amenity criteria. A fundamental difference between the intrusiveness and the amenity criteria is the period they relate to:

- intrusiveness criteria — apply over 15 minutes in any period (day, evening or night); and
- amenity criteria — apply to the entire assessment period (day, evening or night).

5.2.1 Intrusiveness

The intrusiveness criteria require that $L_{eq(15\text{-}min)}$ noise levels from the Project during the relevant operational periods (ie day, evening and night) do not exceed the RBL by more than 5 dB. The adopted RBL utilised for determination of the intrusive criteria are based on those reported within the PWCS T4 EA (EMM 2012) to provide a conservative approach for the NIA as these are marginally lower than those measured by EMM.

Table 5.1 presents the intrusive noise criteria determined for the site.

Table 5.1 Intrusive noise criteria

Location	Period[1]	Adopted RBL, dB(A)	Intrusive criteria dB(A), $L_{eq(15\text{-}min)}$
R1 to R11	Day	45	50
	Evening	45[2]	50
	Night	41	46
R12 to R13	Day	45	50
	Evening	43	48
	Night	39	44

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

2. In accordance with the INP Application Notes, the RBL for day has been adopted for the evening period since the measured RBL during the evening was higher than that measured for daytime.

5.2.2 Amenity

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

Residential assessment locations potentially affected by the Project have been categorised in the INP (EPA 2000) urban amenity category. The corresponding recommended amenity criteria for the Project are given in Table 5.2. It is noted that no adjustment to the acceptable recommended noise amenity level was necessary during the day since there was no significant level of existing industrial noise at the assessment locations. Relevant adjustments have been made to the evening and night urban amenity criteria based on the existing levels of industrial noise (refer Table 4.4).

Table 5.2 Amenity criteria

Assessment location	Indicative area	Time period	Recommended noise level dB(A), $L_{eq,period}$	
			Acceptable	Maximum
Residential R1 to R11	Urban	Day	60	65
		Evening	48	55
		Night	41	50
Residential R12 to R13	Urban	Day	60	65
		Evening	50	55
		Night	45	50
School classrooms - internal	All	Noisiest 1 hour period when in use	35	40
Place of worship - internal	All	When in use	40	45
Active recreation	All	When in use	55	60
Commercial	All	When in use	65	70

Source: INP (EPA 2000).

5.2.3 Project specific noise level

The project-specific noise level (PSNL) is the lower of the calculated intrusive or amenity criteria. The PSNL for the daytime and morning shoulder periods are indicated in bold in Table 5.3.

Table 5.3 Project specific noise levels

Location	Period[1]	Intrusive criteria dB(A), $L_{eq(15\text{-}min)}$	Amenity criteria dB(A), $L_{eq,period}$
R1 to R11	Day	**50**	60
	Evening	50	**48**
	Night	46	**41**
R12 to R13	Day	**50**	60
	Evening	**48**	50
	Night	**44**	45
Mayfield West Public School	When in use	n/a	**35 (internal)**
Mayfield Church of Church	When in use	n/a	**40 (internal)**
3rd Mayfield Scouts Hall	When in use	n/a	**55**
CSIRO	When in use	n/a	**65**

Note: 1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; evening: 6 pm to 10 pm; night is the remaining periods.

5.3 Construction noise criteria

The Interim Construction Noise Guideline (ICNG) (DECC 2009) provides two methods for the assessment of construction noise emissions:

- quantitative, which is suited to major construction projects with typical durations of more than three weeks; and
- qualitative, which is suited to short term infrastructure maintenance (less than three weeks).

Although the construction phase of the Project is estimated to be 10 weeks duration, there are no significant excavation activities proposed (refer Section 3.3) and no construction activity will occur at night. Hence, a qualitative assessment has been completed for the Project as construction activity required for the Project will be relatively minor in nature.

5.4 Sleep disturbance criteria

The Project will operate during the night-time period from 10 pm to 7 am. Therefore assessment of sleep disturbance is required in accordance with the INP and associated application notes.

The operational criteria described in Section 5.1, which consider the average noise emission of a source over 15 minutes, are appropriate for assessing noise from steady-state sources, such as engine noise from mobile plant and other pit equipment. However impact noise from sources such as a front end loader (FEL) loading trucks is intermittent (rather than continuous) and needs to be assessed using the L_1 or L_{max} noise metrics.

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

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

- maximum internal noise levels below 50 to 55 dBA are unlikely to awaken people from sleep; and
- one or two noise events per night, with maximum internal noise levels of 65 to 70 dBA, are not likely to affect health and wellbeing significantly.

It is commonly accepted by acoustic practitioners and regulatory bodies that a facade including a partially open window will reduce external noise levels by 10 dB(A). Therefore, external noise levels in the order of 60 to 65 dB(A) calculated at the facade of a residence are unlikely to cause sleep disturbance affects. Similarly, the World Health Organisation (WHO) *Guidelines for Community Noise* (WHO 1999) suggest that levels below 45 dB(A) inside homes are unlikely to wake sleeping occupants.

The descriptors L_{max} and L_1 may be considered interchangeable which is accepted by the EPA.

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

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

Table 5.4 provides the sleep disturbance criteria for the residential assessment locations.

Table 5.4 Sleep disturbance criteria – residential assessment locations

Assessment location	Adopted RBL, dB(A)[1]	Sleep disturbance criteria dB(A), L_{max} Night-time period (10 pm to 7 am)
R1 to R11	41	56
R12 to R13	39	54

Notes: 1.Night-time RBLs adopted.

5.5 Road traffic noise criteria

The principle guidance for assessing the impact of road traffic noise is the *Road Noise Policy* (RNP) (EPA 2011). Vehicles will access the site from Industrial Drive via Steel River Boulevard and McIntosh Drive. Industrial Drive is a major heavy vehicle route and is classified as an arterial road in accordance with the RNP.

Table 5.5 presents the road noise assessment criteria reproduced from Table 3 of the RNP.

Table 5.5 Road traffic noise assessment criteria for residential land uses

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

Source: EPA (2011).

The RNP states that where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2 dB.

5.5.1 Relative increase criteria

In addition to meeting the assessment criteria, any significant increase in total traffic noise at assessment locations must be considered. Assessment locations experiencing increases in total traffic noise levels above those presented in Table 5.6 should be considered for mitigation.

Table 5.6 Relative increase criteria for residential land uses

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

Road traffic generated by the Project will be relatively minor compared to existing traffic volumes on the proposed transport route. The potential for the relative increase criteria to be exceeded is therefore highly unlikely and has not been considered further.

6 Operational noise modelling and assessment

6.1 Noise modelling method

This section presents the methods and assumptions used to model noise emissions from operation of the Project.

Noise modelling was based on three-dimensional digitised ground contours of the surrounding land. Noise predictions were carried out using Brüel and Kjær Predictor Version 8.14 noise prediction software. 'Predictor' calculates total noise levels at assessment locations from the concurrent operation of multiple noise sources. The model has considered factors such as:

- the lateral and vertical location of plant;
- source to assessment location distances;
- ground effects;
- atmospheric absorption;
- topography of the Project site and surrounding area; and
- applicable meteorological conditions (refer to Section 4.3).

Plant and equipment was modelled at locations and heights representing activities during operation of the Project using representative equipment sound power levels and quantities provided in Table 6.1 The sound power levels adopted have been taken from an EMM database of similar equipment. Noise modelling has conservatively assumed that all plant and equipment operates simultaneously. While this may occur at times, the use of individual plant generally will be intermittent during operations.

Table 6.1 Operational plant and equipment sound power levels

Plant and equipment	Typical activities	Location	Quantity	Lw, $L_{eq(15\text{-}min)}$, dB(A)
Main operations				
Excavator	Sorting waste using a variety of excavator attachments Loading feed to processing plant Loading trucks	Inside main building	1	104
Heavies sorter (Screen)	Sorting co-mingled waste	Inside main building	1	101
Picking line	Sorting / moving co-mingled waste	Inside main building	2	88
Front-end loader (FEL)	Loading trucks Moving waste products	Outside; north of main shed	1	108
Road truck	Delivering waste and dispatching products, returning to/leaving the site	Delivery/dispatch route	4	103 loaded 105 unloaded
Idling road trucks	Standing at weighbridge	Weighbridge	1	98
Generator	Power for weighbridge, offices, amenities and lighting	Outside; immediately east of main shed	1	113

Table 6.1 Operational plant and equipment sound power levels

Plant and equipment	Typical activities	Location	Quantity	Lw, $L_{eq(15\text{-}min)}$, dB(A)
Campaign basis				
Excavator/secondary crusher	Loading material to crusher Crushing/screening material	Segregated heavy waste yard	1	123
Timber shredder	Shredding timber and vegetation	Segregated heavy waste yard	1	115
Transporting product only (evening and night-time)				
Road truck	Delivering waste and dispatching products, returning to/leaving the site	Delivery/dispatch route	4	103 loaded 105 unloaded
Front end loader	Loading trucks	Outside	1	108

Activities in the ancillary waste activities area (refer Section 3.1) in the east of the site have not been modelled. While the exact noise generating activities that will occur in this area are unknown, these activities will generally be much quieter than those associated with the main operations and campaign crushing and most will be conducted inside buildings. Therefore, they are not expected to contribute significantly to the overall noise emissions from the site.

Noise modelling was completed for daytime, evening and night-time periods for the meteorological scenarios presented in Table 4.5.

6.2 Noise modelling results and discussion

Noise modelling results from the Project site to all assessment locations shown in Figure 4.1 are provided in Table 6.2 and Table 6.3 for day and night-time periods, respectively. Results for the evening period have not been included as the night-time criteria provide the most stringent requirements for the operational scenario considered during these periods ie transporting product only.

Table 6.2 Operational noise modelling results - daytime

Assessment location	Predicted operational noise level, dB(A)						Target noise level, dB(A)
	Main operations		Campaign		Main ops + campaign		
	Calm	Wind	Calm	Wind	Calm	Wind	
R1	36	39	44	47	45	48	50 $L_{eq(15\text{-}min)}$
R2	37	40	46	49	47	50	50 $L_{eq(15\text{-}min)}$
R3	36	39	43	46	44	47	50 $L_{eq(15\text{-}min)}$
R4	35	38	44	46	44	47	50 $L_{eq(15\text{-}min)}$
R5	38	41	46	49	47	50	50 $L_{eq(15\text{-}min)}$
R6	37	40	44	47	45	48	50 $L_{eq(15\text{-}min)}$
R7	38	40	45	48	45	48	50 $L_{eq(15\text{-}min)}$
R8	37	40	45	47	45	48	50 $L_{eq(15\text{-}min)}$
R9	38	41	45	48	46	49	50 $L_{eq(15\text{-}min)}$
R10	37	40	45	47	45	48	50 $L_{eq(15\text{-}min)}$
R11	38	41	45	48	46	48	50 $L_{eq(15\text{-}min)}$
R12	34	34	42	42	42	42	50 $L_{eq(15\text{-}min)}$
R13	30	<30	40	40	40	40	50 $L_{eq(15\text{-}min)}$

Table 6.2 Operational noise modelling results - daytime

Assessment location	Predicted operational noise level, dB(A)						Target noise level, dB(A)
	Main operations		Campaign		Main ops + campaign		
	Calm	Wind	Calm	Wind	Calm	Wind	
MWPS[1, 2]	<30	<30	30	33	31	34	Internal 35 $L_{eq(period)}$
Mayfield Church of Christ[2]	<30	<30	32	35	32	35	Internal 40 $L_{eq(period)}$
3rd Mayfield Scouts Hall	35	38	42	45	43	46	55 $L_{eq(period)}$
CSIRO	46	49	54	56	55	57	65 $L_{eq(period)}$

Notes: *1.Mayfield West Public School.*

2. Internal noise levels have been conservatively estimated as 10 dB below predicted external levels. This is a typical facade noise reduction achieved with windows open.

Table 6.3 Operational noise modelling results – night

Location	Predicted operational noise level, dB(A)			Target noise level, dB(A)
	Transporting product only			
	Calm	Wind	Inversion	
R1	34	37	37	41 $L_{eq(night)}$
R2	35	38	38	41 $L_{eq(night)}$
R3	33	36	36	41 $L_{eq(night)}$
R4	33	36	36	41 $L_{eq(night)}$
R5	36	39	39	41 $L_{eq(night)}$
R6	35	38	38	41 $L_{eq(night)}$
R7	35	38	38	41 $L_{eq(night)}$
R8	35	37	37	41 $L_{eq(night)}$
R9	36	39	39	41 $L_{eq(night)}$
R10	35	38	38	41 $L_{eq(night)}$
R11	36	39	39	41 $L_{eq(night)}$
R12	35	38	38	44 $L_{eq(15\text{-}min)}$
R13	30	33	33	44 $L_{eq(15\text{-}min)}$
MWPS[1, 2]	<30	<30	<30	Internal 35 $L_{eq(period)}$
Mayfield Church of Christ[2]	<30	<30	<30	Internal 40 $L_{eq(period)}$
3rd Mayfield Scouts Hall	36	38	38	55 $L_{eq(period)}$
CSIRO	47	49	49	65 $L_{eq(period)}$

Notes: *1.Mayfield West Public School.*

2. Internal noise levels have been conservatively estimated as 10 dB below predicted external levels. This is a typical facade noise reduction achieved with windows open.

3. Based on previous experience at similar sites and given the likely intermittent nature of night-time activities, the predicted $L_{eq(night)}$ noise level from the project has been conservatively estimated as 3 dB lower than the predicted $L_{eq(15\ min)}$.

Noise modelling predicts that the INP PSNLs will be met at all assessment locations for calm and prevailing conditions during all proposed operational periods.

6.3 Sleep disturbance assessment

The loading and/or unloading of trucks during the night-time period has been assessed. Typical maximum noise events are likely to include reversing alarms and impacts associated with loading activities. A typical L_{max} sound power level of 125 dB(A) has been used to predict potential sleep disturbance impacts. Results are provided in Table 6.4.

Table 6.4 Predicted maximum noise levels at residential assessment locations

Assessment location	Predicted L_{max} noise level, dB(A)			L_{max}, noise criterion, dB(A)
	Calm	Worst case wind	Inversion	
R1	48	51	51	56
R2	49	52	52	56
R3	48	51	51	56
R4	47	50	50	56
R5	50	53	53	56
R6	49	51	51	56
R7	49	52	52	56
R8	49	52	52	56
R9	50	52	52	56
R10	49	51	51	56
R11	49	52	52	56
R12	46	48	48	54
R13	44	47	47	54

Noise modelling predicts that the sleep disturbance criteria will be met during calm and prevailing meteorological conditions.

6.4 Cumulative noise assessment

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

Based on experience with similar sites, amenity noise levels from such sites are typically 1 to 3 dB below the intrusive noise level. On this basis, the highest predicted daytime amenity level at any residential assessment location is 47 to 49 dB(A). This is greater than 10 dB below the acceptable amenity level for an urban receiver type and thus is predicted to not have the effect of increasing industrial noise above the relevant criteria.

The predicted amenity level from the project is also greater than 10 dB below the measured existing ambient $L_{Aeq,day}$ of 59 dB(A) and $L_{Aeq,night}$ of 50 dB(A) which is primarily due to traffic on Industrial Drive. Hence, noise levels from the Project are not predicted to increase existing ambient noise levels at any of the assessment locations.

On this basis, the Project is predicted to have a negligible impact on the existing ambient acoustic environment and is not predicted to increase industrial noise levels above the relevant amenity criteria.

7 Construction noise assessment

As stated in Section 5.3, a qualitative assessment approach has been taken regarding construction noise due to the limited activity required for the Project.

The construction noise assessment is presented in Table 7.1.

Table 7.1 Qualitative construction noise assessment

Noise source	Questions relating to noise heard at residences			Is examination of work practices necessary?
	Is noise loud, in absolute terms, or relative to other noises in the area?	Does the noise include tones or impulses?	Does the noise occur at times that interfere with sleep or comfort?	
Trucks	Yes	Yes, reversing alarms	No	No
Hand tools	Occasionally	Unlikely	No	No
Front end loader	No	Possibly reversing alarms	No	No
Line marking	No	Unlikely	No	No

It is very unlikely that construction activity proposed for the site will be noticed at the assessment locations. Notwithstanding this, it is recommended that the following work practices be considered to minimise construction noise:

- provide contact details on a site board at the front of the site, and maintain a complaints register suited to the scale of works;
- use broadband, “growlers”, reversing alarms rather than tonal reversing alarms;
- turn off plant that is not being used;
- ensure that plant is regularly maintained, and repair or replace equipment that becomes noisy;
- arrange the work site to minimise the need for use of reversing alarms;
- locate noisy plant away from potentially noise affected neighbours or behind barriers such as sheds or walls;
- avoid dropping materials from height or dragging materials along the ground; and
- handle complaints in a prompt and responsive manner.

8 Road traffic noise assessment

The nearest residences potentially affected by an increase in road traffic volumes as a result of the Project are located adjacent to Industrial Drive in Mayfield West. The Traffic Impact Assessment for the Project (EMM 2015) states that the predicted total traffic volume increase as a result of vehicles associated with operation of the Project is up to +0.9% on Industrial Drive with an associated increase in heavy vehicles of 4.1%.

This increase in traffic volume would lead to a negligible increase (<0.5 dB) in road traffic noise from Industrial Drive. Therefore, the impact of road traffic noise associated with the Project is predicted to be negligible and within the 2 dB allowable increase for land use developments as described in the RNP (DECCW 2011).

9 Noise management and monitoring

It is noted that residual noise impacts, that is, noise emission levels above the PSNLs, are not predicted for the Project. Further, given the existing high levels of ambient noise (primarily from road traffic) it is unlikely that the Project will have any significant acoustic impact on the assessment locations. Hence, additional specific noise mitigation and management measures have not been considered for the operational phase of the Project.

Generic noise management measures have been provided in Section 7 relevant to the construction phase of the Project. Controls that would be implemented during construction and operations to minimise noise impacts include the following:

- plant and equipment with high noise emissions has been located on the northern side of the site, furthest away from potentially noise affected neighbours;
- plant and equipment will be regularly maintained and serviced;
- broadband reversing alarms (growlers) will be used;
- a site layout that minimises the need for mobile plant to reverse;
- plant and equipment will be switched off when not in use;
- any vehicle queuing will be on site rather than public roads;
- material drop heights will be minimised and dragging materials along the ground will be minimised;
- site contact details will be provided on a board at the front of the site;
- any noise-related complaints will be handled promptly; and
- a complaints register will be maintained.

It is recommended that noise management is described in the environment management plan (EMP). This should include any proposed noise monitoring.

10 Conclusion

EMM has completed a NIA to quantify potential noise impacts associated with the Project.

Operational noise levels have been assessed for the daytime and morning shoulder periods during calm and prevailing weather conditions. 'Worst-case' predictions assumed that all plant is operating simultaneously for the proposed day and morning shoulder operations. In all cases, noise levels from the Project were predicted to comply with the relevant PSNLs.

Sleep disturbance from operation of the Project during the night-time has been assessed. Maximum noise level events are predicted to be below the EPA screening criteria at all residential assessment locations.

An assessment of cumulative industrial noise from the Project together with other industrial noise sources in the vicinity was also conducted. The Project is predicted to have a negligible impact on the existing ambient acoustic environment and is not predicted to increase industrial noise levels above the relevant amenity criteria.

A qualitative approach has been taken regarding assessment of construction noise from the Project due to the limited proposed construction activity. It is very unlikely that the proposed construction activity will be noticed at the assessment locations. Notwithstanding this, recommendations have been provided regarding work practices to be considered to minimise construction noise from the Project.

The Project will result in additional traffic movements on Industrial Drive. This increase is minor in comparison to existing traffic volumes on Industrial Drive and the overall increase in road traffic noise level at residents will be negligible.

In summary, noise levels from the Project have been found to comply with current EPA noise criteria. Further, noise levels from the Project are predicted to be significantly less than existing ambient noise levels at the assessment locations which are primarily due to high road traffic noise. Noise levels from the Project are therefore not expected to cause adverse impacts at the assessment locations.

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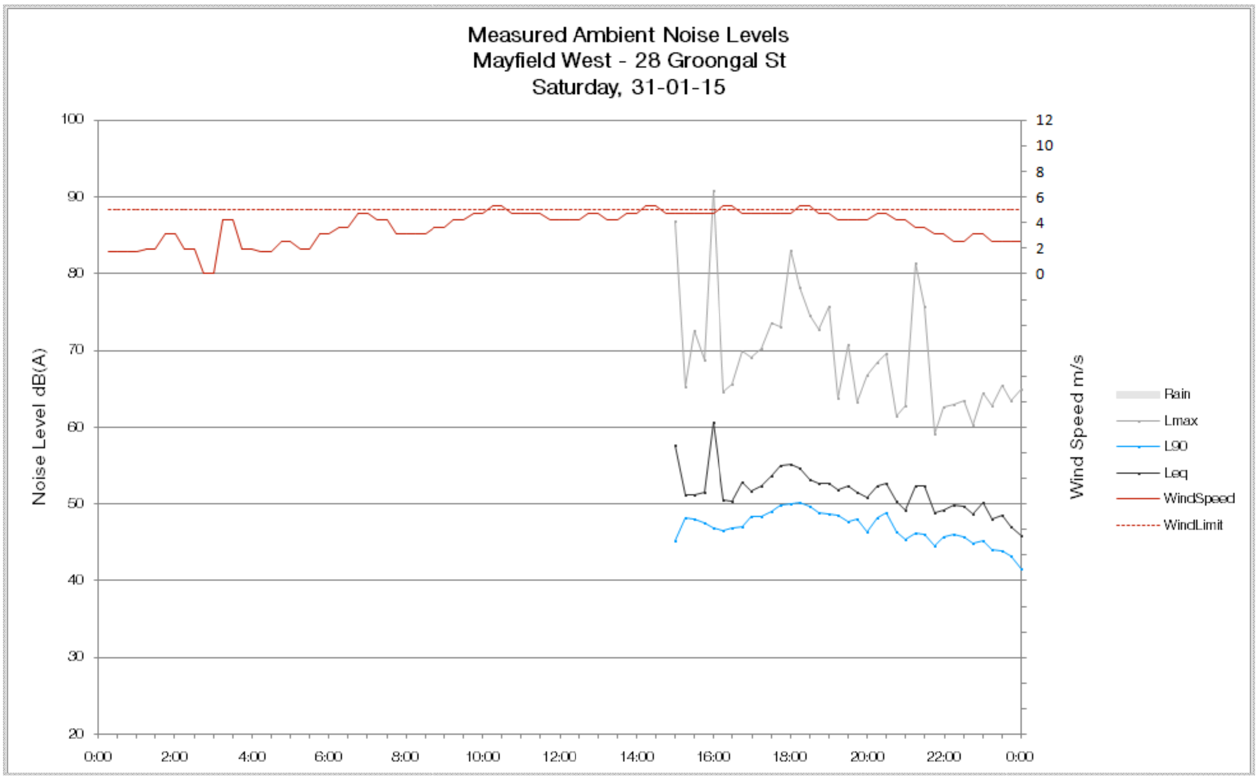
EMGA Mitchell McLennan Pty Ltd 2012, *PWCS T4 Project Environmental Assessment.*

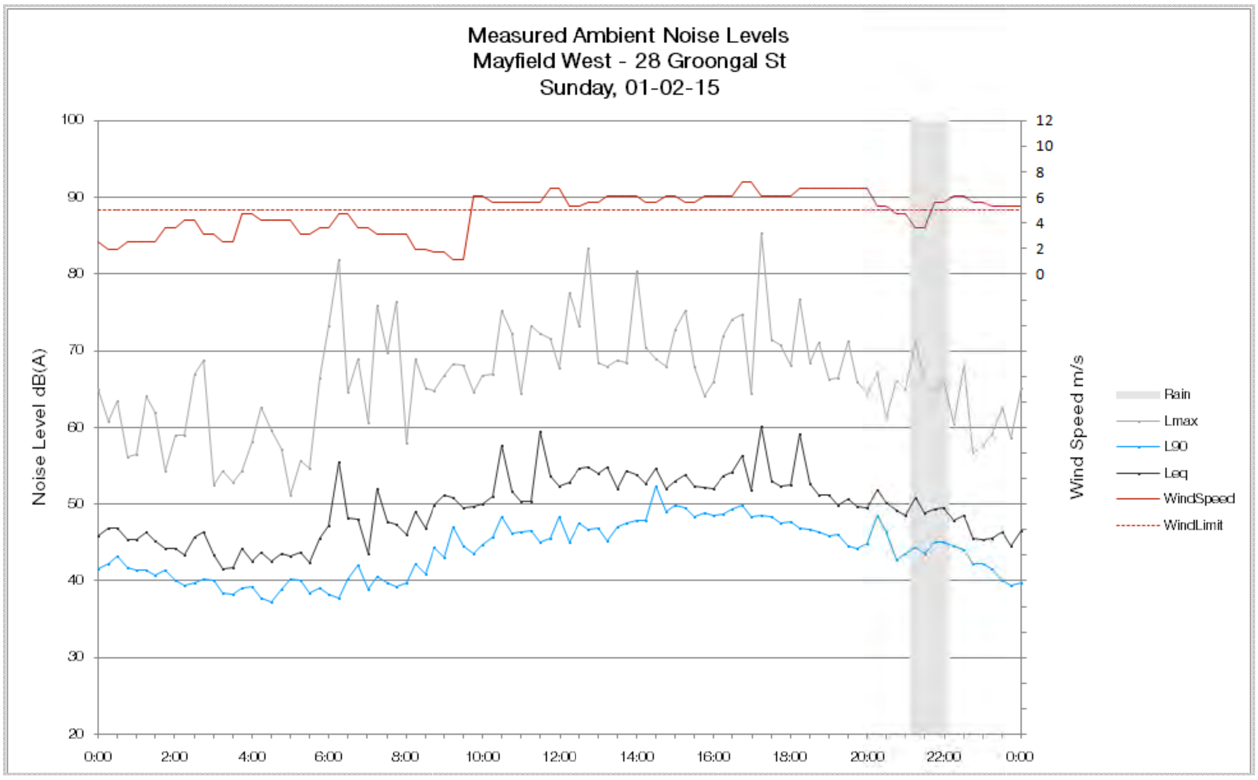
The City of Newcastle 1998, *Strategic Impact Assessment Study, "Steel River" Project.*

Environment Protection Authority (superseded), *Environmental Noise Control Manual.*

Appendix A

Daily unattended noise monitoring results


Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Saturday, 31-01-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Rain
Lmax
L90
Leq
WindSpeed
WindLimit


Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Sunday, 01-02-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
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50
40
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20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
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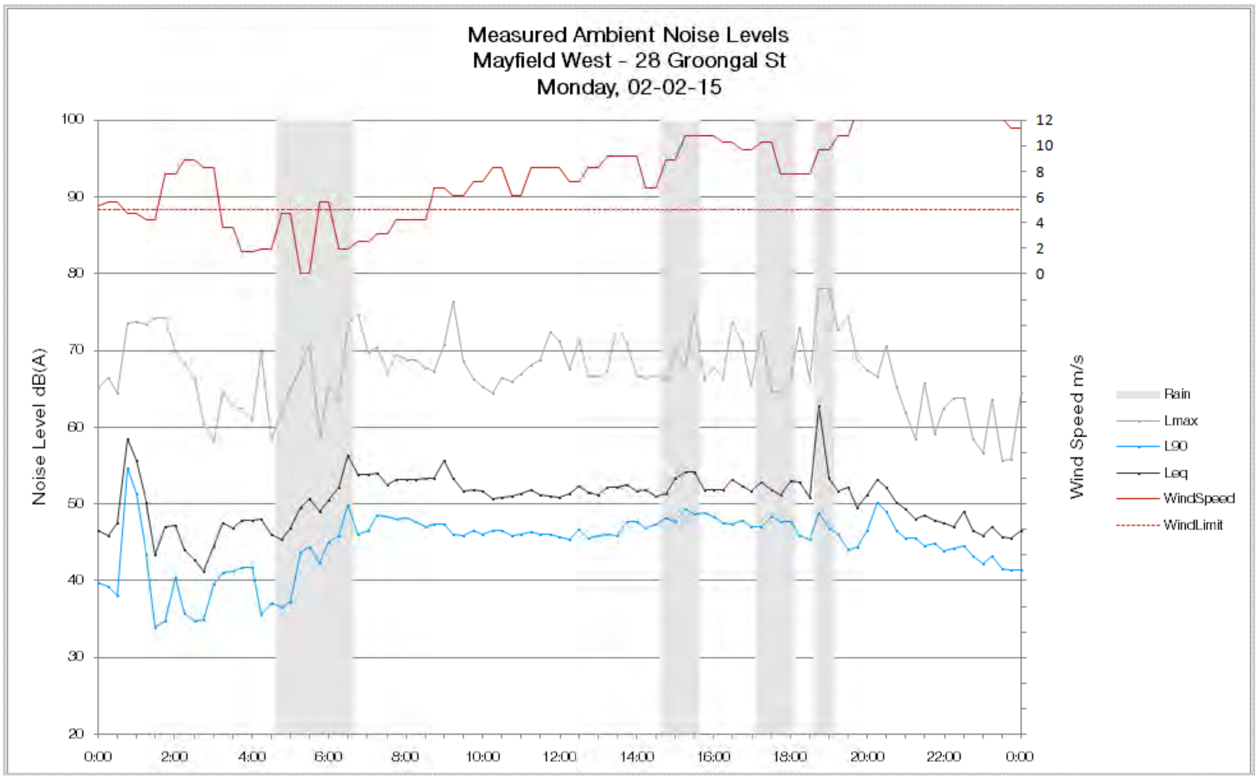
20:00
22:00
0:00
Rain
Lmax
L90
Leq
WindSpeed
WindLimit


Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Monday, 02-02-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
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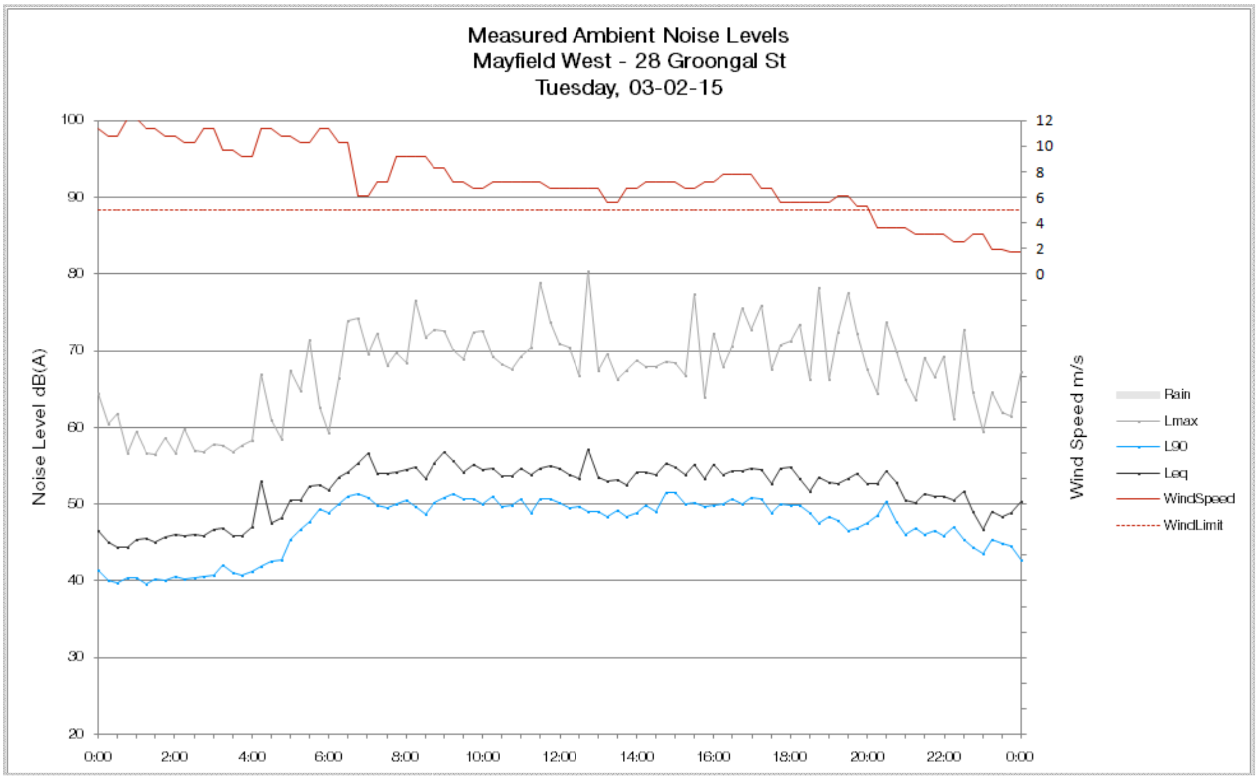
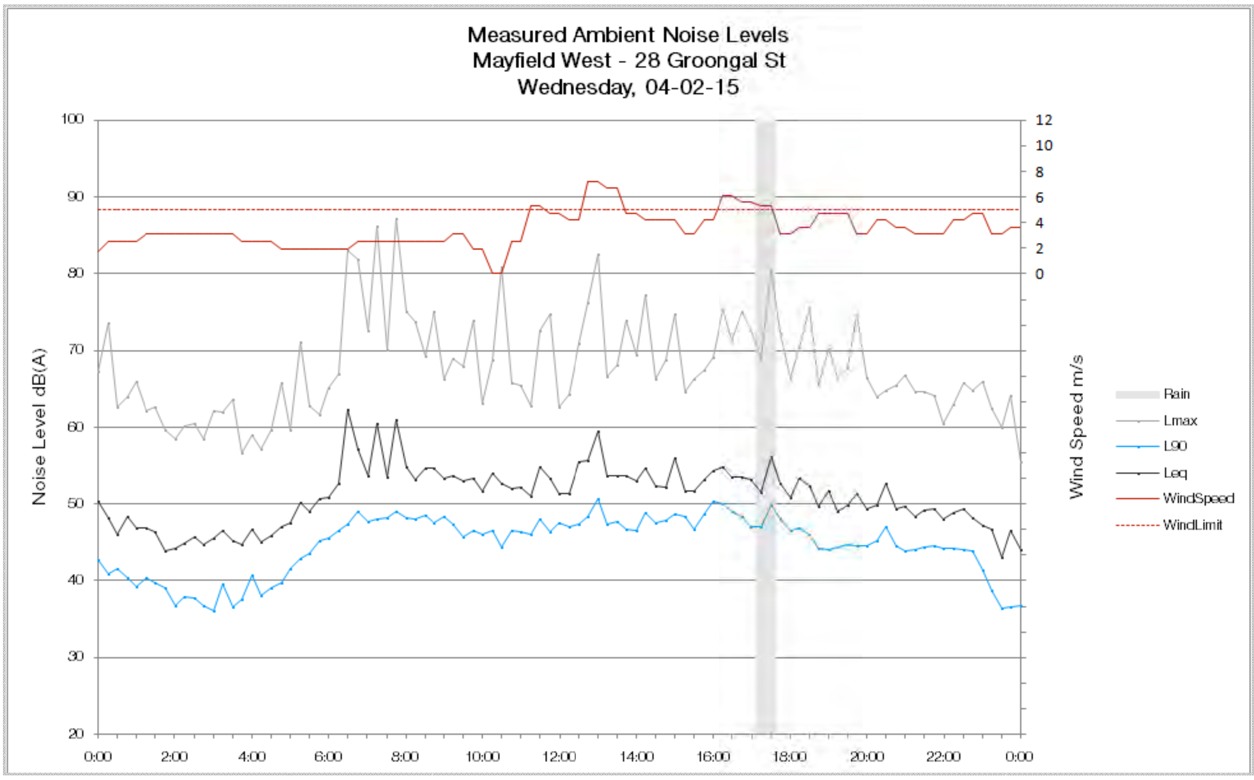
40
30
20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Rain
Lmax
L90
Leq
WindSpeed
WindLimit


Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Tuesday, 03-02-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Rain
Lmax
L90
Leq
WindSpeed
WindLimit



Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Wednesday, 04-02-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
10:00
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16:00
18:00
20:00
22:00
0:00
Rain
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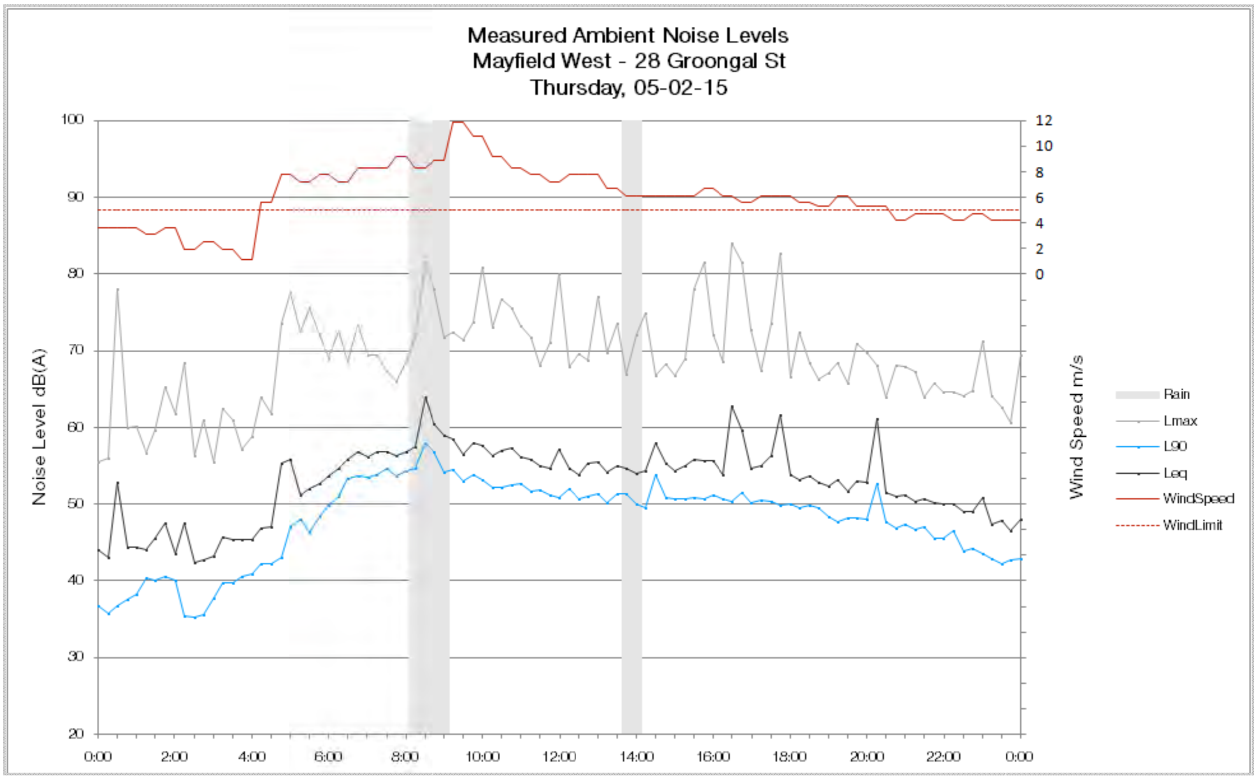
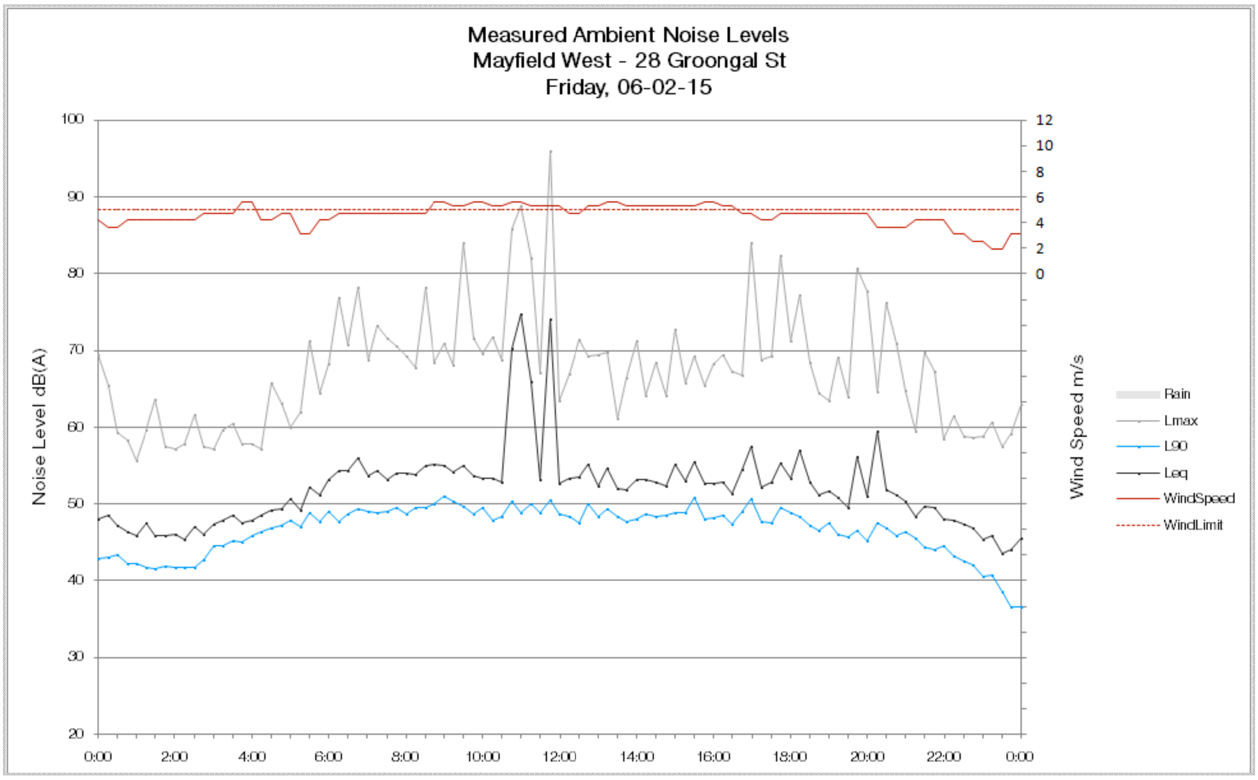
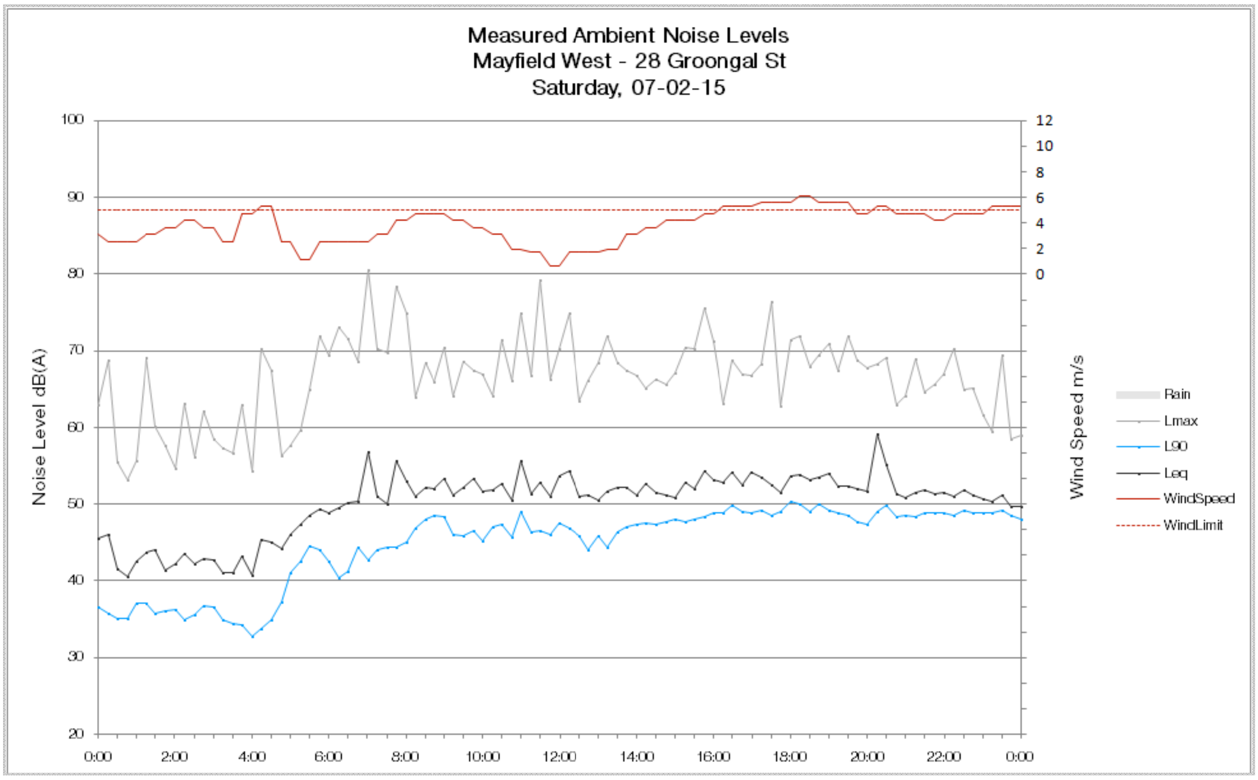
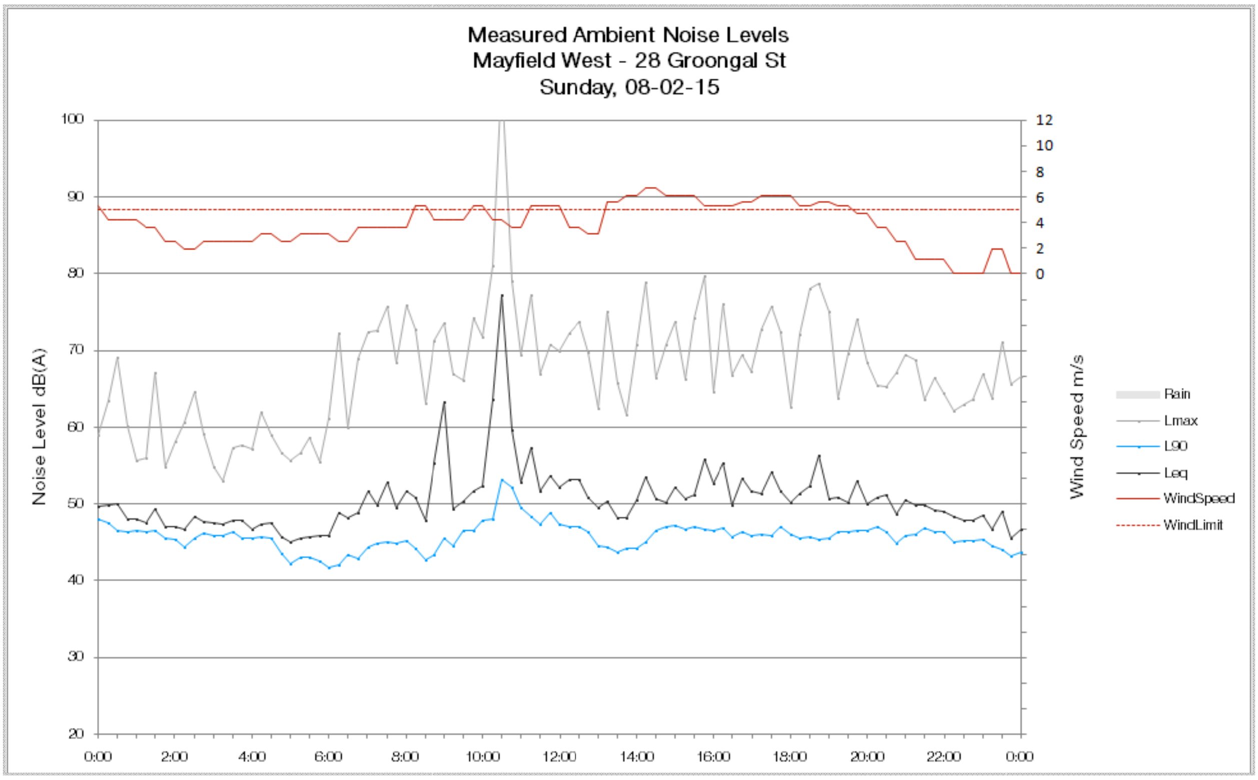
L90
Leq
WindSpeed
WindLimit



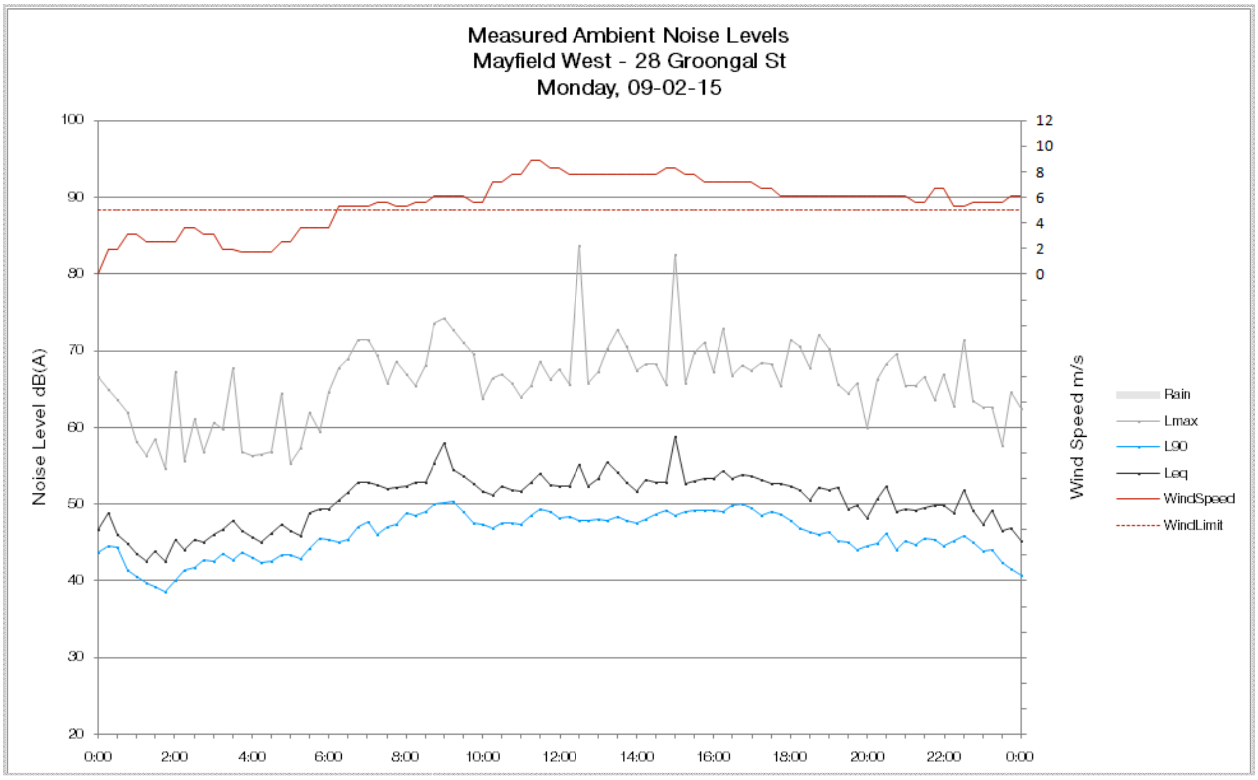
Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Thursday, 05-02-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Rain
Lmax
L90
Leq
WindSpeed
WindLimit


Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Friday, 06-02-15
Noise Level dB(A)
Wind Speed m/s
Rain
Lmax
L90
Leq
WindSpeed
WindLimit

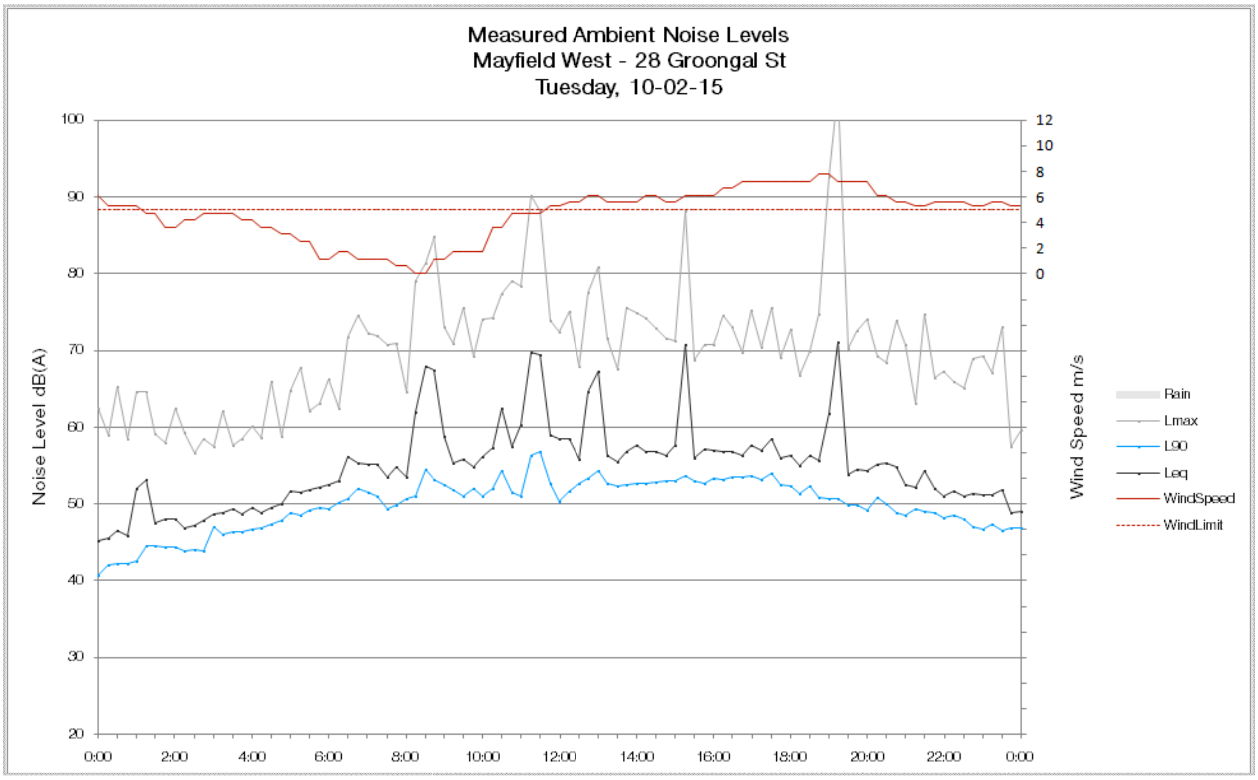

Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Saturday, 07-02-15
Noise Level dB(A)
Wind Speed m/s
Rain
Lmax
L90
Leq
WindSpeed
WindLimit



Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Sunday, 08-02-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Rain
Lmax
L90
Leq
WindSpeed
WindLimit



Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Monday, 09-02-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Rain
Lmax
L90
Leq
WindSpeed
WindLimit


Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Tuesday, 10-02-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
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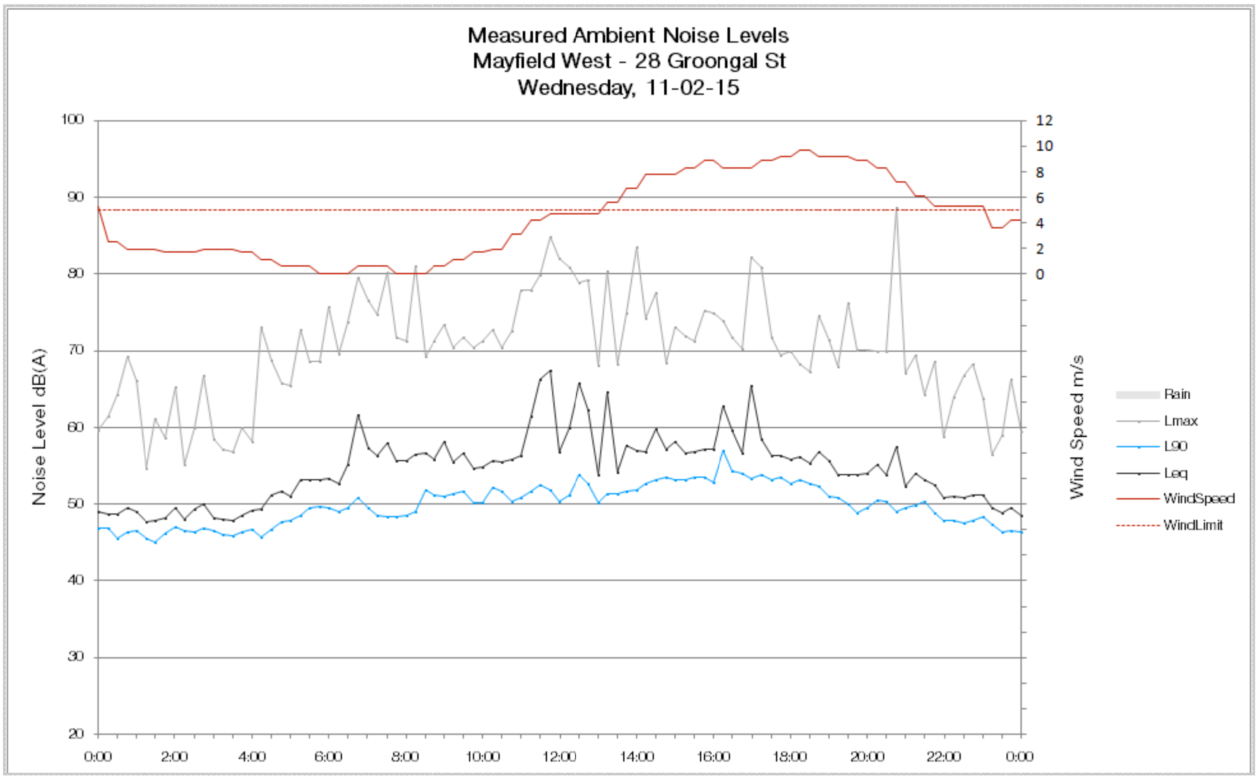
50
40
30
20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Rain
Lmax
L90
Leq
WindSpeed
WindLimit


Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Wednesday, 11-02-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
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40
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20
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6
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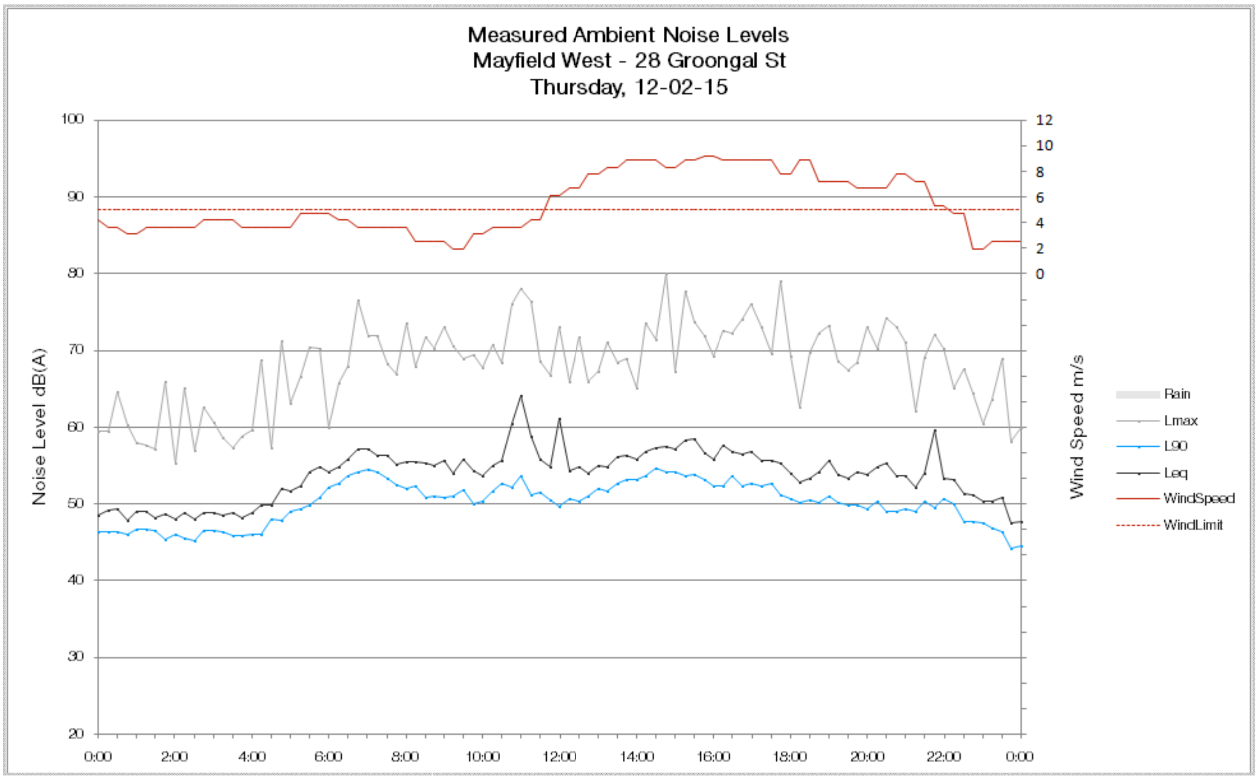
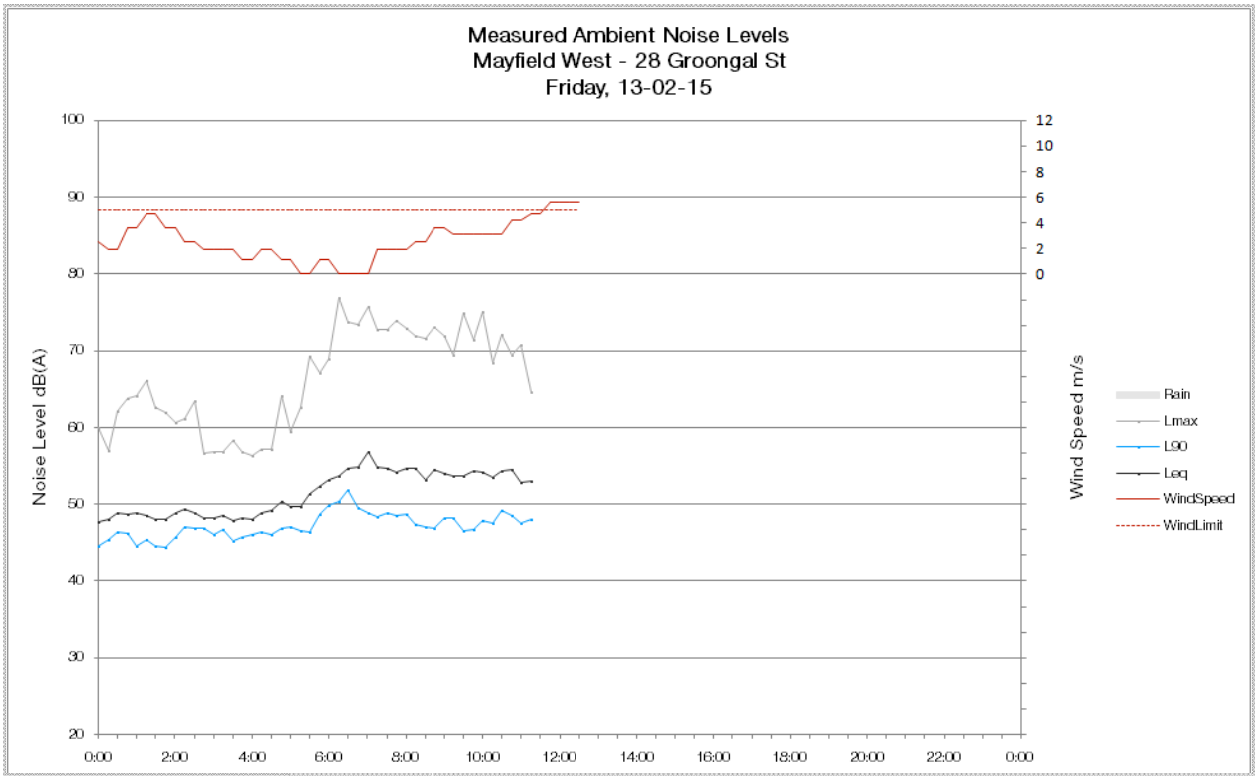
2
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Rain
Lmax
L90
Leq
WindSpeed
WindLimit

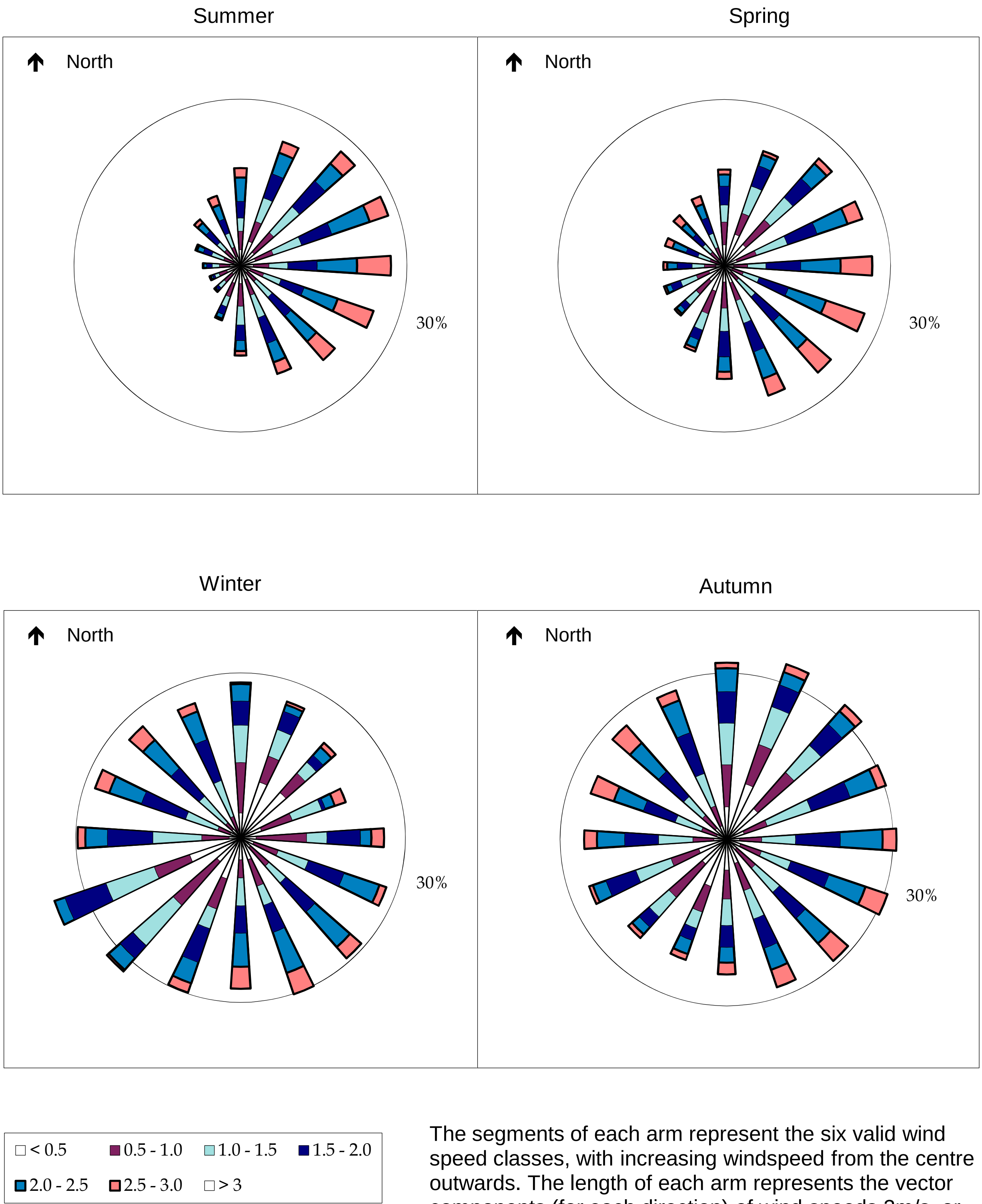

Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Thursday, 12-02-15
Noise Level dB(A)
Wind Speed m/s
Rain
Lmax
L90
Leq
WindSpeed
WindLimit


Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Friday, 13-02-15
Noise Level dB(A)
Wind Speed m/s
Rain
Lmax
L90
Leq
WindSpeed
WindLimit

Appendix B

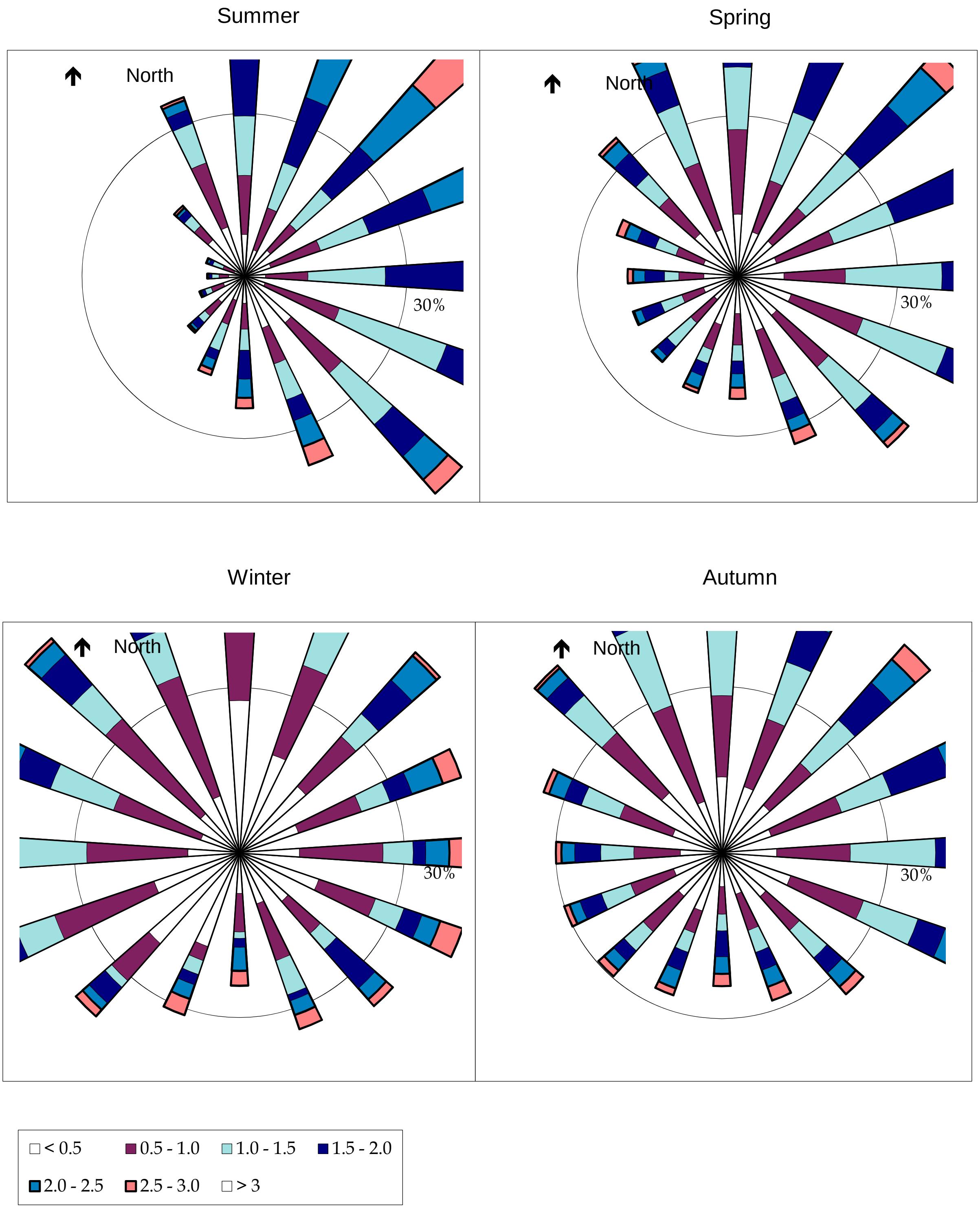
Wind roses

Day



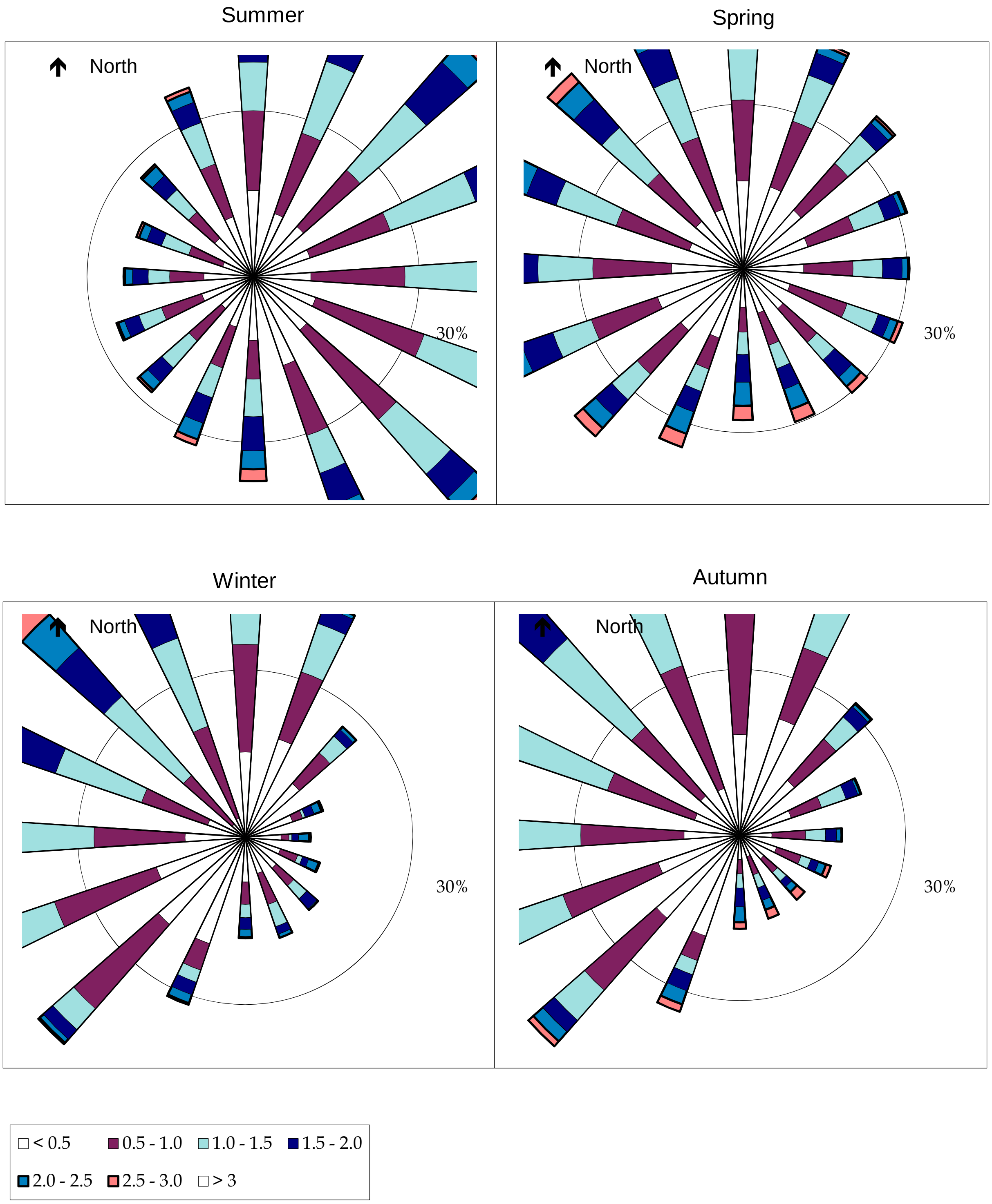
The segments of each arm represent the six valid wind speed classes, with increasing windspeed from the centre outwards. The length of each arm represents the vector components (for each direction) of wind speeds 3m/s or below as a proportion of the total time for the period . The circle represents the 30% occurrence threshold.

Evening



Summer
North
30%
Spring
North
30%
Winter
North
30%
Autumn
North
30%
< 0.5
0.5 - 1.0
1.0 - 1.5
1.5 - 2.0
2.0 - 2.5
2.5 - 3.0
> 3

Night


Summer
North
30%
Spring
North
30%
Winter
North
30%
Autumn
North
30%
< 0.5
0.5 - 1.0
1.0 - 1.5
1.5 - 2.0
2.0 - 2.5
2.5 - 3.0
> 3

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Appendix F

Traffic assessment

Traffic Impact Assessment

Recycling Facility, Mayfield West

Prepared for Benedict Recycling Pty Ltd | 20 March 2015

Planning + Environment + Acoustics

Traffic Impact Assessment

Recycling Facility, Mayfield West

Prepared for Benedict Recycling Pty Ltd | 20 March 2015

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Traffic Impact Assessment

Final Draft

Report J14152RP3 | Prepared for Benedict Recycling Pty Ltd | 20 March 2015

Prepared by	**Tim Brooker**	Approved by	**Philip Towler**
Position	Senior Transport Planner	Position	Associate Director
Signature		Signature	
Date	20 March 2015	Date	20 March 2015

This report has been prepared in accordance with the brief provided by the client and has relied upon the information collected at the time and under the conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of the client and no responsibility will be taken for its use by other parties. The client may, at its discretion, use the report to inform regulators and the public.

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Document Control

Version	Date	Prepared by	Reviewed by
v1	13 March 2015	Tim Brooker	Philip Towler
v2	20 March 2015	Tim Brooker	Philip Towler

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1 Introduction

1.1 Project background

The Benedict Recycling site is located at 80 Tourle Street, Mayfield West, Newcastle, and is legally described as Lot 1 in DP 874109. It is within the Steel River industrial estate and covers about 8.9 ha.

The proposed recycling facility site was used by Delta EMD until 2008, for the processing of electrolytic manganese dioxide. The site is flat (approximately 10 m Australian Height Datum (AHD)) and largely devoid of vegetation except for trees around the boundary and patches of planted vegetation near old office buildings. Since the closure of Delta EMD, the site has been decommissioned leaving:

- a number of buildings, including the large Delta EMD Electrolysis Building, and
- large open areas covered by concrete, crushed rock and asphalt.

The proposed recycling facility will have two main components:

- the main recycling facility on the west of the site that will accept and process segregated and co-mingled inert waste; and
- an ancillary waste activities area on the east of the site, for activities including:
    - temporary storage of plant, equipment, machinery, commercial vehicles, bins and containers;
    - some waste storage and processing (eg recyclable glass crushing within an existing building); and
    - refuse derived fuel (RDF) and/or biochar production within a building if a market for these products develops.

Waste material will be brought to the site via Industrial Drive, Steel River Boulevard and McIntosh Drive. Industrial Drive is a major heavy vehicle route. Steel River Boulevard and McIntosh Drive are local roads, within the General Industrial 'IN1' zone, which are suitable for heavy vehicles.

Approximately 35,000 incoming waste deliveries are expected annually when the facility is operating at maximum capacity for 90,000 tonnes of material processed annually. Variations may occur in the amounts of waste received on any given day. However, there will be a daily average of about 95 light vehicle loads and 34 heavy vehicle loads bringing waste material to the site.

Recycled products will be sold to customers throughout Newcastle and the Lower Hunter Region. Up to 20% of the waste received will not be able to be recycled. These non-recyclable residues will be stockpiled undercover prior being sent for disposal at an EPA licensed facility, most likely the Summerhill Waste Management Centre. Some of the non-recyclable residues may be processed in a building to produce RDF and/or biochar and these products sold.

Recycled products and non-recyclable residues will generate about 2,800 truck loads annually using 33 tonne truck loads (10.5 loads per day on average) when the recycling facility is operating at maximum capacity.

Other traffic movements will be generated by the ancillary site operations, the site workforce and general visitor/maintenance traffic:

- The ancillary site operations may generate up to 160 daily vehicle movements (a vehicle movement is a one-way vehicle trip) representing up to 20 daily light vehicles (40 movements) and 60 daily heavy vehicles (120 movements) visiting the site.

- The typical daily site workforce (12), visitors (3) and maintenance trucks (2) will generate about 17 vehicle visits each day (34 vehicle movements) from these operations.

1.2 Scope of this report

This Traffic Impact Assessment (TIA) report has been prepared in accordance with the general requirements of the Road and Maritime Services (RMS) *Guide to Traffic Generating Developments* (RMS 2002) and addresses.

- the existing site access and traffic arrangements;

- existing traffic flows on major roads and at intersections in the locality;

- the proposed internal site traffic circulation and car parking;

- the forecast traffic generation from the proposal;

- effects of the proposal on the external road network and intersections; and

- effects of the proposal on traffic safety, public transport, pedestrian and cycling facilities.

The Department of Planning and Environment (DPE) Secretary's Environmental Assessment Requirements (SEARs) for the project specifically request the consideration and assessment of:

- details of road transport routes to access to the site;

- construction and operational stage traffic predictions; and

- impacts on the safety and function of the road network and any road upgrades required.

Additionally, in correspondence to the DPI, RMS have requested that the traffic analysis of intersections includes the following items:

- current traffic counts and 10 year traffic growth projections, with and without development scenarios, allowing 2% background traffic growth on the classified road network;

- 95th percentile back-of-queue lengths;

- delays and level of service on all legs of intersections;

- use of SIDRA or similar traffic model; and

- electronic input/output data files for RMS review.

All SEARs and RMS requirements have been addressed in this TIA.

2 Existing traffic conditions

2.1 Site location and land uses

The site is part of the large Steel River industrial estate which is located on the northern side of Industrial Drive, between the intersections with Tourle Street and the Pacific Highway. The site is located approximately eight kilometres by road, north-west of the Newcastle city centre.

The location of the site is shown in Figure 2.1. The existing two-lane site access road from McIntosh Drive will continue to be used. This will be further delineated by concrete blocks, line markings and signage. The existing intersection of McIntosh Drive and the access road will not need to be modified. Lockable gates will be installed at the northern and southern end of the access road.

2.2 Road network and traffic volumes

The major road network in the vicinity of the project is shown in Figure 2.1 and consists of the following roads:

- Tourle Street, Mayfield, is part of a major arterial road route (MR 108) which is either two to four lanes wide. It provides access to Kooragang Island, Stockton, Williamtown, Nelson Bay, Port Stephens and surrounding areas of NSW, including heavy industrial sites on Kooragang Island. The site has no direct vehicular access to Tourle Street. This access is prevented both legally and physically, by the concrete median barriers and embankments at the Tourle Street site frontage. The RMS has recently exhibited a *Review of Environmental Factors* (RMS 2014) for the widening of the remaining two lane sections of the Tourle Street and Cormorant Road MR 108 route. This includes Tourle Street in the vicinity of the site frontage where a second two lane bridge is to be constructed crossing the Hunter River South Arm.

- Industrial Drive (MR 316) is a four to six-lane dual carriageway arterial road which connects the Pacific Highway near Sandgate to central Newcastle near the Wickham Railway Station. It provides a traffic relief bypass route for the Pacific Highway, through the main retail and commercial districts of Mayfield. As its name suggests, the road serves a number of major industrial sites in the locality including the former BHP Billiton (now OneSteel) steelworks and the Newcastle port terminals at Carrington. The route has significant heavy vehicle traffic usage throughout most periods of the day and night.

- Werribee Street (MR 605) is also an arterial type road which intersects with Industrial Drive at Mayfield West, approximately 350 m west of Tourle Street and 350 m east of Steel River Boulevard. It has traffic signals controlling the traffic movements at the intersection with Industrial Drive. It also carries significant heavy vehicle traffic, between the MR 108 Tourle Street route, the industrial and port areas of Newcastle and other urban areas of Newcastle to the south.

- Steel River Boulevard is a local industrial area road which provides the only access to the newly developed Steel River industrial and business park precinct. It also has traffic signals controlling the intersection with Industrial Drive.

Photographs 2.1 to 2.7 show the existing road widths, cross sections and traffic lane configurations of the local roads and intersections within the Steel River precinct which are likely to be used by the recycling facility traffic, including the intersection of Steel River Boulevard with Industrial Drive.

T:\Jobs\2014\J14152 - Benedict Newcastle Recycling\GIS\02_Maps\T002_SiteAccessRoad_20150312_01.mxd 12/03/2015

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Site access road

Recycling Facility, Mayfield West

Traffic Impact Statement

Figure 2.1

Photograph 2.1 Site access driveway at McIntosh Drive viewed from Murray Dwyer Circuit

Photograph 2.2 McIntosh Drive west of the site looking towards Steel River Boulevard

Photograph 2.3 McIntosh Drive looking east towards the site

Photograph 2.4 Murray Dwyer Circuit 300 metres south of the site

Photograph 2.5 Steel River Boulevard at Industrial Drive intersection

Photograph 2.6 Industrial Drive looking west from Steel River Boulevard

Photograph 2.7 Industrial Drive looking east from Steel River Boulevard

To analyse the impacts of the proposal on the surrounding road network, the peak hour traffic movements at the intersection of Industrial Drive/Steel River Boulevard were surveyed on Wednesday 4 February 2015. The raw traffic count data for this location is included in Appendix A.

Historic tube traffic counts have also been undertaken by the Roads and Maritime Services (RMS), formerly the Roads and Traffic Authority (RTA), at a number of locations on the MR 316 Industrial Drive and MR 108 Tourle Street routes. A summary of these counts, which record the historic growth in the average annual daily traffic (AADT) volumes in the Mayfield West locality, is provided in Table 2.1.

Table 2.1 Summary of AADT traffic volumes on Industrial Drive and Tourle Street

RMS Location ref	Road and nearest cross street	2001	2004	2010	2012	2015 (estimate)	% per annum growth rate[1]
05.953	Tourle Street, Mayfield North, north of Industrial Drive	23,650	24,052	29,173	32,008	34,300	+3.2%
05.979	Industrial Drive Mayfield West, west of Werribi Street	21,559	23,339	-	-	31,300	-

Note: 1.The annual daily traffic growth rate is calculated from 2001 to the most recent actual survey in 2012.

The current peak hourly traffic volumes on the road network and proportions of heavy vehicle traffic have been determined from the 4 February 2015 intersection traffic survey. These are summarised in Table 2.2.

Table 2.2 Summary of February 2015 surveyed peak hour and heavy vehicle traffic

Road	Direction	am peak hour 7.45 to 8.45 am typically			pm peak hour 5.00 to 6.00 pm typically		
		All traffic	Heavy vehicles	% Heavy	All traffic	Heavy vehicles	% Heavy
Steel River Boulevard (north of Industrial Drive)	N'bound	513	6	1.2%	109	2	1.8%
	S'bound	104	5	4.8%	445	4	0.9%
Industrial Drive (east of Steel River Boulevard))	E'bound	1,286	94	7.3%	1,304	45	3.5%
	W'bound	1,430	117	8.2%	1,599	64	4.0%
Industrial Drive (west of Steel River Boulevard)	E'bound	1,407	96	6.8%	1,689	68	4.0%
	W'bound	1,142	118	10.3%	1,058	47	4.4%

During the morning and afternoon peak traffic hours, the proportions of heavy vehicle traffic using Steel River Boulevard are generally less than 5%, but at other times of the day when there is less commuter traffic the heavy vehicle percentages are higher.

Similarly on Industrial Drive, the heavy vehicle traffic proportions are between 6% to 10% during the morning and approximately 4% during the afternoon peak traffic hours, but there are higher proportions of heavy vehicle traffic, typically about 10% of all traffic, at other times of the day.

2.3 Intersections

The current RMS 'intersection level of service' standards are summarised in Table 2.3. Satisfactory intersection operation is also usually indicated by an intersection degree of saturation of 0.80 or lower.

Table 2.3 Intersection level of service standards

Level of Service	Average delay (seconds per vehicle)	Traffic signals, roundabout	Priority intersection ('Stop' and 'Give Way')
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
E	57 to 70	At capacity At signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity; requires other control mode
F	Greater than 71	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing; requires other control mode

Source: (RTA 2002).

The SIDRA analysis results for the existing (2015) base traffic situation at the intersection of Steel River Boulevard and Industrial Drive (which is the only access intersection for the industrial estate) show the following intersection results. The modelled intersection layout, including the length of the additional left and right turning traffic lanes and the detailed SIDRA analysis results are included as Appendix B.

- Industrial Drive/Steel River Boulevard (am peak);
  - degree of saturation: 0.713;
  - average delay: 17.4 s; and
  - level of service: B.
- Industrial Drive/Steel River Boulevard (pm peak);
  - degree of saturation: 0.594;
  - average delay: 14.0 s; and
  - level of service: A.

The intersection is not currently congested and is operating with a satisfactory peak hour degree of saturation (0.6 to 0.7) which corresponds to low traffic delays and relatively good intersection levels of service.

The intersection is currently working well at level of service B under existing traffic demands during the morning peak hour and level of service A (although close to the transition point to level of service B) during the afternoon peak hour.

2.4 Existing industrial area traffic

The existing peak hourly volumes for all the industrial precinct traffic, which is combined on Steel River Boulevard at the Industrial Drive intersection, are shown in Table 2.2 and can be summarised as follows:

- morning peak hour (7.45 to 8.45 am);
  - 617 vehicles per hour two way (606 cars, 11 trucks); and
- afternoon peak hour (5.00 to 6.00 pm);
  - 554 vehicles per hour two way (548 cars, 6 trucks).

These peak hourly volumes correspond to a daily traffic volume of about 6,500 vehicle movements currently from all sites within the industrial area.

2.5 Road safety and accident history

The recent accident history of the MR 316 Industrial Drive route between Wickham and Mayfield West has been investigated by EMM. Over the total seven kilometre section there were 200 traffic accidents recorded over a five year period between July 2006 and June 2011, including three fatal crashes with three fatalities.

The three recorded fatal accidents were all single vehicle accidents involving a male driver aged 17 to 37, where the vehicle hit an object off the road carriageway and ‘vehicle speed’ was identified as a contributory factor in the accident. No heavy vehicles were involved in fatal traffic accidents during the period.

2.6 Car parking

There are adequate paved areas available within the site for car parking, for the future site employees and visitors. Historically with the Delta EMD site operations, the site employee car parking has mainly been provided in the south east corner of the site, which minimises the distances which employee and visitor cars have to travel within the site.

2.7 Walking and cycling

The site is located over one kilometre travel distance from the nearest residential areas of Newcastle. The future site employees and other persons will not walk to and from the site unless they lived within reasonable proximity.

2.8 Public transport access

A map of the current public bus routes operating within the Mayfield area is shown in Figure 2.2.

Figure 2.2 Bus routes map of the Mayfield area of Newcastle

Several bus routes (100, 106, 107, 111 and 118) currently operate through the Mayfield area.

Route 118, which travels via Tourle Street and Industrial Drive, passes closest to the site. However, the pedestrian accessibility between the site and any existing bus stop locations on Tourle Street is likely to be difficult and it is considered unlikely that any of the future site workforce will normally travel to and from work by public transport as a result of this constraint.

3 The proposal

3.1 Site layout and operations

The recycling facility (Figure 3.1) will include the following components:

- a weighbridge area with two weighbridges, a wheel wash for outbound vehicles, demountable offices and amenities;
- the main processing shed (previously the EMD Delta Electrolysis Building) which will contain the majority of waste processing activities;
- a segregated heavy waste processing and stockpiling area north of the main processing shed;
- vehicle repair and maintenance facilities in an existing shed;
- a truck wash in an existing shed;
- access and internal roads; and
- an ancillary activity area for storage, parking and other ancillary uses.

The site will accept inert waste from businesses and the general public. Accordingly, waste will be delivered to site by a variety of vehicles including:

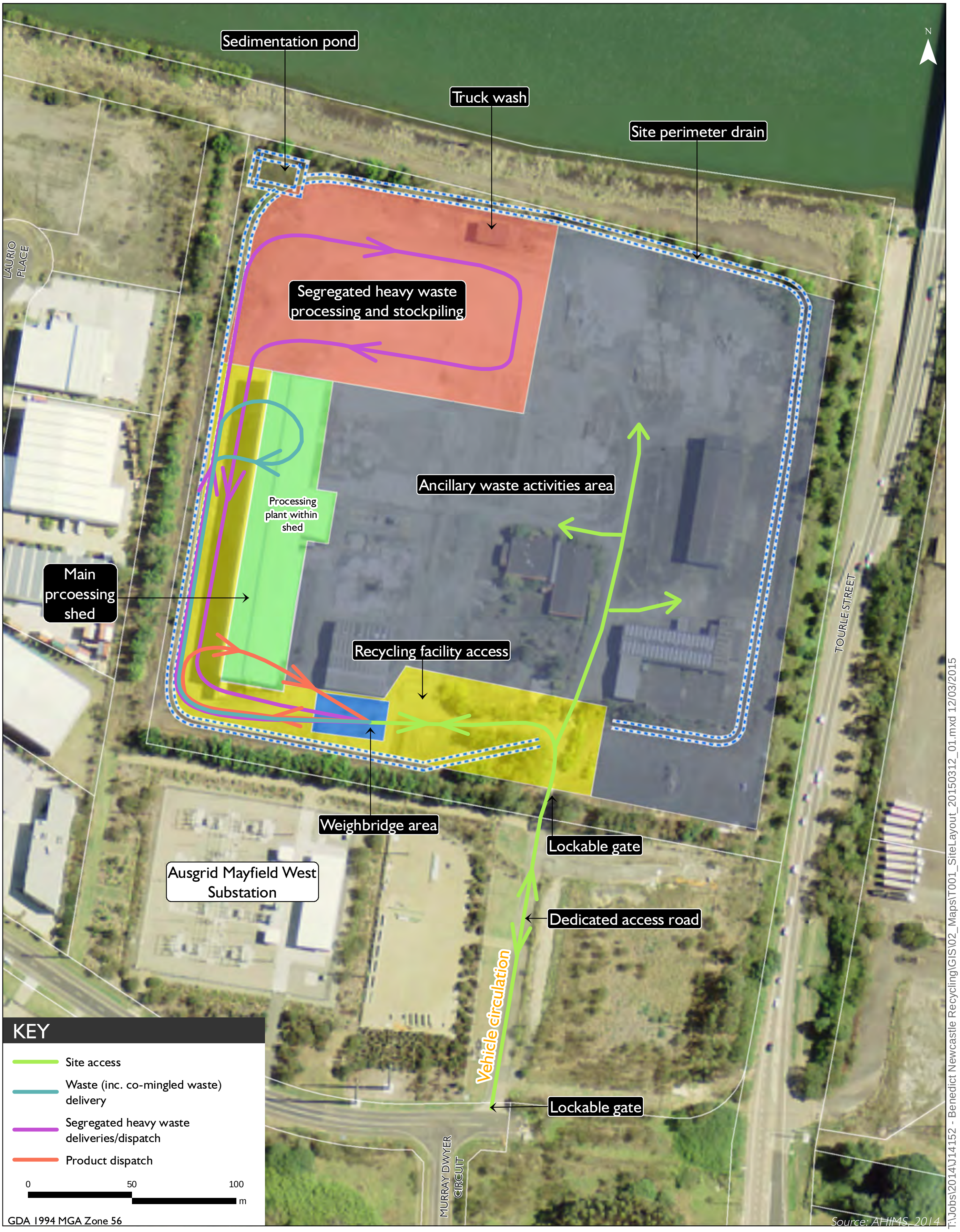
- light vehicles such as cars with box trailers and utilities;
- single or dual axle heavy vehicles such as 'Daihatsu's' and skip-bin trucks; and
- multiple axle combination heavy vehicles.

All vehicles delivering waste will be directed to the weighbridge where the load will be inspected for potential contaminants and classified. A ticket will then be issued to the driver and they will be instructed where to deliver the waste: within the processing shed or external yard areas.

Mobile plant will be used during operations. Contractors will use additional mobile equipment during processing campaigns.

Initially, a single above-ground weighbridge will be used for incoming and outgoing vehicles. It is anticipated that a second above-ground weighbridge will be installed later to allow segregation of incoming and outgoing vehicles. The weighbridges will be installed on an existing internal site road and will not require any excavation. An above-ground self-contained wheel wash will be provided prior to the weighbridge for trucks leaving the site.

The offices and amenities will be demountables that will not require foundations. The site office and reception will include a raised platform to allow incoming loads to be inspected.



Proposed site layout showing traffic circulation

Recycling Facility, Mayfield West
Traffic Impact Assessment

Figure 3.1

3.2 Site access and haulage routes

The site will receive waste and deliver recycled products throughout the Newcastle and Lower Hunter Region of NSW. The site truck origins and destinations will be approximately 60% east of the site via Industrial Drive (which also connects to the north and south via Tourle Street and Werribee Street) and 40% west of the site via Industrial Drive (which connects to other routes such as The Pacific Highway, Maitland Road and Sandgate Road).

The recycling facility internal road layout is shown on Figure 3.1. The circulation of traffic within the waste depot area will be dependent on the use of each area. In all cases, vehicle traffic will be restricted to sealed internal roads.

All roads will be marked and speed limits posted. Unsealed areas will be cordoned off from vehicle use The site will include parking areas for trucks, and employee and visitor light vehicles. Customer skip bins and skip-bin trucks will also be stored.

Lockable gates will installed at the northern and southern end of the access road. The gate at the southern end of the access road will prevent unauthorised out-of-hours vehicular access to the site and surrounds. This will prevent illegal dumping of waste in the site or immediate surrounds.

The ancillary activity areas will be used for a range of uses, including:

- parking for trucks, and employee and visitor light vehicles generally in the existing car park in the south-east corner of the site;
- temporary storage for:
  - light and heavy vehicles;
  - bins and containers;
  - construction and demolition plant and equipment;
  - general machinery storage; and
  - temporary demountable offices and sheds.
- recyclable glass crushing within one of the existing buildings.

Any additional waste processing, such as RDF or biochar production, will be conducted within a building/shed.

3.3 Proposed hours of operation

The recycling facility will normally accept waste deliveries (from businesses and the public) and dispatch materials between 6 am and 6 pm Monday to Friday and between 6 am and 5 pm on Saturday. It will also normally accept deliveries from 7 am to 3 pm on Sunday, providing an additional day on which the public could deliver recyclable waste to the facility if there is sufficient demand.

At times waste is generated by major infrastructure projects at night, particularly from road and rail works. This application therefore seeks approval for the facility to accept (but not process) waste 24 hours per day on occasion. The NCC will be notified prior to these occasions.

Waste processing will only occur at the site from 7 am to 6 pm Monday to Saturday. There will be no processing on Sundays or public holidays.

The recycling facility is expected to be operated by approximately 12 employees. There will be additional contractors operating on the site during campaign processing of concrete and wood. There may also be additional employees or contractors operating in the ancillary waste activity area or operating the RDF/biochar plant should this be constructed in the future.

3.4 Construction stage peak traffic generation

Project construction will require marking existing internal roads; re-installing some gates and fencing; installing the weighbridges and demountable offices/amenities; ensuring runoff controls are operating efficiently; sealing/armouring unsealed areas and restoring services (electricity, water, gas and waste water) to the site.

No significant ground excavation is anticipated so contaminated soil will not be disturbed although there may be very minor ground disturbance such as installing signage poles and anchors for demountables.

At the peak stage of construction there will be a potential maximum of 10 light vehicles and 10 heavy vehicles per day visiting the site during the 7.00 am to 6.00 pm daytime period. This will generate a potential maximum of 40 vehicle movements per day at the site during the peak stage of construction.

Construction light vehicle traffic will potentially generate up to 10 light vehicles arriving at the site during any one-hour morning peak period (eg 7.45 to 8.45 am) and a similar number departing from the site during any one hour afternoon peak period (eg 5.00 to 6.00 pm).

The peak hourly construction heavy vehicle traffic will be potentially up to 3 trucks per hour arriving at and departing from the site during a one hour morning peak period (eg 7.45 am to 8.45 am).

The remainder of the site construction related heavy vehicle traffic movements will generally be evenly distributed over the remainder of the working day, generating 1 truck per hour typically arriving at and departing from the site during most other periods of the working day.

4 Traffic impacts and mitigation measures

4.1 Traffic generation and distribution

The total daily and peak hourly traffic movements generated by all site activities are summarised in Table 4.1 and Table 4.2.

Approximately 50% of the total daily employee and site visitor car traffic movements will occur during the morning and afternoon peak hourly traffic periods. These will generally travel in to the site during the morning peak hour and out during the afternoon peak hour.

The other site traffic movements, including all the site truck traffic, will be more uniformly distributed over the full working day, with approximately 10% of all the daily inbound and outbound site waste and recycled product traffic occurring during the morning peak hour (7.45 to 8.45 am), and a lesser proportion (5% approximately) occurring during the afternoon peak hour (5.00 to 6.00 pm).

The afternoon peak hour site traffic movements (61 hourly vehicle movements) will be lower than in the mornings (103 hourly vehicle movements), because the site operations truck traffic, including all waste receivals and product sales will normally be less intensive towards the end of the working day in comparison to during the mornings on weekdays.

Table 4.1 Summary of site - generated daily traffic movements

Activity	Total daily traffic movements	Daily car and other light vehicle movements	Daily truck traffic movements
Site employees and visitors	34	30	4
Waste receivals	258	190	68
Recycled product and rejects	22	0	22
Ancillary operations	160	40	120
All site traffic	**474**	**260**	**214**

Table 4.2 Summary of site - generated peak hourly traffic movements

Peak Hour	Inbound site traffic movements[1]		Outbound site traffic movements[1]	
(time of day)	Cars/other light vehicles	Trucks	Cars/other light vehicles	Trucks
Morning peak hour (7.45 to 8.45 am)	15 site employees/visitors +23 waste traffic	21 waste and product traffic	23 waste traffic	21 waste and product traffic
Afternoon peak hour (5.00 to 6.00 pm)	12 waste traffic	11 waste and product traffic	15 site employees/visitors +12 waste traffic	11 waste and product traffic

Notes: 1.The site car and truck traffic movements will both be distributed approximately 60%/40% to and from the east/west on Industrial Drive.

4.2 Traffic increases on the road network

4.2.1 Site construction traffic

The site construction daily traffic movements are summarised in Section 3.4 and the estimated additional peak hourly construction traffic movements are as follows.

- in the construction morning peak hour, +10 additional car traffic movements (all inbound) and +6 additional truck traffic movements (3 inbound and 3 outbound); and
- in the construction afternoon peak hour, +10 additional car traffic movements (all outbound) and +2 additional truck traffic movements (1 inbound and 1 outbound).

The total daily site construction traffic movements (40 vehicle movements) will not be much higher than the combined morning and afternoon peak hour construction traffic (28 vehicle movements) and there will be generally minimal impacts to the external major road network, including Industrial Drive and Tourle Street, from the site construction traffic using these roads, where the existing daily traffic volumes are currently around 30,000 vehicle movements per day or higher (Table 2.1).

4.2.2 Site operations traffic

The predicted locality daily traffic increases in 2015 from the recycling facility traffic operations on an average day are summarised In Table 4.3, in comparison to the existing daily traffic using these roads, which was identified in Section 2.2 and Section 2.4.

Table 4.3 Summary of 2015 daily traffic volumes and increases with the recycling facility traffic

Road	Existing daily traffic (all vehicles)	Additional daily traffic (all vehicles)	Increase (%)	Existing daily traffic (heavy vehicles)	Additional daily traffic (heavy vehicles)	Increase (%)
Steel River Boulevard (north of Industrial Drive)	6,500	474	7.3%	325*	214	65.8%
Industrial Drive (east of Steel River Boulevard)	31,300	284	0.9%	3,130*	128	4.1%
Industrial Drive (west of Steel River Boulevard)	29,400	190	0.6%	2,940*	86	2.9%

Notes: **Existing daily heavy vehicle traffic movements are calculated using the upper range of the surveyed am and pm peak hour proportions of heavy vehicle traffic in Table 2.2.*

The results in Table 4.3 demonstrate that the increases in the total daily traffic movements by all vehicles on Industrial Drive, either to the east or the west of Steel River Boulevard, will be of the order of +0.6% to +0.9%. These increases will not generally be noticeable to existing road users. The corresponding increases in the daily heavy vehicle traffic movements using these sections of Industrial Drive will be approximately +3% to +4% which will also be unlikely to be noticeable to existing road users.

The results in Table 4.3 show that the additional site traffic on Steel River Boulevard (which will include a high proportion of heavy vehicles) will represent a +7% increase in all traffic using the road but a +66% increase in the daily truck traffic using the road. The higher percentage traffic increase for trucks occurs because the recycling facility traffic will have a much higher proportion of truck traffic within its daily traffic movements, than most of the other sites within the industrial precinct.

The estimated truck traffic increase on Steel River Boulevard is likely to be noticeable to existing road users, but will nevertheless be acceptable, given the industrial nature of the road in this locality. The existing road pavement surfaces on Steel River Boulevard and McIntosh Drive (as shown in Photographs 2.1 and 2.2) are generally in good condition with recent resurfacing evident in most areas. Additional road widening or reconstruction work not be warranted as a result of additional daily traffic movements (including truck traffic) generated by the proposed recycling facility traffic operations.

4.3 Traffic impacts at intersections

4.3.1 Site construction traffic

The additional site-generated peak hourly construction traffic movements have been assessed using SIDRA at the Industrial Drive/Steel River Boulevard intersection. The impacts of the net additional traffic (+16 vehicle movements during the morning peak hour and +12 vehicle movements during the afternoon peak hour), are summarised in Table 4.4 and detailed results are provided in Appendix B.

During the project construction, there will be no reduction in the morning or afternoon peak hour level of service at the Industrial Drive/Steel River Boulevard intersection. The actual changes in the average vehicle delay for all traffic at the intersection will be minimal, eg from 17.4 to 17.7 seconds per vehicle in the morning peak hour and from 14.0 to 14.3 seconds per vehicle in the afternoon peak hour.

Table 4.4 Results of the construction stage traffic impacts analysis (am and pm peak hours)

Intersection	Peak hour	Existing traffic situation			Peak project construction		
		LoS	DOS	AVD	LoS	DOS	AVD
Industrial Drive/ Steel River Boulevard	Morning peak hour (7.45 to 8.45 am)	B	0.713	17.4	B	0.727	17.7
Industrial Drive/ Steel River Boulevard	Afternoon peak hour (5.00 to 6.00 pm)	A	0.594	14.0	A	0.594	14.3

Notes: LoS – Level of Service, DOS – Degree of Saturation, AVD – Average Vehicle Delay.

The SIDRA intersection analysis results in Table 4.4 show that there will be no noticeable changes in either the degree of saturation, level of service or average traffic delays at the Industrial Drive/Steel River Boulevard intersection, from the site construction activity.

4.3.2 Site operations traffic

i Site operations traffic - 2015

The short term future traffic impacts of the additional peak hourly traffic generated by the site operations in 2015 are summarised from the SIDRA intersection analysis results in Table 4.5. The analysis has been undertaken for the net additional +103 vehicle movements per hour which are predicted for the site traffic during the morning peak hour and +61 additional vehicle movements during the afternoon peak hour.

The detailed 2015 SIDRA analysis results are provided in Appendix B.

Table 4.5 SIDRA results for the 2015 recycling facility operations (am and pm peak hours)

Intersection	Peak hour	Existing 2015 base traffic			With project operations traffic		
		LoS	DOS	AVD	LoS	DOS	AVD
Industrial Drive/ Steel River Boulevard	Morning peak hour (7.45 to 8.45 am)	B	0.713	17.4	B	0.752	18.8
Industrial Drive/ Steel River Boulevard	Afternoon peak hour (5.00 to 6.00 pm)	A	0.594	14.0	B	0.603	15.1

Notes: LoS – Level of Service, DOS – Degree of Saturation, AVD – Average Vehicle Delay.

The 2015 SIDRA results in Table 4.5 show that during the morning peak hour (7.45 am to 8.45 am) there will be only a minor change to the intersection operations. The average vehicle delays for all traffic at the intersection will increase from 17.4 seconds to 18.8 seconds and the intersection level of service will remain within the range of level of service 'B' (overall range 15 to 28 seconds).

During the afternoon peak hour (5.00pm to 6.00 pm), there will be similar minor increases to the average intersection delays for all traffic (from 14.0 seconds to 15.1 seconds) and the intersection level of service will change from 'A' to 'B'. However, there will be only a minor change in the corresponding intersection operating delays which will represent a minor actual traffic impact.

The predicted intersection peak hour maximum (95th percentile) traffic queue lengths, in particular for the right hand turn by the Industrial Drive westbound traffic, have also been considered. These are included in the detailed SIDRA analysis results in Appendix B. The right turn lane for the westbound traffic on Industrial Drive has an actual length of 155 m and the 95th percentile morning and afternoon peak period traffic queues within this right turn lane will increase with the recycling facility project traffic as follows:

- in the 2015 morning peak hour, the 95th percentile traffic queue length will increase from 113 m to 115 m during the project construction and to 132 m during the project operations; and
- in the 2015 afternoon peak hour, the 95th percentile traffic queue length will not change from 28 m during the project construction but will increase to 35 m during the project operations.

These 95th percentile traffic queue lengths will not exceed the actual storage capacity of the right turn lane, which is 155 m, so there will be no adverse traffic queuing effects at the major road intersection Industrial Drive/Steel River Boulevard with the recycling facility traffic in 2015.

ii Site operations traffic - 2025

A ten year future traffic impacts scenario for the additional peak hourly traffic movements generated by the site operations in 2025 has also been analysed. The detailed 2025 SIDRA analysis results are provided in Appendix C. A summary of the SIDRA intersection analysis results is presented in Table 4.6.

The analysis has been undertaken for the future base traffic situation in 2025 (without the project) assuming a ten year traffic growth factor of x1.20 (corresponding to 2% annual linear traffic growth) for all the peak hourly traffic movements at the intersection.

The project site traffic movements in 2025 are assessed for the same net additional traffic movements for the site which were predicted for 2015, namely +103 vehicle movements per hour during the morning peak hour and +61 additional vehicle movements during the afternoon peak hour.

Table 4.6 SIDRA results for the 2025 recycling facility operations (am and pm peak hours)

Intersection	Peak hour	Future 2025 base traffic			With project operations traffic		
		LoS	DOS	AVD	LoS	DOS	AVD
Industrial Drive/ Steel River Boulevard	Morning peak hour (7.45 to 8.45 am)	B	0.856	22.3	B	0.890	26.2
Industrial Drive/ Steel River Boulevard	Afternoon peak hour (5.00 to 6.00 pm)	B	0.713	15.8	B	0.723	17.0

Notes: LoS – Level of Service, DOS – Degree of Saturation, AVD – Average Vehicle Delay.

The 2025 SIDRA results in Table 4.6 show that during the morning peak hour (7.45 am to 8.45 am) there will be only a minor change to the intersection operations. The average vehicle delays for all traffic at the intersection will increase from 22.3 seconds to 26.2 seconds and the intersection level of service will remain at 'B' (within the overall range 15 to 28 seconds).

During the afternoon peak hour (5.00pm to 6.00 pm), there will be similar minor increases to the average intersection delays for all traffic (from 15.8 seconds to 17.0 seconds) but the intersection level of service will also remain at 'B' (within the overall range 15 to 28 seconds) with only a minor actual change in the corresponding intersection operating delays.

The intersection peak hour traffic queue lengths, in particular the maximum (95th percentile) traffic queue length for the right hand turn by the Industrial Drive westbound traffic, have also been considered. These are included in the detailed SIDRA analysis results in Appendix A. The right turn lane for the westbound traffic on Industrial Drive has an actual length of 155 m and the 95th percentile morning and afternoon peak period traffic queues within this right turn lane will increase with the recycling facility project traffic as follows:

- in the morning peak hour, the 95th percentile traffic queue length will increase from 159 m in the 2025 base traffic situation to 185 m including project operations; and
- in the afternoon peak hour, the 95th percentile traffic queue length will increase from 35 m in the 2025 base traffic situation to 42 m including project operations.

It is predicted that the increase in base traffic flow by 2025 (ie without the proposal) will increase the 95th percentile traffic queue length at the Industrial Drive/Steel River Boulevard intersection so that the storage capacity of the right turn lane on Industrial Drive (155 m) is exceeded in the morning peak hour. Therefore, 95th percentile traffic queue lengths will also be exceeded in 2025 when traffic flow from the proposal is included. There is sufficient space within the centre of Industrial Drive (the grassed area immediately west of the current right-hand turn lane) to extend the length of the right turn lane to accommodate increased traffic queue lengths that will occur with or without the proposal traffic.

4.4 Car and truck parking

There is a large amount of on-site car parking capacity available (approximately 120 car parking spaces) within the site within a paved car park in the south eastern corner of the site.

In the Newcastle Development Control Plan 2012 (Section 7.03), the car parking requirements for industrial sites are defined as either 1 space per 100 m^2 of building gross floor area or 1 space per 2 employees, whichever is the greater. Minor additional requirements also apply for bicycle and motorcycle parking.

A formal assessment of the site car parking capacity in relation to the site building floor areas which would be utilised for the proposed recycling centre uses, is not warranted as the current site provision of 120 car parking spaces is clearly adequate for the maximum number of full time recycling facility employees (twelve) plus the maximum number of site visitors (three) who are likely to be present at the site during normal weekday site operations.

The additional contractors working at the site during campaign processing periods will also generate some additional car or truck parking demand at these times. However, these activities will not result in any adverse site car parking impacts as the supply of site car parking will generally be able to accommodate the additional car parking needs of these activities.

4.5 Impact on road safety and traffic management

The project will generate approximately 214 additional truck movements each day in this locality (Mayfield West) where there are already large daily numbers of truck movements operating on the major roads, Industrial Drive, Tourle Street and Werribee Street.

These roads have all been constructed to accommodate large amounts of heavy vehicle traffic and there are no identified traffic safety concerns for these roads as a result of the additional truck traffic movements generated by the recycling facility.

The existing proportions of truck traffic in the overall daily traffic movements within the Steel River industrial estate are generally lower than on Industrial Drive. In this assessment it has been assumed that the recycling facility generated truck traffic movements would generally travel via Steel River Boulevard and Mcintosh Drive and this traffic would not generally utilise other routes such as Murray Dwyer Circuit.

4.6 Impact on public transport services, pedestrians and cyclists

Due to the relatively low full time site workforce and visitor numbers (15), and the likely minimum travel distance of over 1 km for access to or from the nearest residential areas, the proposal is not anticipated to create any increased demand for pedestrian or cyclist access or public transport service improvements in the Mayfield West area.

Additional contractors who are also likely to be working at the site during campaign processing periods will generally travel to and from the site in their own vehicles and would not require public transport access.

5 Summary and conclusion

The traffic impact assessment has assessed the transport impacts of the proposed recycling facility at 80 Tourle Street, Mayfield West.

The proposed annual processing of 90,000 tonnes per annum of waste materials at the site, together with ancillary operations, will result in approximately 214 additional truck movements and 460 additional car/other light vehicle movements being generated each day on Steel River Boulevard and the surrounding road network (474 additional daily traffic movements in total).

During construction, the proposal will potentially generate up to 10 employee cars and 10 truck deliveries on a typical weekday, resulting in an additional 40 daily traffic movements in total.

The operational traffic impacts of the proposal have been assessed for the maximum hourly traffic which will potentially occur from site employees and waste/recycling traffic during both the morning (7.45 to 8.45 am typically) and afternoon (5.00 to 6.00 pm) peak traffic hours on the surrounding road network. During these times the peak site traffic will potentially be:

- +103 vehicle movements per hour (61 by cars and 42 by trucks) during the morning peak hour; and
- +61 additional vehicle movements (39 by cars and 22 by trucks) during the afternoon peak hour.

Based on the likely waste delivery and product dispatch routes, it is anticipated that the additional site operations traffic movements will be distributed, approximately 60% and 40% to and from the east or the west via Industrial Drive at the Steel River Boulevard intersection. Beyond the immediate locality of Mayfield West, the future site traffic will be further distributed onto other traffic routes, such as Tourle Street, Werribee Street, Maitland Road, the Pacific Highway and Sandgate Road, such that the future project generated traffic volumes will be relatively minor on each of these routes.

The key findings of the project traffic impact assessment for the predicted future site daily and peak hour traffic movements are as follows:

- The additional daily traffic movements from the project will generate only minimal percentage traffic increases on the surrounding major roads (eg Industrial Drive) and will be accommodated with minimal changes to the existing traffic flows, traffic delays or road safety. On Steel River Boulevard, the future project generated traffic increases will be more noticeable but will remain acceptable and generally within the traffic capacity of this road which is the main industrial area access route. The project generated daily traffic increases will not require any additional road widening or reconstruction of either the Steel River Boulevard or McIntosh Drive routes.
- The main affected intersection on the surrounding road network, at Industrial Drive/Steel River Boulevard, is currently operating at relatively uncongested peak hour traffic conditions with a level of service B during the morning peak hour (7.45 to 8.45 am) and a transitional level of service A/B during the afternoon peak hour (5.00 to 6.00 pm).
- These intersection levels of service will not change with the site traffic generated during the project construction phase in 2015. The intersection levels of service have been re-assessed for 2015 and 2025 traffic conditions with and without the recycling facility operations traffic.

- For the future project operations traffic in both 2015 and 2025, the morning peak hour levels of service will not change from B but the afternoon peak hour levels of service will change from a transitional level of service A/B in 2015 to level of service B in 2025. However, the actual increases in the corresponding average intersection traffic delays will be relatively minor at either +1.1 and +1.4 seconds per vehicle in 2015, increasing to +1.2 and +3.9 seconds per vehicle in 2025.

- The additional morning and afternoon peak hour intersection traffic queue lengths in 2015 and 2025 were also investigated, in particular the traffic queue for the westbound right turn from Industrial Drive into Steel River Boulevard. The existing maximum (95^{th} percentile) right turn traffic queue lengths are noticeably higher (113 m) during the morning peak hour, compared to the afternoon peak (28 m). The future 95^{th} percentile traffic queue lengths will increase to 132 m (morning peak) and 35 m (afternoon peak) with the project operations traffic in 2015. These queues will not exceed the actual storage capacity (155 m) of the right turn lane.

- In the 2025 base traffic situation (without the project traffic) the predicted 95^{th} percentile traffic queue length will exceed the actual storage capacity of the right turn lane, being 159 m in the morning peak hour. This will increase to 185 m with the project operations traffic. However, as the traffic storage capacity of the right turn lane is exceeded in the 2025 base traffic situation, this future traffic queuing impact is not directly attributable to the recycling facility traffic. There is is sufficient space within the centre of Industrial Drive to extend the length of the right turn lane to accommodate increased queue lengths.

- The likely future car parking demand from the full time employees and visitors at the site (excluding waste received) will be approximately 15 car parking spaces. The existing site car parking areas are considered adequate for this anticipated demand, including when required, additional car or other vehicle parking for contractors working at the site. During the project construction phase, sufficient on site car parking will also be provided for the anticipated peak project construction workforce parking demand (10 vehicles).

- The proposed internal site truck access and circulation paths will provide clear separation for the site truck access and the employee/visitor car parking areas which is desirable.

- For the optimum future management of the future recycling facility traffic within the Steel River industrial estate, it is recommended that the site generated truck traffic movements should be formally directed to travel only via Steel River Boulevard and Mcintosh Drive within the Steel River estate and not utilise any other routes such as Murray Dwyer Circuit.

- The project is not anticipated to create any increased demand for public transport, pedestrian or cyclist access in the locality, due to the restricted access catchment for these travel modes currently and the relatively low future site employee and visitor numbers.

Based on the results of this TIA report, there will be no significant traffic impacts anticipated from proposal on either traffic capacity, traffic delays or road safety on the surrounding major road network, in comparison to either the 2015 or 2025 base traffic conditions (without the project traffic).

References

Roads and Maritime Services (RMS) 2002, *Guide to Traffic Generating Developments.*

- 2014, *Review of Environmental Factors for Duplication of Tourle Street and Cormorant Road, Kooragang (Appendix J) Traffic Study*.

Appendix A

Intersection traffic survey data

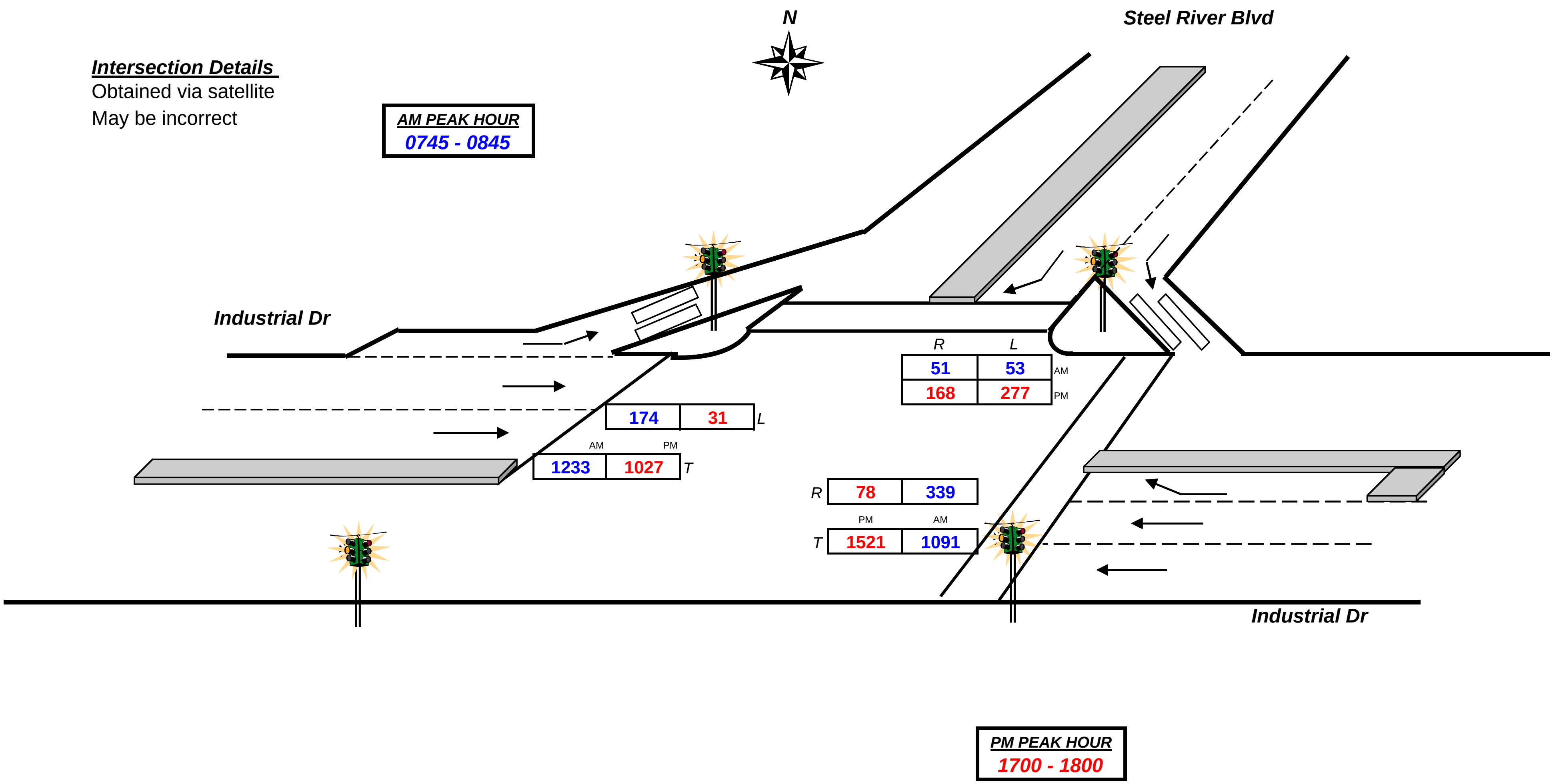
R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : EMGA
Job No/Name : 2867 NEWCASTLE Steel River Blvd
Day/Date : Wednesday 4th February 2015

Intersection Details
Obtained via satellite
May be incorrect



Weather >>>

R.O.A.R. DATA
Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849.
Mobile.0418239019

Client	: EMGA
Job No/Name	: 2867 NEWCASTLE Steel River Blvd
Day/Date	: Wednesday 4th February 2015

PEDS	WEST	NORTH	EAST	
Time Per	*Industrial Dr*	*Steel River*	*Industrial Dr*	TOT
0600 - 0615				**0**
0615 - 0630		NOT		**0**
0630 - 0645		REQUIRED		**0**
0645 - 0700				**0**
0700 - 0715				**0**
0715 - 0730				**0**
0730 - 0745				**0**
0745 - 0800				**0**
0800 - 0815				**0**
0815 - 0830				**0**
0830 - 0845				**0**
0845 - 0900				**0**
Per End	**0**	**0**	**0**	**0**

PEDS	WEST	NORTH	EAST	
Peak Per	*Industrial Dr*	*Steel River*	*Industrial Dr*	TOT
0600 - 0700	0	0	0	**0**
0615 - 0715	0	0	0	**0**
0630 - 0730	0	0	0	**0**
0645 - 0745	0	0	0	**0**
0700 - 0800	0	0	0	**0**
0715 - 0815	0	0	0	**0**
0730 - 0830	0	0	0	**0**
0745 - 0845	0	0	0	**0**
0800 - 0900	0	0	0	**0**
PEAK HR	**0**	**0**	**0**	**0**

Lights	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Time Per	T	L	R	L	R	T	TOT
0600 - 0615	196	10	2	5	19	156	**388**
0615 - 0630	246	14	3	6	17	176	**462**
0630 - 0645	305	25	5	5	30	165	**535**
0645 - 0700	199	45	5	12	49	146	**456**
0700 - 0715	221	25	11	17	23	159	**456**
0715 - 0730	203	23	12	16	50	220	**524**
0730 - 0745	236	23	9	9	46	246	**569**
0745 - 0800	263	33	8	8	104	311	**727**
0800 - 0815	298	42	15	15	68	250	**688**
0815 - 0830	302	59	16	9	75	235	**696**
0830 - 0845	279	35	10	18	91	179	**612**
0845 - 0900	261	35	11	18	82	167	**574**
Per End	**3009**	**369**	**107**	**138**	**654**	**2410**	**6687**

Heavies	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Time Per	T	L	R	L	R	T	TOT
0600 - 0615	23	2	0	0	1	10	**36**
0615 - 0630	23	2	0	0	1	13	**39**
0630 - 0645	19	2	0	1	0	15	**37**
0645 - 0700	17	2	2	3	1	24	**49**
0700 - 0715	26	0	2	0	0	19	**47**
0715 - 0730	20	0	1	1	1	20	**43**
0730 - 0745	23	1	0	1	1	19	**45**
0745 - 0800	21	1	1	0	0	31	**54**
0800 - 0815	29	0	0	1	0	27	**57**
0815 - 0830	26	3	1	1	0	33	**64**
0830 - 0845	15	1	0	1	1	25	**43**
0845 - 0900	33	0	0	2	3	41	**79**
Per End	**275**	**14**	**7**	**11**	**9**	**277**	**593**

Combined	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Time Per	T	L	R	L	R	T	TOT
0600 - 0615	219	12	2	5	20	166	**424**
0615 - 0630	269	16	3	6	18	189	**501**
0630 - 0645	324	27	5	6	30	180	**572**
0645 - 0700	216	47	7	15	50	170	**505**
0700 - 0715	247	25	13	17	23	178	**503**
0715 - 0730	223	23	13	17	51	240	**567**
0730 - 0745	259	24	9	10	47	265	**614**
0745 - 0800	284	34	9	8	104	342	**781**
0800 - 0815	327	42	15	16	68	277	**745**
0815 - 0830	328	62	17	10	75	268	**760**
0830 - 0845	294	36	10	19	92	204	**655**
0845 - 0900	294	35	11	20	85	208	**653**
Per End	**3284**	**383**	**114**	**149**	**663**	**2687**	**7280**

Lights	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Peak Per	T	L	R	L	R	T	TOT
0600 - 0700	946	94	15	28	115	643	**1841**
0615 - 0715	971	109	24	40	119	646	**1909**
0630 - 0730	928	118	33	50	152	690	**1971**
0645 - 0745	859	116	37	54	168	771	**2005**
0700 - 0800	923	104	40	50	223	936	**2276**
0715 - 0815	1000	121	44	48	268	1027	**2508**
0730 - 0830	1099	157	48	41	293	1042	**2680**
0745 - 0845	1142	169	49	50	338	975	**2723**
0800 - 0900	1140	171	52	60	316	831	**2570**
PEAK HR	**1142**	**169**	**49**	**50**	**338**	**975**	**2723**

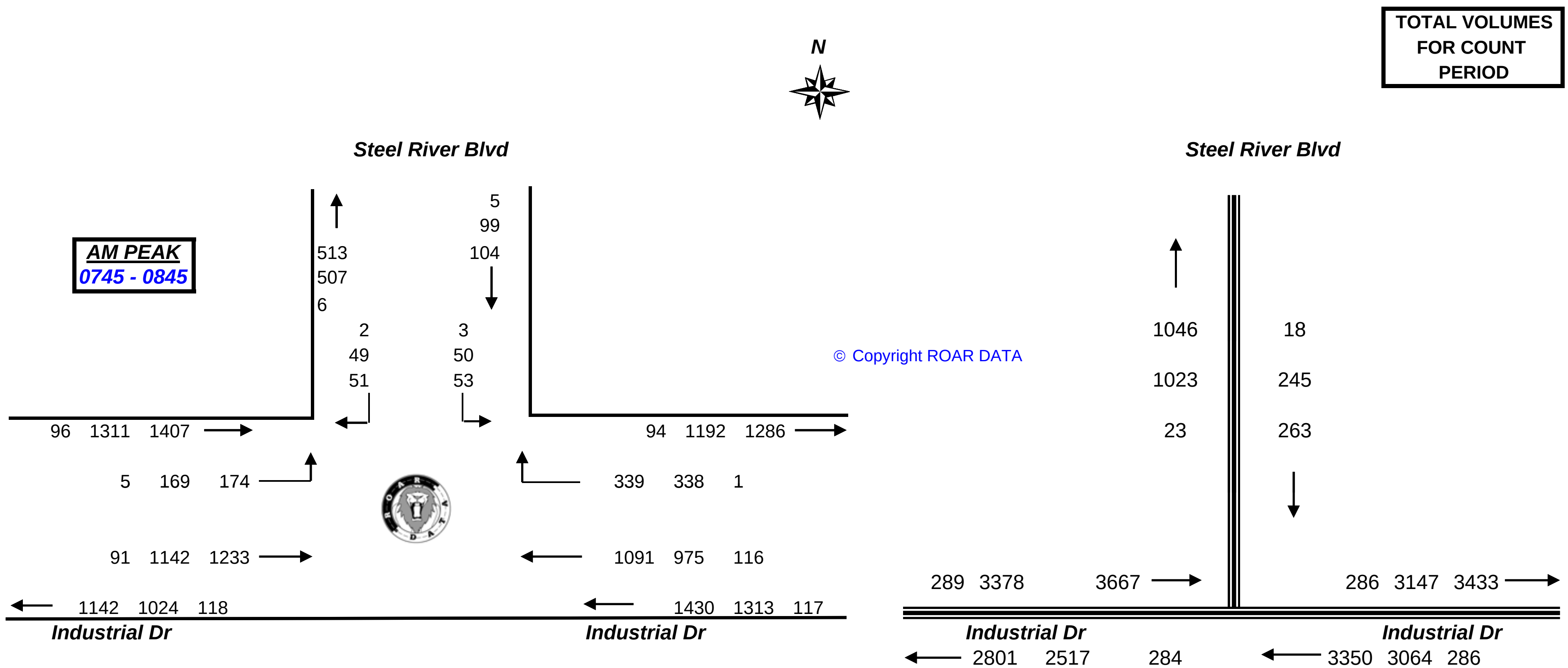
Heavies	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Peak Per	T	L	R	L	R	T	TOT
0600 - 0700	82	8	2	4	3	62	**161**
0615 - 0715	85	6	4	4	2	71	**172**
0630 - 0730	82	4	5	5	2	78	**176**
0645 - 0745	86	3	5	5	3	82	**184**
0700 - 0800	90	2	4	2	2	89	**189**
0715 - 0815	93	2	2	3	2	97	**199**
0730 - 0830	99	5	2	3	1	110	**220**
0745 - 0845	91	5	2	3	1	116	**218**
0800 - 0900	103	4	1	5	4	126	**243**
PEAK HR	**91**	**5**	**2**	**3**	**1**	**116**	**218**

Combined	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Peak Per	T	L	R	L	R	T	TOT
0600 - 0700	1028	102	17	32	118	705	**2002**
0615 - 0715	1056	115	28	44	121	717	**2081**
0630 - 0730	1010	122	38	55	154	768	**2147**
0645 - 0745	945	119	42	59	171	853	**2189**
0700 - 0800	1013	106	44	52	225	1025	**2465**
0715 - 0815	1093	123	46	51	270	1124	**2707**
0730 - 0830	1198	162	50	44	294	1152	**2900**
0745 - 0845	1233	174	51	53	339	1091	**2941**
0800 - 0900	1243	175	53	65	320	957	**2813**
PEAK HR	**1233**	**174**	**51**	**53**	**339**	**1091**	**2941**

R.O.A.R. DATA
Client : EMGA

Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849, Mob.0418-239019

Job No/Name : 2867 NEWCASTLE Steel River Blvd
Day/Date : Wednesday 4th February 2015



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849.
Mobile.0418239019

Client : EMGA
Job No/Name : 2867 NEWCASTLE Steel River Blvd
Day/Date : Wednesday 4th February 2015

PEDS	WEST	NORTH	EAST	
Time Per	*Industrial Dr*	*Steel River*	*Industrial Dr*	TOT
1500 - 1515				**0**
1515 - 1530		NOT		**0**
1530 - 1545		REQUIRED		**0**
1545 - 1600				**0**
1600 - 1615				**0**
1615 - 1630				**0**
1630 - 1645				**0**
1645 - 1700				**0**
1700 - 1715				**0**
1715 - 1730				**0**
1730 - 1745				**0**
1745 - 1800				**0**
Per End	**0**	**0**	**0**	**0**

PEDS	WEST	NORTH	EAST	
Peak Per	*Industrial Dr*	*Steel River*	*Industrial Dr*	TOT
1500 - 1600	0	0	0	**0**
1515 - 1615	0	0	0	**0**
1530 - 1630	0	0	0	**0**
1545 - 1645	0	0	0	**0**
1600 - 1700	0	0	0	**0**
1615 - 1715	0	0	0	**0**
1630 - 1730	0	0	0	**0**
1645 - 1745	0	0	0	**0**
1700 - 1800	0	0	0	**0**
PEAK HR	**0**	**0**	**0**	**0**

Lights	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Time Per	T	L	R	L	R	T	TOT
1500 - 1515	158	9	28	33	36	181	**445**
1515 - 1530	149	7	41	42	26	242	**507**
1530 - 1545	167	12	28	38	32	271	**548**
1545 - 1600	205	15	50	60	14	260	**604**
1600 - 1615	211	10	34	37	23	300	**615**
1615 - 1630	261	17	53	65	27	320	**743**
1630 - 1645	255	12	38	68	18	257	**648**
1645 - 1700	179	14	51	68	23	268	**603**
1700 - 1715	221	5	42	71	16	359	**714**
1715 - 1730	213	10	46	84	23	317	**693**
1730 - 1745	269	7	44	77	27	423	**847**
1745 - 1800	279	7	32	45	12	358	**733**
Per End	**2567**	**125**	**487**	**688**	**277**	**3556**	**7700**

Heavies	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Time Per	T	L	R	L	R	T	TOT
1500 - 1515	23	0	0	0	1	20	**44**
1515 - 1530	23	1	0	0	0	30	**54**
1530 - 1545	19	1	0	0	0	23	**43**
1545 - 1600	34	2	0	0	2	35	**73**
1600 - 1615	17	1	0	1	0	20	**39**
1615 - 1630	31	1	0	0	1	29	**62**
1630 - 1645	14	0	0	1	0	16	**31**
1645 - 1700	19	0	1	0	0	18	**38**
1700 - 1715	7	1	0	0	0	21	**29**
1715 - 1730	15	1	1	0	0	15	**32**
1730 - 1745	11	0	2	0	0	14	**27**
1745 - 1800	12	0	1	0	0	14	**27**
Per End	**225**	**8**	**5**	**2**	**4**	**255**	**499**

Combined	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Time Per	T	L	R	L	R	T	TOT
1500 - 1515	181	9	28	33	37	201	**489**
1515 - 1530	172	8	41	42	26	272	**561**
1530 - 1545	186	13	28	38	32	294	**591**
1545 - 1600	239	17	50	60	16	295	**677**
1600 - 1615	228	11	34	38	23	320	**654**
1615 - 1630	292	18	53	65	28	349	**805**
1630 - 1645	269	12	38	69	18	273	**679**
1645 - 1700	198	14	52	68	23	286	**641**
1700 - 1715	228	6	42	71	16	380	**743**
1715 - 1730	228	11	47	84	23	332	**725**
1730 - 1745	280	7	46	77	27	437	**874**
1745 - 1800	291	7	33	45	12	372	**760**
Per End	**2792**	**133**	**492**	**690**	**281**	**3811**	**8199**

Lights	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Peak Per	T	L	R	L	R	T	TOT
1500 - 1600	679	43	147	173	108	954	**2104**
1515 - 1615	732	44	153	177	95	1073	**2274**
1530 - 1630	844	54	165	200	96	1151	**2510**
1545 - 1645	932	54	175	230	82	1137	**2610**
1600 - 1700	906	53	176	238	91	1145	**2609**
1615 - 1715	916	48	184	272	84	1204	**2708**
1630 - 1730	868	41	177	291	80	1201	**2658**
1645 - 1745	882	36	183	300	89	1367	**2857**
1700 - 1800	982	29	164	277	78	1457	**2987**
PEAK HR	**982**	**29**	**164**	**277**	**78**	**1457**	**2987**

Heavies	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Peak Per	T	L	R	L	R	T	TOT
1500 - 1600	99	4	0	0	3	108	**214**
1515 - 1615	93	5	0	1	2	108	**209**
1530 - 1630	101	5	0	1	3	107	**217**
1545 - 1645	96	4	0	2	3	100	**205**
1600 - 1700	81	2	1	2	1	83	**170**
1615 - 1715	71	2	1	1	1	84	**160**
1630 - 1730	55	2	2	1	0	70	**130**
1645 - 1745	52	2	4	0	0	68	**126**
1700 - 1800	45	2	4	0	0	64	**115**
PEAK HR	**45**	**2**	**4**	**0**	**0**	**64**	**115**

Combined	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Peak Per	T	L	R	L	R	T	TOT
1500 - 1600	778	47	147	173	111	1062	**2318**
1515 - 1615	825	49	153	178	97	1181	**2483**
1530 - 1630	945	59	165	201	99	1258	**2727**
1545 - 1645	1028	58	175	232	85	1237	**2815**
1600 - 1700	987	55	177	240	92	1228	**2779**
1615 - 1715	987	50	185	273	85	1288	**2868**
1630 - 1730	923	43	179	292	80	1271	**2788**
1645 - 1745	934	38	187	300	89	1435	**2983**
1700 - 1800	1027	31	168	277	78	1521	**3102**
PEAK HR	**1027**	**31**	**168**	**277**	**78**	**1521**	**3102**

R.O.A.R. DATA

Reliable, Original & Authentic Results

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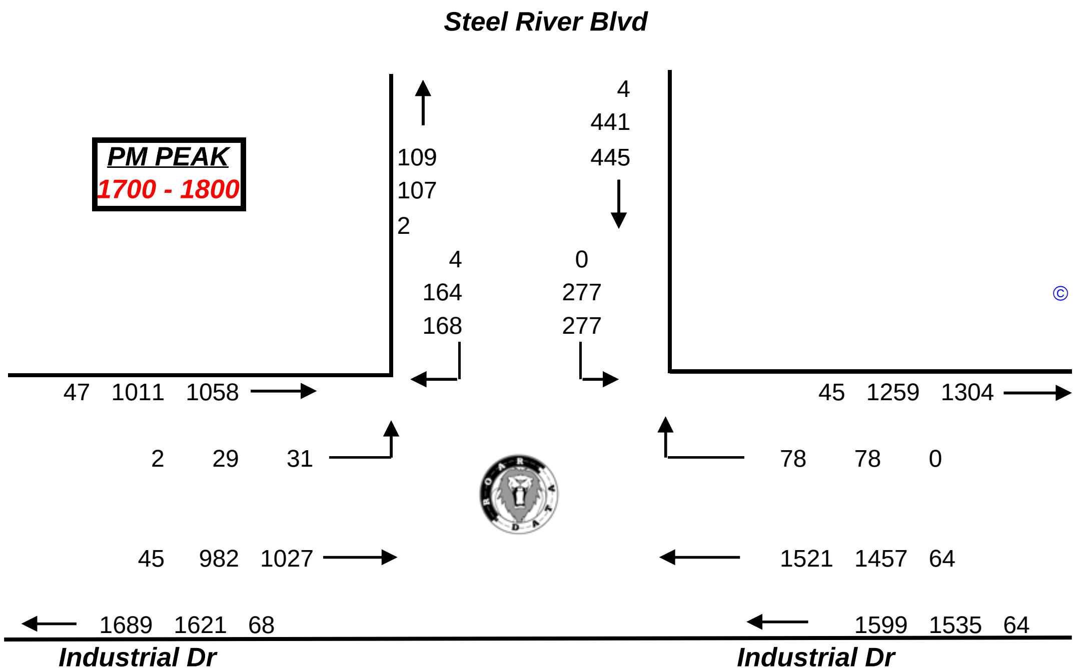
Client	: EMGA
Job No/Name	: 2867 NEWCASTLE Steel River Blvd
Day/Date	: Wednesday 4th February 2015

N

TOTAL VOLUMES FOR COUNT PERIOD



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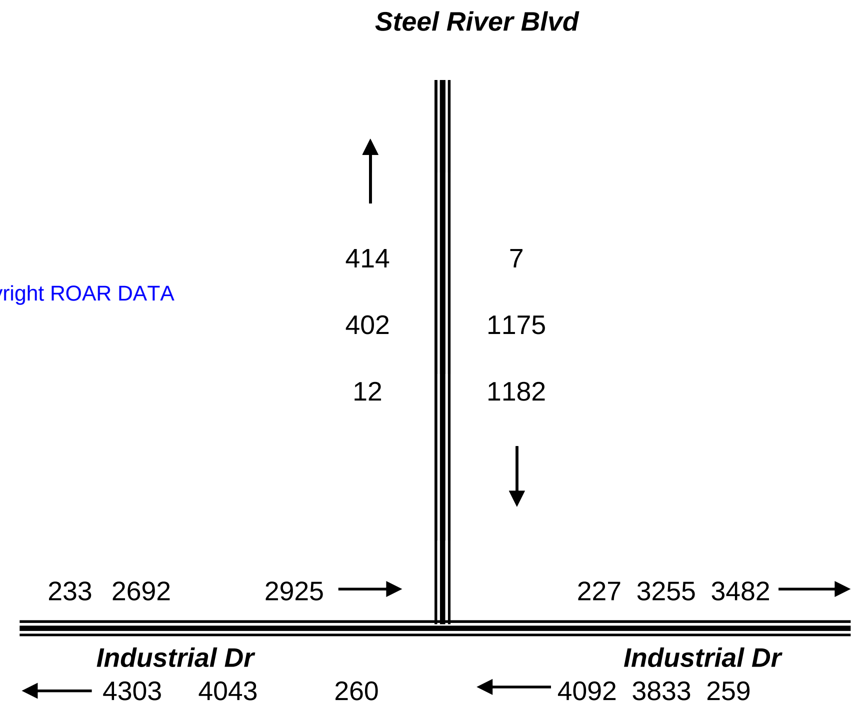
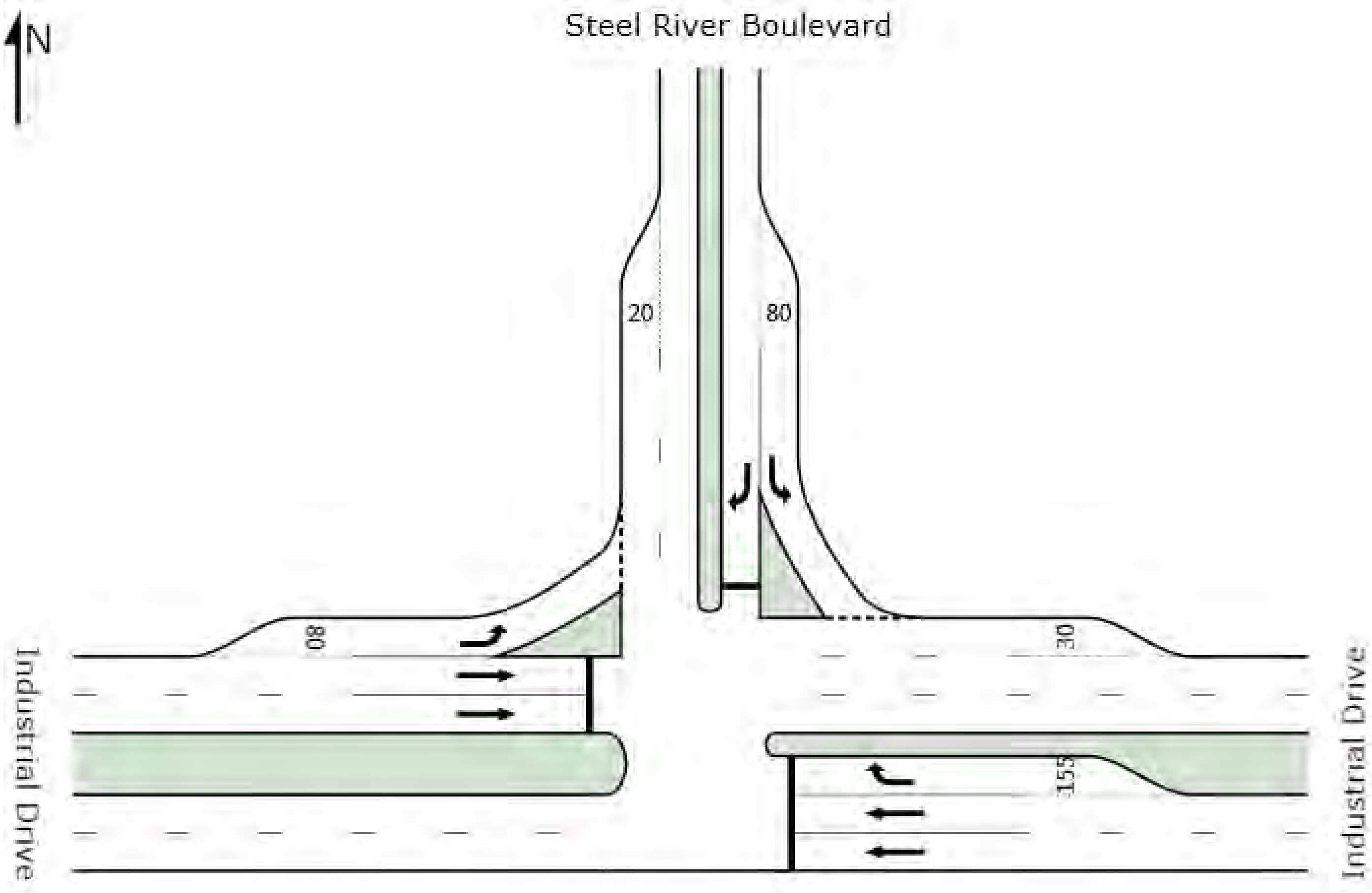


Appendix B

2015 SIDRA intersection analysis results


N
Steel River Boulevard
20
80
80
30
155
Industrial Drive
Industrial Drive

MOVEMENT SUMMARY

Site: AM-2015 7.45-8.45 am During Construction

Industrial Dr-Steel River Boulevard

Signals - Fixed Time   Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1148	10.6	0.384	2.5	LOS A	7.2	55.1	0.28	0.26	70.6
6	R	365	0.9	0.707	45.7	LOS D	16.4	115.4	0.96	0.86	28.9
Approach		1514	8.3	0.707	12.9	LOS A	16.4	115.4	0.45	0.40	54.2
North: Steel River Boulevard											
7	L	58	9.1	0.094	15.0	LOS B	1.1	8.3	0.44	0.69	40.9
9	R	55	5.8	0.511	61.0	LOS E	2.8	20.6	1.00	0.75	23.0
Approach		113	7.5	0.511	37.4	LOS C	2.8	20.6	0.71	0.72	29.7
West: Industrial Drive											
10	L	188	3.4	0.210	13.5	LOS A	2.6	18.6	0.35	0.71	52.1
11	T	1298	7.4	0.727	22.3	LOS B	25.2	187.5	0.86	0.78	43.4
Approach		1486	6.9	0.727	21.1	LOS B	25.2	187.5	0.80	0.77	44.2
All Vehicles		3113	7.6	0.727	17.7	LOS B	25.2	187.5	0.62	0.59	47.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: AM-2015 7.45-8.45 am Actual Peak

Industrial Dr-Steel River Boulevard

Signals - Fixed Time   Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1148	10.6	0.384	2.5	LOS A	7.2	55.1	0.28	0.26	70.6
6	R	357	0.3	0.713	46.7	LOS D	16.2	113.6	0.96	0.86	28.5
Approach		1505	8.2	0.713	13.0	LOS A	16.2	113.6	0.44	0.40	54.1
North: Steel River Boulevard											
7	L	56	5.7	0.088	14.7	LOS B	1.0	7.7	0.44	0.68	41.0
9	R	54	3.9	0.495	60.8	LOS E	2.7	19.8	1.00	0.75	23.1
Approach		109	4.8	0.495	37.3	LOS C	2.7	19.8	0.72	0.71	29.7
West: Industrial Drive											
10	L	183	2.9	0.203	13.4	LOS A	2.5	17.8	0.34	0.71	52.2
11	T	1298	7.4	0.712	21.4	LOS B	24.7	183.7	0.84	0.76	44.1
Approach		1481	6.8	0.712	20.4	LOS B	24.7	183.7	0.78	0.76	44.8
All Vehicles		3096	7.4	0.713	17.4	LOS B	24.7	183.7	0.62	0.58	47.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: AM-2015 7.45-8.45 am - With Proposal

Industrial Dr-Steel River Boulevard

Signals - Fixed Time   Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1148	10.6	0.384	2.5	LOS A	7.2	55.1	0.28	0.26	70.6
6	R	395	3.7	0.752	46.9	LOS D	18.3	132.3	0.97	0.88	28.5
Approach		1543	8.9	0.752	13.9	LOS A	18.3	132.3	0.46	0.42	53.1
North: Steel River Boulevard											
7	L	84	20.0	0.151	16.5	LOS B	1.8	14.7	0.48	0.70	40.2
9	R	72	14.7	0.710	64.0	LOS E	3.8	30.1	1.00	0.85	22.5
Approach		156	17.6	0.710	38.3	LOS C	3.8	30.1	0.72	0.77	29.6
West: Industrial Drive											
10	L	207	6.6	0.247	14.3	LOS A	3.2	23.4	0.38	0.72	51.2
11	T	1298	7.4	0.742	23.1	LOS B	25.7	191.2	0.88	0.79	42.6
Approach		1505	7.3	0.742	21.9	LOS B	25.7	191.2	0.81	0.78	43.5
All Vehicles		3204	8.5	0.752	18.8	LOS B	25.7	191.2	0.64	0.60	46.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: PM-2015 5.00-6.00 pm - During Construction

Industrial Dr-Steel River Boulevard

Signals - Fixed Time Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1601	4.2	0.594	7.7	LOS A	19.3	139.9	0.54	0.50	60.2
6	R	83	1.3	0.452	57.9	LOS E	4.0	28.4	0.98	0.77	24.7
Approach		1684	4.1	0.594	10.2	LOS A	19.3	139.9	0.57	0.51	56.8
North: Steel River Boulevard											
7	L	299	0.4	0.445	13.1	LOS A	6.4	44.9	0.52	0.75	41.9
9	R	181	2.3	0.583	50.2	LOS D	8.4	59.8	0.97	0.81	25.6
Approach		480	1.1	0.583	27.1	LOS B	8.4	59.8	0.69	0.77	33.8
West: Industrial Drive											
10	L	33	6.5	0.028	10.7	LOS A	0.2	1.3	0.17	0.67	56.2
11	T	1081	4.4	0.518	15.1	LOS B	16.4	119.4	0.68	0.60	50.4
Approach		1114	4.4	0.518	15.0	LOS B	16.4	119.4	0.66	0.61	50.5
All Vehicles		3278	3.8	0.594	14.3	LOS A	19.3	139.9	0.62	0.58	49.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: PM-2015 5.00-6.00 pm Actual Peak

Industrial Dr-Steel River Boulevard

Signals - Fixed Time   Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1601	4.2	0.594	7.7	LOS A	19.3	139.9	0.54	0.50	60.2
6	R	82	0.0	0.491	59.2	LOS E	4.0	28.2	0.99	0.77	24.4
Approach		1683	4.0	0.594	10.2	LOS A	19.3	139.9	0.57	0.51	56.7
North: Steel River Boulevard											
7	L	292	0.0	0.439	13.0	LOS A	6.1	42.7	0.51	0.75	42.0
9	R	177	2.4	0.570	50.1	LOS D	8.2	58.3	0.97	0.81	25.6
Approach		468	0.9	0.570	27.0	LOS B	8.2	58.3	0.68	0.77	33.9
West: Industrial Drive											
10	L	33	6.5	0.028	10.7	LOS A	0.2	1.3	0.17	0.67	56.2
11	T	1081	4.4	0.509	14.4	LOS A	16.1	116.6	0.66	0.59	51.2
Approach		1114	4.4	0.509	14.3	LOS A	16.1	116.6	0.65	0.59	51.3
All Vehicles		3265	3.7	0.594	14.0	LOS A	19.3	139.9	0.61	0.58	50.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
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SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: PM-2015 5.00-6.00 pm - With Proposal

Industrial Dr-Steel River Boulevard

Signals - Fixed Time   Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1601	4.2	0.603	8.3	LOS A	20.0	144.8	0.56	0.52	59.2
6	R	97	7.6	0.550	58.9	LOS E	4.7	35.4	1.00	0.78	24.5
Approach		1698	4.4	0.603	11.1	LOS A	20.0	144.8	0.59	0.53	55.5
North: Steel River Boulevard											
7	L	316	2.3	0.470	13.9	LOS A	7.2	51.6	0.55	0.76	41.4
9	R	193	4.4	0.594	49.6	LOS D	8.9	64.4	0.97	0.82	25.8
Approach		508	3.1	0.594	27.4	LOS B	8.9	64.4	0.71	0.78	33.7
West: Industrial Drive											
10	L	42	15.0	0.040	11.1	LOS A	0.2	2.0	0.18	0.67	56.0
11	T	1081	4.4	0.528	15.8	LOS B	16.8	122.1	0.69	0.62	49.6
Approach		1123	4.8	0.528	15.6	LOS B	16.8	122.1	0.67	0.62	49.8
All Vehicles		3329	4.3	0.603	15.1	LOS B	20.0	144.8	0.64	0.60	48.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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Appendix C

2025 SIDRA intersection analysis results

MOVEMENT SUMMARY

Site: AM-2025 7.45-8.45 am Actual Peak

Industrial Dr-Steel River Boulevard

Signals - Fixed Time   Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1378	10.6	0.461	2.7	LOS A	9.5	72.9	0.31	0.29	69.8
6	R	428	0.2	0.856	55.5	LOS D	22.7	159.1	1.00	0.94	25.4
Approach		1806	8.2	0.856	15.3	LOS B	22.7	159.1	0.48	0.44	51.3
North: Steel River Boulevard											
7	L	67	6.3	0.116	19.3	LOS B	1.6	12.1	0.54	0.70	38.1
9	R	64	3.3	0.590	61.5	LOS E	3.3	23.9	1.00	0.78	22.9
Approach		132	4.8	0.590	39.9	LOS C	3.3	23.9	0.77	0.74	28.8
West: Industrial Drive											
10	L	220	2.9	0.269	14.9	LOS B	3.6	26.0	0.39	0.72	50.4
11	T	1557	7.4	0.854	30.0	LOS C	37.2	276.5	0.95	0.93	38.0
Approach		1777	6.8	0.854	28.2	LOS B	37.2	276.5	0.88	0.91	39.0
All Vehicles		3715	7.4	0.856	22.3	LOS B	37.2	276.5	0.68	0.67	43.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: AM-2025 7.45-8.45 am AM Peak with Project

Industrial Dr-Steel River Boulevard

Signals - Fixed Time   Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1378	10.6	0.461	2.7	LOS A	9.5	72.9	0.31	0.29	69.8
6	R	465	2.9	0.882	58.0	LOS E	25.7	184.5	1.00	0.96	24.7
Approach		1843	8.7	0.882	16.7	LOS B	25.7	184.5	0.49	0.46	49.8
North: Steel River Boulevard											
7	L	96	18.7	0.181	21.4	LOS B	2.6	20.7	0.58	0.71	37.2
9	R	82	12.8	0.804	66.1	LOS E	4.5	34.9	1.00	0.92	22.1
Approach		178	16.0	0.804	42.0	LOS C	4.5	34.9	0.77	0.81	28.3
West: Industrial Drive											
10	L	244	6.0	0.319	16.2	LOS B	4.5	33.0	0.43	0.72	49.0
11	T	1557	7.4	0.890	37.2	LOS C	41.4	307.9	0.98	1.02	34.1
Approach		1801	7.2	0.890	34.3	LOS C	41.4	307.9	0.91	0.98	35.4
All Vehicles		3822	8.3	0.890	26.2	LOS B	41.4	307.9	0.70	0.72	40.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
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MOVEMENT SUMMARY

Site: PM-2025 5.00-6.00 pm Actual Peak

Industrial Dr-Steel River Boulevard

Signals - Fixed Time   Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1921	4.2	0.713	9.0	LOS A	27.1	196.8	0.64	0.59	57.7
6	R	99	0.0	0.592	60.0	LOS E	4.9	34.5	1.00	0.79	24.1
Approach		2020	4.0	0.713	11.5	LOS A	27.1	196.8	0.66	0.60	54.6
North: Steel River Boulevard											
7	L	349	0.0	0.536	19.4	LOS B	11.4	79.9	0.76	0.85	37.9
9	R	213	2.5	0.685	51.9	LOS D	10.2	73.0	0.99	0.85	25.2
Approach		562	0.9	0.685	31.7	LOS C	11.4	79.9	0.85	0.85	31.8
West: Industrial Drive											
10	L	39	5.4	0.034	10.8	LOS A	0.2	1.7	0.18	0.67	56.0
11	T	1297	4.4	0.611	15.7	LOS B	21.0	152.2	0.72	0.65	49.6
Approach		1336	4.4	0.611	15.5	LOS B	21.0	152.2	0.71	0.65	49.7
All Vehicles		3918	3.7	0.713	15.8	LOS B	27.1	196.8	0.70	0.66	48.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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MOVEMENT SUMMARY

Site: PM-2025 5.00-6.00 pm PM Peak With Project

Industrial Dr-Steel River Boulevard

Signals - Fixed Time   Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1921	4.2	0.723	9.7	LOS A	28.1	203.6	0.66	0.61	56.7
6	R	114	6.5	0.640	60.0	LOS E	5.7	42.1	1.00	0.81	24.2
Approach		2035	4.3	0.723	12.5	LOS A	28.1	203.6	0.68	0.62	53.3
North: Steel River Boulevard											
7	L	374	2.0	0.571	20.4	LOS B	11.8	84.3	0.75	0.87	37.4
9	R	228	4.1	0.704	51.7	LOS D	11.0	79.8	0.99	0.86	25.2
Approach		602	2.8	0.704	32.2	LOS C	11.8	84.3	0.84	0.87	31.7
West: Industrial Drive											
10	L	48	13.0	0.046	11.2	LOS A	0.3	2.4	0.19	0.67	55.8
11	T	1297	4.4	0.633	17.2	LOS B	21.9	159.3	0.75	0.68	48.0
Approach		1345	4.7	0.633	16.9	LOS B	21.9	159.3	0.73	0.68	48.2
All Vehicles		3982	4.2	0.723	17.0	LOS B	28.1	203.6	0.72	0.68	46.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
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Appendix G

Site Management Plan for Subsurface Disturbance Activities

Prepared for:

Delta EMD Australia Pty Ltd

PO Box 249
Mayfield NSW 2304

Site Management Plan for Subsurface Disturbance Activities

Delta EMD Australia Pty Ltd
McIntosh Drive, Mayfield, NSW

AECOM

2 October 2009

Document No.: N4113204_SMP_Rev4_2Oct09.doc

Environment

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Site Management Plan for Subsurface Disturbance Activities
Delta EMD Australia Pty Ltd
McIntosh Drive, Mayfield, NSW

2 October 2009

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Glossary of Terms

General Terms	
ACM	Asbestos containing material(s)
ANZECC	Australian and New Zealand Environment and Conservation Council
AHD	Australian Height Datum
APHA	American Public Health Association
ASS	Acid Sulfate Soil
AST	Above ground Storage Tank
BaP	Benzo(a)pyrene (a PAH)
BTEX	Benzene, toluene, ethylbenzene and xylenes
CCA	Copper chrome arsenate
DECC	NSW Department of Environment and Climate Change
DQOs	Data Quality Objectives
DQIs	Data Quality Indicators
EIL	Ecological Investigation Level
EPA	New South Wales Environment Protection Authority
EMP	Environmental Management Plan
EMD	Electrolytic Manganese Dioxide
EPL	Environment Protection Licence
ESA	Environmental Site Assessment
HASP	Health and Safety Plan
HRA	Health Risk Assessment
Heavy metals	Generally, arsenic (a metalloid), cadmium, chromium, copper, mercury, nickel, lead and zinc
HIL	Health Investigation Level
LOR	Level of reporting
NEHF	National Environmental Health Forum
NEPC	National Environment Protect Council
NEPM	National Environmental Protection Measure
NSW EPA	New South Wales Environment Protection Authority
Occupier	Occupier for the time being of the Site
OCPs	Organochlorine pesticides
OH&S	Occupational Health & Safety
OPPs	Organophosphorus pesticides
Owner	Registered proprietor for the time being of the Site
PAHs	Polynuclear Aromatic Hydrocarbons
PASS	Potential Acid Sulphate Soils
PCBs	Polychlorinated biphenyls
PID	Photoionisation detector
PQL	Practical quantitation level (or limit)
PSH	Phase Separated Hydrocarbon
QA/QC	Quality Assurance/Quality Control
RAP	Remedial Action Plan
RPD	Relative Percent Difference
SAQP	Sampling, Analytical and Quality Plan

SMP	Soil or Site Management Plan
SVOC	Semi-volatile Organic Compound
SWL	Standing Water level
TPH	Total petroleum hydrocarbons
UCL	Upper Confidence Limit (on mean)
USEPA	United States Environment Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compound

Units

ha	hectare		µg/kg	micrograms/kilogram
km	kilometre		µg/L	micrograms/litre
m	metre		ppb	parts per billion
m^2	metres squared		ppm	parts per million
m bgl	metres below ground level			
mg/kg	milligrams/kilogram		t	tonne
mg/L	milligrams/litre			

1.0 Introduction

1.1 General Introduction

ENSR Australia Pty Ltd, trading as AECOM and referred to hereafter as AECOM, has prepared this Site Management Plan (SMP) for subsurface disturbance activities for the former Electrolytic Manganese Dioxide (EMD) Facility located at 1 McIntosh Drive, Mayfield, NSW 2304 (the Site). The Site is identified as Lot 1 in Deposited Plan 874109 in the local government area of Newcastle City Council and is currently zoned Zone 4b Port and Industry under Newcastle City Council Local Environment Plan (LEP).

Site inspections conducted in 2009 showed that the Site is relatively flat, with the ground level approximately 8 m above the Southern Arm of the Hunter River, located approximately 20 m north of the Site. The Site is built upon reclaimed land and is underlain by fill materials associated with former BHP steel works activities. An open, asphalt-lined drain surrounds the majority of the Site (apart from the Site entrance), which diverts stormwater run-off to the surface water pond located in the north western corner of the Site. The surface cover of the Site is approximately 50 % open ground, 20 % infrastructure and 30 % hardstand. The hardstand comprises bitumen and concrete roadways and a carpark, located in the south eastern corner of the Site**.**

Previous environmental works undertaken at the Site identified the presence of elevated concentrations of a number of inorganic and organic compounds within soil (fill) and groundwater beneath the Site, primarily manganese associated with the former EMD operations and organics (total petroleum hydrocarbons and polycylic aromatic hydrocarbons) associated with reclaimed steel works materials previously used to fill the Site. The previous environmental works and details on the Site contamination are further detailed in **Section 5.0** and **Appendix A** of this SMP.

The purpose of this SMP is to provide a manual for use by the Site owner and operational staff at the Site during subsurface disturbance activities. The SMP is also intended to form an advisory document to regulatory agencies and identified stakeholders.

1.2 Purpose of SMP

The purpose of the SMP is to provide guidance for any work that involves disturbance of the subsurface (soil and groundwater) on the Site. The SMP will be incorporated into the standard operating procedures and quality plans used at the Site by:

- Site owner/s.
- Site occupier, including Site Management.
- Works Supervisor.
- Operational staff, also including contractors and sub-contractors.

1.3 SMP Objectives

The objectives of the SMP are to:

- Summarise background environmental information and current conditions at the Site.
- Outline contaminants of concern present on the Site.
- Provide guidance for management of excavation works or disturbance of soil at the Site.
- Outline safety controls.

- Outline methods to prevent any adverse effects on the environment and human health.
- Management and effective containment of contaminants of concern.
- Outline procedures for routine or emergency maintenance works at the Site.

1.4 SMP Structure

The SMP is presented in the following sections:

- Section 2.0: Site Identification.
- Section 3.0: SMP Application and Responsibilities.
- Section 4.0: Statutory Requirements.
- Section 5.0: Summary of Contamination.
- Section 6.0: Future Works Methodology.
- Section 7.0: Environmental Management Plan.
- Section 8.0: Emergency Response.
- Section 9.0: General Health and Safety.
- Section 10: Contingency Plans.
- Section 11: SMP Record Keeping.
- Section 12: SMP Auditing

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2.0 Site Identification

The Site is identified in **Table 1** below.

Table 1: Site Identification

Current Site Owner (July 2009)	Delta EMD Australia Pty Ltd
Site Address	1 McIntosh Drive, Mayfield, NSW, 2304
Local Government Authority	Newcastle City Council
Lot and DP Numbers	Lot 1 DP 874109
Current Zoning	Zone 4b Port and Industry
Distance from nearest CBD (approximate)	6km (Newcastle)
Area (approximate)	89 500 m^2
Elevation (approximate)	9 m AHD
Locality Map	Refer to **Figure F1**
Site Layout	Refer to **Figure F2**

Notes: *CBD - Central Business District, m AHD - metres above Australian Height Datum.*

A summary of Site background information, including a summary of the Site history, Site setting and a review of previous environmental investigations is provided in **Appendix A**.

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3.0 SMP Application and Responsibilities

3.1 Introduction

The following subsections outline details of the application of, and responsibilities for, the SMP.

3.2 Application of the SMP

This SMP is to be applied through the Owner/Occupiers management system. The management system will implement the SMP through, but not be limited to, site health and safety inductions, permit to work, excavation clearances, job safety analyses and standard operating procedures.

This SMP is required to be referred to, and implemented prior to disturbance of the Site's subsurface, in particular during (but not limited to) the following activities:

- Trenching for service installation, such as gas, electricity, stormwater, surface drainage, telephone, cabling and water supply.
- Maintenance of underground services.
- Excavation of soils for the construction of building footprints.
- Disturbance of soil for the construction of building foundations.
- Installation of equipment that may require excavation of soils for placement of footings.
- Construction of internal roads.
- Development of landscaping areas.
- Geotechnical works or other subsurface/intrusive testing.

It is further noted that surfaces (sealed, gravel and grass) across the Site should be retained and maintained, where practicable, to prevent the generation of dust, direct exposure to underlying soil and groundwater, and also to reduce the volume of surface water infiltration into the underlying groundwater.

Where the above activities are required, all other statutory requirements (see **Section 4**) and other site specific approvals (e.g. workplans, health and safety plans, site specific management plans etc) will be required to be adhered to. It is noted that preparation of any such additional Site-specific documents should include reference to this SMP and confirm that all works must be undertaken in accordance with the requirements of the SMP.

3.3 Document Revision

This SMP is to be reviewed and updated, as necessary. Therefore, it is the responsibility of the reader of this document to ensure they have the current version of the SMP. The master document, with the up-to-date version of the SMP will be available from the Site Owner.

3.4 Responsibilities

Site Management and/or the Works Supervisor is responsible for managing the works associated with Site, including management of any disturbance of surface soil, dust mitigation and suppression, surface water run-off, erosion and sedimentation control and all monitoring requirements outlined in this SMP.

The Owner of the Site and/or its representative is responsible for ensuring that all Site personnel including Site Management, Works Supervisor and Operational Staff undertake the appropriate environmental management measures during any Site works. The Works Supervisor is responsible for ensuring that any sub-contractors employed during any Site works conduct their operations in accordance with the environmental management principles contained in this plan and relevant statutory requirements.

General responsibilities during any of the works listed in **Section 3.2** are outlined in **Table 2** below.

Table 2: SMP Responsibilities

Position and Company	Responsibilities
Site Owner	• Approve and update the SMP, as required (e.g. prior to and following development / submission to Council, etc). • Ensure that the SMP is included as part of all preliminary OHS and Site induction discussions, which must occur prior to the completion of all subsurface/intrusive works. All subsurface/ intrusive works must be documented in the Register of Intrusive works. • Ensure appropriate consents and licences are obtained for works. • Ensure all contractors comply with statutory and licence requirements. • Oversee subsurface/intrusive works and overall implementation of SMP. • Undertake monitoring and inspections of the Site as required.
Occupier (Site Management)	• Implement the SMP at Site level. • Ensure appropriate consents and licences are obtained for works. • Ensure all contractors comply with statutory and licence requirements. • Oversee subsurface/intrusive works and overall implementation of SMP. • Undertake monitoring and inspections of the Site as required.
Works Supervisor	• Implement the SMP at Site level, ensuring all Operational Staff, including contractors and sub-contractors are inducted in the requirements of this SMP. • Comply with the relevant conditions of any statutory approvals. • Complete all necessary registers, databases and records as required in the SMP. • Ensure access restrictions are in place (e.g. fencing / signage / site attendance register) and written approval received from Site owner prior to commencing.

Position and Company	Responsibilities
	• Conduct all site operations in a safe and environmentally responsible manner on a day-to-day basis. • Meet all OH&S regulatory requirements. • Ensure that all environmental protection measures are in place and are functioning correctly. • Notify Site Owner if visually contaminated or unusual material is encountered or strong odours are noted during works. • Undertake daily Site inspections (OH&S and environmental) during any works and record and report as appropriate (see **Section 11.0**). • Complete non-conformance and corrective action reports as required and undertake follow up corrective actions, as required (see **Section 11.0**). • Complete incident reports and complaint reports, as required, and follow up as required (see **Section 11.0**). • Provide adequate training of all employees and contractors during Site induction, and as required on an ongoing basis during the works. • Conduct monitoring as required in the SMP. • Undertake audits of the project activities in accordance with the requirements of the SMP. The frequency of the audits will depend on the duration of the works. • Ensure all non-conformance and/or complaints are reported to the Site Owner/Occupier (see **Section 11.0**). • Undertake corrective actions in response to requests made by the Site Owner/Occupier regarding specific environmental or safety issues (see **Section 11.0**). • Ensure all works comply with relevant regulatory requirements. • Ensure all sub-contractors comply with statutory and licence requirements and conditions of the SMP. • Monitor to ensure that all subsurface/intrusive works are carried out in an environmentally responsible manner through Site inspections and monitoring, as required. • Monitor to ensure that the environmental protection measures put in place are appropriate and functioning correctly. • Sample and analyse any visually contaminated or unusual material uncovered during any excavation work.
Operational Staff, including contractors and sub-contractors	• Ensure all works are undertaken in compliance with the requirements of the SMP, as set out in a Site induction prior to start of any subsurface/intrusive works. • Complete any of the tasks listed above, as delegated to/from the Works Supervisor.

Position and Company	Responsibilities
Environmental Professional	• As required, inspect the condition of the site surface. Notify the Site Owner/Occupier of any significant issues identified during inspections. • Provide advice to Site Owner/Occupier, as required.

4.0 Statutory Requirements

4.1 Licences and Approvals Requirements

The Site Management and Works Supervisor will be responsible for ensuring all necessary approvals and licences are obtained prior to the commencement of any subsurface/intrusive works that require an approval or licence. All Operational Staff (including contractors and any sub-contractors) must comply with the terms and conditions of all approvals and licences obtained, including relevant Consent Conditions from the appropriate regulatory authorities.

4.2 Regulatory Requirements

During the course of future subsurface/intrusive works, all Operational Staff working on the Site are to consider the applicable environmental regulatory requirements, which include but are not limited to:

- Contaminated Land Management Act, 1997; as amended 2008.
- Environmental Planning and Assessment Act, 1979 (State Environmental Planning Policy No 55 – Remediation of Land).
- Environmental Planning and Assessment Regulation, 2000.
- Protection of the Environment Operations Act, 1997 and Regulations.
- Occupational Health and Safety Act 2000 and Occupational Health and Safety Regulation 2001.
- Environmentally Hazardous Chemicals Act, 1985.
- NSW DECC 2008, Waste Classification Guidelines, April 2008.
- Traffic Act 1909 and regulations.
- Relevant NSW DECC guidelines.

In addition, all Operational Staff will abide by any directions or procedures provided by the Site Management and/or Works Supervisor.

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5.0 Summary of Contamination

5.1 Introduction

AECOM has undertaken the following environmental works at the Site:

- Site Closure Strategy for Site and Kooragang Island Facility, dated 26 September 2008 (reference N4094601_26Sept08) (ENSR 2008a).
- Data Gap Analysis, Site, dated 29 September 2008 (reference N409460201_29Sept08) (ENSR 2008b).
- Phase 2 Environmental Site Assessment, dated 29 September 2008 (reference N4094604_RPT_29Sept08) (ENSR 2008c).
- Phase 2 ESA Summary, Site, dated 22 October 2008 (reference N4108501_RPT_22Octo8) (ENSR 2008d).
- Data Interpretation and Outline Remediation Strategy, dated 15 May 2009 (reference N4113201_Rpt_15May09.doc) (AECOM 2009a).
- Human Health and Ecological Screening Risk Assessment - Former Electrolytic Manganese Dioxide Plant, McIntosh Drive, Mayfield, NSW, dated TBA (reference TBA) (AECOM 2009b).

A review of each of the above documents is presented in **Appendix A**, although a summary of the key findings in relation to soil and groundwater conditions beneath the Site is presented in the following subsections.

5.2 Soil (Fill)

The key sources of soil contamination at the Site have been identified as:

- Manganese in the shallow subsurface (upper 0.5 m) associated with the former EMD operations, and at depth, associated with underlying fill materials. Lead was also identified at two isolated locations between 1 m and 2 m below ground level associated with underlying fill materials.
- Organic compounds including total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAHs), generally associated with the underlying fill materials and localised shallow usage at the Site's surface.

5.2.1 Inorganics

Results from ENSR (2008c) identified concentrations of manganese above the adopted Investigation Level (IL) of 7500 mg/kg (protective of industrial / commercial workers) across the entire Site. The highest concentrations were identified in the shallow subsurface in unsealed areas of the Site (predominantly in the north eastern corner of the Site in the vicinity of the Ore Shed and Kiln). Results of the AECOM risk assessment (AECOM 2009b) confirmed that whilst marginal risks were identified from manganese at the Site (noting the highest concentration of 180 000 mg/kg was used in the risk assessment), remediation of the shallow soils (fill) impacted was not necessary, subject to the implementation of an SMP.

The results for inorganics analysis in soil from ENSR (2008c) are presented in the **Tables** section of this report, and the locations of the site investigation locations are presented in the **Figures** section of this report. A summary of the distribution of manganese concentrations is also presented in ENSR (2008c).

Statistical analysis of manganese concentrations in soil was presented in ENSR (2008d), which identified that manganese concentrations were generally more elevated in the upper 0.5 m of the subsurface and associated with the former EMD operations and deeper manganese impacts were generally associated with the buried steelworks materials.

5.2.2 Organics

In comparison to the widespread nature of elevated manganese concentrations above the adopted IL, concentrations of organic compounds above the respective adopted ILs were limited in extent across the Site, and exceedences of the ILs were less significant. The key organic compounds, which exceeded the criteria at only eight of 76 samples scheduled for organic analysis included benzo(a)pyrene ((B(a)P), a PAH compound), Total PAHs and TPH (C_{10}-C_{36}).

The results for organic analyses in soil from ENSR (2008c) are presented in the **Tables** section of this report, and the locations of the site investigation locations are presented in the **Figures** section of this report, noting a summary of the spread of organics concentrations across the Site are also presented.

5.3 Groundwater

Previous investigations have identified that groundwater beneath the Site exists as two key aquifers: a shallow Fill Aquifer within the underlying fill materials and a deeper Estuarine Aquifer in the estuarine sediments which underlie the fill. Shallow perched water was identified in ENSR (2008c) at a depth of 1m to 1.5m below ground level (m bgl) at two locations only, both in the vicinity of the leachate tanks in the north western corner of the Site. A summary of the contamination status of the groundwater beneath the Site is presented below, noting that exceedences of ILs generally related to the key environmental receptor (the Hunter River), and not human health receptors, although direct contact with the groundwater should be avoided.

With respect to the SMP, any subsurface works are unlikely to extend to the interface with the Fill Aquifer and any future groundwater management is likely to be associated with perched water which exists at shallower depths across the Site.

5.3.1 Perched Water

ENSR (2008c) reported elevated manganese (46.4 mg/L and 112 mg/L) were reported in test pits TP18 and TP37, respectively, in the vicinity of the leachate tanks in the north western corner of the Site. It is possible that shallow perched water containing elevated concentrations of manganese may exist at other locations across the Site, although it was not encountered elsewhere during the ENSR (2008c) investigations.

Total PAHs and TPH were also reported in the perched water encountered at TP18 and TP37, at maximum concentrations of 96.9 µg/L (total PAHs in TP18) and 915 µg/L (TPH in TP37) respectively.

It is noted that no groundwater ILs were available for manganese, total PAHs and TPH (however ILs were available for individual PAH compounds).

5.3.2 Fill Aquifer

Groundwater in the Fill Aquifer was generally identified between 5 and 6 m bgl during ENSR 2008c investigations. Conditions in relation to manganese and organics are summarised below:

- Manganese concentrations ranged between 0.003 mg/L (MW13) and 0.849 mg/L (MW102).
- Napthalene in MW10 (128 µg/L), MW11 (181 µg/L) and MW13 (888 µg/L) exceeded the IL of 70 µg/L, with concentrations less than the IL ranging from less than the laboratory limit of reporting (LOR) to 55 µg/L (MW7).

- Total PAHs ranged from 2.1µg/L to 1072 µg/L, noting no IL exists for Total PAHs in groundwater.
- TPH (C_6-C_9) ranged from <LOR to 110 µg/L.
- TPH (C_{10}-C_{36}) ranged from 430 µg/L to 3480 µg/L.
- Benzene was less than the laboratory LOR or IL, and with exception of minor toluene, ethylbenzene and xylenes (total) (TEX) concentrations reported in MW7, TEX concentrations were less than the LOR.

5.3.3 Estuarine Aquifer

The Estuarine Aquifer is present within the underlying estuarine sediments some 10 m bgl and it is unlikely that any subsurface works would extend to this depth. The analytical results from the ENSR (2008c) investigation are, however, summarised below:

- Manganese concentrations ranged between 0.013 mg/L (MW2) and 6.66 mg/L (MW204).
- Napthalene was not reported at concentrations greater than the IL in any sample.
- Total PAHs ranged from <LOR to 43.2 µg/L.
- TPH C_6-C_9 was not reported at concentrations greater than the LOR.
- TPH C_{10}-C_{36} ranged from 780 µg/L to 1980 µg/L.
- Benzene was less than the LOR and/or IL, and TEX concentrations were all less than the LOR.

5.4 Exposure Pathways

The key exposure pathways for impacted soil (particularly shallow manganese impacted soils) and groundwater are considered to be inhalation, incidental ingestion of soil and direct dermal contact with soil and groundwater.

To limit the exposure pathways and further to **Section 3.2**, the SMP requires the retention and maintenance of sealed, gravel and grassed surfaces across the Site, where practicable. Consequently, prescribed measures are to be implemented for any works carried out which disturb any of the sealed, gravel or grassed surfaces.

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6.0 Future Works Methodology

6.1 Introduction

The following management procedures/controls are required to be implemented at the Site as part of any future works conducted at the Site.

6.2 Site Establishment

- The Site Management and/or the Works Supervisor will obtain all necessary approvals and licences required by the regulatory authorities prior to the commencement of the works. A record of these permits/approvals and licenses should be maintained.
- The Owner, Site Management, Works Supervisor and all other parties conducting subsurface/intrusive work on the Site will review the SMP and be familiar with management requirements for any areas that will be disturbed.
- A site specific Occupational Health and Safety (OH&S) Plan will be prepared prior to any subsurface/intrusive works and all Site personal will be inducted in accordance with the OH&S Plan. Section 11 of this document provides minimum OHS requirements for the Site.
- All Site personnel will be inducted into the requirements of this SMP, and acknowledge acceptance and compliance of the procedures by signing the attached log (**Appendix B**).
- Appropriate signage will be erected around the work area in accordance with Clause 78H of the EP&A Regulation (1998), informing of the construction works and any site-specific requirements.
- Bunding and siltation fences will be constructed around the perimeter of the work area.
- Guards and fences will be established around all excavation works in accordance with the relevant standards.
- Sediment control structures will be appropriately placed (ie. silt fencing and/or hay bales) down-slope of the construction area and on the up-slope of any stormwater collection channels.
- The Works Supervisor will designate a hardstand area within the Site for the stockpiling of excavated material, taking care to allow for separate stockpiling of imported fill, potentially contaminated soil and other excavated soil material. The Works Supervisor will ensure that the area is appropriately bunded to prevent any surface run-off from entering adjacent areas. Sediment control measures will be strategically placed down-slope of the stockpile area and on the up-slope side of any stormwater collection channels in accordance with *Managing Urban Stormwater: Soils and Construction* (DOH, 2004).
- Dust screening fences and noise mitigation measures will be established in accordance with this SMP (refer to **Section 7.0)**.

6.3 Earthworks

- All subsurface/intrusive works will be undertaken during dry weather (where possible), and in accordance with contractors operating procedures and any contract requirements.
- Stockpiles of material excavated from the Site are required to be segregated from other materials (refer to **Section 7.3)**.
- Excavations and any stockpiled material will be inspected by the Works Supervisor and/or a suitably qualified Environmental Professional for any obvious signs of contamination.
- In the event that any 'unknown' or 'unexpected' materials are uncovered, the spoil excavated will be managed in accordance with the Soil Management Plan outlined in **Section 7.3**.
- Any fill material used for backfilling will comply with the requirements for the Site, which include determining that the material is suitable for commercial / industrial land use.
- During subsurface/intrusive works, the Works Supervisor will undertake daily Site inspections. An inspection report (or similar), refer to **Appendix C** should be completed during the Site inspections. The following are required to be inspected:
  - Soil stockpiles;
  - Excavation voids;
  - Erosion and sediment control measures;
  - Drainage lines;
  - Surface water levels and conditions; and
  - Dust and odour levels.

Photographs are required to be taken, as required, as a record of Site conditions and the location of the area depicted in the photographs shall be identified on a site map. The photographs will be retained on the Site file for reference. Sampling of soil, fill and water will be undertaken by an appropriately qualified Environmental Professional, as required.

6.4 Reinstatement

Any area that is disturbed as part of the works will be reinstated with similar material, to minimise exposure to underlying fill.

Any excavated soil not used at the Site will need to be sampled and analysed (by a suitably qualified Environmental Professional) to be classified and disposed to an appropriately licensed landfill in accordance with NSW DECC (2008) Waste Guidelines.

The Site Management and/or the Works Supervisor will keep detailed records of the works and relevant contamination issues.

Where practicable, areas of hardstand and grassed and/or gravel surfaces in unpaved areas of the site must be retained and maintained, to minimise direct access to underlying soil and groundwater.

6.5 Use of Groundwater

The Site is located in an industrial area and serviced by reticulated, potable water, therefore groundwater is unlikely to be used for potable uses in the vicinity of the Site. Groundwater must not be extracted from Site for potable or irrigation use and may only be used for industrial purposes, subject to appropriate approvals.

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7.0 Environmental Management Plan

7.1 Introduction

The purpose of this Site-specific Environmental Management Plan (EMP) is to ensure that environmental risks are properly managed during subsurface/intrusive works at the Site. In general, best practice procedures will be followed throughout any subsurface/intrusive works to protect the environment within and around the Site and include:

- Surface water management.
- Soil management.
- Groundwater management.
- Traffic and access.
- Protection of vegetation.
- Odour control measures.
- Dust control measures.
- Noise and vibration control measures.
- Equipment cleaning and operation.

7.2 Water Management Plan

The Site Management and/or Works Supervisor shall implement a soil and water management plan or erosion and sediment control plan in accordance with *Managing Urban Stormwater - Soils and Construction* (DOH, 2004). At a minimum, the following stormwater controls must be implemented:

- Run-off from excavated fill or soil stockpile surfaces will not be allowed to enter stormwater. In the event that run off may occur, such run-off will be prevented to enter stormwater by either covering the excavated material or containing any run-off on-site for appropriate treatment in a collection system (if required) prior to reuse or disposal. Prior to any discharge to sewer or stormwater, a license will be obtained from the relevant authority.
- Measures as outlined in the Soil Management Plan (below in **Section 7.3)** should be included to minimise the sediment load if a run-off event is likely to enter the stormwater collection system.
- Under no circumstances shall any activities (including run-off or dewatering procedures) be undertaken which may involve a threat of pollution to any nearby water body, particularly to the Southern Arm of the Hunter River.
- All pollution control devices shall be regularly maintained.
- Run-off detention basins shall be used if a large volume of water is to be used during construction works. These basins should be constructed in the downslope areas of the work area in accordance with DOH (2004).

7.3 Soil Management Plan

Sediment control measures (i.e. silt fencing and/or hay bales) in accordance with DOH (2004) will be strategically placed at the following locations:

- Up-slope of stockpiles to redirect water.
- Down-slope of stockpiles and slopes.
- Up-slope side of the stormwater collection channels.
- Around temporary stockpiles.
- Down-gradient of stormwater channels as contingency against overflow.

Should stockpiling of imported fill materials be required, they will be placed in an area designated by the Works Supervisor. The imported fill stockpiling area will be prepared by removing rubbish, rubble and vegetation, then by trimming and grading so that any depressions or mounds are removed. Imported fill stockpiles will be numbered and logged in the materials tracking forms for identification, and must be certified as meeting the landuse criteria for commercial / industrial landuse prior to use on-site.

Spoil resulting from any disturbance of the subsurface (e.g. excavations, drilling, piling activities or similar) must be stockpiled on hardstand surface and bunded surface, separate to other soil stockpiles. All subsurface disturbance activities must be undertaken with the involvement of an appropriately qualified Environmental Professional, responsible for the sampling and analysis of the resulting spoil.

7.4 Traffic and Access

All heavy vehicle access and egress must follow a designated heavy vehicle route specified by the Works Supervisor, which complies with local Council requirements. As a minimum, the following traffic control measures will be implemented:

- All streets along the designated heavy vehicle route will be kept free from detritus material sourced from the Site during the course of the project. A representative of the contractor will, on a daily basis, monitor the roadways leading to and from the Site, and take steps to clean any adversely impacted pavements.
- Vehicles travelling along the designated heavy vehicle route shall adhere to the RTA speed limits.

Where necessary, fencing will be erected around the defined work area and appropriate signage will be put in place. Only authorised personnel are to enter the work area and written approval to proceed with the work from the Site Management is required. All personnel working in the work area will be required to sign an attendance register.

7.5 Odour Control

Given that the key contaminant of concern is manganese, it is unlikely that odours will be generated from excavations. There is the potential for isolated hot spots of organic contamination to be encountered which may generate odours. However, all activities conducted at the Site will be conducted using equipment designed and operated to control the emission of smoke, fumes and vapour into the atmosphere. Any possible odours arising from the excavation or stockpiled material are to be controlled, including odours in deep excavations. Control measures may include:

- Maintenance of construction equipment so that exhaust emissions comply with the Clean Air Regulations issued under the Protection of the Environment Operations Act.

- Use of appropriate vapour ventilation equipment.
- Cleared vegetation, demolition materials and other combustible waste will not be burned onsite.
- Use of covers (i.e. HDPE) or water/odour suppressant sprays.

All practicable measures will be taken to ensure that fugitive emissions emanating from the Site are minimised so that associated odours do not constitute a nuisance and that the ambient air quality is not adversely impacted.

7.6 Dust Control Measures

All practicable measures will be taken to ensure that dust emanating from the Site is restricted / minimised, including the following:

- Use of water sprays over unsealed or bare surfaces, which have the potential to generate unacceptable amounts of dust.
- Covering of excavation faces and stockpiles, where necessary (if unacceptable amounts of dust are generated or if strong winds are predicted or occur).
- Establishing dust screens consisting of a minimum of 2 metre high shade cloth or similar material secured to a chain wire fence.
- Maintenance of all dust control measures to ensure good operating condition.
- All vehicles having accessed unpaved or contaminated areas of the Site shall exit via wheel cleaning facility (refer to **Section 7.8**) to prevent mud and sediment from being deposited on Council roadways.

7.7 Noise and Vibration Control

The noise and vibration associated with construction will be controlled by the following means:

- Ensuring that no vehicles, machinery or equipment generate noise levels beyond applicable guidelines.
- Approved silencing measures shall be provided and maintained on all power-operated plant used in construction works.
- Restricting the activities generating high noise and vibration levels to Council's sanctioned working hours.
- All construction vehicles will enter and leave the Site in accordance with the Site entry requirements.
- Use of suitable construction techniques.

All practicable measures will be taken to minimise the generation of noise and vibrations to acceptable levels. In the event that short-term noisy operations are necessary, and where these are likely to affect on-site workers and neighbours, notification will be provided to the Site Owner and neighbours, specifying the expected timing and duration, and monitoring will be undertaken at the direction of the Site Owner/Occupier and/or its representative.

7.8 Vehicle/Equipment Cleaning and Operation

The following controls will be placed on operation and movement of equipment:

- Equipment working within an excavation area will be washed inside the area. Wash water will run into the excavation. The wash water will be allowed to evaporate / infiltrate.
- The surface of internal access roads carrying vehicular traffic will be kept clean;
- All equipment will be operated by suitably qualified operators.
- All equipment will be maintained at optimum operating conditions and any servicing of equipment will be undertaken in areas specified by the Works Supervisor. It is recommended that such activities be undertaken on concrete or bitumen surfaces to prevent impact to surface soils by oils, fuels or cleaning agents.
- Any fuel stored onsite will be held in an area designated by the Works Supervisor. The area will be appropriately bunded to contain any potential spillages and/or leaks.
- Vehicles carrying spoil or rubble from the Site must at all times be covered with an "enviro-tarp" or similar impervious cover to prevent the escape of dust or other material.
- A log of all trucks removing soil from the Site or importing soil to the Site will be kept in a Truck Log book.
- All heavy vehicle access and egress to and from the Site shall be via the route designated by the Works Supervisor.
- The wheels and wheel arches of all vehicles having had access to unpaved areas will be cleaned by the use of a broom or water spray to prevent mud and sediment from being deposited on Council roadways.
- After wheel and wheel arch cleaning, vehicles shall be inspected for the presence of rocks between tyres and sediment within the undercarriage of the vehicle. If detected, this shall be removed and placed at a designated point within the Site.

7.9 Materials Management

To ensure that no inappropriate disposal and/or reuse of stockpiled material occurs the following management controls will be used:

- All stockpiles will be sign posted as to their source location and uniquely numbered and recorded.
- A field sketch of stockpiles will be recorded in the field log/site diary at the end of each day.

No material will be reused on Site or taken offsite without first obtaining approval from the Site Management and/or Works supervisor. The Site will be secured at night to prevent the potential for any illegal dumping.

All material handled on the site (including imported fill) will be tracked by the use of the Materials Tracking Register (**Appendix D**) and location drawn on field logs or diary.

7.10 Waste Management and Minimisation

Waste minimisation and recycling practices and programmes will be employed to meet the requirements of the NSW DECC. The aim will be to:

- Minimise products used.
- Maximise the use of recycled materials, maximise recycling (paper, PET, glass, plastics, etc.).
- Reduce waste generation (litter/garbage).

The waste management hierarchy (in order of preference) in accordance with Waste Avoidance and Resource Recovery Act (2001) will be:

- Avoid.
- Reduce.
- Reuse/recycle.
- Treat.
- Dispose.

Containers will be made available on Site by the Works Supervisor to allow segregation of the above materials, if practical, and necessary.

Waste management activities related to the works shall be undertaken in accordance with any relevant Councils Waste Development Control Plans.

All waste materials resulting from works should be inspected by the Works Supervisor and/or a suitably qualified Environmental Professional prior to disposal or reuse. The inspection will evaluate whether the material is contaminated (visually or through testing).

Should asbestos be encountered, asbestos materials management during removal of asbestos from buildings shall be undertaken in accordance with relevant legislation and WorkCover guidance, and by using appropriately licensed contractors.

All waste disposal activities should be undertaken in accordance with the NSW DECC (2008) Waste Guidelines.

All waste management activities should be undertaken with the involvement of an appropriately qualified Environmental Professional.

7.11 Material Safety Data Sheets (MSDS)

Material Safety Data Sheets (MSDS) for chemicals/materials on the Site and for chemicals/materials brought to the Site for use during works associated with construction will be kept by Site Management and/or Works Supervisor. These will be referred to by Operational Staff and/or contractors as required.

7.12 Community Consultation

Any consultation with surrounding landowners and occupants of the nearby properties will be undertaken by the Site Owner and/or Site Management.

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8.0 Emergency Response

In the event of any incident, the first priority shall be the safety of all personnel and the community in the immediate vicinity. Following this, all practical steps should be taken to minimise the risk of further environmental damage as soon as possible after the event. The situation should be stabilised following the appropriate incident management or contingency plan procedures. The appropriate staff should be notified and emergency procedures enacted.

Typical first response actions may include:

- Containment of any pollution using booms, silt fences, absorbents, bunding or interception pits.
- Temporary repair or isolation of failed plant/equipment component.
- Sampling of impacted Site media, be it soil and/or surface water.

Follow up action will include the development of a work plan to remediate the impacted Site media. Such a work plan would detail any sampling and analysis requirements to define the nature and extent of impact, methods for the recovery, handling, storage and treatment of impacted material, disposal and/or reuse options for impacted material and personal protective equipment requirements.

In the event of a serious emergency at the Site, the following procedure will be followed:

1 Stop work.
2 All personnel shall leave the work zone via established entry/exit routes.
3 Leave the Site and assemble at the emergency assembly area (to be designated by Site Management).
4 Await further instructions from Site Management.

No project personnel or visitors are to leave the assembly area unless advised to do so by Site Management.

The on-Site manager will notify the relevant services as to the details regarding any emergency:

- Fire Brigade (phone: 000)
- Ambulance (phone: 000)
- Police (phone: 000)
- NSW DECC
- Council
- Other service providers (Telstra, etc)

Records will be kept of any incidents, accidents, hazardous situations, unusual events and unsafe health exposures and the corrective action taken. The Site Management will investigate the cause of any emergency so that necessary changes in work practices can be made to prevent the incident recurring.

Emergency procedures and contact telephone numbers are required to be displayed in a prominent position during Site works by the Works Supervisor.

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9.0 General Health and Safety

9.1 Introduction

A Site Specific Safety Plan has not been developed for the Site. However, the following general OH&S requirements of the Occupational Health and Safety Regulation 2001 under the Occupational Health and Safety Act 2000 should be followed:

- Evaluation of onsite hazards and potential risks associated with these hazards.
- Particular risk control measures (including provisions regarding lighting, noise, atmosphere, electricity, confined spaces and manual handling).
- Definition of personal protection standards.
- Classification of onsite personnel and work zones.
- Details on work practices and restrictions, assessment of anticipated protection levels, controls on access to work zones and decontamination.
- The use of plant at places of work.
- Supervision of work practices and medical surveillance.
- The notification of accidents and other matters.
- Environmental monitoring protocols.
- Emergency information.
- Risk assessment methods.

9.2 General

All workers and visitors to the work area must attend the Health and Safety Induction before entry to the work area is allowed.

9.3 Personal Protective Equipment

At a minimum, the following PPE will be worn by all Site personnel working in areas of surface soil/pavement disturbance: long trousers and long sleeved shirt or overalls, steel toe capped boots, hard hat, latex gloves and safety glasses. The Works Supervisor should ensure that face masks are available and worn during excavation and manual handling soils, if dusty conditions develop. PPE must meet the requirements of Australian Standards.

Use or disclosure of data contained on this sheet is subject to the restriction on the distribution page of this document.

9.4 Potential Hazards and Prevention

In addition to the regulatory OH&S requirements, the following prevention practices will be employed (as a minimum) for the Site during times of subsurface disturbance activities as listed in **Section 3.2**.

Table 3: Potential Hazards and Prevention

Hazard	Prevention
Dermal Contact - Contaminated soil and groundwater (perched) coming into contact with skin.	Personal protective equipment as defined in **Section 9.3** will include long trousers and long sleeved shirt or overalls, steel toe capped boots, hard hat, latex gloves and safety glasses shall be provided for the duties of each on-site individual.
Dust inhalation / ingestion – there is the potential for exposure to contaminants (particularly manganese) via inhalation as a result of dust creation during any excavation works.	• Dust Prevention o Use of water sprays over unsealed or bare surfaces, which have the potential to generate dust. o Covering of excavation faces and stockpiles, where necessary. o Establishing dust screens consisting of a minimum of 2 metre high shade cloth or similar material secured to a chain wire fence, where necessary. o Maintenance of all dust control measures to ensure good operating condition. • Dust masks will be made available and worn on Site by all Site personnel in the work area during excavation and ground disturbance activities, and at other times when dusty conditions are visible. • No eating, drinking or smoking is to occur in the work area. • No eating, drinking or smoking is to occur outside the work area until all PPE has been removed and appropriate personal decontamination (i.e. hand and face washing) has occurred.

10.0 Contingency Plans

10.1 Introduction

The purpose of the contingency plan is to identify unexpected situations that could occur, and specify procedures that can be implemented to manage such situations and prevent adverse impacts to the environment and human health.

Site Management and/or Works Supervisor will be notified of any incidents and/or complaints, depending on the severity of the incident, other government agencies including the NSW DECC may be notified. The Site Management and/or Works Supervisor will be able to request that works cease, if unacceptable conditions arise.

Details of the procedures are defined in the following sections.

10.2 Disturbance of the Surface

In the event that any surface (i.e. barrier to materials that may be contaminated, comprising floor slabs, pavements, grassed areas and/or gravel surfaces) is disturbed, the surface will be reinstated as soon as practicable with similar material to minimise exposure to fill materials that remain on the site. Where practicable, current areas of hardstand should be maintained to minimise the amount of infiltration through underlying fill and into perched and shallow groundwater.

10.3 Dust Generation

Where possible, all subsurface works will be undertaken in such a manner as to reduce / restrict dust generation at the Site. All works that generate dust will require all personnel in the work area to wear a dust mask in addition to PPE set out in **Sections 9.3 and 9.4.** In the event that prevention of significant quantities of dust is not possible, all works will stop until dusty conditions cease, or until alternative measures are put in place (e.g. covering over of stockpiles, water spray over the work area, etc).

10.4 Potential Acid Sulfate Soils

Given the significant thickness of fill materials underlying the Site, the potential for acid sulfate soils is not considered to be an issue at the Site.

10.5 Uncover Contaminated or Unknown Materials

In the event that any significant unknown type of material (including contaminated material) is identified during future subsurface/intrusive works, the material will be inspected by the Works Supervisor and a suitably qualified Environmental Professional. Any action required will be coordinated by the Works Supervisor, with advice from the Environmental Professional, and records must be kept in relation to the nature, location and management of the particular material.

10.6 Encountering Groundwater

In the event that groundwater is encountered during subsurface works, advice from a suitably qualified Environmental Professional should be sought for appropriate assessment, and potential off-Site disposal via a licensed contractor. PPE, as defined in **Section 9.3** is required to be worn. Assessment of groundwater may include:

- Estimation of volumes of water present.
- Collection of water samples for laboratory analysis.

- Following receipt of laboratory data, assessment of appropriate water disposal options.

10.7 Spills and Leaks

Plant and vehicles used during future redevelopment works will be stored, refuelled and maintained in a designated section of the Site. Spill response procedures shall be made available to all employees and covered during induction training.

If spills or leaks of hydraulic fluids, lubricants or fuel from vehicles/plant occurs in the work areas, the following measures will be considered for use as appropriate:

- Treatment with an absorbent material specifically designed for such situations.
- Construction of retention basins, diversion drains.

10.8 Excessive Rain

During major rain events, significant earthworks shall cease. Sediment control measures and bunding will be regularly inspected and maintained. The frequency of the sediment control monitoring will be increased during heavy rain events.

10.9 Equipment Failure

In the event that any equipment fails, equipment and associated operations will be shut down until repairs are made. The Works Supervisor and equipment operator should ensure that spare equipment parts and/or rental options are available as appropriate.

10.10 Surface Water Protection Measures Fail

In the event that any surface water protection measures (i.e. bunding, hay bails, etc) fail, the Site Management and/or Works Supervisor should ensure that they are repaired and/or supplemented immediately.

11.0 SMP Record Keeping

The following internal record keeping will be undertaken, independent of any external reporting requirements of the Environment Protection Licence (EPL) that the Site Management is required to undertake.

Non-conformances (relating to the SMP) reported to Site Management and/or Works Supervisor will be recorded in a Non-Conformance and Corrective Action Report. A copy of the Non-Conformance Report is provided in **Appendix E**. Details of the non-conformance, including any immediate corrective actions undertaken, are to be recorded by Site Management and/or Works Supervisor.

It is the responsibility of Site Management and/or Works Supervisor to immediately initiate corrective actions, if required. Once completed, the Site Management and/or Works Supervisor will provide details of the actions undertaken on the Non-conformance Report and sign, date and place the report in the Site. The Site Management and/or Works Supervisor will monitor feedback and response to prevent future occurrences.

Records will be kept of any environmental incidents, accidents, hazardous situations, unusual events and unsafe health exposures and the corrective action taken. A representative of Site Management will investigate the cause of any emergency so that necessary changes in work practices can be made to prevent the incident recurring.

Site Management will be required to maintain a register of complaints from local neighbours, which will include a record of any action taken with respect to the complaints. Site Management will be notified immediately should any incident affecting the environment or the surrounding community occur.

Details of the complaint are to be documented by Site Management in the Site's Complaints Register in **Appendix F**.

If a complaint identifies a non-conformance, a Non-Conformance and Corrective Action report is to be initiated **Appendix E.**

All subsurface/intrusive works undertaken are to be logged on the Intrusive Works Register in **Appendix G,** which should detail dates and duration of all subsurface/intrusive works, with observation relating to surface conditions, subsurface conditions (i.e. observed contamination) and comments relating to reinstatement activities. Compliance with the SMP should also be noted.

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12.0 SMP Auditing

Site Management (with the Works Supervisor) shall conduct weekly (or other appropriate schedule, depending on the work being undertaken) audits of any subsurface/intrusive works. These will involve reviewing all environmental documents, records and monitoring results to ensure compliance with the requirements of the SMP and conditions of any regulatory approvals. If any deficiency is detected, the Site Management and/or Works Supervisor shall initiate a Non-Conformance Report and initiate the appropriate corrective action. The Site Owner will be informed of any non-conformances. Other issues to be covered by the audit may include, but not be limited to, the following:

- Relevant environmental legislation;
- Reporting procedures;
- Complaint management;
- General Site issues;
- Traffic and access;
- Noise and vibration;
- Water quality, erosion and sedimentation;
- Air quality and dust;
- Hazards, risks and safety;
- Waste disposal and recycling; and
- Emergency response procedures.

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13.0 References

ANZECC and ARMCANZ, 2000. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand. *Australian Water Quality Guidelines for Fresh and Marine Water quality. National Water Quality Monitoring Strategy, October 2000.*

ANZECC 1999 *Guidelines for the On-site Containment of Contaminated Soil.*

ANZECC 1992 *Guidelines for the Assessment and Management of Contaminated Sites.*

Department of Environment and Climate Change (DECC) 2007, *Guidelines for the Assessment and Management of Groundwater Contamination*.

NSW Department of Environment and Conservation (DEC) *Guidelines for the NSW Site Auditor Scheme (2nd Edition)*, April 2006.

ENSR 2008a, *Site Closure Strategy for Site and Kooragang Island Facility, Delta EMD Pty Ltd, McIntosh Drive, Mayfield, NSW, 26 September 2008.*

ENSR 2008b*, Data Gap Analysis, Site, McIntosh Drive, Mayfield, NSW, 29 September 2008.*

ENSR 2008c, *Phase 2 Environmental Site Assessment, McIntosh Drive, Mayfield, NSW, 29 September 2008.*

ENSR 2008d, *Data Gap Analysis, Kooragang Island, NSW, McIntosh Drive, Mayfield, NSW, 29 September 2008.*

ENSR 2008e, *Phase 2 ESA Summary, Site, McIntosh Drive, Mayfield, NSW, 22 October 2008.*

AECOM 2009a, *Data Interpretation and Outline Remediation Strategy, Delta EMD Australia Pty Ltd, McIntosh Drive, Mayfield, NSW, 15 May 2009.*

AECOM 2009b, *Human Health and Ecological Screening Risk Assessment, dated TBA Former Electrolytic Manganese Dioxide Plant, McIntosh Drive, Mayfield, NSW (reference TBA) (AECOM 2009b).*

National Environmental Protection Council (NEPC) 1999a*, National Environment Protection (Assessment of Land Contamination) Measure (NEPM), Health based Investigation Levels Schedule B(7a).*

NSW Environment Protection Authority (EPA), 1994. *Guidelines for Assessing Service Station Sites, December 1994.*

NSW Environment Protection Authority (EPA) 1997*. Guidelines for Consultants Reporting on Contaminated Sites, November 1997.*

NSW DECC 2008, Waste Classification Guidelines, April 2008;

NSW Contaminated Land Management (CLM) Act 1997, and as amended 2008.

NSW Protection of the Environment Operations (POEO) Act 1997.

NSW State Environmental Planning Policy No. 55 (SEPP 55).

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Tables - from ENSR (2008)c

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Table T2: Soil Results - Inorganics

Analyte	Units	LOR	NEPM HIL F	TP01_0.2	TP01_1.0	TP02_0.2	TP02_1.0	TP03_0.2	TP03_1.3	TP04_0.2	TP04_0.9	TP05-0.5	TP05-2.1	TP06_0.5	TP07_0.5	TP07_2.0	TP08_0.2	DUP02-TP
				27-June-2008	27-June-2008	27-June-2008	27-June-2008	27-June-2008	27-June-2008	27-June-2008	27-June-2008	04-July-2008	07-July-2008	30-June-2008	01-July-2008	01-July-2008	27-June-2008	27-June-2008
pH (Lab)	pH_Units	0.1	NV	13.1	13.8	11.5	12.6	11.6	12.5	11.4	13.8	13	12.5	13.3	13.5	13.5	11.2	10.9
Sulphate	mg/kg	100	NV	1,470	2,830	1,640	1,650	1,620	1,490	1,810	3,330	2,430	6,210	4,240	3,230	2,720	1,550	1,760
Total Sulphur	%	0.01	NV	0.1	0.13	0.15	0.13	0.14	0.14	0.12	0.13	0.68	0.12	0.19	0.15	0.16	0.12	0.16
Sulphide as S	%	0.01	NV	0.05	0.04	0.1	0.08	0.08	0.09	0.06	0.02	0.47	0.04	0.05	0.04	0.07	0.07	0.1
Aluminium	mg/kg	50	NV	1,980	4,130	13,000	7,070	17,100	6,220	13,300	11,900	6,310	54,900	3,900	7,170	8,020	18,600	12,100
Arsenic	mg/kg	5	500	10	6	28	11	34	9	20	7	8	<5	6	5	7	16	9
Barium	mg/kg	10	NV	100	140	2,780	170	2,520	300	4,870	200	320	410	80	140	130	1,920	900
Cadmium	mg/kg	1	100	2	<1	1	2	<1	1	<1	<1	2	<1	2	1	1	1	<1
Chromium (total)	mg/kg	2	NV	330	464	1070	316	146	280	177	466	455	53	513	507	414	126	417
Cobalt	mg/kg	2	500	4	2	26	9	29	5	27	2	<2	<2	<2	<2	<2	12	9
Copper	mg/kg	5	5,000	61	44	82	121	113	30	29	42	41	8	40	44	43	51	35
Iron	mg/kg	50	NV	170,000	104,000	79,800	89,400	38,300	92,000	40,700	110,000	90,900	25,200	118,000	109,000	125,000	54,600	66,600
Lead	mg/kg	5	1,500	107	56	59	**2,310**	39	89	86	37	89	8	18	53	57	83	50
Manganese	mg/kg	5	7,500	**24,200**	**31,400**	**132,000**	**16,200**	**163,000**	**21,400**	**180,000**	**25,700**	**32,400**	5,890	**31,000**	**25,000**	**25,000**	**156,000**	**80,000**
Mercury	mg/kg	0.1	75	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	mg/kg	2	NV	3	3	19	39	12	10	11	3	4	<2	<2	2	5	7	4
Zinc	mg/kg	5	35,000	242	148	624	1720	111	112	154	80	244	29	50	132	268	213	152

Notes

TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection
RPD %	Relative percentage difference, used
Dup1 (BH59_0.1-0.2)	It is noted that this sample was a duplicate of BH59_0.1-0.2, however,

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

Table T2: Soil Results - Inorganics

Analyte	Units	LOR	NEPM HIL F	TP08_0.8	BH9_0.1-0.2	BH9_0.9-1.0	TP10_0.5	DUP05-TP	TP10_1.4	TP11_0.1	TP11_0.5	TP11_1.4	TP12_0.5	TP13_0.1	TP13_0.5	TP14_0.1	TP14_1.8	BH16_0.2-0.3
				27-June-2008	03-July-2008	03-July-2008	30-June-2008	30-June-2008	30-June-2008	02-July-2008	02-July-2008	02-July-2008	30-June-2008	30-June-2008	30-June-2008	02-July-2008	02-July-2008	14-July-2008
pH (Lab)	pH_Units	0.1	NV	13.6	12.4	12.3	12.7	13.3	12.8	11	12	12.9	12.7	10.4	12.3	8.8	12.7	11.7
Sulphate	mg/kg	100	NV	2,760	6,100	4,290	3,410	2,290	2,190	3,570	3,290	6,080	890	2100	1490	2,040	2,900	3,930
Total Sulphur	%	0.01	NV	0.14	0.22	0.6	0.11	0.14	0.15	0.13	0.18	0.38	0.1	0.13	0.06	0.13	0.12	0.18
Sulphide as S	%	0.01	NV	0.05	0.02	0.46	<0.01	0.06	0.08	0.01	0.07	0.18	0.07	0.06	0.01	0.06	0.02	0.05
Aluminium	mg/kg	50	NV	4,340	41,900	54,400	4,190	3,820	4,020	15,800	23,600	17,200	4,830	12,200	3,870	17,600	9,780	16,400
Arsenic	mg/kg	5	500	8	7	<5	8	6	10	8	10	8	6	22	5	<5	6	8
Barium	mg/kg	10	NV	120	830	460	130	140	140	720	430	280	100	970	170	190	90	250
Cadmium	mg/kg	1	100	1	<1	<1	2	2	2	<1	1	1	1	<1	<1	<1	1	1
Chromium (total)	mg/kg	2	NV	476	221	160	407	461	390	525	267	412	376	300	355	167	271	265
Cobalt	mg/kg	2	500	<2	4	<2	<2	<2	3	12	4	2	<2	38	<2	4	<2	4
Copper	mg/kg	5	5,000	30	5	15	35	36	60	336	74	62	46	1780	63	40	37	76
Iron	mg/kg	50	NV	153,000	29,900	22,600	143,000	122,000	151,000	74,400	72,500	99,000	106,000	54,100	59,100	24,600	97,400	62,800
Lead	mg/kg	5	1,500	18	14	7	23	22	52	40	68	65	104	50	74	27	111	261
Manganese	mg/kg	5	7,500	**28,100**	**26,700**	**12,100**	**26,900**	**29,500**	**25,600**	**30,000**	**20200**	**24,900**	**19,400**	**130,000**	**19,600**	**10,600**	**16,300**	**19000**
Mercury	mg/kg	0.1	75	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.3	0.3
Molybdenum	mg/kg	2	NV	3	3	<2	2	3	2	10	<2	3	24	14	4	<2	<2	5
Zinc	mg/kg	5	35,000	84	22	15	62	44	175	305	572	311	277	222	116	125	222	630

Notes

TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection
RPD %	Relative percentage difference, used
Dup1 (BH59_0.1-0.2)	It is noted that this sample was a duplicate of BH59_0.1-0.2, however,

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

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Table T2: Soil Results - Inorganics

Analyte	Units	LOR	NEPM HIL F	BH16_0.4-0.5	DUP17	BH17_0.2-0.3	BH17_1.9-2.0	TP18_0.5	TP18_1.0	BH19_0.1-0.2	BH20_0.1-0.2	BH20_1.9-2.0	BH21_0.2-0.3	BH21_1.9-2.0	TP22_0.1	TP22_1.3	BH22_3.4-3.5	DUP20
				14-July-2008	14-July-2008	14-July-2008	14-July-2008	30-June-2008	30-June-2008	26-June-2008	30-June-2008	30-June-2008	15-July-2008	15-July-2008	02-July-2008	02-July-2008	15-July-2008	15-July-2008
pH (Lab)	pH_Units	0.1	NV	12.1	12.3	9.7	10.6	12.5	12.4	10.6	5.8	11.4	12.1	12.1	13.2	12.8	10.5	11
Sulphate	mg/kg	100	NV	3,620	3,380	890	430	3,470	1,980	<100	6,080	1050	3,250	2,260	4,210	5040	950	220
Total Sulphur	%	0.01	NV	0.22	0.2	0.17	0.36	0.22	0.48	0.01	0.23	0.44	0.22	0.12	0.11	0.6	0.26	0.3
Sulphide as S	%	0.01	NV	0.1	0.09	0.14	0.34	0.1	0.41	0.01	0.03	0.4	0.11	0.04	<0.01	0.43	0.23	0.29
Aluminium	mg/kg	50	NV	13,100	14,400	9,110	10,700	10,300	63,100	4,980	6,010	28,300	15,200	9,050	9,080	14,300	4,860	4,180
Arsenic	mg/kg	5	500	8	7	30	10	7	<5	<5	<5	12	6	7	<5	<5	15	20
Barium	mg/kg	10	NV	230	210	2,550	240	160	630	20	110	360	320	200	160	270	210	280
Cadmium	mg/kg	1	100	1	<1	<1	<1	1	<1	<1	<1	<1	1	1	2	<1	<1	<1
Chromium (total)	mg/kg	2	NV	377	385	560	98	382	125	9	25	108	513	266	623	320	5	19
Cobalt	mg/kg	2	500	5	4	77	<2	<2	<2	4	5	6	7	2	<2	<2	3	3
Copper	mg/kg	5	5,000	60	58	62	24	52	13	7	14	138	32	40	70	53	19	31
Iron	mg/kg	50	NV	102,000	83,100	56,300	67,600	119,000	26,100	14,200	15,600	51,300	97,700	108,000	110,000	73,200	15,700	56,600
Lead	mg/kg	5	1,500	212	180	40	125	258	31	7	9	137	36	111	24	293	145	1100
Manganese	mg/kg	5	7,500	**24,900**	**24,400**	**154,000**	7,110	**29,400**	**12,000**	845	6,630	5,100	**33,600**	**17,800**	**23,300**	**17,900**	465	1170
Mercury	mg/kg	0.1	75	0.2	0.1	0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	0.1	<0.1	<0.1	0.2	0.1
Molybdenum	mg/kg	2	NV	4	5	15	<2	2	<2	<2	6	<2	4	3	3	2	<2	<2
Zinc	mg/kg	5	35,000	452	366	118	175	162	64	40	44	1,100	93	908	135	158	75	96

Notes

TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection
RPD %	Relative percentage difference, used
Dup1 (BH59_0.1-0.2)	It is noted that this sample was a duplicate of BH59_0.1-0.2, however,

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

AECOM

Table T2: Soil Results - Inorganics

Analyte	Units	LOR	NEPM HIL F	BH22_5.4-5.5	BH23_0.1-0.2	DUP 11	BH23_1.9-2.0	BH23_5.9-6.0	BH24_1.4-1.5	TP24-0.1	TP24-0.5	TP25-0.1	TP25-0.4	TP26-0.1	TP26-1.3	TP27-0.5	TP27-1.5	TP28-0.5
				15-July-2008	07-July-2008	07-July-2008	07-July-2008	07-July-2008	15-July-2008	04-July-2008	04-July-2008	04-July-2008	04-July-2008	03-July-2008	03-July-2008	03-July-2008	03-July-2008	03-July-2008
pH (Lab)	pH_Units	0.1	NV	11.1	11.9	12.2	12.5	11.6	13.1	11	11.7	11	11.9	11.3	11.4	12.1	12.8	12
Sulphate	mg/kg	100	NV	170	3060	2670	8,110	<100	3,190	3,570	4,020	3,020	1,940	2,140	1,660	4,590	3,570	9,480
Total Sulphur	%	0.01	NV	0.27	0.17	0.19	0.47	0.18	0.22	0.15	0.25	0.16	0.14	0.12	0.13	0.47	0.16	0.38
Sulphide as S	%	0.01	NV	0.26	0.07	0.1	0.2	0.18	0.11	0.03	0.12	0.06	0.08	0.05	0.07	0.32	0.04	0.06
Aluminium	mg/kg	50	NV	4,060	35,800	44600	19,500	4,700	14,800	27,400	11,100	14,000	13,400	16,600	14,600	9,230	5,620	8,930
Arsenic	mg/kg	5	500	13	<5	<5	6	18	7	6	5	<5	<5	<5	<5	<5	<5	7
Barium	mg/kg	10	NV	160	370	360	230	230	260	520	240	200	240	380	200	130	80	180
Cadmium	mg/kg	1	100	<1	<1	<1	1	<1	1	6	1	<1	1	1	<1	4	1	2
Chromium (total)	mg/kg	2	NV	4	78	65	177	4	458	1,290	908	272	765	1,410	1,030	42	380	266
Cobalt	mg/kg	2	500	6	14	<2	5	3	<2	<2	<2	<2	<2	<2	17	<2	<2	3
Copper	mg/kg	5	5,000	17	106	46	1160	18	48	281	113	83	98	364	30	36	28	70
Iron	mg/kg	50	NV	19,600	15,900	12,100	54,800	20,500	105,000	83,300	82,500	15,500	71,300	76,500	44,300	22,300	85,600	68,900
Lead	mg/kg	5	1,500	122	26	11	**3,790**	40	74	46	49	15	77	27	48	183	115	83
Manganese	mg/kg	5	7,500	469	**11,200**	**9,460**	**7,970**	465	**35,600**	**76,100**	**21,200**	**10,200**	**24,200**	**18,100**	**10,500**	3,260	**25,900**	**38,200**
Mercury	mg/kg	0.1	75	0.1	<0.1	<0.1	0.2	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.2
Molybdenum	mg/kg	2	NV	<2	<2	<2	8	<2	3	9	6	<2	2	9	<2	<2	4	<2
Zinc	mg/kg	5	35,000	48	230	63	782	64	200	1320	276	78	143	224	170	186	130	356

Notes

TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection
RPD %	Relative percentage difference, used
Dup1 (BH59_0.1-0.2)	It is noted that this sample was a duplicate of BH59_0.1-0.2, however,

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

Table T2: Soil Results - Inorganics

Analyte	Units	LOR	NEPM HIL F	TP28-1.3	TP29-0.1	BH30_0.1-0.2	BH30_0.9-1.0	TP31-0.25	BH32_0.1-0.2	BH32_0.9-1.0	TP33-0.1	TP33-0.5	TP33-1.8	BH34_0.1-0.2	BH34_1.9-2.0	BH35_0.1-0.2	BH35_0.9-1.0
				03-July-2008	03-July-2008	15-July-2008	15-July-2008	04-July-2008	15-July-2008	15-July-2008	04-July-2008	04-July-2008	07-July-2008	15-July-2008	15-July-2008	02-July-2008	02-July-2008
pH (Lab)	pH_Units	0.1	NV	12.4	11.8	12.3	11.5	11.9	13.1	12.2	10.6	12.1	13.2	12.8	11.8	12.3	12.9
Sulphate	mg/kg	100	NV	3,310	1,600	6,490	2,070	3,920	2,130	3,510	2,400	4,540	4,640	2,070	2,520	2,710	2,750
Total Sulphur	%	0.01	NV	0.2	0.09	0.36	0.35	0.22	0.13	0.38	0.12	0.19	0.21	0.24	0.29	0.31	0.19
Sulphide as S	%	0.01	NV	0.09	0.04	0.14	0.28	0.09	0.06	0.26	0.04	0.04	0.06	0.17	0.21	0.22	0.1
Aluminium	mg/kg	50	NV	6,520	5,750	59,800	40,400	48,200	16,200	54,200	9,340	15,900	3,380	22,100	10,300	27,000	10,800
Arsenic	mg/kg	5	500	6	<5	<5	8	<5	6	5	5	<5	<5	<5	6	7	11
Barium	mg/kg	10	NV	100	40	540	510	690	260	650	300	230	80	270	160	400	360
Cadmium	mg/kg	1	100	1	<1	<1	<1	<1	1	<1	2	1	1	<1	1	<1	1
Chromium (total)	mg/kg	2	NV	285	8	26	240	78	486	198	798	402	402	534	447	205	426
Cobalt	mg/kg	2	500	3	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	6	3	3
Copper	mg/kg	5	5,000	39	9	<5	22	8	48	28	107	23	37	8	67	54	38
Iron	mg/kg	50	NV	90,000	6180	9,050	51,200	10,100	109,000	48,800	77,400	71,800	79,400	88,800	75,800	93,000	78,500
Lead	mg/kg	5	1,500	76	12	8	49	13	24	33	38	58	41	6	104	288	322
Manganese	mg/kg	5	7,500	**22,200**	796	5,650	**18,100**	**31,200**	**32,300**	**19,500**	**66,000**	**20,600**	**25,000**	**19,200**	**22,600**	**33,100**	**33,300**
Mercury	mg/kg	0.1	75	<0.1	<0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.3	<0.1	1.5	<0.1	0.1
Molybdenum	mg/kg	2	NV	<2	<2	<2	<2	<2	2	<2	8	<2	<2	4	2	3	2
Zinc	mg/kg	5	35,000	159	53	30	100	55	85	122	359	180	109	<5	334	662	932

Notes

TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection
RPD %	Relative percentage difference, used
Dup1 (BH59_0.1-0.2)	It is noted that this sample was a duplicate of BH59_0.1-0.2, however,

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

Table T2: Soil Results - Inorganics

Analyte	Units	LOR	NEPM HIL F	TP36-0.1	DUP_TP2	TP36-0.9	TP37_1.0	TP37-2.0	BH38_0.2-0.3	BH38_0.4-0.5	TP39_0.2	TP39_0.7	BH40_0.1-0.2	BH40_0.4-0.5	DUP12	BH41_0.1-0.2	BH41_1.9-2.0	BH42_0.1-0.2
				04-July-2008	04-July-2008	04-July-2008	30-June-2008	07-July-2008	14-July-2008	14-July-2008	27-June-2008	27-June-2008	14-July-2008	14-July-2008	14-July-2008	26-June-2008	26-June-2008	14-July-2008
pH (Lab)	pH_Units	0.1	NV	11.5	11.6	12.1	10.8	11	12.5	12.2	12	13.2	10.6	12.4	12.5	10.8	12.6	11.8
Sulphate	mg/kg	100	NV	3,190	5,550	6,720	850	400	1,640	2,180	2,660	2,320	1,530	1,720	2,400	130	2,730	670
Total Sulphur	%	0.01	NV	0.26	0.26	0.47	0.09	0.2	0.12	0.13	0.24	0.12	0.09	0.13	0.17	0.02	0.17	0.03
Sulphide as S	%	0.01	NV	0.15	0.07	0.24	0.06	0.19	0.06	0.06	0.15	0.04	0.04	0.07	0.09	0.02	0.08	<0.01
Aluminium	mg/kg	50	NV	50,000	47,800	57,500	14,600	5,220	10,700	8,350	49,900	6,320	9,650	11,200	18,700	3,650	25,800	8,040
Arsenic	mg/kg	5	500	<5	<5	<5	12	44	7	5	<5	7	24	9	6	<5	<5	<5
Barium	mg/kg	10	NV	960	790	450	180	220	210	180	680	120	2,070	310	450	20	350	50
Cadmium	mg/kg	1	100	<1	<1	<1	2	<1	1	<1	<1	<1	1	1	<1	<1	<1	<1
Chromium (total)	mg/kg	2	NV	11	14	12	142	10	488	599	9	381	341	769	558	15	353	92
Cobalt	mg/kg	2	500	2	<2	<2	5	2	14	<2	3	5	32	12	11	4	<2	6
Copper	mg/kg	5	5,000	14	14	13	482	15	60	45	43	32	455	51	39	15	21	12
Iron	mg/kg	50	NV	4,960	5,230	3,690	56,400	16,100	105,000	99,000	7,030	108,000	47,000	116,000	72,800	11,200	81,000	28,400
Lead	mg/kg	5	1,500	10	9	28	647	46	107	74	13	110	102	66	73	9	19	24
Manganese	mg/kg	5	7,500	**16,200**	**13,100**	3,450	5,250	2,070	**33,100**	**33,300**	**8,910**	**24,600**	**108,000**	**21,500**	**26,900**	421	**19,400**	6,440
Mercury	mg/kg	0.1	75	<0.1	<0.1	<0.1	0.5	0.3	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	mg/kg	2	NV	2	<2	<2	18	<2	4	4	<2	4	9	4	7	4	<2	<2
Zinc	mg/kg	5	35,000	36	44	161	1,220	151	181	101	65	277	620	476	212	36	103	84

Notes

TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection
RPD %	Relative percentage difference, used
Dup1 (BH59_0.1-0.2)	It is noted that this sample was a duplicate of BH59_0.1-0.2, however,

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

Table T2: Soil Results - Inorganics

Analyte	Units	LOR	NEPM HIL F	BH42_0.9-1.0	DUP13	TP43_0.2	TP43_1.0	TP44_0.2	DUP04-TP	TP44_0.9	TP45_0.1	TP45_1.0	BH46_0.1-0.2	BH46_0.9-1.0	DUP15	BH47_0.4-0.5	DUP 5	BH47_0.9-1.0
				14-July-2008	14-July-2008	27-June-2008	27-June-2008	27-June-2008	27-June-2008	27-June-2008	01-July-2008	01-July-2008	14-July-2008	14-July-2008	14-July-2008	02-July-2008	02-July-2008	02-July-2008
pH (Lab)	pH_Units	0.1	NV	12.3	12.5	13	13.6	10.4	10.4	11.1	9.4	13.5	11.6	13.1	13	12.3	12.4	12.5
Sulphate	mg/kg	100	NV	3480	3,300	1,670	1,760	11,200	6,930	7,850	1,550	4,220	1,520	2,450	2,370	3,980	4,200	1,680
Total Sulphur	%	0.01	NV	0.19	0.19	0.1	0.11	0.39	0.4	0.4	0.25	0.17	0.11	0.17	0.16	0.24	0.22	0.51
Sulphide as S	%	0.01	NV	0.07	0.08	0.04	0.05	0.02	0.17	0.14	0.2	0.03	0.06	0.09	0.08	0.11	0.08	0.45
Aluminium	mg/kg	50	NV	28,600	32,000	6,480	3,610	32,100	25,000	37,000	14,100	4,320	9,090	12,600	12,200	16,000	11,100	8,980
Arsenic	mg/kg	5	500	6	76	27	14	22	56	12	<5	<5	7	6	<5	8	6	7
Barium	mg/kg	10	NV	490	500	2,210	840	800	890	670	530	100	170	220	170	400	500	180
Cadmium	mg/kg	1	100	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	1	1
Chromium (total)	mg/kg	2	NV	364	220	304	301	55	130	111	563	521	322	244	152	580	355	396
Cobalt	mg/kg	2	500	<2	4	17	8	13	14	12	3	<2	3	<2	<2	<2	3	<2
Copper	mg/kg	5	5,000	24	76	77	55	67	123	108	198	19	41	23	22	54	31	50
Iron	mg/kg	50	NV	69,100	63,800	101,000	104,000	31,200	45,600	46,800	91,100	74,600	63,500	59,900	44,600	83,800	76,900	102,000
Lead	mg/kg	5	1,500	25	36	83	71	70	80	62	15	14	94	40	33	117	116	134
Manganese	mg/kg	5	7,500	**22,000**	**20,500**	**111,000**	**53,000**	**72,400**	**90,200**	**46,000**	**29,200**	**29,000**	**21,200**	**15,000**	**10,500**	**27,900**	**32,400**	**27,600**
Mercury	mg/kg	0.1	75	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.8	0.1
Molybdenum	mg/kg	2	NV	2	<2	31	17	4	7	6	10	2	3	<2	<2	28	3	36
Zinc	mg/kg	5	35,000	95	114	226	195	627	211	194	39	37	163	111	93	245	194	200

Notes

TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection
RPD %	Relative percentage difference, used
Dup1 (BH59_0.1-0.2)	It is noted that this sample was a duplicate of BH59_0.1-0.2, however,

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

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Table T2: Soil Results - Inorganics

Analyte	Units	LOR	NEPM HIL F	TP48-0.1	TP48-1.0	TP49_0.1	TP49_1.9	BH49_3.9-4.0	BH49_5.9-6.0	TP50_0.3	TP50_1.0
				04-July-2008	04-July-2008	02-July-2008	02-July-2008	15-July-2008	15-July-2008	27-June-2008	27-June-2008
pH (Lab)	pH_Units	0.1	NV	11.6	11.4	11.4	12.6	11.5	10.8	13	13.8
Sulphate	mg/kg	100	NV	2,910	2,560	4,400	3,990	230	150	1,030	2,000
Total Sulphur	%	0.01	NV	0.17	0.17	0.29	0.63	0.25	0.33	0.13	0.15
Sulphide as S	%	0.01	NV	0.07	0.08	0.14	0.5	0.24	0.32	0.1	0.08
Aluminium	mg/kg	50	NV	22,000	8,130	11,300	25,100	4,460	4,800	3,100	3,580
Arsenic	mg/kg	5	500	8	7	5	5	11	28	21	8
Barium	mg/kg	10	NV	490	240	260	330	210	230	2,910	1,020
Cadmium	mg/kg	1	100	1	1	2	<1	<1	<1	<1	1
Chromium (total)	mg/kg	2	NV	298	176	777	279	4	5	139	443
Cobalt	mg/kg	2	500	8	4	<2	<2	2	20	28	5
Copper	mg/kg	5	5,000	544	168	90	20	21	16	83	37
Iron	mg/kg	50	NV	49,700	63,600	90,800	96,200	20,200	24,000	66,100	110,000
Lead	mg/kg	5	1,500	353	425	62	33	26	32	75	54
Manganese	mg/kg	5	7,500	**24,100**	**14,200**	**57,600**	**22,800**	807	689	**145,000**	**39,600**
Mercury	mg/kg	0.1	75	<0.1	0.2	<0.1	0.1	0.2	0.2	<0.1	<0.1
Molybdenum	mg/kg	2	NV	3	11	6	<2	<2	3	12	4
Zinc	mg/kg	5	35,000	190	551	522	134	47	57	195	124

Notes

TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection
RPD %	Relative percentage difference, used
Dup1 (BH59_0.1-0.2)	It is noted that this sample was a duplicate of BH59_0.1-0.2, however,

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

Table T2: Soil Results - Inorganics

Analyte	Units	LOR	NEPM HIL F	BH52_0.1-0.2	BH52_1.9-2.0	TP53_0.5	TP53_1.9	BH55_0.4-0.5	DUP16	BH55_0.9-1.0	BH56_0.1-0.2	BH56_0.4-0.5	TP57_0.2M	TP57_1.2M	TP58-0.2	DUP_TP1	TP58-1.4	DUP1 (BH59_0.1-0.2)
				26-June-2008	26-June-2008	01-July-2008	01-July-2008	14-July-2008	14-July-2008	14-July-2008	15-July-2008	15-July-2008	26-June-2008	26-June-2008	04-July-2008	04-July-2008	04-July-2008	26-June-2008
pH (Lab)	pH_Units	0.1	NV	10.6	11.3	13.5	12.6	12.5	12.5	12.1	12.3	12.8	10.9	12.8	13.4	13.4	13.3	12.8
Sulphate	mg/kg	100	NV	16,900	440	1,870	2,450	1,730	1,760	1,760	1,210	1,070	850	2,200	5,570	3,720	4,170	1,180
Total Sulphur	%	0.01	NV	0.74	0.52	0.17	0.2	0.21	0.2	0.15	0.21	0.12	0.12	0.15	0.17	0.18	0.15	0.13
Sulphide as S	%	0.01	NV	0.18	0.5	0.11	0.12	0.17	0.14	0.08	0.15	0.09	0.09	0.08	<0.01	0.06	0.01	0.09
Aluminium	mg/kg	50	NV	51,000	4,590	11,400	8,400	21,200	18,200	13,000	4,830	3,960	3,290	10,100	3,630	3,360	5,540	4,460
Arsenic	mg/kg	5	500	5	26	232	9	7	6	8	8	8	7	<5	6	<5	<5	8
Barium	mg/kg	10	NV	180	310	450	140	390	300	240	130	120	140	160	80	80	80	100
Cadmium	mg/kg	1	100	<1	<1	2	2	1	<1	<1	1	2	1	<1	2	1	2	2
Chromium (total)	mg/kg	2	NV	40	65	495	557	370	355	375	378	470	269	289	371	392	352	448
Cobalt	mg/kg	2	500	5	3	9	2	<2	<2	5	<2	<2	3	<2	<2	<2	<2	3
Copper	mg/kg	5	5,000	23	15	304	38	44	123	84	59	69	44	24	42	37	24	60
Iron	mg/kg	50	NV	10,900	25,700	105,000	120,000	79,800	91,300	100,000	113,000	146,000	124,000	89,800	118,000	93,600	107,000	125,000
Lead	mg/kg	5	1,500	16	38	154	99	145	170	91	115	98	66	46	62	46	47	192
Manganese	mg/kg	5	7,500	**55,800**	1,810	**37,900**	**23,500**	**27,000**	**28,200**	**23,800**	**42,400**	**40,900**	**20,700**	**23,500**	**25,800**	**30,900**	**30,200**	**21,500**
Mercury	mg/kg	0.1	75	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1
Molybdenum	mg/kg	2	NV	2	<2	4	45	9	8	70	6	4	3	<2	<2	2	3	4
Zinc	mg/kg	5	35,000	54	85	1670	1,250	245	335	323	310	215	213	108	113	110	212	490

Notes

TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection
RPD %	Relative percentage difference, used
Dup1 (BH59_0.1-0.2)	It is noted that this sample was a duplicate of BH59_0.1-0.2, however,

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

Table T2: Soil Results - Inorganics

Analyte	Units	LOR	NEPM HIL F	BH59_0.4-0.5	BH59_1.9-2.0	BH60_0.1-0.2	BH60_0.9-1.0	DUP 10
				27-June-2008	27-June-2008	07-July-2008	07-July-2008	07-July-2008
pH (Lab)	pH_Units	0.1	NV	12.6	12.9	12.7	12.7	13
Sulphate	mg/kg	100	NV	1,060	2,140	1,330	1,420	1540
Total Sulphur	%	0.01	NV	0.1	0.13	0.1	0.39	0.34
Sulphide as S	%	0.01	NV	0.06	0.06	0.06	0.34	0.29
Aluminium	mg/kg	50	NV	5,900	8,620	3,120	35,900	48,000
Arsenic	mg/kg	5	500	10	<5	8	7	<5
Barium	mg/kg	10	NV	120	140	90	500	620
Cadmium	mg/kg	1	100	2	<1	2	<1	<1
Chromium (total)	mg/kg	2	NV	471	508	455	201	140
Cobalt	mg/kg	2	500	4	<2	<2	<2	<2
Copper	mg/kg	5	5,000	69	26	65	29	19
Iron	mg/kg	50	NV	123,000	100,000	133,000	39,400	33,400
Lead	mg/kg	5	1,500	190	52	66	28	19
Manganese	mg/kg	5	7,500	**24,200**	**29,900**	**24,000**	**11,900**	**10,500**
Mercury	mg/kg	0.1	75	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	mg/kg	2	NV	5	2	2	<2	<2
Zinc	mg/kg	5	35,000	690	169	211	134	72

Notes

TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection
RPD %	Relative percentage difference, used
Dup1 (BH59_0.1-0.2)	It is noted that this sample was a duplicate of BH59_0.1-0.2, however,

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

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Table T2: Soil Results - Inorganics

Analyte	Units	LOR	NEPM HIL F	TP61_0.1	TP61_1.6	BH62_0.1-0.2	BH62_0.9-1.0	BH63_0.4-0.5	TP64-0.1	TP64-0.7	BH65_0.1-0.2	BH65_1.9-2.0	TP66-0.1	TP66-2.3	TP67_0.1	TP67_1.2	BH68_0.1-0.2	BH68_1.9-2.0
				02-July-2008	02-July-2008	07-July-2008	07-July-2008	30-June-2008	04-July-2008	04-July-2008	01-July-2008	01-July-2008	07-July-2008	07-July-2008	30-June-2008	30-June-2008	02-July-2008	02-July-2008
pH (Lab)	pH_Units	0.1	NV	10.8	11.3	12.4	12.7	12.7	10.8	12.2	11.7	11.9	11.6	11.6	12.7	13.6	13.1	11.5
Sulphate	mg/kg	100	NV	2,200	540	3,740	2,030	2,540	1,770	2,740	440	280	2,680	120	1,890	3,260	2,010	<100
Total Sulphur	%	0.01	NV	0.2	0.15	0.16	0.11	0.54	0.12	0.23	0.03	0.25	0.16	0.26	0.3	0.15	0.2	0.24
Sulphide as S	%	0.01	NV	0.13	0.13	0.04	0.04	0.46	0.06	0.14	0.02	0.24	0.07	0.26	0.24	0.04	0.13	0.24
Aluminium	mg/kg	50	NV	42,200	5,890	9,010	9,510	57,600	17,100	7,820	2,820	7,210	29,200	4,540	3,960	12,900	22,400	3,530
Arsenic	mg/kg	5	500	8	14	6	8	<5	<5	6	<5	22	5	18	<5	<5	<5	15
Barium	mg/kg	10	NV	700	170	150	150	600	550	150	40	190	400	200	80	190	240	170
Cadmium	mg/kg	1	100	1	<1	1	1	<1	2	<1	<1	<1	2	<1	1	<1	<1	<1
Chromium (total)	mg/kg	2	NV	56	47	348	405	102	889	232	1,430	142	217	3	620	401	436	<2
Cobalt	mg/kg	2	500	4	<2	<2	<2	<2	3	<2	32	4	<2	<2	<2	<2	<2	2
Copper	mg/kg	5	5,000	80	16	38	57	10	141	21	11	23	36	12	43	5	8	9
Iron	mg/kg	50	NV	68,500	27,900	86,600	91,200	31,000	83,700	70,600	21,500	48,200	43,800	19,800	97,200	48,100	62,300	13,800
Lead	mg/kg	5	1,500	54	28	58	71	17	38	79	12	36	102	34	926	7	6	20
Manganese	mg/kg	5	7,500	**16,500**	3,390	**28,400**	**23,400**	**13,100**	**24,500**	**18,000**	4,180	3,740	**19,600**	403	**23,300**	**15,600**	**18,200**	431
Mercury	mg/kg	0.1	75	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.2	<0.1	<0.1	0.5	0.2
Molybdenum	mg/kg	2	NV	<2	<2	<2	2	<2	5	2	<2	2	<2	<2	3	<2	4	<2
Zinc	mg/kg	5	35,000	290	80	126	244	83	309	158	89	88	163	52	183	18	5	56

Notes

TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection
RPD %	Relative percentage difference, used
Dup1 (BH59_0.1-0.2)	It is noted that this sample was a duplicate of BH59_0.1-0.2, however,

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

Table T2: Soil Results - Inorganics

Analyte	Units	LOR	NEPM HIL F	TP69_0.5	TP70_0.1M	TP70_2.0M	BH71_0.1-0.2	BH71_0.9-1.0
				30-June-2008	27-June-2008	27-June-2008	15-July-2008	15-July-2008
pH (Lab)	pH_Units	0.1	NV	12.9	10.8	13.1	12.2	13.2
Sulphate	mg/kg	100	NV	1,670	670	1,750	1,180	2,350
Total Sulphur	%	0.01	NV	0.11	0.23	0.12	0.07	0.11
Sulphide as S	%	0.01	NV	0.05	0.21	0.06	0.03	0.03
Aluminium	mg/kg	50	NV	3,770	28,900	9630	8,690	6,090
Arsenic	mg/kg	5	500	8	26	10	<5	<5
Barium	mg/kg	10	NV	70	490	130	110	80
Cadmium	mg/kg	1	100	2	<1	3	<1	<1
Chromium (total)	mg/kg	2	NV	362	6	367	183	513
Cobalt	mg/kg	2	500	<2	4	3	<2	<2
Copper	mg/kg	5	5,000	220	16	42	14	22
Iron	mg/kg	50	NV	128,000	12,000	128,000	46,800	76,600
Lead	mg/kg	5	1,500	369	16	52	34	16
Manganese	mg/kg	5	7,500	**21,000**	1,020	**23,600**	**13,700**	**33,600**
Mercury	mg/kg	0.1	75	<0.1	0.2	<0.1	<0.1	<0.1
Molybdenum	mg/kg	2	NV	17	<2	5	<2	<2
Zinc	mg/kg	5	35,000	306	47	235	92	60

Notes

TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection
RPD %	Relative percentage difference, used
Dup1 (BH59_0.1-0.2)	It is noted that this sample was a duplicate of BH59_0.1-0.2, however,

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

Table T2: Soil Results - Inorganics

Analyte	Units	LOR	NEPM HIL F	BH72_0.1-0.2	BH72_0.4-0.5	TP73_0.5	TP73_2.0	TP74_0.2M	DUP01-TP	TP74_1.2M	TP75_0.2M	TP75_0.9M	TP76_0.2	TP76_0.9	TP77-0.1	TP77-0.6	TP78_0.1	DUP06-TP
				14-July-2008	14-July-2008	30-June-2008	30-June-2008	26-June-2008	26-June-2008	26-June-2008	26-June-2008	26-June-2008	27-June-2008	27-June-2008	04-July-2008	04-July-2008	30-June-2008	30-June-2008
pH (Lab)	pH_Units	0.1	NV	13	12.8	13.2	12.5	12.4	12.5	12.3	12.8	13.5	13.3	13.5	11.4	12.7	10.8	10.3
Sulphate	mg/kg	100	NV	2,320	2,040	2510	2200	3,780	4,420	2,430	2,540	2,440	2,100	2,440	2,840	4,450	4,370	4,470
Total Sulphur	%	0.01	NV	0.16	0.19	0.17	0.16	0.39	0.51	0.4	0.15	0.13	0.11	0.14	0.24	0.19	0.17	0.24
Sulphide as S	%	0.01	NV	0.08	0.12	0.09	0.09	0.26	0.36	0.32	0.06	0.05	0.04	0.06	0.14	0.04	0.02	0.09
Aluminium	mg/kg	50	NV	24,900	10,100	8,540	6,560	41,300	46,500	26,200	4,870	2,410	3,110	4,240	42,400	7,180	12,500	12,100
Arsenic	mg/kg	5	500	<5	12	<5	8	5	<5	8	7	6	8	<5	<5	6	8	10
Barium	mg/kg	10	NV	300	200	100	100	620	680	640	160	80	210	160	420	80	510	690
Cadmium	mg/kg	1	100	<1	<1	<1	1	<1	<1	<1	1	<1	1	<1	<1	2	<1	<1
Chromium (total)	mg/kg	2	NV	484	454	430	389	146	125	285	451	583	457	574	5	529	373	316
Cobalt	mg/kg	2	500	<2	2	<2	<2	2	<2	3	4	<2	2	<2	<2	3	4	6
Copper	mg/kg	5	5,000	10	48	22	62	23	12	30	42	25	461	166	6	42	53	47
Iron	mg/kg	50	NV	69,800	113,000	81,500	107,000	76,600	33,100	60,100	123,000	98,100	134,000	111,000	2,320	91,300	59,000	48,400
Lead	mg/kg	5	1,500	11	57	.	18	19	21	50	248	178	59	39	41	137	32	37
Manganese	mg/kg	5	7,500	**22,000**	**29,000**	**23,600**	**25,600**	**13,800**	**13,800**	**25,200**	**30,900**	**28,200**	**36,900**	**34,100**	**17,000**	**19,600**	**89,400**	**89,200**
Mercury	mg/kg	0.1	75	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.2
Molybdenum	mg/kg	2	NV	4	3	2	8	<2	<2	3	3	3	5	3	<2	6	11	5
Zinc	mg/kg	5	35,000	22	202	153	83	64	64	139	639	562	175	128	345	678	184	200

Notes

TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection
RPD %	Relative percentage difference, used
Dup1 (BH59_0.1-0.2)	It is noted that this sample was a duplicate of BH59_0.1-0.2, however,

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

Table T2: Soil Results - Inorganics

Analyte	Units	LOR	NEPM HIL F	TP78_0.5 30-June-2008	TP79_0.1 01-July-2008
pH (Lab)	pH_Units	0.1	NV	12.4	11.4
Sulphate	mg/kg	100	NV	3,030	1,270
Total Sulphur	%	0.01	NV	0.17	0.05
Sulphide as S	%	0.01	NV	0.07	<0.01
Aluminium	mg/kg	50	NV	15,200	16,600
Arsenic	mg/kg	5	500	7	8
Barium	mg/kg	10	NV	250	610
Cadmium	mg/kg	1	100	1	<1
Chromium (total)	mg/kg	2	NV	369	271
Cobalt	mg/kg	2	500	<2	6
Copper	mg/kg	5	5,000	38	40
Iron	mg/kg	50	NV	96,400	70,400
Lead	mg/kg	5	1,500	57	54
Manganese	mg/kg	5	7,500	**27,700**	**25,900**
Mercury	mg/kg	0.1	75	<0.1	<0.1
Molybdenum	mg/kg	2	NV	<2	2
Zinc	mg/kg	5	35,000	141	100

Notes

TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection
RPD %	Relative percentage difference, used
Dup1 (BH59_0.1-0.2)	It is noted that this sample was a duplicate of BH59_0.1-0.2, however,

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

AECOM

Table T3: Soil Results - Organics

	Analyte	Units	LOR	NEPM 1999 HIL F	SSG	TP08_0.2	DUP02-TP	BH9_0.1-0.2	BH9_0.9-1.0	BH9_2.9-3.0	BH16_0.4-0.5	DUP17	BH16_2.9-3.0	BH20_2.9-3.0	BH21_1.9-2.0	TP22_0.1	BH22_3.4-3.5	DUP20	BH23_0.4-0.5	BH23_3.9-4.0
						27-June-2008	27-June-2008	03-July-2008	03-July-2008	03-July-2008	14-July-2008	14-July-2008	14-July-2008	30-June-2008	15-July-2008	02-July-2008	15-July-2008	15-July-2008	07-July-2008	07-July-2008
PAHS	Acenaphthene	mg/kg	0.05	NV	NV	<0.05	<0.05	<0.05	0.22	0.28	0.2	0.18	0.3	<0.05	2.44	<0.05	0.44	<0.05	0.62	0.18
	Acenaphthylene	mg/kg	0.05	NV	NV	0.08	0.06	<0.05	0.07	0.12	0.23	0.19	0.11	<0.05	8.41	<0.05	<0.05	<0.05	0.34	0.07
	Anthracene	mg/kg	0.05	NV	NV	0.14	0.1	0.24	0.85	0.59	0.91	0.72	0.59	0.7	10.1	<0.05	0.63	0.87	1.01	0.16
	Benz(a)anthracene	mg/kg	0.05	NV	NV	0.63	0.36	1.42	2.85	3.34	4.81	3.43	2.28	1.06	9.65	0.08	1.68	2.18	3.88	0.23
	Benzo(a) pyrene	mg/kg	0.05	5	1 *	0.52	0.26	1.22	2.19	2.88	4.65	3.29	1.96	0.67	**8.06**	0.07	1.43	2.14	3.85	0.14
	Benzo(b)fluoranthene	mg/kg	0.05	NV	NV	1.07	0.61	1.8	3.42	4.77	7.74	4.63	2.94	0.97	11.4	0.11	1.75	2.27	5.13	0.15
	Benzo(g,h,i)perylene	mg/kg	0.05	NV	NV	0.47	0.21	1.07	2.22	3.53	3.81	2.29	1.58	0.29	4.62	<0.05	0.68	1.03	4.03	0.08
	Benzo(k)fluoranthene	mg/kg	0.05	NV	NV	0.38	0.18	0.6	1	2.07	1.77	1.38	1.25	0.32	3.24	0.05	0.7	0.79	2.43	0.06
	Chrysene	mg/kg	0.05	NV	NV	0.56	0.35	1.31	2.74	3.61	4.52	3.6	2.09	0.88	8.39	0.08	1.46	1.87	3.75	0.21
	Dibenz(a,h)anthracene	mg/kg	0.05	NV	NV	0.08	<0.05	0.24	0.6	0.71	0.63	0.39	0.3	0.08	0.82	<0.05	0.15	0.19	0.83	<0.05
	Fluoranthene	mg/kg	0.05	NV	NV	1.47	0.74	3.61	6.44	5.65	9.09	7.06	4.8	2.53	29.8	0.12	3.03	4.17	5.76	0.42
	Fluorene	mg/kg	0.05	NV	NV	<0.05	<0.05	<0.05	0.09	0.07	0.13	<0.05	0.16	<0.05	7.59	<0.05	0.48	<0.05	0.4	0.2
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.05	NV	NV	0.33	0.16	0.93	1.83	2.81	3	1.84	1.29	0.24	4	<0.05	0.61	0.86	3.28	<0.05
	Naphthalene	mg/kg	0.05	NV	NV	0.11	5.07	<0.05	<0.05	0.36	2.97	3.23	1.73	1.56	16.3	0.13	4.58	4.28	8.58	1.11
	Phenanthrene	mg/kg	0.05	NV	NV	0.55	0.4	1.33	3.02	2.42	3.29	2.76	2.12	3.77	27.9	0.07	3.23	4.44	3.3	1.09
	Pyrene	mg/kg	0.05	NV	NV	1.45	0.96	3.18	5.89	6.35	10.7	7.93	4.73	3.1	24.9	0.12	3.08	4.33	6.48	0.42
	Total	mg/kg		100	20 *	7.84	9.46	16.95	33.43	39.56	58.45	42.92	28.23	16.17	**177.62**	0.83	23.93	29.42	53.67	4.52
TPH	TPH C 6 - C 9 Fraction	mg/kg	10	NV	65	<10	<10	<10	<10	<10	<10	<10	<10	12	<10	<10	<10	<10	<10	13
	TPH C10 - C14 Fraction	mg/kg	50	NV	NV	<50	<50	<50	<50	<50	<50	<50	<50	60	200	<50	<50	<50	<50	<50
	TPH C15 - C28 Fraction	mg/kg	100	NV	NV	100	<100	<100	<100	160	230	190	140	550	1330	<100	300	210	<100	<100
	TPH C29-C36 Fraction	mg/kg	100	NV	NV	120	130	<100	<100	160	200	200	<100	270	530	<100	170	180	130	<100
	TPH+C10 - C36 (Sum of total)	mg/kg	-	NV	1,000	245	205	<250	<250	345	455	415	215	880	**2,060**	<250	495	415	130	<250
BTEX	Benzene	mg/kg	0.2	NV	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.4	<0.2	<0.2	<0.2	<0.2	<0.2
	Ethylbenzene	mg/kg	0.5	NV	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Toluene	mg/kg	0.5	NV	130	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Xylene (m & p)	mg/kg	0.5	NV	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.6	<0.5	<0.5	<0.5	<0.5	0.8
	Xylene (o)	mg/kg	0.5	NV	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Xylene Total	mg/kg	-	NV	25	<1	<1	<1	<1	<1	<1	<1	<1	0.6	0.6	<1	<1	<1	<1	<250

Notes

PAHs Polycyclic Aromatic Hydrocarbons

TPH Total Petroleum Hydrocarbons
BTEX Benzene, toluene, ethylbenzene, xylene
TP06 Soil Sample Location
TP06_0.5 Sample Identity
30/06/2008 Date Sample Collected
1,100 Indicates Exceedence of Assessment Criteria
LOR Laboratory Limit of Reporting
nv No value exists
NEPM HIL F National Environment Protection (Assessment of Contamination) Measure 1999
SSG Guidelines for Assesing Service Station Sites, NSW EPA December 1994 (note
* Note that the benzo (a) pyrene) and Total PAH value for the SSG assumes
Dup_TP2 (TP36_0.1) It is noted that this sample was a duplicate of TP36_0.1, however, the original sample was not analysed and DUP_TP2 presents conditions at TP36 at 0.1m

DUP1 (TP74 m)

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

AECOM

Table T3: Soil Results - Organics

	Analyte	Units	LOR	NEPM 1999 HIL F	SSG	TP27-0.1	TP27-1.5	BH30_0.1-0.2	BH30_0.9-1.0	TP33-0.1	TP33-1.8	BH34_0.1-0.2	BH34_1.9-2.0	BH35_2.9-3.0	DUP 6	DUP_TP2 (TP36_0.1	TP36-0.5	TP37_1.0	TP37-2.0	BH38_0.2-0.3
						03-July-2008	03-July-2008	15-July-2008	15-July-2008	04-July-2008	07-July-2008	15-July-2008	15-July-2008	02-July-2008	02-July-2008	04-July-2008	04-July-2008	30-June-2008	07-July-2008	14-July-2008
PAHS	Acenaphthene	mg/kg	0.05	NV	NV	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.09	<0.05	0.29	<0.05	<0.05	0.17	0.08	0.07
	Acenaphthylene	mg/kg	0.05	NV	NV	0.1	<0.05	<0.05	0.05	<0.05	0.06	<0.05	0.42	<0.05	0.12	<0.05	<0.05	0.1	0.46	0.05
	Anthracene	mg/kg	0.05	NV	NV	0.13	0.06	<0.05	0.12	<0.05	0.21	<0.05	0.68	0.24	0.25	<0.05	<0.05	0.94	0.54	0.28
	Benz(a)anthracene	mg/kg	0.05	NV	NV	0.55	0.33	0.12	0.32	<0.05	1.41	<0.05	2.57	0.47	0.68	<0.05	<0.05	8.08	1.81	1.97
	Benzo(a) pyrene	mg/kg	0.05	5	1 *	0.6	0.27	0.08	0.29	<0.05	1.04	<0.05	2.56	0.25	0.4	<0.05	<0.05	**9.63**	2.29	1.76
	Benzo(b)fluoranthene	mg/kg	0.05	NV	NV	0.97	0.6	0.16	0.58	0.06	2.42	<0.05	3.31	0.18	0.59	0.06	<0.05	16	2.95	3.16
	Benzo(g,h,i)perylene	mg/kg	0.05	NV	NV	0.72	0.4	0.06	0.25	<0.05	1.12	<0.05	2.45	0.07	0.22	<0.05	<0.05	4.65	2.08	1.94
	Benzo(k)fluoranthene	mg/kg	0.05	NV	NV	0.41	0.3	0.09	0.19	<0.05	0.74	<0.05	1.45	0.13	0.16	<0.05	<0.05	3.16	0.76	1.04
	Chrysene	mg/kg	0.05	NV	NV	0.68	0.58	0.22	0.4	0.05	2.16	<0.05	2.37	0.42	0.68	0.05	<0.05	7.81	1.54	1.96
	Dibenz(a,h)anthracene	mg/kg	0.05	NV	NV	0.15	0.08	<0.05	0.05	<0.05	0.27	<0.05	0.34	<0.05	0.06	<0.05	<0.05	1.05	0.34	0.35
	Fluoranthene	mg/kg	0.05	NV	NV	0.96	1.19	0.67	0.84	0.08	4.45	0.1	6.35	0.52	1.01	0.09	0.06	13.1	4.46	3.89
	Fluorene	mg/kg	0.05	NV	NV	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.1	<0.05	0.37	<0.05	<0.05	0.09	0.12	<0.05
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.05	NV	NV	0.59	0.32	0.05	0.23	<0.05	1	<0.05	1.76	<0.05	0.19	<0.05	<0.05	4.33	1.48	1.53
	Naphthalene	mg/kg	0.05	NV	NV	0.39	0.06	0.2	0.2	<0.05	0.12	0.05	1.58	2.58	2.06	<0.05	<0.05	0.13	0.68	0.18
	Phenanthrene	mg/kg	0.05	NV	NV	0.78	0.58	4.27	0.59	0.06	2.29	0.08	3.19	2.36	2.5	0.05	<0.05	3.08	1.55	1.66
	Pyrene	mg/kg	0.05	NV	NV	0.93	1.02	1.06	0.64	0.07	3.43	0.1	6.04	0.95	1.17	0.09	<0.05	13.2	4.09	3.62
	Total	mg/kg		100	20 *	7.96	5.79	6.98	4.75	0.32	20.72	0.33	35.26	8.17	10.75	0.34	0.06	85.52	25.23	23.46
TPH	TPH C 6 - C 9 Fraction	mg/kg	10	NV	65	<10	<10	<10	<10	<10	<10	<10	<10	10	12	<10	<10	<10	<10	<10
	TPH C10 - C14 Fraction	mg/kg	50	NV	NV	<50	<50	610	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	TPH C15 - C28 Fraction	mg/kg	100	NV	NV	<100	<100	3460	<100	<100	180	<100	<100	<100	<100	<100	<100	250	140	120
	TPH C29-C36 Fraction	mg/kg	100	NV	NV	<100	<100	450	<100	<100	190	<100	<100	<100	<100	<100	<100	260	<100	100
	TPH+C10 - C36 (Sum of total)	mg/kg	-	NV	1,000	<250	<250	**4,520**	<250	<250	395	<250	<250	<250	<250	<250	<250	535	215	245
BTEX	Benzene	mg/kg	0.2	NV	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Ethylbenzene	mg/kg	0.5	NV	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Toluene	mg/kg	0.5	NV	130	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Xylene (m & p)	mg/kg	0.5	NV	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Xylene (o)	mg/kg	0.5	NV	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Xylene Total	mg/kg	-	NV	25	<1	<1	<1	<1	<1	<1	<1	<1	1.1	0.5	<1	<1	<1	<1	<1

Notes

PAHs	Polycyclic Aromatic Hydrocarbons
TPH	Total Petroleum Hydrocarbons
BTEX	Benzene, toluene, ethylbenzene, xylene
TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment Criteria
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection (Assessment of Contamination) Measure 1999
SSG	Guidelines for Assesing Service Station Sites, NSW EPA December 1994 (note
*	Note that the benzo (a) pyrene) and Total PAH value for the SSG assumes
Dup_TP2 (TP36_0.1)	It is noted that this sample was a duplicate of TP36_0.1, however, the original sample was not analysed and DUP_TP2 presents conditions at TP36 at 0.1m

DUP1 (TP74 m)

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

Table T3: Soil Results - Organics

	Analyte	Units	LOR	NEPM 1999 HIL F	SSG	TP39_0.7	BH42_0.1-0.2	BH42_0.9-1.0	TP44_0.2	DUP04-TP	TP44_0.9	TP45_0.5	TP45_1.0	BH46_0.1-0.2	BH46_0.9-1.0	BH47_0.4-0.5	DUP 5	BH47_3.9-4.0	TP48-0.1	BH49_5.9-6.0
						27-June-2008	14-July-2008	14-July-2008	27-June-2008	27-June-2008	27-June-2008	01-July-2008	01-July-2008	14-July-2008	14-July-2008	02-July-2008	02-July-2008	02-July-2008	04-July-2008	15-July-2008
PAHS	Acenaphthene	mg/kg	0.05	NV	NV	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.13	0.14	<0.05	<0.05	<0.05
	Acenaphthylene	mg/kg	0.05	NV	NV	<0.05	0.05	<0.05	0.16	0.42	<0.05	0.15	<0.05	<0.05	<0.05	0.16	0.23	<0.05	0.08	<0.05
	Anthracene	mg/kg	0.05	NV	NV	0.15	0.11	0.06	0.17	0.62	0.06	0.3	0.05	0.2	0.51	0.86	0.94	0.24	0.14	0.22
	Benz(a)anthracene	mg/kg	0.05	NV	NV	0.68	0.46	0.31	0.63	1.89	0.32	1.52	0.16	1.32	2.82	2.66	3.36	0.45	0.84	0.39
	Benzo(a) pyrene	mg/kg	0.05	5	1 *	0.47	0.42	0.24	0.53	1.51	0.29	1.25	0.17	1	1.98	2.48	3.03	0.19	0.75	0.18
	Benzo(b)fluoranthene	mg/kg	0.05	NV	NV	1.2	0.77	0.53	1.08	2.64	0.65	2.69	0.29	1.93	6.33	3.34	4.58	<0.05	1.37	0.15
	Benzo(g,h,i)perylene	mg/kg	0.05	NV	NV	0.49	0.42	0.29	0.4	0.86	0.31	0.83	0.13	0.93	2.88	1.3	2.68	<0.05	0.89	0.08
	Benzo(k)fluoranthene	mg/kg	0.05	NV	NV	0.37	0.25	0.18	0.36	0.79	0.2	0.78	0.09	0.63	1.52	1.04	1.55	<0.05	0.62	0.12
	Chrysene	mg/kg	0.05	NV	NV	0.76	0.53	0.4	0.56	1.48	0.31	1.94	0.19	1.47	4.91	2.57	3.29	0.32	1.05	0.35
	Dibenz(a,h)anthracene	mg/kg	0.05	NV	NV	0.08	0.08	<0.05	0.07	0.17	<0.05	0.19	<0.05	0.18	0.55	0.28	0.61	<0.05	0.18	<0.05
	Fluoranthene	mg/kg	0.05	NV	NV	2	0.9	0.85	1.25	4.7	0.51	2.63	0.26	3.01	9.19	7.51	6.51	0.41	1.42	0.41
	Fluorene	mg/kg	0.05	NV	NV	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.18	0.22	<0.05	<0.05	<0.05
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.05	NV	NV	0.36	0.33	0.23	0.31	0.7	0.21	0.75	0.11	0.75	1.93	1.18	2.26	<0.05	0.74	<0.05
	Naphthalene	mg/kg	0.05	NV	NV	0.19	0.68	0.13	0.25	0.46	0.1	0.42	0.19	0.34	0.81	0.76	1.2	1.03	0.22	1.81
	Phenanthrene	mg/kg	0.05	NV	NV	0.94	0.39	0.32	0.69	2	0.27	1.04	0.09	1.44	5.54	3.39	3.37	1.86	0.53	2.34
	Pyrene	mg/kg	0.05	NV	NV	1.88	1	0.74	1.5	4.87	0.5	2.6	0.43	2.39	7.65	6.54	6.12	0.97	1.88	0.58
	Total	mg/kg		100	20 *	9.57	6.39	4.28	7.96	23.11	3.73	17.09	2.16	15.59	15.93	34.38	40.09	5.47	10.71	6.63
TPH	TPH C 6 - C 9 Fraction	mg/kg	10	NV	65	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	TPH C10 - C14 Fraction	mg/kg	50	NV	NV	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	50	<50	<50
	TPH C15 - C28 Fraction	mg/kg	100	NV	NV	<100	<100	<100	120	180	120	160	<100	120	220	190	200	510	<100	150
	TPH C29-C36 Fraction	mg/kg	100	NV	NV	<100	<100	<100	140	140	160	170	<100	140	180	160	180	250	<100	<100
	TPH+C10 - C36 (Sum of total)	mg/kg	-	NV	1,000	<250	<250	<250	285	345	305	355	<250	285	425	375	405	810	<250	225
BTEX	Benzene	mg/kg	0.2	NV	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Ethylbenzene	mg/kg	0.5	NV	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Toluene	mg/kg	0.5	NV	130	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Xylene (m & p)	mg/kg	0.5	NV	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5
	Xylene (o)	mg/kg	0.5	NV	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Xylene Total	mg/kg	-	NV	25	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.5	<1	<1

Notes

PAHs	Polycyclic Aromatic Hydrocarbons
TPH	Total Petroleum Hydrocarbons
BTEX	Benzene, toluene, ethylbenzene, xylene
TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
1,100	Indicates Exceedence of Assessment Criteria
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	National Environment Protection (Assessment of Contamination) Measure 1999
SSG	Guidelines for Assesing Service Station Sites, NSW EPA December 1994 (note
*	Note that the benzo (a) pyrene) and Total PAH value for the SSG assumes
Dup_TP2 (TP36_0.1)	It is noted that this sample was a duplicate of TP36_0.1, however, the original sample was not analysed and DUP_TP2 presents conditions at TP36 at 0.1m

DUP1 (TP74 m)

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

AECOM

Table T3: Soil Results - Organics

	Analyte	Units	LOR	NEPM 1999 HIL F	SSG	TP53_0.5	TP58-0.2	TP58-1.4	BH59_0.4-0.5	BH59_2.9-3.0	BH60_0.1-0.2	BH60_0.9-1.0	DUP 10	TP61_3.0	BH62_3.9-4.0	BH63_0.4-0.5	BH63_2.9-3.0	BH65_0.4-0.5	BH65_3.9-4.0	TP66-0.6
						01-July-2008	04-July-2008	04-July-2008	27-June-2008	26-June-2008	07-July-2008	07-July-2008	07-July-2008	02-July-2008	07-July-2008	30-June-2008	30-June-2008	01-July-2008	01-July-2008	07-July-2008
PAHS	Acenaphthene	mg/kg	0.05	NV	NV	<0.05	<0.05	<0.05	0.18	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Acenaphthylene	mg/kg	0.05	NV	NV	<0.05	<0.05	<0.05	0.08	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
	Anthracene	mg/kg	0.05	NV	NV	0.13	0.11	<0.05	0.62	0.6	0.06	0.09	0.06	<0.05	<0.05	0.19	0.19	0.27	0.38	0.17
	Benz(a)anthracene	mg/kg	0.05	NV	NV	0.53	0.47	0.17	3.26	1.4	0.5	0.31	0.24	0.65	<0.05	2.52	0.42	1.68	0.6	1.51
	Benzo(a) pyrene	mg/kg	0.05	5	1 *	0.43	0.45	0.11	2.52	1.09	0.55	0.27	0.19	0.28	<0.05	1.42	0.19	1.64	0.27	0.97
	Benzo(b)fluoranthene	mg/kg	0.05	NV	NV	0.98	1.18	0.33	5.32	2.23	1.15	0.44	0.4	<0.05	<0.05	3.1	0.13	2.69	0.14	2.43
	Benzo(g,h,i)perylene	mg/kg	0.05	NV	NV	0.36	0.68	0.2	1.87	0.96	0.79	0.32	0.16	<0.05	<0.05	0.87	0.05	1.19	<0.05	1.19
	Benzo(k)fluoranthene	mg/kg	0.05	NV	NV	0.37	0.39	0.17	1.26	0.65	0.34	0.22	0.12	<0.05	<0.05	0.8	0.08	1.1	0.12	0.93
	Chrysene	mg/kg	0.05	NV	NV	0.86	1.09	0.35	2.82	1.24	0.84	0.42	0.36	0.46	<0.05	2.75	0.34	2.04	0.51	2.3
	Dibenz(a,h)anthracene	mg/kg	0.05	NV	NV	0.07	0.14	<0.05	0.3	0.14	0.13	0.06	<0.05	<0.05	<0.05	0.19	<0.05	0.22	<0.05	0.22
	Fluoranthene	mg/kg	0.05	NV	NV	2.04	3.13	0.78	7.27	3.15	1.2	0.8	0.58	0.68	<0.05	4.54	0.39	4.27	0.58	9.35
	Fluorene	mg/kg	0.05	NV	NV	<0.05	<0.05	<0.05	0.06	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.05	NV	NV	0.32	0.55	0.16	1.45	0.7	0.61	0.25	0.14	<0.05	<0.05	0.78	<0.05	1.02	<0.05	0.92
	Naphthalene	mg/kg	0.05	NV	NV	<0.05	0.08	<0.05	0.35	0.23	0.18	0.4	0.21	0.46	<0.05	<0.05	2.33	0.11	1.13	0.24
	Phenanthrene	mg/kg	0.05	NV	NV	0.89	1.62	0.27	2.92	1.37	0.34	0.48	0.37	2.5	<0.05	0.4	2.04	1.12	2.51	5.52
	Pyrene	mg/kg	0.05	NV	NV	1.45	1.94	0.6	8.58	3.25	1.12	0.71	0.52	1.61	<0.05	8.49	0.79	4.46	1.49	6.08
	Total	mg/kg		100	20 *	8.43	11.83	3.14	38.86	17.21	7.81	4.77	3.35	6.64		26.05	6.95	21.81	7.73	31.88
TPH	TPH C 6 - C 9 Fraction	mg/kg	10	NV	65	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	14	<10	10	<10
	TPH C10 - C14 Fraction	mg/kg	50	NV	NV	<50	<50	<50	<50	<50	<50	<50	<50	70	<50	<50	60	<50	90	<50
	TPH C15 - C28 Fraction	mg/kg	100	NV	NV	<100	120	<100	270	120	<100	<100	<100	680	<100	160	460	110	730	220
	TPH C29-C36 Fraction	mg/kg	100	NV	NV	110	<100	<100	280	120	110	<100	<100	350	<100	120	240	110	350	220
	TPH+C10 - C36 (Sum of total)	mg/kg	-	NV	1,000	185	195	<250	575	265	185	<250	<250	**1,100**	<250	305	760	245	**1,170**	465
BTEX	Benzene	mg/kg	0.2	NV	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Ethylbenzene	mg/kg	0.5	NV	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Toluene	mg/kg	0.5	NV	130	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Xylene (m & p)	mg/kg	0.5	NV	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5
	Xylene (o)	mg/kg	0.5	NV	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Xylene Total	mg/kg	-	NV	25	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.6	<1	<1	<1

Notes

PAHs Polycyclic Aromatic Hydrocarbons

TPH Total Petroleum Hydrocarbons
BTEX Benzene, toluene, ethylbenzene, xylene
TP06 Soil Sample Location
TP06_0.5 Sample Identity
30/06/2008 Date Sample Collected
1,100 Indicates Exceedence of Assessment Criteria
LOR Laboratory Limit of Reporting
nv No value exists
NEPM HIL F National Environment Protection (Assessment of Contamination) Measure 1999
SSG Guidelines for Assesing Service Station Sites, NSW EPA December 1994 (note
* Note that the benzo (a) pyrene) and Total PAH value for the SSG assumes
Dup_TP2 (TP36_0.1) It is noted that this sample was a duplicate of TP36_0.1, however, the original sample was not analysed and DUP_TP2 presents conditions at TP36 at 0.1m

DUP1 (TP74 m)

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

AECOM

Table T3: Soil Results - Organics

	Analyte	Units	LOR	NEPM 1999 HIL F	SSG	TP66-1.5 07-July-2008	BH68_0.1-0.2 02-July-2008	BH68_3.9-4.0 02-July-2008	BH72_0.4-0.5 14-July-2008	TP73_2.8 30-June-2008	DUP1 (TP74 0.2m) 26-June-2008	TP75_0.9M 26-June-2008	TP79_0.8 01-July-2008	TP79_3.0 01-July-2008
PAHS	Acenaphthene	mg/kg	0.05	NV	NV	<0.05	<0.05	<0.05	<0.4	<0.05	0.06	<0.05	<0.05	0.47
	Acenaphthylene	mg/kg	0.05	NV	NV	0.06	<0.05	<0.05	13.1	<0.05	0.05	<0.05	<0.05	0.43
	Anthracene	mg/kg	0.05	NV	NV	0.32	<0.05	0.35	14.3	0.31	0.38	<0.05	<0.05	1.86
	Benz(a)anthracene	mg/kg	0.05	NV	NV	1.63	<0.05	0.73	14.9	1.06	1.6	0.22	0.15	5.2
	Benzo(a) pyrene	mg/kg	0.05	5	1 *	1.22	<0.05	0.31	**13.8**	0.71	1.21	0.21	0.14	**5.07**
	Benzo(b)fluoranthene	mg/kg	0.05	NV	NV	2.25	<0.05	<0.05	17.9	1.4	2.64	0.54	0.18	6.14
	Benzo(g,h,i)perylene	mg/kg	0.05	NV	NV	1.08	<0.05	<0.05	9.1	0.4	0.89	0.26	0.08	2.33
	Benzo(k)fluoranthene	mg/kg	0.05	NV	NV	0.83	<0.05	<0.05	6.25	0.5	0.88	0.24	0.09	1.58
	Chrysene	mg/kg	0.05	NV	NV	1.85	<0.05	0.55	13.7	1.38	1.52	0.31	0.16	4.81
	Dibenz(a,h)anthracene	mg/kg	0.05	NV	NV	0.21	<0.05	<0.05	1.53	0.09	0.16	<0.05	<0.05	0.5
	Fluoranthene	mg/kg	0.05	NV	NV	4.24	<0.05	0.73	50.4	3.72	3.7	0.61	0.28	13.8
	Fluorene	mg/kg	0.05	NV	NV	<0.05	<0.05	<0.05	7.14	<0.05	<0.05	<0.05	<0.05	0.62
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.05	NV	NV	0.84	<0.05	<0.05	7.89	0.28	0.7	0.19	0.07	2.18
	Naphthalene	mg/kg	0.05	NV	NV	0.12	0.74	0.88	45.5	0.55	0.27	0.1	<0.05	0.46
	Phenanthrene	mg/kg	0.05	NV	NV	1.56	<0.05	3.47	49.6	2.1	1.51	0.17	0.06	8.83
	Pyrene	mg/kg	0.05	NV	NV	4.02	<0.05	2.08	43.1	3.48	4.24	0.5	0.23	13.1
	Total	mg/kg		100	20 *	20.23	0.74	9.1	**308.21**	15.98	19.81	3.35	1.44	67.38
TPH	TPH C 6 - C 9 Fraction	mg/kg	10	NV	65	<10	<10	15	<10	<10	<10	<10	<10	<10
	TPH C10 - C14 Fraction	mg/kg	50	NV	NV	<50	<50	80	90	<50	<50	<50	<50	<50
	TPH C15 - C28 Fraction	mg/kg	100	NV	NV	300	<100	850	1220	330	260	<100	<100	330
	TPH C29-C36 Fraction	mg/kg	100	NV	NV	230	<100	430	1020	180	280	<100	<100	220
	TPH+C10 - C36 (Sum of total)	mg/kg	-	NV	1,000	555	<250	**1360**	**2,330**	535	565	<250	<250	575
BTEX	Benzene	mg/kg	0.2	NV	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Ethylbenzene	mg/kg	0.5	NV	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Toluene	mg/kg	0.5	NV	130	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Xylene (m & p)	mg/kg	0.5	NV	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Xylene (o)	mg/kg	0.5	NV	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Xylene Total	mg/kg	-	NV	25	<1	<1	<1	<1	<1	<1	<1	<1	<1

Notes

PAHs Polycyclic Aromatic Hydrocarbons

TPH Total Petroleum Hydrocarbons
BTEX Benzene, toluene, ethylbenzene, xylene
TP06 Soil Sample Location
TP06_0.5 Sample Identity
30/06/2008 Date Sample Collected
1,100 Indicates Exceedence of Assessment Criteria
LOR Laboratory Limit of Reporting
nv No value exists
NEPM HIL F National Environment Protection (Assessment of Contamination) Measure 1999
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* Note that the benzo (a) pyrene) and Total PAH value for the SSG assumes
Dup_TP2 (TP36_0.1) It is noted that this sample was a duplicate of TP36_0.1, however, the original sample was not analysed and DUP_TP2 presents conditions at TP36 at 0.1m

DUP1 (TP74 m)

Where a duplicate is reported, it is a duplicate of the preceeding sample (i.e. Dup02-TP is a duplicate of TP08_0.2)

Table T4: Soil Results -OC/OP & PCB's

Analyte	Units	LOR	NEPM HIL F	TP03_0.2 27-June-2008	TP10_0.2 30-June-2008	BH30_0.1-0.2 15-July-2008	BH34_0.1-0.2 15-July-2008	BH63_0.1-0.2 30-June-2008	BH65_0.1-0.2 01-July-2008	BH72_0.1-0.2 14-July-2008	TP73_0.1 30-June-2008	TP74_0.2M 26-June-2008	DUP01-TP 26-June-2008	TP76_0.2 27-June-2008	TP78_0.1 30-June-2008
Pesticides															
a-BHC	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Azinophos methyl	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
b-BHC	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chlordane (cis)	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chlordane (trans)	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
d-BHC	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
DDD	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
DDT	mg/kg	0.2	NV	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Demeton-S-methyl	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dichlorvos	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dimethoate	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan I	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan II	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulphate	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin ketone	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
g-BHC (Lindane)	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	mg/kg	0.05	50	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Malathion	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	mg/kg	0.2	NV	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methyl parathion	mg/kg	0.2	NV	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Monocrotophos	mg/kg	0.2	NV	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion	mg/kg	0.2	NV	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin + Dieldrin	mg/kg		50	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
DDT+DDE+DDD	mg/kg		1000	<0.3	<0.3	<3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
4,4-DDE	mg/kg	0.05	NV	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PCB's	mg/kg	0.1	50	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Notes

TP06	Soil Sample Location
TP06_0.5	Sample Identity
30/06/2008	Date Sample Collected
LOR	Laboratory Limit of Reporting
nv	No value exists
NEPM HIL F	Measure 1999 Helath Investigation Level 'F' for Commercial / Industrial Prop

Table T5: Groundwater Elevations & Wellhead Parameter Measurements

Aquifer	MW	Easting	Northing	RL (mAHD)	TDW (mbtoc)	SWL (mbtoc)	SWL (mAHD)	Purged Volume (L)	DO (mg/l)	pH	Redox (mV)	Temp (0C)	Date Sampled	Comments
Fill Aquifer	MW101	381192.468	6361319.584	8.508	8.470	6.040	2.468	5	1.79	10.4	81.0	20.3	13/8/2008	Purged dry after 5L (15L required), well left to recharge prior to sampling. Water clear on top, murky brown at depth, tar odour, no sheen.
	MW102	381231.974	6361328.703	8.340	8.400	6.180	2.160	14	2.00	8.0	42.0	21.1	13/8/2008	Water brown, turbid, estuarine odour, no sheen.
	MW103	381201.434	6361288.046	8.515	8.260	6.000	2.515	5	1.80	11.5	-205.0	22.4	13/8/2008	Purged dry after 5L (10.44L required). Water brown, turbid, no odour/sheen.
	MW104	381236.202	6361216.015	8.524	8.260	4.920	3.604	20	1.76	9.1	-27.0	22.1	15/8/2008	Water brown. Required volume purged
	MW105	381153.869	6361232.465	8.186	8.5	3.4	4.786	31	1.92	9.5	110.0	21.4	13/8/2008	Water brown, turbid, no odour/sheen. Required volume purged.
	MW106	381296.402	6361192.586	8.885	8.760	5.790	3.095	7	2.28	11.3	-190.0	20.0	15/8/2008	Purged dry after 7L (18L required), well left to recharge prior to sampling. Water grey-brown, turbid, no odour/sheen.
	MW107	381266.550	6361069.142	8.801	8.92	3.9	4.901	30	4.01	9.9	181.0	18.1	13/8/2008	Water dark brown, turbid, no odour/sheen. Required volume purged.
	MW108	381124.324	6361093.492	8.826	8.750	5.585	3.241	19	0.54	7.5	-12.0	22.3	13/8/2008	Water brown, turbid, lots of silt at depth, no odour/sheen. Required volume purged.
	BH13	381408.677	6361074.005	9.601	11.680	7.440	2.161	13	3.00	11.1	-180.0	22.3	15/8/2008	Purged dry after 13L (21.84L required), well left to recharge prior to sampling. Water clear, strong organic odour.
	BH12	381225.001	6361181.368	8.820	8.72	5.37	3.45	21	2.38	11.6	-5.0	20.7	15/8/2008	Water clear, black suspended solids, no odour. Inside of well stained from product entering the well. Required volume purged.
	BH11	381268.003	6361249.525	9.004	8.700	6.200	2.804	18	2.36	8.6	68.0	22.2	14/8/2008	Required volume purged. No odours or sheen.
	BH10	381336.720	6361323.457	8.517	8.300	6.540	1.977	11	2.75	7.4	-82.0	18.0	14/8/2008	Water clear, some suspended solids, no odour/sheen. Required volume purged.
	BH9	381414.261	6361291.809	8.299	9.530	6.580	1.719	10	6.48	12.4	-311.0	22.6	14/8/2008	Purged dry after 10L. Water clear, no odour/sheen. Required volume purged.
	BH8	381411.019	6361216.296	8.948	11.560	6.660	2.288	22	3.48	10.0	-147.0	21.2	15/8/2008	Purged dry after 22L (30L required), well left to recharge prior to sampling. Water clear, black suspended solids, no odour.
	BH7	381402.784	6361165.621	8.771	12.020	6.520	2.251	33	3.13	11.4	-185.0	19.0	14/8/2008	Water clear, tar odour, no sheen. Required volume purged.
Estuarine Sediments	BH2	381225.074	6361082.610	9.738	13.7	7.07	2.668	23	1.87	9.1	-10.0	20.2	14/8/2008	Purged dry after 15L, further 8L purged following day (42L required). Water clear, no sheen, estuarine odour.
	MW201	381237.007	6361214.705	8.521	13.220	5.150	3.371	48	3.00	8.9	-12.8	21.3	15/8/2008	Required volume purged.
	MW202	381193.111	6361321.467	8.542	13.470	8.290	0.252	31	1.89	7.2	-37.0	19.4	13/8/2008	Faint organic odour. Required volume purged.
	MW203	381342.550	6361322.186	8.512	13.900	7.600	0.912	37	1.44	8.6	-178.0	21.4	13/8/2008	Required volume purged. No odours or sheen.
	MW204	381410.306	6361195.569	8.633	13.750	7.800	0.833	36	0.94	6.8	-82.0	19.9	14/8/2008	Water brown/black, turbid, estuarine odour, no sheen. Required volume purged.

Notes

RL (mAHD)	Relative level of the top of the well casing in relation to metres above Australian Height Datum (m AHD)
TDW (m btoc)	Total Depth of Well (metres below top of well casing)
SWL (mbtoc)	Standing Water Level (metres below top of well casing)
SWL (mAHD)	Standing Water Level (metres above Australian Height Datum)
DO (mg/l)	Dissolved Oxygen
Temp (^{o}C)	Temperature

Table T6: Groundwater Results - Inorganics

Analyte	Units	LOR	ANZECC 2000 95% Marine (mg/L)	Shallow Fill Aquifer											
				MW7	MW8	MW9	MW10	MW11	MW12	MW13	MW101	MW102	MW103	MW104	MW105
				14-August-2008	15-August-2008	14-August-2008	14-August-2008	14-August-2008	15-August-2008	15-August-2008	13-August-2008	13-August-2008	13-August-2008	15-August-2008	13-August-2008
pH (Lab)	pH_Units	0.01	7.0-8.5 *	11.6	9.53	12.7	8.72	8.61	11.4	10.8	10.3	8.01	11.9	9.32	9.67
Sulphate	mg/L	1	NV	128	23	7	113	1180	191	174	351	784	49	557	14
Sulphide	mg/L	0.1	NV	0.3	0.3	1.4	<0.1	<0.1	<0.1	0.9	<0.1	<0.1	<0.1	<0.1	<0.1
Aluminium	mg/L	0.01	NV	0.74	2.05	0.66	0.02	0.02	1.31	0.68	0.11	0.02	2.64	26.8	0.17
Barium	mg/L	0.001	NV	0.036	0.213	0.743	0.089	0.008	0.096	0.035	0.021	0.072	0.027	0.342	0.029
Cadmium	mg/L	0.0001	0.0055	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	0.0274**	0.002	0.005	<0.001	<0.001	0.012	0.015	0.004	<0.001	<0.001	<0.001	0.006	<0.001
Cobalt	mg/L	0.001	0.001	<0.001	**0.002**	<0.001	<0.001	<0.001	**0.002**	<0.001	<0.001	<0.001	<0.001	**0.003**	<0.001
Copper	mg/L	0.001	0.0013	<0.001	**0.088**	<0.001	0.001	**0.002**	**0.029**	**0.007**	**0.003**	<0.001	<0.001	**0.012**	<0.001
Iron	mg/L	0.05	NV	<0.05	2.36	<0.5	<0.05	<0.05	3.31	1.15	0.14	0.17	<0.05	9.36	<0.05
Lead	mg/L	0.001	0.0044	0.001	**0.142**	<0.001	<0.001	<0.001	**0.006**	**0.01**	<0.001	<0.001	**0.002**	**0.117**	<0.001
Manganese	mg/L	0.001	NV	0.012	0.058 *	0.002	0.395	0.033	0.027 *	0.003 *	0.014	0.849	0.004	0.178	0.006
Molybdenum	mg/L	0.001	NV	0.031	0.098	0.148	0.041	0.011	0.008	0.053	0.236	0.069	0.116	0.037	0.028
Nickel	mg/L	0.001	0.07	<0.001	0.008	<0.005	<0.001	<0.001	0.006	0.002	0.008	<0.001	0.001	0.006	<0.001
Zinc	mg/L	0.005	0.015	<0.005	**0.271**	<0.005	<0.005	<0.005	**0.27**	**0.058**	<0.005	<0.005	<0.005	**0.029**	<0.005
Mercury	mg/L	0.0001	0.0004	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	**0.0452**	**0.009**	0.0002	<0.0001	0.0002

Notes

MW07	Sample location / identity
30/06/2008	Date Sample Collected
LOR	Laboratory Limit of Reporting
nv	No value exists
ANZECC 2000 95% Marine	ANZECC (2000) *Guidelines for Fresh and Marine Water Quality*
128	Indicates an exceedence of the ANZECC 2000
*	Note MW8, MW12, MW13 and MW106 were re-sampled on 11 September 2008 and analysed for manganese, and the results presented above are from the September 11 sampling event

Table T6: Groundwater Results - Inorganics

Analyte	Units	LOR	ANZECC 2000 95% Marine (mg/L)	Shallow Fill Aquifer			
				MW106 15-August-2008	MW107 13-August-2008	DUP01 13-August-2008	MW108 13-August-2008
pH (Lab)	pH_Units	0.01	7.0-8.5 *	11.3	10	10	7.87
Sulphate	mg/L	1	NV	749	<50	68	368
Sulphide	mg/L	0.1	NV	<0.1	<0.1	<0.1	<0.1
Aluminium	mg/L	0.01	NV	27.3	0.13	0.17	0.1
Barium	mg/L	0.001	NV	1.24	0.046	0.044	0.475
Cadmium	mg/L	0.0001	0.0055	0.001	0.0002	0.0004	<0.0001
Chromium	mg/L	0.001	0.0274**	**0.036**	<0.001	<0.001	<0.001
Cobalt	mg/L	0.001	0.001	**0.025**	<0.001	<0.001	<0.001
Copper	mg/L	0.001	0.0013	**0.071**	<0.001	0.001	**0.028**
Iron	mg/L	0.05	NV	30.6	<0.05	0.05	0.12
Lead	mg/L	0.001	0.0044	**0.807**	<0.001	**0.004**	0.001
Manganese	mg/L	0.001	NV	0.003 *	0.006	0.013	0.122
Molybdenum	mg/L	0.001	NV	0.167	0.037	0.039	0.052
Nickel	mg/L	0.001	0.07	0.04	<0.001	<0.001	<0.001
Zinc	mg/L	0.005	0.015	**0.714**	<0.005	<0.005	<0.005
Mercury	mg/L	0.0001	0.0004	0.0003	0.0004	-	0.0001

Notes

MW07	Sample location / identity
30/06/2008	Date Sample Collected
LOR	Laboratory Limit of Reporting
nv	No value exists
ANZECC 2000 95% Marine	ANZECC (2000) *Guidelines for Fresh and Marine Water Quality*
128	Indicates an exceedence of the ANZECC 2000
*	Note MW8, MW12, MW13 and MW106 were re-sampled on 11 September 2008 and analysed for manganese, and the results presented above are from the September 11 sampling event

AECOM

Table T6: Groundwater Results - Inorganics

Analyte	Units	LOR	ANZECC 2000 95% Marine (mg/L)	Deeper Estuarine Aquifer								Perched Test Pit Water	
				MW2 14-August-2008	MW201 15-August-2008	MW202 13-August-2008	DUP02 13-August-2008	MW203 13-August-2008	MW204 14-August-2008	DUP03 14-August-2008	Trip02 14/08/08	TP18 09-July-2008	TP37 09-July-2008
pH (Lab)	pH_Units	0.01	7.0-8.5 *	10	9.05	7.31	7.13	8.68	7.15	7.16	7.0	11.4	9.85
Sulphate	mg/L	1	NV	150	37	1410	1960	66	711	722	624.0	52	102
Sulphide	mg/L	0.1	NV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aluminium	mg/L	0.01	NV	0.02	24.5	<0.1	<0.1	0.06	<0.1	<0.1	<0.01	-	-
Barium	mg/L	0.001	NV	0.021	0.841	0.086	0.102	0.014	1.04	0.8	0.789	1.1	2.3
Cadmium	mg/L	0.0001	0.0055	0.001	<0.0001	<0.001	<0.001	<0.0001	<0.001	<0.001	0.001	<0.005	**0.007**
Chromium	mg/L	0.001	0.0274**	<0.001	0.027	<0.01	<0.01	0.002	<0.01	<0.01	<0.005	**0.17**	**0.73**
Cobalt	mg/L	0.001	0.001	<0.001	**0.008**	<0.01	<0.01	<0.001	**0.011**	<0.01	**0.01**	-	-
Copper	mg/L	0.001	0.0013	<0.001	**0.017**	<0.02	<0.02	<0.001	<0.02	<0.02	<0.002	**0.32**	**0.86**
Iron	mg/L	0.05	NV	<0.05	21	10.6	14.5	<0.05	23.8	9.97	0.1	-	-
Lead	mg/L	0.001	0.0044	0.001	**0.049**	**0.037**	**0.02**	**0.006**	**0.014**	**0.026**	<0.001	**0.54**	**2.43**
Manganese	mg/L	0.001	NV	0.013	0.337	2.04	2.8	0.103	6.66	4.68	10.8	46.4	112
Molybdenum	mg/L	0.001	NV	0.048	0.037	<0.01	<0.01	0.077	<0.01	<0.01	0.003	-	-
Nickel	mg/L	0.001	0.07	<0.001	0.019	<0.01	<0.01	<0.001	<0.01	<0.01	<0.005	-	-
Zinc	mg/L	0.005	0.015	<0.005	**0.056**	<0.05	<0.05	<0.005	<0.05	<0.05	**0.017**	**0.9**	**6.27**
Mercury	mg/L	0.0001	0.0004	<0.0001	<0.0001	**0.0007**	-	<0.0001	-	-	-	<0.0001	<0.0001

Notes

MW07	Sample location / identity
30/06/2008	Date Sample Collected
LOR	Laboratory Limit of Reporting
nv	No value exists
ANZECC 2000 95% Marine	ANZECC (2000) *Guidelines for Fresh and Marine Water Quality*
128	Indicates an exceedence of the ANZECC 2000
*	Note MW8, MW12, MW13 and MW106 were re-sampled on 11 September 2008 and analysed for manganese, and the results presented above are from the September 11 sampling event

AECOM

Table T7: Groundwater Results - Organics

	Analyte	Units	LOR	ANZECC 2000 95% Marine	Shallow Fill Aquifer												
					MW7	MW8	MW9	MW10	MW11	MW12	MW13	MW101	MW102	MW103	MW104	MW105	MW106
					14-August-2008	15-August-2008	14-August-2008	14-August-2008	14-August-2008	15-August-2008	15-August-2008	13-August-2008	13-August-2008	13-August-2008	15-August-2008	13-August-2008	15-August-2008
PAHS	Acenaphthene	µg/L	1	NV	3	<1	1.5	63.3	<1	<1	6.6	34.4	<1	1.3	<1	<1	<1
	Acenaphthylene	µg/L	1	NV	<1	<1	<1	2.3	21.4	<1	26.5	3.6	<1	<1	<1	<1	<1
	Anthracene	µg/L	1	NV	<1	<1	<1	1.6	2.3	<1	8.7	14.2	3.7	<1	<1	<1	<1
	Benz(a)anthracene	µg/L	1	NV	<1	<1	<1	<1	<1	<1	1	11.9	8.2	1.2	<1	<1	<1
	Benzo(a) pyrene	µg/L	0.5	NV	<0.5	0.6	<0.5	<1	<1	<0.5	<1	10.5	8.5	1.4	<0.5	<0.5	<0.5
	Benzo(b)fluoranthene	µg/L	1	NV	<1	<1	<1	<1	<1	<1	<1	12.9	10	1.6	<1	<1	<1
	Benzo(g,h,i)perylene	µg/L	1	NV	<1	<1	<1	<1	<1	<1	<1	8.8	6.7	1.1	<1	<1	<1
	Benzo(k)fluoranthene	µg/L	1	NV	<1	<1	<1	<1	<1	<1	<1	5.8	5.4	<1	<1	<1	<1
	Chrysene	µg/L	1	NV	<1	<1	<1	<1	<1	<1	<1	10.5	7.6	1.1	<1	<1	<1
	Dibenz(a,h)anthracene	µg/L	1	NV	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Fluoranthene	µg/L	1	NV	<1	2	<1	1.4	1.8	<1	16.4	29.9	14.6	3	<1	<1	<1
	Fluorene	µg/L	1	NV	<1	1	<1	18.8	9.4	<1	30.4	21.9	<1	<1	<1	<1	<1
	Indeno(1,2,3-c,d)pyrene	µg/L	1	NV	<1	<1	<1	<1	<1	<1	<1	7	5.5	<1	<1	<1	<1
	Naphthalene	µg/L	1	70	55.4	7	11.8	**128**	**181**	2.1	**888**	22.4	<1	33.5	<1	<1	<1
	Phenanthrene	µg/L	1	NV	1.3	3.6	1.8	13.6	10.7	<1	82.4	58.7	5.9	1.8	<1	<1	<1
	Pyrene	µg/L	1	NV	<1	1.8	<1	<1	1.1	<1	12	24.6	13.3	2.7	<1	<1	<1
	Total PAHs	-	-	NV	59.7	16.0	15.1	229.0	227.7	2.1	1,072.0	277.1	89.4	48.7	-	-	-
TPH	TPH C 6 - C 9 Fraction	µg/L	20	NV	110	<20	<20	<20	40	<20	50	<20	<20	<20	<20	<20	<20
	TPH C10 - C14 Fraction	µg/L	50	NV	440	220	850	460	370	110	1,580	360	110	900	160	110	750
	TPH C15 - C28 Fraction	µg/L	100	NV	800	1,300	2,300	600	600	300	800	1,900	400	1,100	200	400	600
	TPH C29-C36 Fraction	µg/L	50	NV	210	380	280	160	140	100	80	1,220	220	360	70	100	140
	TPH+C10 - C36 (Sum of total)	µg/L	-	NV	1,450	1,900	3,430	1,220	1,110	510	2,460	3,480	730	2,360	430	610	1,490
BTEX	Benzene	µg/L	1	700	77	<1	<1	<1	20	8	39	<1	<1	<1	<1	<1	<1
	Ethylbenzene	µg/L	2	NV	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Toluene	µg/L	2	NV	12	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Xylene (m & p)	µg/L	2	NV	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Xylene (o)	µg/L	2	NV	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Xylene Total	µg/L	-	NV	7	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4

Notes

PAHs	Polycyclic Aromatic Hydrocarbons
TPH	Total Petroleum Hydrocarbons
BTEX	Benzene, toluene, ethylbenzene, xylene
MW07	Sample location / identity
30/06/2008	Date Sample Collected
LOR	Laboratory Limit of Reporting
nv	No value exists
ANZECC 2000 95% Marine	ANZECC (2000) *Guidelines for Fresh and Marine Water Quality*
128	Indicates an exceedence of the ANZECC 2000 95%

AECOM

Table T7:

	Shallow Fill Aquifer			Deeper Estuarine Aquifer								Perched Test Pit Water	
	MW107	DUP01	MW108	MW2	MW201	MW202	DUP02	MW203	MW204	DUP03	Trip02	TP18	TP37
	13-August-2008	13-August-2008	13-August-2008	14-August-2008	15-August-2008	13-August-2008	13-August-2008	13-August-2008	14-August-2008	14-August-2008	14/08/08	09-July-2008	09-July-2008
PAHS	3.9	2.7	1.4	<1	<1	20.7	20.6	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.8	1.8
	1.2	<1	1.1	<1	<1	<1	<1	<1	<1	<1	<1	9	7.3
	1.1	0.6	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	2.3	6.9
	1.3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	12.6	11.1
	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	5.1	6.1
	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	3	3.4
	1.1	<1	1.1	<1	<1	<1	<1	<1	<1	<1	<1	8.7	6.6
	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.3	1.2
	3.4	2.2	2	<1	<1	2.3	1.7	<1	<1	1.1	<1	20.2	13.4
	<1	<1	<1	<1	<1	6.5	7	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	5	4.8
	23.7	15	4.5	<1	<1	4.3	4.9	<1	2.5	1.7	<1	1.2	5.6
	3	2	4.5	<1	<1	7.7	8.1	<1	1.2	1.3	<1	10.1	5.9
	2.8	1.8	2.1	<1	<1	1.7	1.1	<1	<1	<1	<1	16.6	14.9
	41.5	24.3	17.6	-	-	43.2	43.4	-	3.7	4.1	-	96.9	89.0
TPH	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<50	<20	<20
	490	440	450	140	610	1,000	180	530	1240	990	**390	<50	<50
	700	700	1700	500	400	400	300	500	600	600	<200	400	500
	340	250	910	140	160	200	<50	230	140	180	<50	220	390
	1,530	1,390	3,060	780	1,170	1,600	505	1,260	1,980	1,770	390	645	915
BTEX	4	<1	<1	2	<1	<1	<1	<1	<1	<1	<1	<1	<1
	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1	<2	<2
	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	3.0	<5	<5
	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	4.0	<2	<2
	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	2.0	<2	<2
	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	6.0	<4	<4

Notes

PAHs
TPH
BTEX
MW07
30/06/2008
LOR
nv
ANZECC 2000
95% Marine
128

Figures from ENSR (2008)c

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G:\Projects\N4\N41100_N41199\N41132\N4113201 F1 16 07 2009 TO

AECOM

0 250m

Site boundary

Figure F1 **Site Location**

Delta EMD Australia Pty Ltd

Data Interpretation and Outline Remediation Strategy

McIntosh Drive, Mayfield NSW

G:\Projects\N4\N41100_N41199\N41132\N4113201 F2 16 07 2009 TO

BUILDING KEY

1 - Surface water pond
2 - Infrastructure no longer present
3 - Storage Building
4 - Reagant building
5 - Cooling tower
6 - Rotary kiln
7 - Switch room 2
8 - Leachate tanks
9 - Electrolyte tanks
10 - Effluent pond
11 - Filter building
12 - PDP building
13 - Ore shed
14 - Diesel Above Ground Storage Tank
15 - Workshop and store
16 - Administration/Laboratory
17 - Control room
18 - Switch room 1
19 - Switch room 3
20 - Electrolysis building
21 - Backup power supply building
22 - Switch room 4
23 - Compressor
24 - Product finishing
25 - Product packing plant
26 - ATCO office
27 - Scaffold compound
28 - Carpark

AECOM

0 50m

Site boundary
Site perimeter drainage

Figure F2 Site Layout and Previous Areas of Operation

Delta EMD Australia Pty Ltd

Data Interpretation and Outline Remediation Strategy

McIntosh Drive, Mayfield NSW

G:\Projects\N4\N41100_N41199\N41132\N4113201 F3 16 07 2009 TO

AECOM

0 50m

Site boundary

Site perimeter drainage

Operational areas/buildings

Hardstand (asphalt/concrete)

Open ground

Figure F3 | **Site Surface Covering**

Delta EMD Australia Pty Ltd

Data Interpretation and Outline Remediation Strategy

McIntosh Drive, Mayfield NSW

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AECOM

0 50m

Site boundary	Borehole location (ENSR, 2008)
Site perimeter drainage	Test pit location (ENSR, 2008)
Operational areas/buildings	Monitoring well location (ENSR, 2008)
Hardstand (asphalt/concrete)	Sample location not drilled due to H&S concerns (15, 51 & 54)
Open ground	

Note: TP22, TP24 & TP49 were drilled deeper for soil samples and are referred to as BH22, BH24 and BH49 for reporting purposes

Figure F4 **Site Layout and Sampling Locations**

Delta EMD Australia Pty Ltd

Data Interpretation and Outline Remediation Strategy

McIntosh Drive, Mayfield NSW

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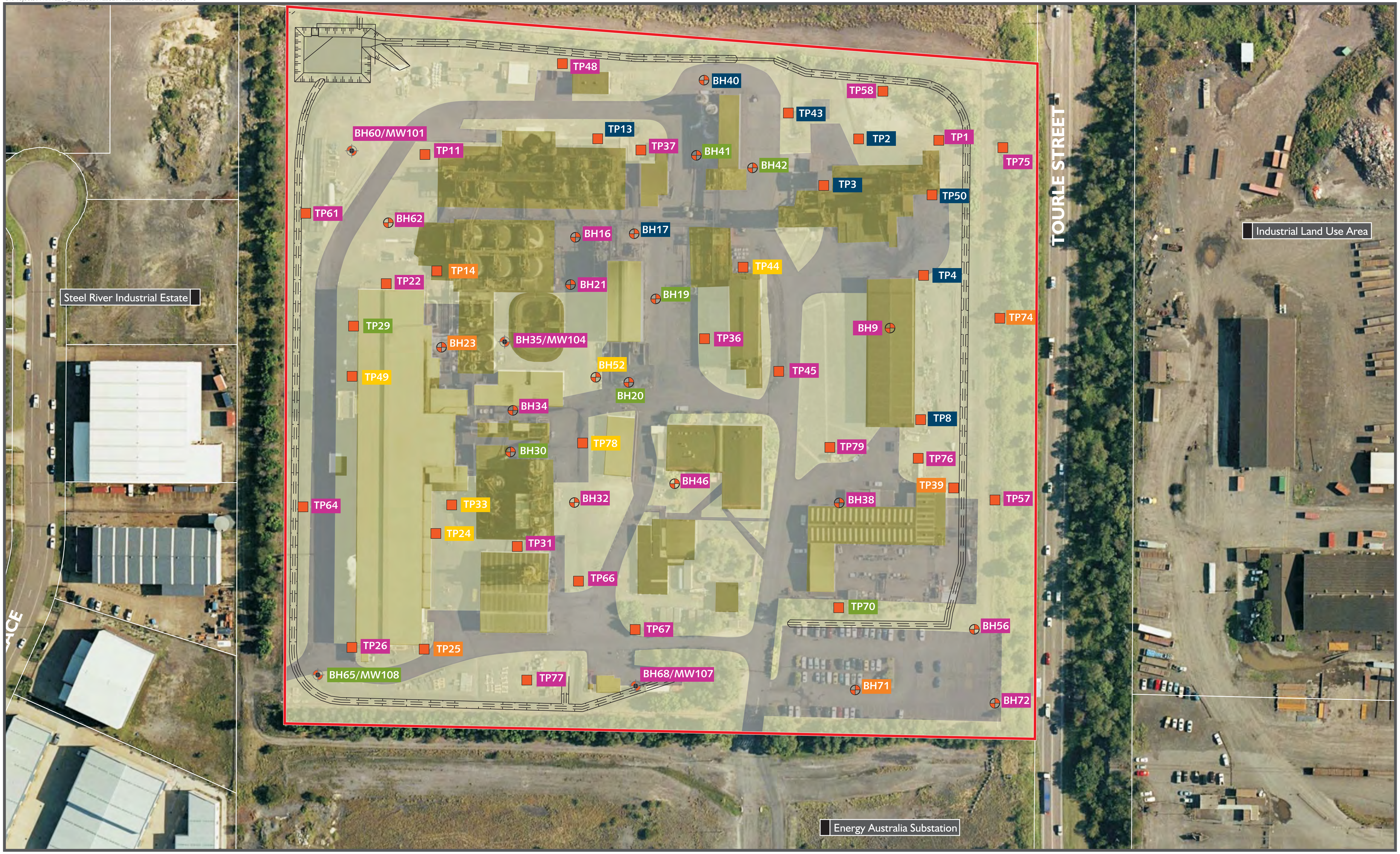

AECOM

0 50m

Site boundary
Site perimeter drainage
Operational areas/buildings
Hardstand (asphalt/concrete)
Open ground

Borehole location (ENSR, 2008)
Test pit location (ENSR, 2008)
Borehole/Monitoring well location (ENSR, 2008)
Sample location not drilled due to H&S concerns (15, 51 & 54)

Note: TP22, TP24 & TP49 were drilled deeper for soil samples and are referred to as BH22, BH24 and BH49 for reporting purposes

SAMPLE ID	<7,500 mg/kg
SAMPLE ID	7,500 - 15,000 mg/kg
SAMPLE ID	15,000 - 50,000 mg/kg
SAMPLE ID	50,000 - 100,000 mg/kg
SAMPLE ID	>100,000 mg/kg

Figure F5 **Manganese Concentrations (mg/kg) in Soil (Fill) from 0.0- 0.3m Depth, ENSR 2008**

Delta EMD Australia Pty Ltd

Data Interpretation and Outline Remediation Strategy

McIntosh Drive, Mayfield NSW

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AECOM

0 50m

Site boundary	Borehole location (ENSR, 2008)
Site perimeter drainage	Test pit location (ENSR, 2008)
Operational areas/buildings	Borehole/Monitoring well location (ENSR, 2008)
Hardstand (asphalt/concrete)	Sample location not drilled due to H&S concerns (15, 51 & 54)
Open ground	

Note: TP22, TP24 & TP49 were drilled deeper for soil samples and are referred to as BH22, BH24 and BH49 for reporting purposes

SAMPLE ID	<7,500 mg/kg
SAMPLE ID	7,500 - 15,000 mg/kg
SAMPLE ID	15,000 - 50,000 mg/kg
SAMPLE ID	50,000 - 100,000 mg/kg
SAMPLE ID	>100,000 mg/kg

Figure F6 **Manganese Concentrations (mg/kg) in Soil (Fill) from 0.3 - 0.5m Depth, ENSR 2008**

Delta EMD Australia Pty Ltd

Data Interpretation and Outline Remediation Strategy

McIntosh Drive, Mayfield NSW

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AECOM

0 50m

- Site boundary
- Site perimeter drainage
- Operational areas/buildings
- Hardstand (asphalt/concrete)
- Open ground

- Borehole location (ENSR, 2008)
- Test pit location (ENSR, 2008)
- Borehole/Monitoring well location (ENSR, 2008)
- Sample location not drilled due to H&S concerns (15, 51 & 54)

Note: TP22, TP24 & TP49 were drilled deeper for soil samples and are referred to as BH22, BH24 and BH49 for reporting purposes

SAMPLE ID	<7,500 mg/kg
SAMPLE ID	7,500 - 15,000 mg/kg
SAMPLE ID	15,000 - 50,000 mg/kg
SAMPLE ID	50,000 - 100,000 mg/kg
SAMPLE ID	>100,000 mg/kg

Figure F7 **Manganese Concentrations (mg/kg) in Soil (Fill) from 0.5 - 2.0m Depth, ENSR 2008**

Delta EMD Australia Pty Ltd

Data Interpretation and Outline Remediation Strategy

McIntosh Drive, Mayfield NSW

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AECOM

0 50m

- Site boundary
- Site perimeter drainage
- Operational areas/buildings
- Hardstand (asphalt/concrete)
- Open ground
- Borehole location (ENSR, 2008)
- Test pit location (ENSR, 2008)
- Borehole/Monitoring well location (ENSR, 2008)
- Sample location not drilled due to H&S concerns (15, 51 & 54)

Note: TP22, TP24 & TP49 were drilled deeper for soil samples and are referred to as BH22, BH24 and BH49 for reporting purposes

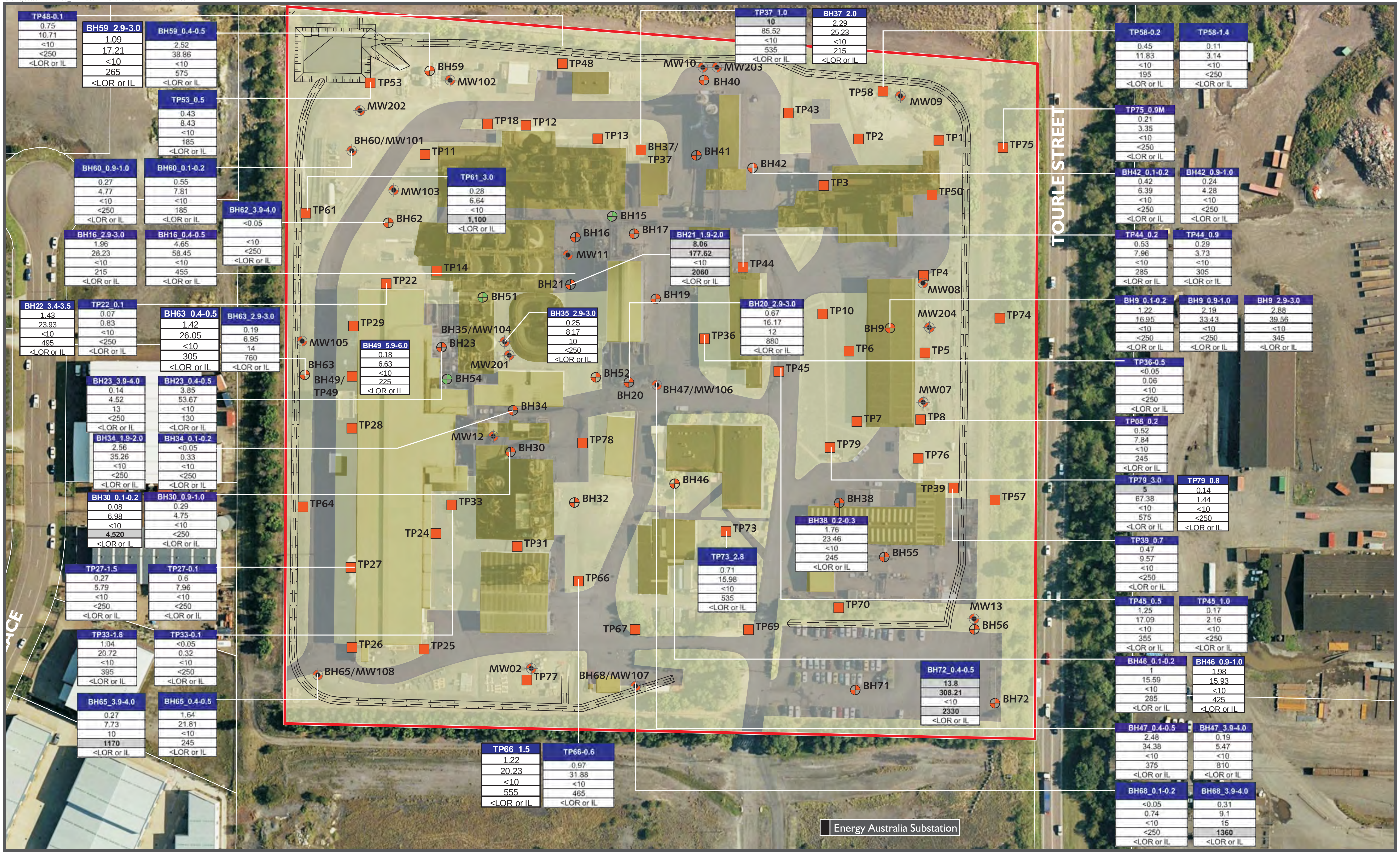
SAMPLE ID	<7,500 mg/kg
SAMPLE ID	7,500 - 15,000 mg/kg
SAMPLE ID	15,000 - 50,000 mg/kg
SAMPLE ID	50,000 - 100,000 mg/kg
SAMPLE ID	>100,000 mg/kg

Figure F8 **Manganese Concentrations (mg/kg) in Soil (Fill) greater than 2.0m Depth, ENSR 2008**

Delta EMD Australia Pty Ltd

Data Interpretation and Outline Remediation Strategy

McIntosh Drive, Mayfield NSW



AECOM

0 50m

- Site boundary
- Site perimeter drainage
- Borehole location (ENSR, 2008)
- Test pit location (ENSR, 2008)
- Monitoring well location (ENSR, 2008)
- Sample location not drilled due to H&S concerns (15, 51 & 54)

Note: TP22, TP24 & TP49 were drilled deeper for soil samples and are referred to as BH22, BH24 and BH49 for reporting purposes

Compounds	TP08_0.2
benzo(a)pyrene	0.52
Total PAH's	7.84
TPH C 6 - C 9	<10
TPH C10 - C36	245
BTEX	<LOR or IL

LOR = Laboratory Limit of Reporting

IL = Investigation Level

HIL F = National Environment Protection (Assessment of Contamination) Measure 1999 Health Investigation Level 'F' for Commercial / Industrial Properties

SSG = Guidelines for Assessing Service Station Sites, NSW EPA December 1994 (note that these guidelines are for a sensitive land use (i.e. residential))

10 Exceedence of IL

Compound	IL	
benzo(a)pyrene	5 mg/kg	HIL F
Total PAH's	100 mg/kg	HIL F
TPH C 6 - C 9	65 mg/kg	SSG
TPH C10 - C36	1,000 mg/kg	SSG
Benzene	1	SSG
Toluene	130	SSG
Ethylbenzene	50	SSG
Total Xylene	25	SSG

Figure F9 **Organic Compound Concentrations (mg/kg) in Soil (Fill), ENSR 2008**

Delta EMD Australia Pty Ltd

Remedial Strategy

McIntosh Drive, Mayfield NSW

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AECOM

- Site boundary
- Site perimeter drainage
- Operational areas/buildings
- Hardstand (asphalt/concrete)
- Open ground

- Borehole location (ENSR, 2008)
- Test pit location (ENSR, 2008)
- Borehole/Monitoring well location (ENSR, 2008)
- Sample location not drilled due to H&S concerns (15, 51 & 54)

Note: TP22, TP24 & TP49 were drilled deeper for soil samples and are referred to as BH22, BH24 and BH49 for reporting purposes

* MW8, MW12, MW13 and MW106 results are from re-sampling on 11 September 2008.

All other results are from August 2008.

Figure F10 **Manganese Concentrations (mg/L) in Shallow Fill Aquifer, ENSR 2008**

Delta EMD Australia Pty Ltd

Data Interpretation and Outline Remediation Strategy

McIntosh Drive, Mayfield NSW

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AECOM

0 50m

Site boundary
Site perimeter drainage
Operational areas/buildings
Hardstand (asphalt/concrete)
Open ground

Borehole location (ENSR, 2008)
Test pit location (ENSR, 2008)
Borehole/Monitoring well location (ENSR, 2008)
Sample location not drilled due to H&S concerns (15, 51 & 54)

Note: TP22, TP24 & TP49 were drilled deeper for soil samples and are referred to as BH22, BH24 and BH49 for reporting purposes

Figure F11 **Manganese Concentrations (mg/L) in Deeper Estuarine Aquifer, ENSR 2008**

Delta EMD Australia Pty Ltd

Data Interpretation and Outline Remediation Strategy

McIntosh Drive, Mayfield NSW

G:\Projects\N4\N41100_N41199\N41132\N4113201 F12 16 07 2009 TO

Compounds	MW108
Napthalene	4.5
Total PAH's	17.6
TPH C 6 - C 9	<20
TPH C10 - C36	3,060
BTEX	<LOR or IL

Perched Water (approximately 1m below ground level)

LOR = Laboratory Limit of Reporting
IL = Investigation Level
No IL available for Total PAH's, TPH and TEX compounds

128 Exceedence of IL

Compound	IL	
Napthalene	70 µg/L	ANZECC 2000 95% Marine
Benzene	700	ANZECC 2000 95% Marine

AECOM

0 50m

- Site boundary
- Site perimeter drainage
- Operational areas/buildings
- Hardstand (asphalt/concrete)
- Open ground
- Borehole location (ENSR, 2008)
- Test pit location (ENSR, 2008)
- Borehole/Monitoring well location (ENSR, 2008)
- Sample location not drilled due to H&S concerns (15, 51 & 54)

Note: TP22, TP24 & TP49 were drilled deeper for soil samples and are referred to as BH22, BH24 and BH49 for reporting purposes

Figure F12 **Organic Compound Concentrations (ug/L) in Shallow Fill Aquifer, ENSR 2008**

Delta EMD Australia Pty Ltd

Data Interpretation and Outline Remediation Strategy

McIntosh Drive, Mayfield NSW

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AECOM

0 50m

- Site boundary
- Site perimeter drainage
- Operational areas/buildings
- Hardstand (asphalt/concrete)
- Open ground
- Borehole location (ENSR, 2008)
- Test pit location (ENSR, 2008)
- Borehole/Monitoring well location (ENSR, 2008)
- Sample location not drilled due to H&S concerns (15, 51 & 54)

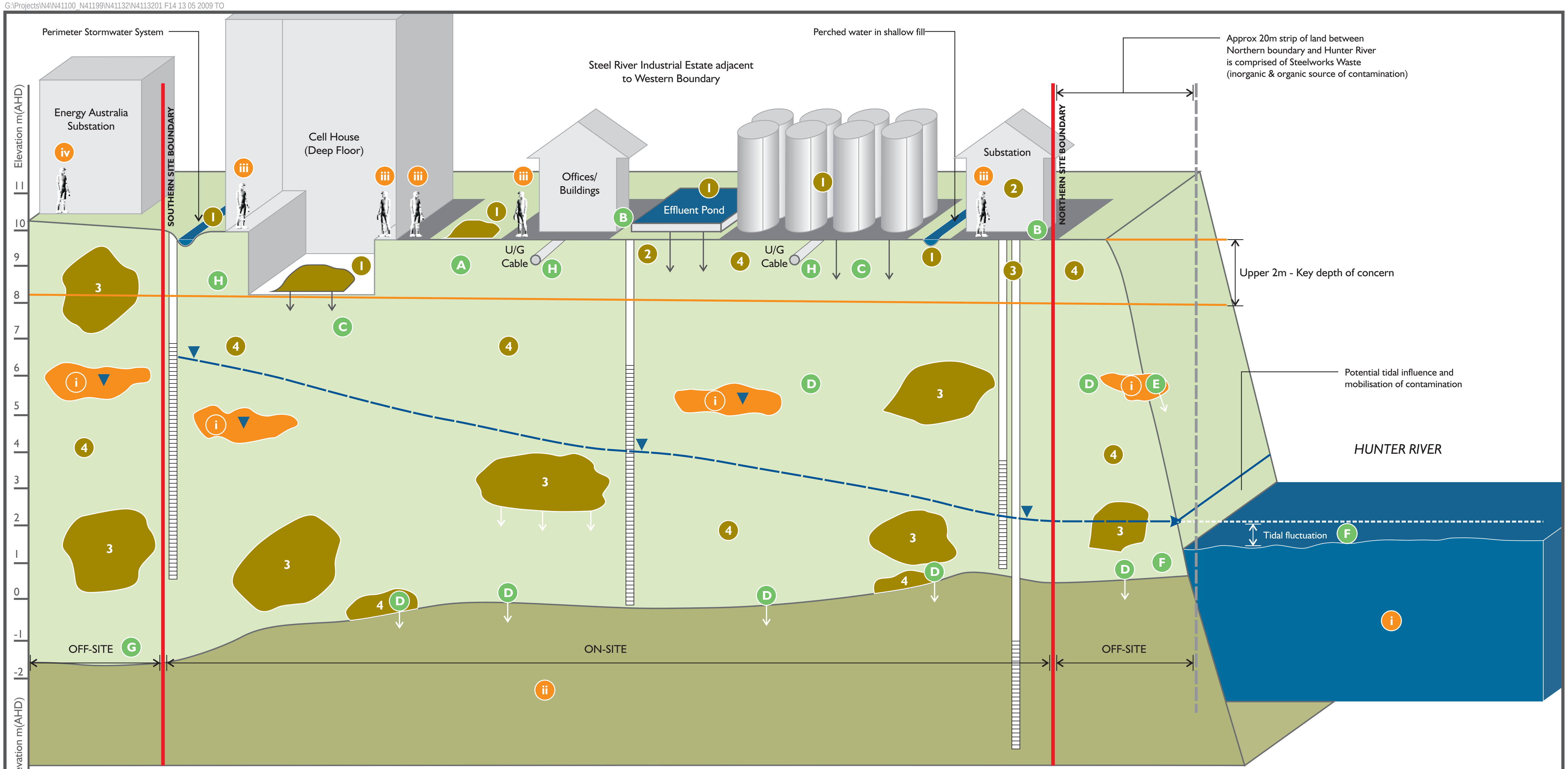
Note: TP22, TP24 & TP49 were drilled deeper for soil samples and are referred to as BH22, BH24 and BH49 for reporting purposes

Figure F13 **Organic Compound Concentrations (ug/L) in Deep Estuarine Aquifer, ENSR 2008**

Delta EMD Australia Pty Ltd

Remedial Strategy

McIntosh Drive, Mayfield NSW



SOURCES

1- Inorganics/manganese from EMD operations
2- Ancillary operations (fuel storage, electricity substations)
3 - Organics from burieed steelworks wastes
4 - Inorganics from steelworks wastes

PATHWAYS

A - Direct dermal contact in un-surfaced areas/areas of subsurface works
B - Vapour migration
C - Vertical migration into Shallow Fill Aquifer
D - Migration into Estuarine Aquifer
E - Groundwater seeps
F - Tidal influence - mobilisation of contamination
G - Platt's Channel
H - Stormwater system and underground services
I - Isolated perched water horizons

RECEPTORS

Environmental -
i - Hunter River
ii - Estuarine Aquifer
Human Health -
iii - On-Site Personnel (including sub-surface workers)
iv - Off-Site Personnel

AECOM

Approximate Horizontal Scale 0 75m
Approximate Vertical Scale 0 20m

Esturine Aquifer (silty sandy clays)
Fill Aquifer (heterogeneous steelworks wastes/slag)
Hardstand (asphalt/concrete)
Monitoring well screened section
Inferred groundwater flow direction
Standing water level

Figure F14 | **Conceptual Site Model**

Delta EMD Australia Pty Ltd

Data Interpretation and Outline Remediation Strategy

McIntosh Drive, Mayfield NSW

Appendix A

Site Background Information

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A.1 Site Setting

A.1.1 Site Description

Site inspections conducted in 2009 showed that the Site is relatively flat, with the ground level approximately 8 m above the Southern Arm of the Hunter River, located approximately 20 m north of the Site. The Site is built upon reclaimed land and is underlain by fill materials associated with former BHP steel works activities. An open, asphalt-lined drain surrounds the majority of the Site (apart from the Site entrance), which diverts stormwater run-off to the surface water pond located in the north western corner of the Site. The surface cover of the Site is approximately 50 % open ground, 20 % infrastructure and 30 % hardstand. The hardstand comprises bitumen and concrete roadways and a carpark, located in the south eastern corner of the Site**.**

A.1.2 Surrounding Land Uses

The surrounding land uses, at the time this report was prepared ,are summarised below:

- ***North***: The Southern Arm of the Hunter River was located approximately 20 m from the northern site boundary which flows in a south easterly direction towards Newcastle Harbour. The strip of vacant land located between the Site and the Hunter River was also reclaimed land comprising of steel works wastes.
- ***South:*** The land adjacent to the southern site boundary was being developed by Energy Australia as an electrical substation.
- ***East:*** Tourle Street bounded the eastern site boundary, beyond which heavy industry was located.
- ***West:*** Steel River Industrial Estate with light industrial facilities was located immediately to the west and south west

A.1.3 Topography and Drainage

The Site is relatively flat with an elevation of approximately 9 mAHD. As discussed above, an open asphalt-lined drain surrounds the majority of the Site (apart from the Site entrance), which diverts stormwater run off to a surface water pond located in the north western corner of the Site. All Site Stormwater is anticipated is run to this stormwater pond.

A.2 Geology

The Geological conditions beneath the Site and the immediate Site surroundings are summarised below:

- ***Fill:*** Fill materials associated with historical emplacement of steelworks wastes was encountered at all investigation locations beneath the Site during the ENSR (2008c) investigation. The full thickness of the fill was penetrated at all locations installed as monitoring wells during ENSR 2008c (MW101-MW106, MW108 and MW201 to MW204), with the exception of BH68/MW107 which met refusal at a depth of 10 m below ground surface (bgs) (noting that this is in the area of the Site which is understood to have been filled on top of Platt's channel). Fill thicknesses ranged from 8.5 m to 10.1 m. Other general wastes (rubbish) were observed in TP13, TP14 and TP53 which are located in the north western portion of the Site.

- ***Estuarine Sediments:*** Estuarine sediments are present beneath the Fill, encountered as a dark brown and grey clay with low plasticity, from depths ranging from 8.5 m. It is noted that a layer of medium grained, dark grey sand was encountered beneath silty clay adjacent to the eastern Site boundary, and also a silty sandy clay containing many shell fragments was observed in MW203, located adjacent to the northern Site boundary. The base of the estuarine sediments was not encountered in any boreholes.
- ***Bedrock***: Bedrock was not encountered during the investigation works although the underlying bedrock is considered to be the Tomago Coal Measures, which is comprised of interbedded sandstones, siltstones and shales.

A.3 Hydrogeology

The hydrogeological conditions encountered during the ENSR (2008c) are summarised below:

- ***Fill Aquifer:*** Perched water within the Fill Aquifer was encountered at a slightly higher level adjacent to the eastern, south eastern and southern site boundaries and also in the centre of the Site. Given the varied nature of the fill beneath the Site (particularly in the southern portion of the Site in the area of the former Platt's Channel) it is difficult to determine a groundwater flow regime as the system is dynamic and subject to change, however at the time the groundwater levels were monitored on 11 August 2008 the groundwater levels indicated that, perched water was lowest adjacent to the northern Site boundary, indicating perched water is generally flowing in a northerly direction towards the Southern Arm of the Hunter River.
- ***Estuarine Aquifer:*** Standing water levels measured in all deeper monitoring wells indicated that the underlying estuarine clay is a semi-confined aquifer (standing water levels had stabilised above the top of the screened section of the well). Water levels in MW2 (adjacent to southern boundary) and MW201 (centre of Site) were considerably higher, indicating that these locations may be under higher pressure than the other locations, although it is noted that the higher level in MW2 may be associated with the contribution of perched water from the Fill Aquifer at this location, based on the well construction.
- Based on the groundwater elevations in both the Fill Aquifer and underlying Estuarine Aquifer, groundwater is inferred to flow generally in a northerly direction towards the Southern Arm of the Hunter River.

A.4 Previous Investigations

A.4.1 Introduction

A summary of the objectives, scope of works and key findings of the previous investigations outlined in **Section 5.0** are presented in the following sections.

A.4.2 ENSR (2008a)

Site Closure Strategy for Site and Kooragang Island Facility, dated 26 September 2008 (reference N4094601_26Sept08)	
Item	**Discussion**
Objectives	• This document was a proposal document outlining ENSR's proposed approach to assessing the environmental conditions of the Site to allow divestment under the Zoning of the Site.
Scope of Works	• The document outlined the environmental Obligations and Regulatory Framework required to be adhered to in preparing the Site for divestment, and also provided a discussion on the Site closure process in regards to planning and potential remediation requirements. • A preliminary Conceptual Site Model (CSM) for the Site was identified outlining identified potential sources, pathways and receptors for Site derived contamination. • The document presented a proposal to undertake a data gap analysis and a preliminary estimate of works required to fill the data gaps.
Key Findings	• Not applicable as this was a proposal document.

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A.4.3 ENSR (2008b)

Data Gap Analysis, Site, dated 29 September 2008 Reference N409460201_29Sept08	
Item	**Discussion**
Objectives	• Provide an updated understanding of the CSM for the Site and to identify any data gaps which may have required further addressing. • Provide recommendations on an appropriate scope of works to close out any identified data gaps.
Scope of Works	Provided a review of the following documentation which existed for the Site: • BHP Engineering, 1998. Environmental Impact Statement Electrolytic Manganese Dioxide Plant, dated May, • Environmental and Earth Sciences, 1990. The Installation of a Groundwater Network, report ref 9013, dated June. • Woodward Clyde, 1997. Site Characterisation & Data Review BHP Manganese, ref A8601117/1 (R001-B.Doc), dated April. • Woodward Clyde April. Site Characterisation & Data Review – BHP Manganese, dated April. • Woodward Clyde May 1997. Steel River Project Remedial Action Plan and Environmental Impact Statement, ref. A8600246, dated May. • Woodward Clyde 1997. Steel River Project Environmental Review and Operational Guidelines, ref. A8601162, dated July. • CMPS & F Environmental, 1997. Australian Manganese Co. Pty Ltd Environmental Due Diligence Audit for Delta S.A (Pty) Ltd, dated August. • CMPS & F Environmental, November 1997. Australian Manganese Co. Pty Ltd Environmental Site Investigation for Delta S.A (Pty) Ltd (ref. VA0087/RP02), dated November. • RCA Australia, 2007. Groundwater and Surface Water Report January 2006 – June 2007, Delta EMD Australia Pty Ltd (ref. 2798E-002/2), dated November. • Raw data provided by Delta relating to groundwater monitoring (including groundwater gauging and analytical results), and groundwater conditions prior to and since Delta's purchase of the Site.
Key Findings	• The status of soil (fill) conditions beneath the Site in relation to inorganic contaminants of concern relating to recent and historical EMD and potential organic contamination associated with historical fill materials beneath the Site were not understood. It was identified that there was the potential for shallow soil/fill contamination associated with recent and historical site activities.

Data Gap Analysis, Site, dated 29 September 2008 Reference N409460201_29Sept08	
Item	**Discussion**
Key Findings (continued)	• The data gap analysis identified insufficient monitoring well coverage across the Site with respect to establishing conditions of groundwater quality within the Fill and Estuarine Aquifers. It was identified that any new wells should be installed to isolate the two aquifers. • It was recommended that monitoring of a number of wells (BH3A, BH3B, BH4A, BH5A, BH5B and BH6) be discontinued. Additional shallow and deep wells were recommended to further assess groundwater flow and groundwater quality within the underlying aquifers. Groundwater samples to be collected from the Fill Aquifer and Estuarine Aquifer to determine conditions of both aquifers across the Site.
Recommendations	• ENSR recommended that a Phase 2 Environmental Site Assessment be undertaken to assess the identified data gaps.

A.4.4 ENSR (2008c)

Phase 2 Environmental Site Assessment, dated 29 September 2008 Reference N4094604_RPT_29Sept08	
Item	**Discussion**
Objectives	• Characterise soil and groundwater conditions beneath the Site (in accessible areas) in relation to the potential contaminants of concern identified within ENSR (2008b). • To prepare a report detailing the scope of works and findings of the Phase 2 ESA.
Scope of Works	• Collection of soil samples from 76 locations across the Site via test pits and boreholes. • Analysis of soil samples from all locations for inorganic compounds (pH, sulphate, sulphide, total sulphur, aluminium, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum and zinc). • Analysis of soil samples from 35 locations for organic compounds (TPH, BTEX and PAHs). Samples for PCBs and OC/OP pesticides analysis were collected from 11 locations across the Site. • Installation of eight additional shallow monitoring wells in the Fill Aquifer, and four deeper monitoring wells in the Estuarine Aquifer. Collection of groundwater samples from 15 shallow and five deeper monitoring wells for laboratory analysis of inorganic and organic compounds. • Perched water from two test pits were also collected for analysis of inorganic and organic compounds. A monitoring well survey was also completed to enable an understanding of groundwater flow conditions beneath the Site. • Assessment of the soil and groundwater analytical results against nominated, NSW DECC endorsed assessment criteria.
Key Findings	• Elevated levels of manganese, greater than nominated assessment criteria of 7500 mg/kg was identified at 69 of the 76 locations tested. • Lead was the only other inorganic compound to exceed its nominated criteria of 1500 mg/kg but only from two locations of the 76 tested. • Exceedances of nominated assessment criteria for organic compounds in soil were limited in extent. Benzo(a)pyrene exceeded its nominated assessment criteria at only three of 35 locations. • Total PAH exceeded its nominated assessment criteria at only two locations (same locations as benzo(a)pyrene). • TPH C_6-C_9 and BTEX compounds were reported at concentrations less than the nominated assessment criteria in all samples tested. • TPH C_{10}-C_{36} was reported at concentrations greater than the nominated assessment criteria at six locations.

Phase 2 Environmental Site Assessment, dated 29 September 2008 Reference N4094604_RPT_29Sept08	
Item	**Discussion**
Key Findings (continued)	• For the Fill Aquifer (including perched water from 2 test pits): - Concentrations of chromium, cobalt, copper, lead and zinc exceeded their nominated assessment criteria, noting that assessment criteria was not available for all inorganic compounds analysed. - pH values ranged from 7.87 to 11.6 and pH values from 14 wells and 2 test pits were outside the nominated assessment range of pH 7 to pH 8.5. - Naphthalene exceeded its nominated assessment criterion at 3 shallow monitoring well locations. No assessment criteria were nominated for TPH, toluene, exthylbenzene and xylene. • For the Estuarine Aquifer: - Concentrations of chromium, cobalt, copper, lead and zinc exceeded their nominated assessment criteria, noting that assessment criteria was not available for all inorganic compounds analysed - pH values from 3 locations were outside the nominated assessment criteria range of pH 7 – pH 8.5. - Naphthalene exceeded its nominated assessment criteria at 3 shallow monitoring well locations. - Where available, the nominated assessment criteria for organic compounds were not exceeded in the Estuarine Aquifer.
Recommendations	This report did not provide any recommendations as it was a factual report.

A.4.5 ENSR (2008d)

Phase 2 ESA Summary, Site, dated 22 October 2008 Reference N4108501_RPT_22Oct08	
Item	**Discussion**
Objectives	• Provide a comparison of soil and groundwater conditions in relation to inorganic and organic compounds of concern analysed during 1997 and 2008 and assess potential contribution of contamination by Deltas EMD activities. • Provide a discussion on the environmental setting of the Site and provide further discussion on the nature of the steel works fill which underlies the Site and provide a discussion on the typical composition of steel works fill anticipated beneath the Site and its surrounding areas.
Scope of Works	• Compilation of relevant 1997 and 2008 data (inorganic and organic results for soil and groundwater). • Statistical analysis of the 1997 and 2008 datasets, including assessment of the following parameters: maximum, minimum and average (arithmetic mean) concentrations and the 95 % Upper Confidence Limit (UCL) calculation for identified relevant compounds in soil. • Compilation of typical steel works fill composition and comparison to the 1997 and 2008 datasets. • Qualitative assessment on subsurface conditions beneath the Site, including a discussion and presentation on the scopes of works completed during each of the 1997 and 2008 investigations. • Preparation of a report, detailing the findings of the above and providing conclusions on the 2008 dataset compared to the 1997 dataset.
Key Findings	• Conditions encountered during 2008 were generally consistent with the 1997 baseline conditions, although due to the higher density sampling strategy, it is considered that the 2008 assessment was more representative of subsurface conditions at the Site compared to the 1997 investigation, as a larger number of soil sample locations, depth ranges and groundwater locations were assessed. • Manganese was the key contaminant of concern associated with the EMD processes and a summary of manganese conditions in soil across Site indicated: - at shallow depths, whilst manganese was elevated, a comparison to the 1997 results indicated that shallow concentrations of manganese had not significantly changed as a result of Delta's operations at the Site between 1997 and 2008. - at depth (> 0.5 m); manganese was generally attributed to the underlying Steel Works fill. - Manganese was present at depth (> 2 m), at lower concentrations compared to the shallower subsurface, although concentrations still exceeded the nominated assessment criterion.

Phase 2 ESA Summary, Site, dated 22 October 2008 Reference N4108501_RPT_22Oct08	
Item	**Discussion**
Key Findings (continued)	• Manganese concentrations at depth were considered to be associated with the steel works wastes. The arithmetic mean concentrations measured during the 2008 Phase 2 ESA were consistent with the typical compositions of steel works wastes present beneath the Site and in the Steel River industrial estate which immediately borders the Site, noting that remediation of deeper soils in the Steel River Industrial Estate had not been undertaken. • With regards to other inorganics in soil: - Elevated concentrations of aluminium and iron present in the subsurface (Fill) were considered to be associated with the steel works fill. - The lead assessment criterion was exceeded at two locations across the Site and all other concentrations were significantly less than the assessment criterion of 1500 mg/kg. • Manganese concentrations with respect to groundwater: - Manganese concentrations in the Fill Aquifer ranged from 0.002 mg/L to 0.849 mg/L; noting that the maximum reported manganese concentration was significantly less than the maximum concentration reported during 1997, and other manganese concentrations were generally less than the 1997 concentrations indicating Deltas EMD processes had not significantly affected groundwater conditions in the Fill Aquifer. - Manganese concentrations in groundwater beneath the Site were consistent with concentrations reported at the Site over the last approximately 20 years as collected by Delta. - With regard to the deeper groundwater within the Estuarine Aquifer, concentrations of manganese were generally greater than those found in the Fill Aquifer, although it was noted that regionally, manganese concentrations in the Estuarine Aquifer were greater indicating conditions beneath the Site may be similar to the adjoining properties. • With regards to other inorganics, conditions were considered to be representative of groundwater conditions in the vicinity of the Site based on the environmental setting of the property and given the surrounding land is comprised of similar steel works wastes. • The CMPS&F (1997) report did not provide sufficient coverage of organic concentrations and given the larger dataset for organic compounds in the subsurface, the 2008 dataset was considered to be more representative of conditions in relation to organic compounds in the subsurface:

Phase 2 ESA Summary, Site, dated 22 October 2008 Reference N4108501_RPT_22Oct08	
Item	**Discussion**
Key Findings (continued)	- Total TPH (C_{10}-C_{36}) was identified as exceeding the criterion value of 1000 mg/kg in the shallow subsurface at six of 68 samples collected across the Site. Statistical analysis, however, indicated that the 95% UCL for each of the different depth intervals assessed were below the assessment criterion of 1000 mg/kg indicating the areas of elevated TPH concentrations were localised. - Total PAH were identified as exceeding the criterion value of 100 mg/kg in only two of 68 samples collected across the Site. Statistical analysis however indicated that the 95% UCL for each of the different depth intervals assessed was below the assessment criterion of 100 mg/kg, indicating the two assessment criterion exceedences represented localised areas of PAH impact. - Benzo (a) pyrene exceeded its assessment criterion of 5 mg/kg at four of 68 samples collected across the Site at depths ranging from 1 m to 2 m bgl. For the depth intervals 0-0.1 m, 0.5 – 2 m and 2 – 10 m, the 95 % UCL's are below the guideline value of 5 mg/kg. The 95 % UCL for the depth interval 0.2-0.5 m is calculated as 5.1 mg/kg was approximately equivalent to the guideline value of 5 mg/kg. • Elevated concentrations of TPH and BTEX were observed in the Fill and Estuarine Aquifers in 2008. Delta's use of organic compounds on the Site was restricted to only a few locations and potential impacts would have been limited to the shallow subsurface. Based on this, and the fact that the underlying fill represents a potential source of organic contamination, ENSR considered organic impacts to groundwater to be associated with historical fill materials. It is also considered likely that impacted groundwater may be migrating onto the Site from up-gradient waste fill locations.
Recommendations	This factual report did not provide any recommendations.

A.4.6 AECOM 2009a

Data Interpretation and Outline Remediation Strategy, dated 15 May 2009 Reference N4113201_Rpt_15May09.doc	
Item	**Discussion**
Objectives	Provide Delta with an Outline Remediation Strategy (ORS) for the Site, with a view to best managing previously identified subsurface contamination at the Site to enable divestment under the current Site zoning, with a non-statutory site audit statement (SAS) from an Auditor for ongoing industrial/commercial land use.
Scope of Works	• Identification of Environmental Obligations and Regulatory Framework. • Interpretation of ENSR's 2008 documentation, to assess the soil and groundwater results in the context of the objectives for the Site. • Assessment of the potential significance of analytes identified at elevated concentrations in ENSR (2008b), and preparation of the Conceptual Site Model (CSM). • Provision of a preliminary discussion on potential risks from the Site. • Preparation of an outline remediation strategy for the Site.
Key Findings	• Most analytes in soil and groundwater on the Site were less than the nominated soil investigation levels or were present in a small number of isolated locations (for example PAH and TPH). • Manganese however, was identified as the key contaminant of concern in soil as it is present at concentrations in excess of the nominated investigation level (IL) of 7500 mg/kg. Aluminium, barium, iron and sulphate were also identified at elevated concentrations, although no ILs were established for these compounds. • Manganese concentrations were also elevated in groundwater from the Estuarine and Fill Aquifers, and some TPH and PAHs were also reported in groundwater. • In relation to potential contaminants of concern analytes in groundwater, a preliminary qualitative risk assessment and consideration of the CSM indicated a relatively low risk to environmental and human health receptors. For the purposes of remediation strategy development it was not anticipated that groundwater remediation would be required, although this was to be determined through further risk assessment (i.e. this document). • Of the analytes present in the soil (fill), manganese represented the limiting factor for remediation of the Site, mainly given the large concentrations in the subsurface. • A preliminary remedial strategy was devised, but a final strategy would be subject to completion of this current risk assessment document.

A.4.7 AECOM (2009b)

Human Health and Ecological Screening Risk Assessment, dated TBA Former Electrolytic Manganese Dioxide Plant, McIntosh Drive, Mayfield, NSW	
Item	**Discussion**
Key objectives	• Assess whether identified contamination present in Site soil and groundwater posed an unacceptable risk to the health of occupants of the current Site office and future Site industrial users or to the off-site environment (the key receptor being the Southern Arm of the Hunter River). • Provide recommendations with respect to areas of the Site which may pose an unacceptable risk to human health or local ecology, in order to assist with the planning and/or design of further assessment or remediation works at the Site (if necessary).
Scope of Works	• Undertake a human health risk assessment based on soil and groundwater chemical monitoring data. • Undertake a screening ecological risk assessment using soil and groundwater monitoring data.
Key Findings	• Using the maximum concentrations reported during ENSR (2008c), marginal exceedences of the risk acceptability criterion for potential Site industrial and commercial worker exposures to manganese and other CoPC (TPH and PAHs), were identified. This was however considered to be a conservative assessment and remediation of soils was not considered to be necessary. To further support this conclusion, a sensitivity analysis was conducted for the on-Site receptors, using the 95%UCL (mg/kg) for concentrations of manganese (ENSR, 2008c). Surface concentrations of 50,218 mg/kg and subsurface concentration of 24,002mg/kg derived a lower Chronic Hazard Index for Maintenance Worker 1 (average exposure) of 0.24 and for Maintenance Worker 2 (reasonable maximum exposure) of 0.45. For Adult Commercial Worker 1(average exposure) the Chronic Hazard Index was reduced to 1.5 and for Maintenance Worker 2 (reasonable maximum exposure) the Chronic Hazard Index was 2.1.
	• A review of groundwater seepage results for the river bank down gradient of the Site indicated that whilst recent monitoring has not occurred, previous monitoring of manganese between 1996 and 2004 indicated that in general, with the exception of 3 minor exceedences, manganese concentrations were below 0.15 mg/L. The value of 0.15 mg/L was the EPL trigger requirement for manganese, for Site discharge to the Hunter River. Seepage results from June 2009 indicated manganese seepage concentrations of 0.015 mg/L in to the river, and a low concentration of PAH, with no TPH or BTEX compounds reported above the LOR. Given groundwater conditions in respect to manganese, and other inorganic and key organic compounds of concern (PAHs and TPH) had remained stable over a longer monitoring period, seepage results would be considered to be stable also.

Human Health and Ecological Screening Risk Assessment, dated TBA Former Electrolytic Manganese Dioxide Plant, McIntosh Drive, Mayfield, NSW	
Item	**Discussion**
Key Findings (continued)	• The Southern Arm of the Hunter River was identified as the key ecological receptor for Site derived contamination. Whilst concentrations of manganese PAHs and TPH are elevated in groundwater beneath the Site, it was noted that with respect to potential impact on the Hunter River, groundwater exiting the Site is required to migrate through a strip of land located between the northern Site boundary and the river, which was considered to be a potential source of similar inorganic and organic contaminants of concern as those identified for the Site.
	• Future management of the Site's soil and groundwater contamination was identified to be via a Site Management Plan (SMP).

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Appendix B

SMP Acknowledgement Record

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PROJECT PERSONNEL LIST AND SMP PLAN ACKNOWLEDGMENT RECORD

Project staff must sign the master copy of this document, indicating they have read and understand it. The employee's signature indicates acceptance and compliance with the requirements of the Site Management Plan (SMP). Copies of this document must be made available for their review and readily available at the job site.

LOG OF PROJECT PERSONNEL

Date	Name	Company Name	Signature

Date	Name	Company Name	Signature

Appendix C

Site Inspection Report (During Intrusive Works)

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SITE INSPECTION REPORT FOR SUBSURFACE WORKS

Report Distribution		
Site / Area:		Date:
Reported By (print):	(sign):	Time:
Weather Conditions:		Wind Speed:

Site Inspection Record	
Item	**Comments (Include any immediate corrective actions undertaken)**
Have all persons on site received induction and environmental training?	
Are all erosion control measures in place?	
Are sedimentation basins in good condition?	
Are filter fences in good condition?	
Are all drains and bunds clear?	
Is the quality of water leaving the site good?	
Water quality and erosion control comments:	
Are dusty conditions observed? If yes, what operations are creating dust?	
Are odorous conditions observed? If yes, what operations are creating odour?	
Are internal and external roads free of dust and tracking marks?	
Are all trucks entering and leaving the site covered?	
Are all stockpiles moist and/or covered and/or protected and/or bunded?	

Site Inspection Record	
Item	**Comments (Include any immediate corrective actions undertaken)**
Dust control comments:	
Are any adverse noise conditions occurring on site? Noise Comments:	
Are all fuels and chemicals stored correctly and in appropriately bunded areas?	
Are bunds free of stormwater, and are gate valves locked?	
Is spill kit adequately stocked?	
Are any spills/leaky drums or plant noted?	
Other Issues / General comments:	

Note: If immediate corrective action could not be undertaken to remedy situation, please initiate Non-Conformance and Corrective Action Report.

Appendix D

Materials Tracking Register

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MATERIALS TRACKING REGISTER

Date	Description of Material	Amount	Destination	Verification (Name/Initials)

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Date	Description of Material	Amount	Destination	Verification (Name/Initials)

Appendix E

Non-conformance and Corrective Action Reports

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AECOM

NON-CONFORMANCE AND CORRECTIVE ACTION REPORT

Report Distribution	
Date:	
Time:	
Reporter Name:	
Report Signature:	
Site / Area:	
Non-Conformation Details	
Non Conformance:	
Cause:	
Report to (Site Owner / Occupier (Name)):	:
Corrective Action:	
Signed by Operational Staff upon completion:	
Feedback Response to Prevent Future Occurrences	
Date:	

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Appendix F

Complaints and Environmental Incidences Register

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COMPLAINTS AND ENVIRONMENTAL INCIDENCES REGISTER

Report Distribution:

Date	Time	Type of communication	Name, address contact ph of complainant	Nature of complaint	Response/ Corrective Action	Date of Response	Date Complainant Notified of Response Taken	Signature/ Position

Date	Time	Type of communication	Name, address contact ph of complainant	Nature of complaint	Response/ Corrective Action	Date of Response	Date Complainant Notified of Response Taken	Signature/ Position

Note: Should a complaint or incident identify a non-conformance that is not able to be immediately rectified, please initiate a Non-Conformance and Corrective Action Report.

Appendix G

Register of Intrusive/Subsurface Works

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REGISTER OF INTRUSIVE WORKS

Report Distribution	
Date works started and time:	
Reporter Name (Supervisor):	
Nature of works	
Surface Conditions at Start	
Depth of Intrusive Works	
Details on any encountered visual soil or groundwater contamination.	
Details on reinstatement methods and observations	
Requirement for environmental Professionals – details.	
Compliance with SMP met?	
Date works completed and time:	
Reporter Signature:	

AECOM

Worldwide Locations

Australia	+61-2-8484-8999
Azerbaijan	+994 12 4975881
Belgium	+32-3-540-95-86
Bolivia	+591-3-354-8564
Brazil	+55-21-3526-8160
China	+86-20-8130-3737
England	+44 1928-726006
France	+33(0)1 48 42 59 53
Germany	+49-631-341-13-62
Ireland	+353 1631 9356
Italy	+39-02-3180 77 1
Japan	+813-3541 5926
Malaysia	+603-7725-0380
Netherlands	+31 10 2120 744
Philippines	+632 910 6226
Scotland	+44 (0) 1224-624624
Singapore	+65 6295 5752
Thailand	+662 642 6161
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Venezuela	+58-212-762-63 39

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Appendix H

Visual assessment

H.1 Introduction

This appendix provides an assessment of the potential visual impacts of the proposal. It assesses the visual impacts at private receptors and public vantage points as required by the Secretary's environmental assessment requirements (SEARs).

H.2 Visual character

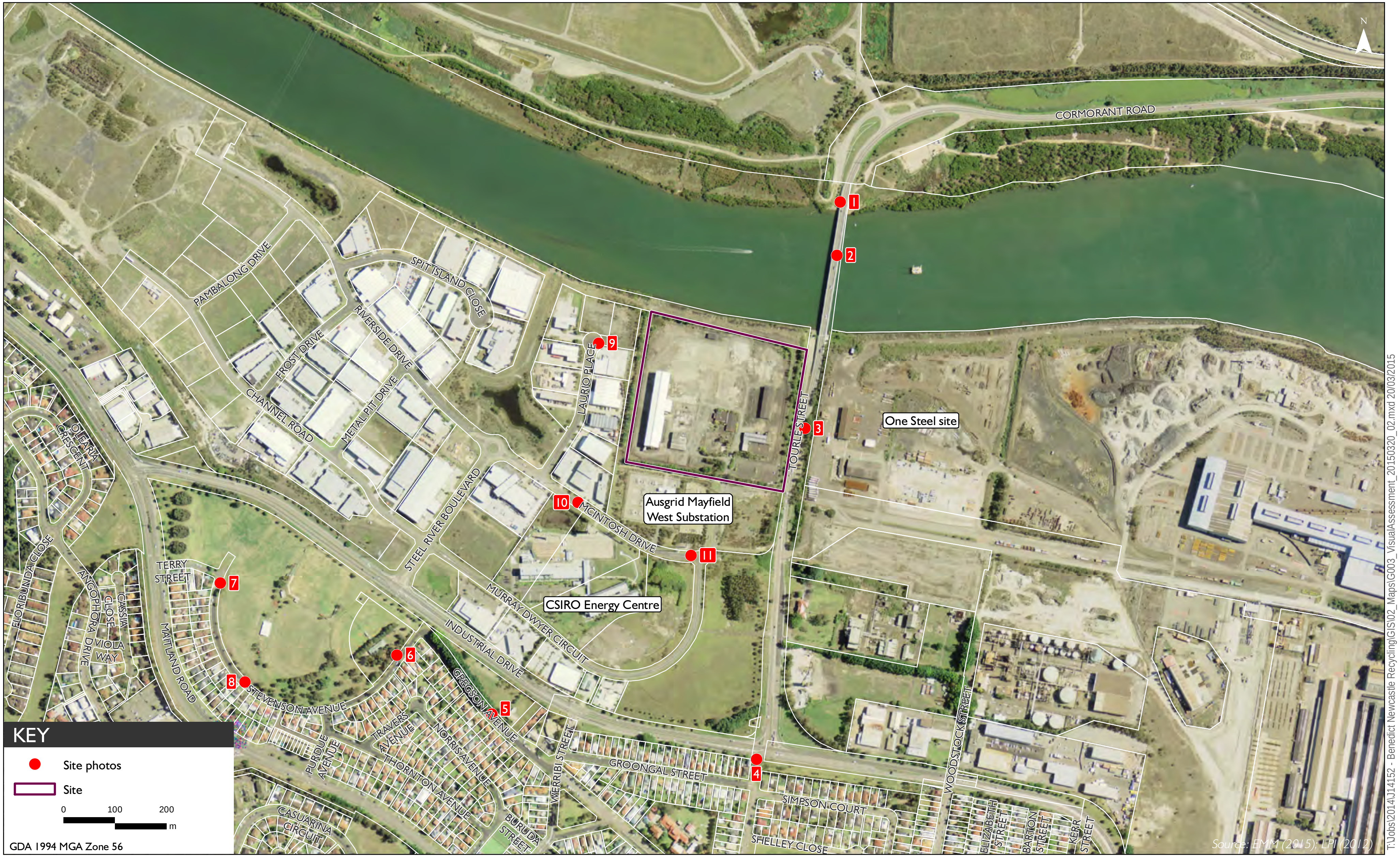
The visual character of the land surrounding the site is predominantly industrial with industrial properties located directly to the west and south of the site as well as east of Tourle Street and north of the Hunter River. Other dominant visual features surrounding the site include the Hunter River and adjoining vegetated areas to the north; and major roads Tourle Street and Industrial Drive to the east and south, respectively. The closest residential area is in Mayfield West on the far side of Industrial Drive approximately 500 m south of the site.

The visual character of the site and surrounds is shown in Photograph H.1.

Photograph H.1 Local visual character

H.3 Viewpoints

Two types of viewpoints were assessed for visual impact assessment: public vantage points and private receptors, including industrial and residential properties. The assessed viewpoints are shown in Figure H.1.



EMM EMGA Mitchell McLennan

Visual assessment locations

Mayfield West Recycling Facility

Environmental Impact Statement

Figure H.1

H.3.1 Public vantage points

i Hunter River

Views to the site from the Hunter River are shown in Photograph H.2. The main processing shed is visible from this viewpoint, though vegetation screens the remainder of the site. Moving from the north side of the river to the south side, the views of the site are increasingly blocked by the steep south bank of the river that is about 10 m high.

Proposed additional vegetation planting along the northern boundary of the site will provide improved screening of the site from views from the Hunter River although the existing roof of the main processing shed will remain visible. The tops of stockpiles in the north of the site (up to 7 m high) may be visible prior to the full establishment of landscaping plantings of Casuarina sp. The external stockpiles on site will contain of concrete (or similar) or wood and will be brown to grey and without stark colour contrasts and will have a low visual impact. Co-mingled and other waste stockpiles that may contain material with a range of colours (and therefore look more like 'rubbish') will be within existing buildings. These will not be visible from the Hunter River.

Photograph H.2 Viewpoint 1 – Hunter River north bank, west of Tourle Street Bridge

ii Tourle Street Bridge

A view to the site from the centre of Tourle Street Bridge is shown in Photograph H.3. Elements of the site including the main processing shed are visible from the south-bound traffic lane and the cyclepath on the east side of Tourle Street Bridge. Views are partially obstructed by vegetation, vehicle movements and the bridge railing. Drivers and passengers in north-bound vehicles have to look over their shoulder to have a view of the site.

Under the proposal, additional vegetation planting will provide improved screening of the site from this viewpoint though the roof of the main processing shed will remain visible and the tops of concrete (and similar) and wood stockpiles may also be seen until the full establishment of landscaping plantings of Casuarina sp along the northern boundary of the site.

RMS proposed to duplicate of Tourle Street bridge. The second bridge will be constructed on the west side of the existing bridge and will be used by north-bound traffic. This will further obscure views to the site from south-bound vehicles.

Photograph H.3 Viewpoint 2 – Tourle Street Bridge, photo taken from cyclepath on eastern side

iii Tourle Street (south of Hunter River)

Existing vegetation and the topography along the eastern boundary of the site screens the site from viewpoints on Tourle Street, south of the Hunter River. No views of the site are present and this will not change under the proposal.

Photograph H.4 Viewpoint 3 – Tourle Street, south of Hunter River

iv Industrial Drive

Views to the site from Industrial Drive are screened by vegetation and topography. No views of the site are present and this will not change under the proposal.

Photograph H.5 Viewpoint 4 – Industrial Drive, at corner of Tourle and Groongal Streets

H.3.2 Private receptors

i Residential properties

The nearest residential properties are located on Gregson Avenue. The roof of the main processing shed is visible from these locations, as shown in Photograph H.6, though it is partially obstructed by vegetation and neighbouring industrial properties. Residential properties on Terry Street and Stevenson Avenue also have partial views of the upper portion of the main processing shed as shown in Photograph H.7 to Photograph H.9. The proposal will not change the main processing shed structure or external appearance and will therefore have no visual impact at these residential properties.

Views to the site from residential properties on Groongal Street are screened by an existing 1.8 m fence and vegetation.

ii Industrial properties

Neighbouring industrial properties include light industrial buildings to the west and south-west of the site on Laurio Place and Ausgrid Mayfield West Substation to the south on McIntosh Drive. Existing elements of the site are visible from some locations on these properties. However, existing vegetation along the site boundaries provides low to moderate screening from the west and high screening from the south.

Additional plantings under the proposal will improve screening of the site from the west, though it is likely that some views, particularly of the main processing shed, will remain.

Photograph H.6 Viewpoint 5 – Gregson Avenue

Photograph H.7 Viewpoint 6 – corner of Terry Street and Stevenson Avenue

Photograph H.8 Viewpoint 7 – Stevenson Avenue (west)

Photograph H.9 **Viewpoint 8 – Stevenson Avenue (east)**

Photograph H.10 **Viewpoint 9 – end of Laurio Place**

Photograph H.11 Viewpoint 10 – McIntosh Drive

Photograph H.12 Viewpoint 11 – McIntosh Drive, near intersection with Murray Dwyer Circuit

H.4 Management measures

Management measures that will be implemented during construction and operations to minimise visual impacts will include:

- Casuarina sp. will be planted along the northern boundary and the northern section of the western boundary of the site to mitigate visual impacts from viewpoints to the north, north-east and west;
- the visual appearance of the site entrance on McIntosh Drive will be improved and the area will be kept tidy;
- rubbish from around the site boundaries will be removed;
- further vandalism and graffiti within the site will be greatly reduced due to the passive security provided by activities on the site; and
- illegal dumping is expected to be reduced as the facility will provide an accessible alternative for disposing of many recyclable wastes.

H.5 Visual impact assessment

The proposal is unlikely to have significant visual impacts given that it is located within an existing industrial estate and is consistent with the visual character of the area. Further, the proposal will result in improved screening of the site through the planting of vegetation along the northern boundary and northern-end of the western boundary where existing vegetation is sparse.

Partial views of the upper portion of the main processing shed will remain from viewpoints due to its height. However, these will generally be unchanged from the existing views.

The tops of concrete (and similar) and wood stockpiles in the north of the site may also be visible from public vantage points on Hunter River and Tourle Street Bridge prior to the full establishment of landscaping plantings of Casuarina sp. The only external stockpiles will contain of concrete (or similar) or wood and will be brown to grey and without stark colour contrasts and will have a low visual impact.

Therefore, there will be no additional visual impacts and no loss of visual amenity expected as a result of the proposal.

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