Response to Submissions

Penrith Waste Recycling and Transfer Facility

Prepared for Benedict Recycling | November 2018

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Penrith Waste Recycling and Transfer Facility | SSD 16_7733

Prepared for Benedict Recycling | 15 November 2018

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Response to Submissions

Final

Report J16099RP2 | Prepared for Benedict Recycling | 15 November 2018

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1 Introduction

1.1 Proposal overview

Benedict Recycling Pty Ltd (Benedict Recycling) proposes to construct and operate a waste recycling and transfer facility (the facility) at 46-48 Peachtree Road, Penrith (the site). The facility will have a capacity of up to 180,000 tonnes per annum (tpa) of general solid (non-putrescible waste), including pre-classified waste types from construction and demolition works, selected commercial and industrial waste, spoils, soils, council clean-ups, hand unloaded household waste, green and wood wastes and virgin natural excavated materials, the waste will be sorted into stockpiles suitable for processing at other facilities.

Segregated recycled materials will be transported to other Benedict Recycling sites or sold to other recycling firms for processing. These include ferrous and non-ferrous metals, paper and cardboard, masonry (concrete, bricks, tiles asphalt gyprock, fines, etc) and plastics. Products will meet recycled feedstock specifications while recovering a range of materials that would otherwise go to a lower order use or be disposed to landfill. It is not proposed to process, screen, compost, crush or shred any waste onsite.

The facility will provide a convenient and cost-effective recycling solution for the area. The facility will service the Penrith and western Sydney area, which is flagged for an increase in residential, industrial and infrastructure investment, generating demand for waste disposal. The facility will provide an environmentally beneficial means of dealing with non-putrescible general solid waste, with approximately 95% of materials sent on for processing and recovery.

Benedict Recycling’s products are turned into valuable sustainable products and sold back into the industry for use in a variety of applications. Timber, concrete, brick, soil and sand are processed to make recycled soil, aggregate, recycled bedding sand for pipe laying, wood mulch and road base. These products have been utilised in major Sydney project, including the Barangaroo Development, WestConnex M4 widening, M2 upgrade, NorthConnex, Wet n’ Wild Recreational Park, Sydney Olympic Park and thousands more.

1.2 Development application

Approval for the facility is being sought under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) as a state significant development (SSD).

The Secretary’s Environmental Assessment Requirements (SEARs, SSD 7733) for the proposed facility were first issued by the NSW Department of Planning and Environment (DPE) on 26 July 2016.

The *Penrith Waste Recycling and Transfer Facility Environmental Impact Statement* (EIS) was prepared by EMM Consulting Pty Limited (EMM 2017), with input from a range of specialists. It was prepared in accordance with the requirements of DPE and other government agencies, including Penrith Council (Council) as provided in the SEARs.

The EIS was placed on public exhibition for 30 June to 14 August 2017 (45 days). Hard copies were displayed at Department of Planning and Environment’s (DPE) information centre in Sydney and Council’s offices in Penrith. Electronic copies of the EIS were available from the DPE website.

An overview of submissions is provided in Chapter 2, with Chapters 4 and 5 responding to submissions.

1.3 Updated proposal

1.3.1 Summary of changes

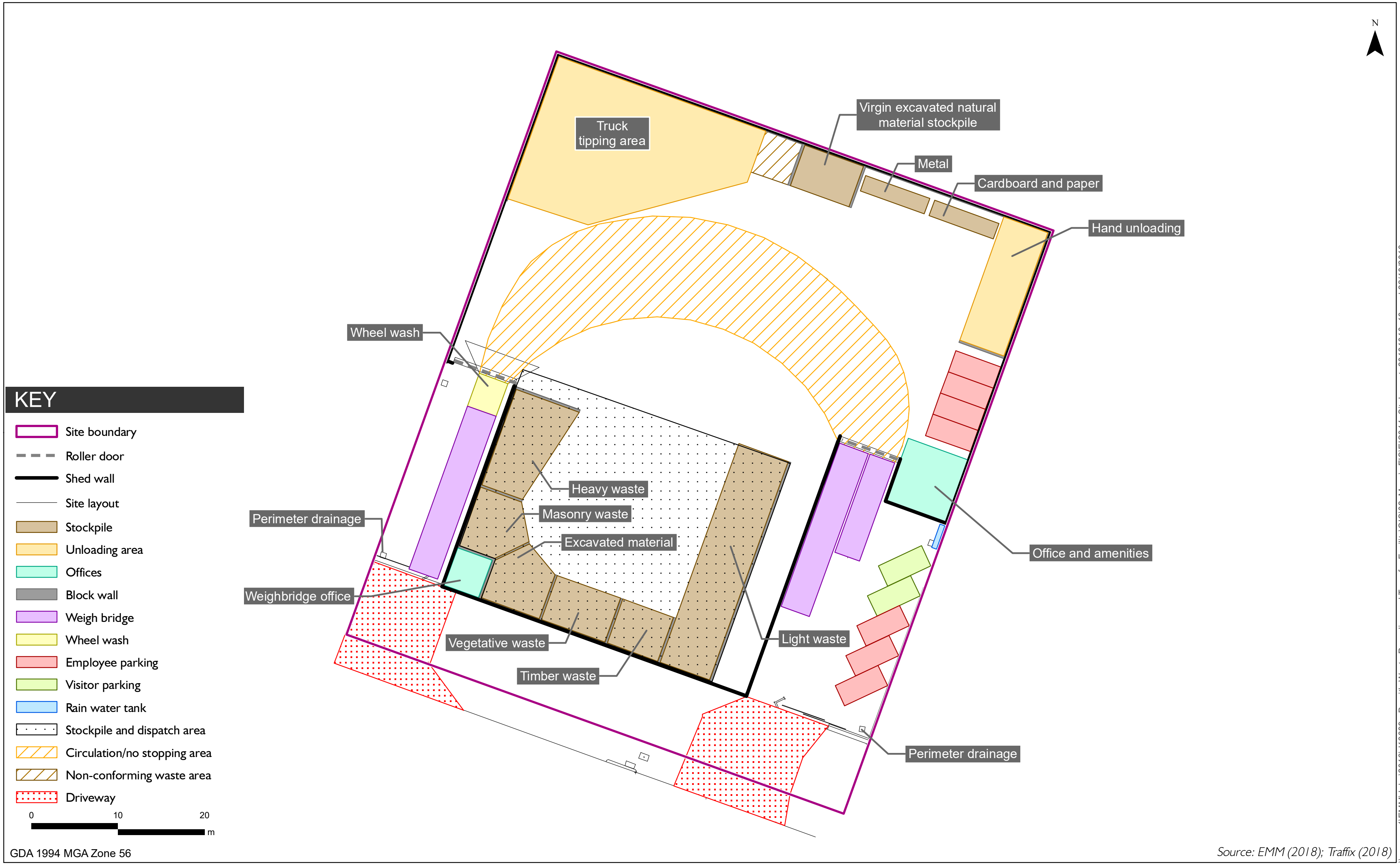
The proposal has been updated to address feedback from community members and agencies received during the public exhibition. While the use of the proposal is the same, being a waste recycling and transfer facility, the built form has been improved to reduce potential impacts, with operational details adjusted as required. The changes are summarised in Table 1.1, below and included in updated plans at Appendix A. A site layout is provided at Figure 1.1.

Table 1.1 Summary of changes

Change	Impact
A 9 m–13 m shed now encloses the operational area of the site.	The shed reduces acoustic, air quality and water quality impacts, as discussed in Sections 3.2, 3.3 and 3.1.
Bunding of shed.	The base of the shed will comprise a 0.1 m kerb, including entrances, bunding the site to capture firewater.
No screening/picking operations.	Materials will be generally sorted by type of material without the use of specialised equipment (ie picking line or similar). This will reduce noise impacts and employee requirements by one.
General rearrangement of tipping and stockpile areas: • truck unloading (north-west); • small vehicle unloading (north-east); • stockpiling and truck loading (south); and • clear circulation (centre).	The internal areas have been designed to minimise interactions between pedestrians, light, heavy and operational vehicles.
Revised stockpile types and sizes.	Stockpiles have been revised to accept more generalised materials due to the removing of specialised processing equipment (eg picking lines and screeners), discussed in Section 1.3.2.
All exiting traffic will leave via a wheel wash and weighbridge.	The universal use of the wheel wash will reduce material brought off the site and improve stormwater quality.
Realignment of driveways.	Queuing vehicles will remain in the site. Vehicles leaving the site have will require less clear space in the street.
No overnight parking.	Reduced traffic impacts.
No oxygen or acetylene stored on site.	Reduced hazardous and dangerous goods impacts.
Normal hours of operation: Deliveries and dispatching: Monday to Friday: 6 am to 10 pm Saturday: 6 am to 5 pm Sunday: 8 am to 4 pm Public holidays: closed Material sorting: Monday to Friday: 6 am to 10 pm Saturday: 7 am to 6 pm Sunday: no sorting Public holidays: closed	Certainty of the normal operational hours per year.

Table 1.1 Summary of changes

Change	Impact
Waste acceptance campaigns: Six two-week 24-hour operational periods per year, including deliveries, dispatching and material sorting.	Certainty of maximum operational hours during a year.
Maximum of 1,500 tonnes of material accepted per day. Maximum of 180,000 tonnes material accepted per year.	Certainty of maximum impacts during a day/year.



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Site layout

Penrith Waste Recycling and Transfer Facility

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Figure 1.1

1.3.2 Revised layout

A revised layout is provided in Figure 1.1, with changes explained below.

As noted in Table 1.1, enclosure of the operational area of the site has provided the opportunity to consolidate aspects of the tipping, stockpiling, amenity and travel paths areas. This process has led to a simpler and more efficient layout that will allow for material to be moved through the site with minimal opportunities for conflict between customers and operational activities.

i Stockpile types and sizes

Proposed stockpiles for the project were discussed in EIS Section 2.7 and Table 2.5, as extracted below in Table 1.2.

Table 1.2 Original maximum stockpile sizes (as extracted from EIS Table 2.5)

Waste/stockpile type	Average tonnes per day (t)	Maximum stockpile volume (m^3)
Excavated soils	198	210
Screened fines	156	100
Oversized materials/aggregate	114	130
Vegetative waste (covered)	30	200
Metals	12	20
Light waste (covered)	90	300
Hand unloading area	na	50
Truck tipping area	na	500

Stockpiles have been revised to reflect the combination of stockpiles required with the removal of specialised processing equipment (eg picking and screening) from the site. Stockpiles have been further identified to describe the primary pre-classified waste types, as defined by *Waste Classification Guidelines (Part 1: Classifying waste)* (EPA 2014) (waste classification guidelines), that will be permitted in each stockpile.

Note that the stockpile types reflect the standard anticipated distribution of materials, which will be refined to meet the waste requirements of the day, as discussed in Section 4.1.3.

The primary pre-classified waste types include:

- building and demolition waste;
- virgin excavated natural material;
- paper or cardboard;
- garden waste;
- wood waste;
- mixed pre-classified waste; and

- household waste from municipal clean-up that does not contain food waste.

As discussed in EIS Section 2.2.1 and 2.2.3, the project will accept general solid waste (non-putrescible), as defined by the waste classification guidelines. Materials will be sourced from building and demolition sites, commercial and industrial sites, skip bins, council clean ups, hand unloaded household waste, and excavated materials and spoils (eg soils).

The waste classification guidelines classify waste through six steps. Waste accepted by the facility will not be special waste (step 1), liquid waste (step 2) or hazardous waste (step 4). Waste will generally be a type of general solid waste (non-putrescible) pre-classified waste (eg bricks, VENM, or other waste types discussed in Section 1.3) (step 3). The waste classification guidelines also provide methods for classifying non-pre-classified waste types as general solid waste (non-putrescible) (steps 5 and 6).

If waste is not classified by steps 1–4, waste generators are responsible for determining if waste meets the waste classification guideline's definitions general solid waste (non-putrescible), as outlined in steps 5 and 6 of the waste classification guidelines, and may define their waste as such if they:

- Step 5: chemically assess their waste as per the waste classification guide's standards, or are otherwise certain that the waste is general solid waste and that relevant potential contaminants are not present in their waste; and

- Step 6: are certain that the waste:

    - does not readily decay under standard conditions, does not emit offensive odours and does not attract vermin or other vectors (such as flies, birds and rodents);

    - has a specific oxygen update of less than 1.5 milligrams O_2 per hour per gram of total organic solids at 20 degrees Celsius;

    - is such that, during compositing (for the purpose of stabilisation), the mass of volatile solids in the organic waste has been reduced by at least 38%; or

    - has been treated by composting for at least 14 days, during which time the temperature of the organic waste must have been greater than 40 degrees Celsius and the average temperature greater than 45 degrees Celsius.

The waste classification guidelines acknowledge that the pre-classification of waste (step 4) does not classify all types of general solid waste (non-putrescible). It does not appear to be the intent of the waste classification guidelines to restrict facilities such as the proposed facility from accepting only certain specifically pre-classified waste types, within the broad general solid waste (non-putrescible) categories.

By accepting general solid waste (non-putrescible) generally, and with a waste quality management plan (discussed at Section 4.4.2), the facility will enable the recovery of a wider range of materials and reducing the amount of material sent to landfill.

Table 1.3 Revised stockpile size and type

Stockpile	Primary general solid waste (non-putrescibles) waste classification types	Likely maximum tonnes per day (t)	Maximum stockpile volume (m^3)
Heavy waste area	Building and demolition waste	405	125
Masonry waste area	Building and demolition waste and associated materials from non-building and demolition activities (eg bricks, concrete and similar materials)	190	125
Vegetation waste area	Garden waste Wood waste Non-putrescible vegetative waste	30	75
Timber waste area	Building and demolition waste Wood waste	75	75
Light waste area	Mixture of General solid waste (non-putrescible)	210	450
Metals bin	Building and demolition waste Metal	75	32
Cardboard bin	Building and demolition waste Paper or cardboard	15	32
Excavated materials area	Excavated material/soils that meets general solid waste (non-putrescible) requirements	195	125
VENM area	Virgin excavated natural material	315	50
Hand unloading area	Mixture of general solid waste (non-putrescible)	n/a	125
Truck tipping area	Mixture of general solid waste (non-putrescible)	n/a	600
Non-conforming waste area (bins)*	Non-conforming waste	n/a	5

Notes: 1. Non-conforming waste is not proposed to be accepted on site. The process for handling and removing non-conforming waste is discussed at section 4.1.3.

2. Tipping areas and non-conforming waste areas do not have maximum tpd figures, as they are transitional areas.

ii Separated light vehicle area

The EIS proposed a hand unloading and light vehicle stacking area at the centre of the site, separated from visitor parking and amenities. This was required due to limitations associated with the existing structures on the site, including difficult-to-access amenities. This issue has been resolved with the updated proposal.

The updated proposal moves the hand unloading area to the north-eastern area, adjacent to a pedestrian access way near amenities. Stacking within the operational area is not proposed. This is an improvement over the original design, as it will segregate light vehicles from the travel paths of heavy and operational vehicles and provide pedestrian access to amenities.

iii Customer and operational vehicle path crossover

The travel paths presented in the EIS included multiple crossovers between customer and operational vehicles. This was required due to limitations associated with processing equipment and existing structures on the site. This issue has been resolved with the updated layout.

The primary customer and operational vehicle path crossover will be between the centralised stockpile area at the south of the site and the truck tipping area to the north-west of the site. No customer vehicles will be permitted to enter the circulation area while site plant (front-end loader (FEL) and excavator) are travelling through the area. This will be enforced by site employees, all of whom will be trained in traffic controlling.

As described in the EIS, material from the hand unloading area will be collected at the end of each day, minimising the need for plant to approach the light vehicle area.

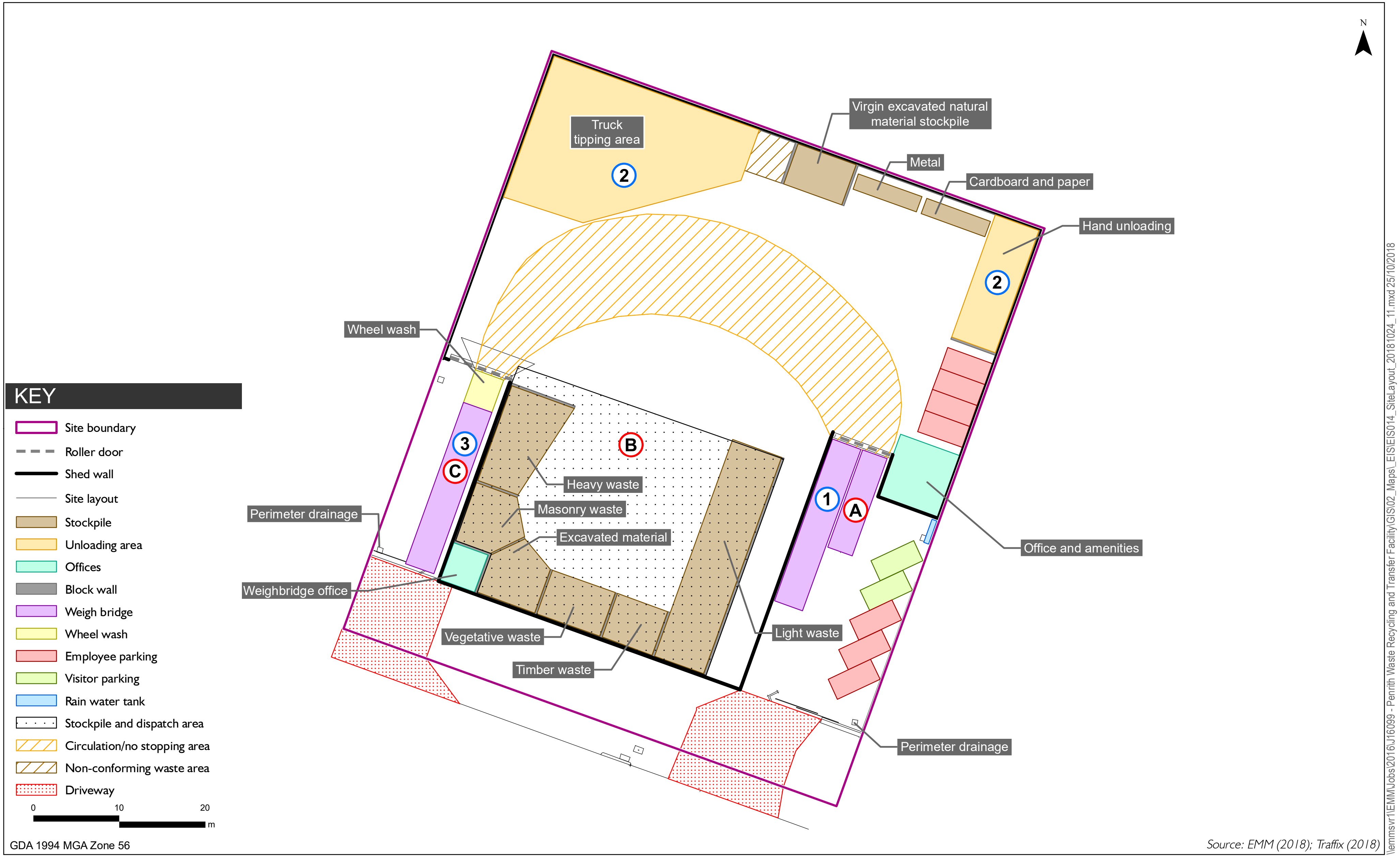
iv The waste recycling process

The waste recycling process for the original proposal was discussed in Section 2.4 of the EIS. This included a step-by-step description of activities, accompanied by an annotated site plan. This has been updated in Table 1.4 and Figure 1.2, which now focus only on delivery and dispatching movements. This process is simpler with the removal of specialised screening equipment or picking lines, with processing being limited to sorting and moving waste types directly to stockpiles.

Table 1.4 Delivery and dispatching activities

Task	Time to complete task
Delivery	
1. Incoming vehicles will enter the site and be weighed and inspected at the weighbridge. Any loads suspected to contain material that cannot be accepted by the site will be rejected and directed to the exit weighbridge.	2 minutes
2. Vehicles will travel to the tripping areas and be unloaded and inspected. A docket will be issued. If unacceptable waste is identified, they will be re-loaded and directed to the exit weighbridge.	8 minutes
3. Outgoing vehicles will be weighed and invoiced at the weighbridges and leave the site.	2 minutes
Total time on site:	12 minutes
Dispatching	
A. Incoming empty vehicles will enter the site and will be weighed at the weighbridge.	2 minutes
B. Vehicles will travel to the stockpile area and be loaded from stockpiles as required, receive a docket and travel to the weighbridge.	10 minutes
C. Outgoing vehicles will be weighed and invoiced if necessary at the weighbridge and leave the site.	2 minutes
Total time on site:	14 minutes

Notes: 1. Times extrapolated from weighbridge data collected at the Benedict Industries site at Chipping Norton.



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Updated site operational flow

Penrith Waste Recycling and Transfer Facility

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Figure 1.2

2 Submission analysis

2.1 Submissions received

During public exhibition of the EIS, submissions were received from:

- eight government agencies:
  - Penrith Council;
  - Department of Primary Industries;
  - Environment Protection Authority;
  - Fire and Rescue NSW;
  - Heritage Council of NSW;
  - Office of Environment and Heritage;
  - Roads and Maritime Services; and
  - Sydney Water.
- 21 individual community members;
- seven businesses:
  - Boyuan Holdings Limited (as future owner of Peachtree Hotel);
  - Hunter Valley Training Company;
  - J&M Burrowes Superannuation Fund (as owner of 44 Peachtree Road);
  - Murrays Sandwich Shop;
  - Sigra Technology Australia;
  - SJB Planning on behalf of Lion Dairy and Drinks; and
  - Trans Vent Spiral Tubing.

All submissions are available on DPE's website:

http:// www.majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7733

In its letter dated 23 August 2017 (DPE RTS request), DPE requested that the proponent address the matters raised in the submissions and provided several additional matters to be addressed.

2.2 Analysis of government and infrastructure provider submissions

Of the eight agency submissions received, three raised no issue (Heritage Council, OEH and Sydney Water), three made general recommendations (DPI, FRNSW and RMS), one requested minor changes and clarifications (Penrith Council) and one recommended refusal due as the facility was not fully enclosed (EPA).

Table 2.1 provides an overview of the outcomes of these submissions.

Table 2.1 Summary of agency submissions

Name	Outcome
Penrith Council (Council)	Council provided comment on several issue areas, primarily regarding traffic and environmental impacts and landscaping. Comments are largely requesting for clarification or minor changes. No objection.
Department of Primary Industries (DPI)	DPI provided a recommendation for groundwater trigger criteria and monitoring. No objection.
Environment Protection Authority (EPA)	EPA noted its expectation that all facilities similar to the project are fully enclosed. EPA stated it will not recommend approval unless the operational areas of the project are enclosed. EPA noted areas of concern were primarily impacts to water and air quality.
Fire and Rescue NSW (FRNSW)	FRNSW recommended that certain clauses of the National Construction Code (NCC) relating to fire management and safety systems be included with a future consent. No objection.
Heritage Council of NSW (Heritage Council)	The Heritage Council raised no issues in relation to State heritage matters, with no further referral required.
Office of Environment and Heritage (OEH)	OEH raised no issues in relation to biodiversity, natural hazards or Aboriginal cultural heritage, with no further referral required.
Roads and Maritime Services (RMS)	RMS provided recommendations for vehicle movements and swept path analysis and the terms of a future construction traffic management plan. Information was provided regarding potential road upgrades in the area. No objection.
Sydney Water	Sydney Water noted that the local water and wastewater systems have adequate capacity to service the proposed development. No objection.

Matters raised in government submissions are addressed in Chapter 4 of this RTS.

2.3 Analysis of public submissions

Submissions were received from 21 individuals and seven businesses.

The 21 individual submissions received objected to the proposed facility. Of the seven submissions received from businesses, five objected to the proposed facility, one provided a comment in relation to the traffic assessment and one business submission stated that due to the compatibility of the former and proposed use of the site, the subject business did not object to the proposal.

The majority of individual submissions were received from residents living in the residential area to the east of the proposed facility. Matters most commonly raised in the individual submissions related to the proximity of the facility to residential land use and potential conflict of the proposed facility with the surrounding environment. Individual submissions also raised concerns regarding the potential impact of the proposed facility on home values as well as potential air quality, noise and traffic impacts.

The majority of the business submissions were received from businesses occupying premises along Peachtree Road with the remaining submissions received from businesses in the in the surrounding industrial area. Matters most commonly raised by businesses included potential impacts on existing businesses along Peachtree Road and potential air quality (including odour), traffic and noise impacts.

Matters raised in these submissions are addressed in Chapter 5 of this RTS.

3 Revised assessments

This chapter summarises revised noise, air quality water and traffic assessments. These assess the potential impacts of the updated proposal including the enclosure of the facility and changes to waste processing on site. The traffic impact assessment has been revised due to updated traffic generation estimates.

3.1 Revised water assessment

A revised water assessment to address the amended design of the proposed facility has been prepared by Tooker and Associates (2018) at Appendix E. Key findings of the revised assessment are summarised below.

The material handling activities will be covered by a roof extending over approximately 3,000 m^2 (68% of the overall site) of the site. The entry and exit driveway areas including the weighbridges along with five car parking spaces (three employee and two visitor) will be open areas without a roof.

The provision of a roof over most of the site will remove a significant quantity of potential pollutants in the runoff from the site that would require treatment. The incorporation of reuse of roof runoff in the amenities will also reduce the volume of runoff from the site.

Runoff from the external areas on the site will be collected in the existing drainage inlet pits and grates across the driveways and piped to the Peachtree Road kerb drainage system. The sumps in the drainage inlet pits in the open areas would be the first line of treatment for the site runoff. Coarse materials and sediment would be trapped in the sumps.

The drainage inlet pits will be maintained regularly by the removal of accumulated materials. The sediment sumps in the drainage inlet pits would be cleared on a monthly basis (or as required).

The majority of the pollutant load in runoff is discharged in small storms up to the 3-month ARI storms and over 90% of the annual pollutant load is contained in frequent runoff up to the 3-month ARI storms (Appendix E). The provision of a roof over 68% of the site and reuse of roof runoff would reduce the runoff pollutant load by more than 55% compared to the existing site. The drainage system will readily cater for these storms and grates across the two driveways will collect the overland surface flows. The proposed drainage system will have an in-pipe capacity to carry 10-year ARI storm runoff.

Changes to the proposed drainage system upgrades to those proposed in the EIS include:

- capturing part of the main shed roof runoff into a rainwater tank for reuse in the amenities;
- using existing sediment traps/sumps to capture water from the uncovered weighbridge and parking areas; and
- gross pollutant traps (GPTs) are no longer proposed as there will be no operational activities in uncovered areas.

The proposed stormwater management concept plan and proposed new stormwater infrastructure are detailed at figures 3 and 4 of the revised waster assessment.

The proposed enclosure of the facility and roof water reuse and will improve the runoff water quality and reduce the volume of runoff from the site. There will be no increase in impervious areas on the site for the proposed development.

The average annual runoff volume from the site under existing conditions has been estimated to be approximately 2,454 m^3.

In the developed scenario, the extent of runoff from the site will be reduced by capturing runoff and reusing it for use in the amenities. The estimated average annual reuse volume would be 30 m^3. This reuse will reduce the average annual runoff volume from the site by 1%.

The average annual supply of roof runoff from the main shed would be stored in a 4,000 L rainwater tank with a pumped supply line to the amenities. It is estimated that the roof runoff reuse could readily supply the demand for non-potable water use in the amenities.

3.2 Revised noise assessment

A revised Noise Impact Assessment (NIA) has been prepared by EMM (Appendix B) to assess the potential noise impacts from the updated proposal.

The revised NIA was undertaken in accordance with the *Industrial Noise Policy* (INP), *Interim Construction Noise Guideline* (ICNG) and *Road Noise Policy* (RNP). These policies have been used for assessment purposes in accordance with the project's Secretary's Environmental Assessment Requirements (SEARs).

The assessment considered impacts to the original 17 representative assessment locations assessed in the original NIA prepared for the EIS as well as an additional noise assessment location included at the request of DPE, as noted at Section 4.1.14. This assessment location, an existing dwelling, is located at 236-248 Coreen Avenue, Penrith approximately 340 m to the north-east of the site (Figure 3.1).

As per the definitions provided in the INP, residential assessment locations were classified as "urban", as they are exposed to "through traffic with characteristically heavy and continuous traffic flows during peak times" and are located "near commercial districts or industrial districts."

Plant and equipment were modelled at locations and heights representing maximum likely activity during operations using representative equipment sound power levels and quantities provided in Table 4 of the revised NIA.

3.2.1 Operational noise

The amendments to the proposal, which have been incorporated into the noise model, include:

- The operational area of the site is proposed to be fully enclosed in a warehouse, which allows for an open floor area. This allows for a simpler operation and more material to be passed through the site.

- Changes to material processing/sorting. Materials will be sorted in the tipping area and transferred to appropriate stockpiles.

Predicted facility noise emission levels at the assessment locations are provided in Table 3.1. Operational noise level predictions for the revised, proposed layout has been compared to project specific noise levels (PSNLs) and to operational noise predictions provided in the previous noise assessment based on the original layout. The results show a general improvement in noise emissions from the amended proposal at levels at receivers, compared to the original layout and the operations originally proposed.

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Noise monitoring and assessment locations

Penrith Waste Recycling and Transfer Facility
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Figure 3.1

Table 3.1 Operational noise modelling results – worst-case

Assessment locations		Predicted operational noise level, dB						Project Specific Noise Level, dB
		Original layout			Proposed layout			
ID	Type	Day	Evening/MS	Night	Day	Evening/MS	Night	
R1	Industrial	62	59	45	57	57	45	70
R2	Commercial	63	60	47	60	60	50	65
R3	Industrial	53	50	40	50	50	38	70
R4	Industrial	48	45	35	46	46	34	70
R5	Industrial	60	57	47	58	58	46	70
R6	Industrial	61	58	48	62	62	47	70
R7	Industrial	53	50	39	50	50	38	70
R8	Industrial	61	59	45	57	57	48	70
R9	Industrial	59	56	45	57	57	45	70
R10	Commercial	61	58	47	43	43	31	65
R11	Residential	39	39	28	26	29	22	47
R12	Residential	39	39	29	27	30	23	47
R13	Residential	41	38	27	36	36	26	47
R14	Residential	40	37	26	35	36	25	47
R15	Residential	38	35	23	33	33	22	47
R16	Passive Recreation	44	40	30	32	33	24	50
R17	Active Recreation	45	41	29	39	39	28	55
R18[1]	Residential	N/A	N/A	N/A	27	33	26	47

Notes: 1. For the purposes of this assessment, R18 (E3 zoned land) has been assessed as a residential assessment location.

Operational noise emission levels are predicted to meet the relevant PSNLs at all assessment locations. Given predicted noise levels satisfy criteria, it is unlikely that noise emissions from the facility would cause adverse impacts at the assessment locations.

i Sleep disturbance assessment

The loading and/or unloading of trucks during the night/morning shoulder period has been assessed for the potential to cause sleep disturbance. Typical maximum noise events are likely to include impacts associated with loading/unloading activities. A typical impact L_{Amax} sound power level of 126 dB has been used to predict potential sleep disturbance impacts (refer Table 3.2).

Table 3.2 Predicted maximum noise levels at residential assessment locations

Assessment locations	Predicted L_{Amax} noise level, dB		L_{Amax} screening criteria, dB
	Original layout	Proposed layout	
R11	57	<30	55 L_{Amax}
R12	57	<30	
R13	55	35	
R14	53	34	
R15	50	32	
R18[1]	N/A	<30	

Notes: 1. For the purposes of this assessment, R18 (E3 zoned land) has been assessed as a residential assessment location.

Based on the revised proposed layout, results of noise modelling indicate that the INP sleep disturbance screening criteria will be met at all residential assessment locations during calm and adverse meteorological conditions.

3.2.2 Construction noise

A quantitative approach has been taken regarding the assessment of construction noise from the facility in accordance with the ICNG noise levels from proposed construction activities were predicted at the assessment locations.

Simultaneous operation of two delivery trucks, two concrete trucks, one crane and one excavator (30 tonne) were used to represent typical construction activities and are considered to represent an acoustically worst-case 15-minute period during standard construction hours.

Representative sound power levels associated with the equipment used in noise modelling are summarised in Table 8 of the revised NIA.

It has been assumed that construction activity will generally take place during standard construction hours. Activities outside standard construction hours may be permitted where there is a safety requirement or emergency work needs to be undertaken or where it can be demonstrated that construction activity will not cause noise impact at residences.

Indicative construction noise emission predictions for the facility are provided in Table 3.3.

Table 3.3 Predicted construction noise

Assessment locations	Indicative construction noise level $L_{Aeq,15 minute}$, dB		Construction noise management level, dB
	Original layout	Proposed layout	
R1	69	72	75 $L_{Aeq,15 minute}$ (external)
R2	66	71	
R3	54	65	
R4	49	52	
R5	64	67	
R6	68	69	
R7	58	63	
R8	65	69	
R9	66	69	
R10	68	67	
R11	40	38	53 $L_{Aeq,15 minute}$ (noise affected) 75 $L_{Aeq,15 minute}$ (highly noise affected)
R12	40	39	
R13	40	42	
R14	40	42	
R15	40	44	
R16	45	47	65 $L_{Aeq,15 minute}$ (external)
R17	42	44	60 $L_{Aeq,15 minute}$ (external)
R18[1]	-	41	53 $L_{Aeq,15 minute}$ (noise affected) 75 $L_{Aeq,15 minute}$ (highly noise affected)

Notes: 1. For the purposes of this assessment, R18 (E3 zoned land) has been assessed as a residential assessment location.

Construction noise levels are predicted to be below the noise-affected management levels at all assessment locations. The predictions assume all equipment is operating simultaneously and at the nearest locations within the site to the relevant residential dwellings (R11–R15 and R18), it is likely that actual construction noise levels would be less than those predicted for much of the time.

3.2.3 Noise management measures

The enclosed facility would result in reduced operational noise impacts and compliance with PSNLs at all assessment locations and would therefore align with *Protection of the Environment Operations Act 1997* (POEO) Section 140. Further, noise modelling indicates that there are no acoustic impacts predicted at 236–248 Coreen Avenue, Penrith (R18) (E3 zoned land).

Accordingly, the management measures provided in Section 6.5.2 of the EIS are considered appropriate and adequate in managing potential noise impacts from the proposal (as amended). No further management measures are proposed.

3.3 Revised air quality assessment

A revised air quality and greenhouse gas assessment was prepared for the proposal as amended by Ramboll Environ Australia Pty Limited (Appendix C). The key changes to the revised proposal regarding air quality emissions are as follows:

- apart from entry and exit paths, all activities associated with the facility are enclosed;
- the shed will feature mains fed water misting at both the entrance and exit doors, along with similar dust suppression within the shed; and
- there will be no stationary processing machinery (eg trommel screen) associated with the facility.

The revised assessment of the revised proposal considered the potential air quality impacts (including dust, odour and cumulative impacts) on nearby private properties (residential, commercial, industrial and recreational) during operations. The assessment was prepared in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (Department of Environment and Conservation NSW 2005).

Impacts were determined for the originally assessed 17 potential sensitive receiver locations, as well as the inclusion of the additional sensitive receptor (R18) representative of existing and potential future residential development at that location, as required by DPE (see Section 4.1.14).

Predicted incremental (site only) total suspended particulates (TSP), PM_{10}, $PM_{2.5}$ and odour concentrations, and dust deposition rates from facility operations are presented in Table 3.4. These results are compared against the incremental results from the original proposal (assessed in Ramboll 2017). Results are well below the NSW EPA criteria at all the assessment locations and show a measurable reduction from concentrations predicted for the original proposal design. Predicted 24-hour average concentrations relate to peak day operations (1,500 tpd), while annual average concentrations relate to average day operations (600 tpd).

Predicted concentrations are negligible at all surrounding residential and recreational receptors (receptors 11 to 18).

Results of cumulative (revised proposal plus ambient background) model predictions of particulate matter (TSP, PM_{10} and $PM_{2.5}$) concentrations are presented in Table 3.5.

The predicted cumulative concentrations for all pollutants and averaging periods are below applicable impact assessment criteria at all neighbouring residential receptors (refer Table 3.5). For all surrounding industrial receptors, the predicted cumulative concentrations for all pollutants and averaging periods are at or below applicable impact assessment criteria. For industrial receptor 6, the predicted cumulative annual average $PM_{2.5}$ concentration is 8 $\mu g/m^3$, which is equal to the applicable NSW EPA impact assessment criteria. For this concentration, the ambient background concentration and modelled contribution from neighbouring NPI sources account for 97% of the cumulative concentration.

The daily-varying pairing of predicted 24-hour concentrations from the facility; predicted concentrations from neighbouring NPI sources; and the corresponding background concentration from the NSW OEH St Marys and Richmond monitoring stations are illustrated in Figure 3.2 for PM_{10} and Figure 3.3 for $PM_{2.5}$ for the most impacted receptor (industrial receptor 6). Predicted cumulative annual average PM_{10} and $PM_{2.5}$ concentrations for all receptors are presented in Figure 3.4 and Figure 3.5respectively.

All of these figures highlight that the key contributor to cumulative concentrations at the receptors surrounding the facility is the ambient background levels. Specifically, the occurrence of exceptional events, such as dust storms or vegetation burning, is the most critical influence for air quality compliance. Predicted facility-only incremental concentrations are by comparison minor. Consequently, it is considered that the potential for adverse cumulative impacts from the operation of the facility is low.

Table 3.4 Incremental concentration and deposition results

Receptor ID	TSP		PM_{10}		PM_{10}		$PM_{2.5}$		$PM_{2.5}$		Deposition		Odour	
	Annual Average ($\mu g/m^3$)		Maximum 24-hr ($\mu g/m^3$)		Annual average ($\mu g/m^3$)		Maximum 24-hr ($\mu g/m^3$)		Annual average ($\mu g/m^3$)		Annual average (g/m^2/month)		99th Percentile 1-second (OU)	
Criteria^	90		50		25		25		8		2		2	
	Original proposal	Revised proposal	Original proposal	Revised proposal	Original proposal	Revised proposal	Original proposal	Revised proposal	Original proposal	Revised proposal	Original proposal	Revised proposal	Original proposal	Revised proposal
R1	3.2	0.6	4.6	1.7	1.3	0.2	1.8	0.5	0.6	0.1	0.5	0.1	1	1
R2	3.0	0.5	6.6	1.6	1.2	0.2	2.7	0.5	0.6	0.1	0.5	0.1	1	1
R3	1.2	0.2	2.7	1.1	0.5	0.1	1.2	0.3	0.2	<0.1	0.2	0.0	<1	<1
R4	1.5	0.3	5.3	1.6	0.6	0.1	2.3	0.5	0.3	<0.1	0.2	0.0	<1	<1
R5	6.7	1.1	11.5	2.9	2.8	0.4	5.2	0.9	1.3	0.1	1.1	0.2	1	1
R6	4.7	1.4	4.6	3.3	1.9	0.5	2.2	1.0	0.9	0.2	0.8	0.3	1	1
R7	1.7	0.4	1.7	1.2	0.7	0.3	0.8	0.3	0.3	<0.1	0.3	0.1	1	1
R8	1.7	0.4	2.0	1.3	0.7	0.4	0.9	0.4	0.3	<0.1	0.3	0.1	1	1
R9	1.7	0.4	1.9	1.2	0.7	0.4	0.9	0.4	0.3	<0.1	0.3	0.1	1	1
R10	7.8	0.7	17.2	1.8	3.4	0.6	5.7	0.6	1.5	0.1	1.4	0.1	1	1
R11	<0.1	<0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1
R12	<0.1	<0.1	0.2	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1
R13	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1
R14	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1
R15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1
R16	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1
R17	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1
R18	-	<0.1	-	0.2	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<1

OU - odour units.

^ Criteria for TSP, PM^{10} and $PM^{2.5}$ are applicable to cumulative concentrations.

** Industrial/commercial receptor*

Table 3.5 Cumulative concentration due to the facility + background air quality + NPI reporting

	TSP Annual Average (µg/m^3)		PM_{10} Annual Average (µg/m^3)		PM_{10} 3rd highest 24hr µg/m³	$PM_{2.5}$ Annual Average (µg/m^3)		$PM_{2.5}$ 4th Highest 24hr µg/m³
Criteria	**90**		**25**		**50**	**8**		**25**
Receptor ID	**Original proposal**	**Revised proposal**	**Original proposal**	**Revised proposal**	**Revised proposal**	**Original proposal**	**Revised proposal**	**Revised proposal**
R1	40.4	35.3	19.3	16.6	42.8	6.8	7.9	23.6
R2	40.1	35.2	19.1	16.6	42.7	6.8	7.9	23.6
R3	38.0	34.8	18.3	16.5	42.6	6.4	7.8	23.5
R4	38.4	34.9	18.4	16.5	42.8	6.5	7.8	23.5
R5	43.8	35.8	20.7	16.8	43.0	7.5	7.9	23.8
R6	42.2	36.2	20.0	16.9	43.0	7.1	8.0	23.9
R7	39.4	35.3	18.9	16.5	42.7	6.5	7.8	23.6
R8	39.2	35.2	18.8	16.5	42.7	6.5	7.8	23.5
R9	39.1	35.1	18.7	16.5	42.7	6.5	7.8	23.5
R10	45.2	35.5	21.4	16.7	42.7	7.7	7.9	23.7
R11	35.6	34.4	17.2	16.4	42.6	6.2	7.8	23.3
R12	35.4	34.1	17.1	16.3	42.5	6.2	7.8	23.3
R13	36.3	34.0	17.5	16.1	42.3	6.2	7.8	23.3
R14	37.3	34.4	18.0	16.2	42.4	6.2	7.8	23.3
R15	47.1	38.5	22.9	17.4	43.3	6.4	7.9	23.5
R16	40.9	36.1	19.8	16.7	42.8	6.3	7.8	23.4
R17	36.6	34.1	17.6	16.2	42.4	6.2	7.8	23.4
R18	-	34.6	-	16.5	42.4	-	7.8	23.4

OU - odour units.

^ Criteria for TSP, PM10 and PM2.5 are applicable to cumulative concentrations.

** Industrial/commercial receptor*

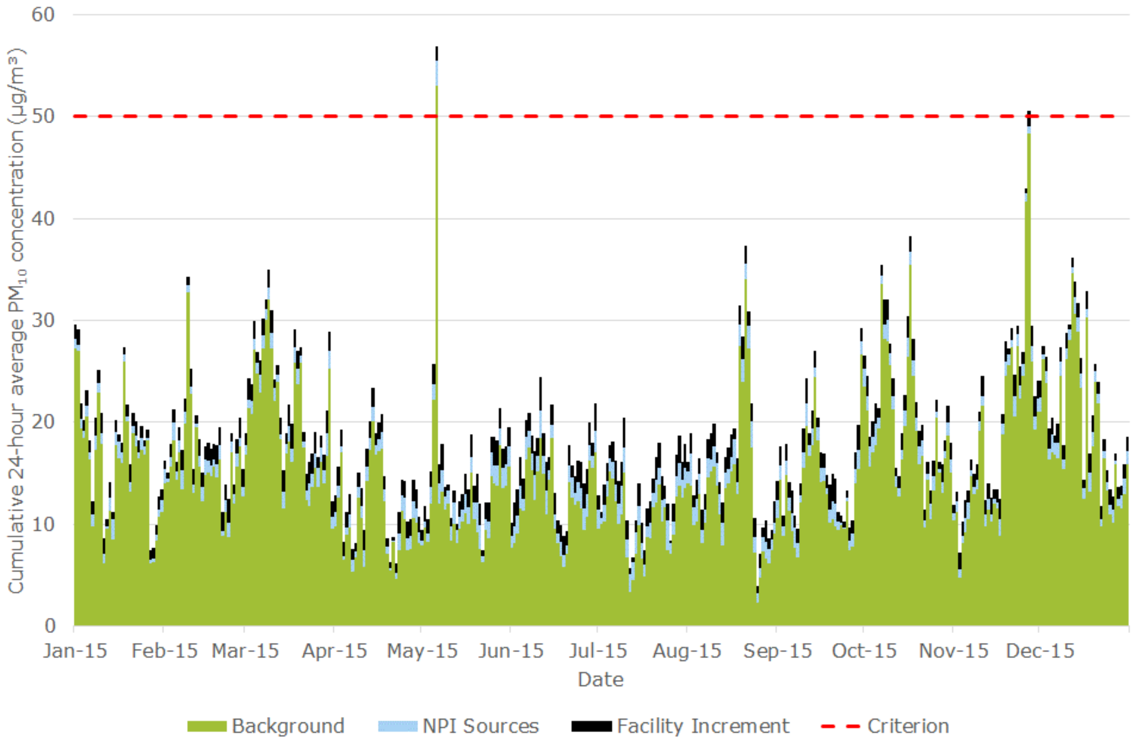


Figure 3.2 Daily-varying cumulative 24-hour average PM_{10} concentrations – Receptor 6 – ambient (OEH St Marys) + NPI sources + facility increment

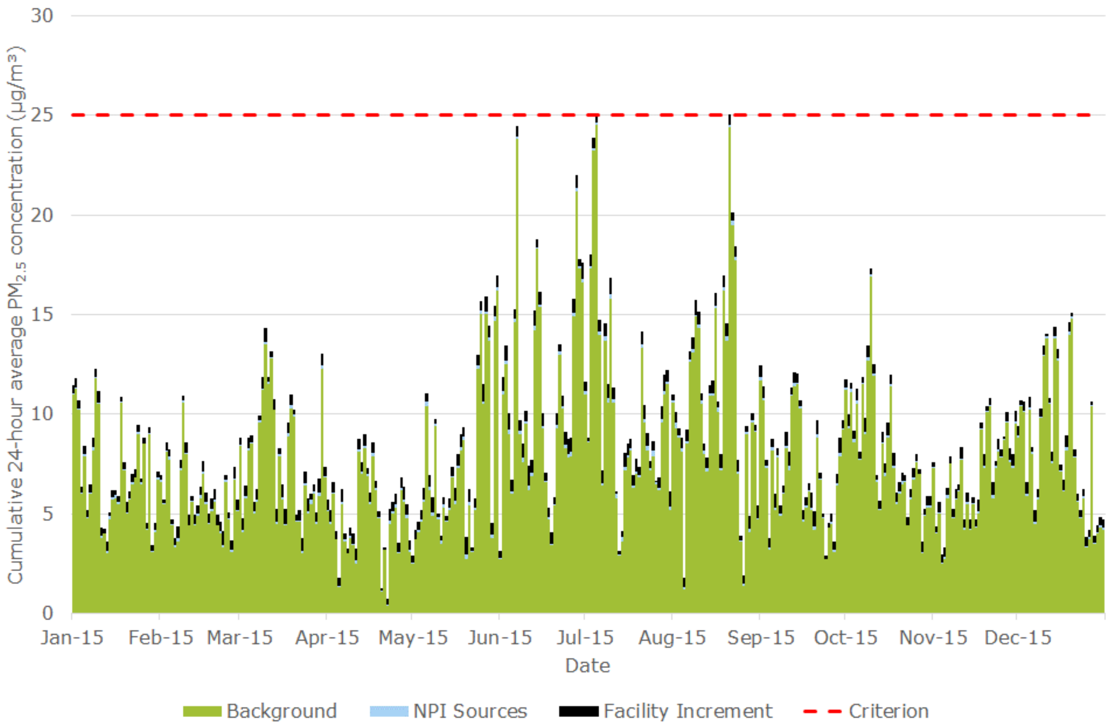


Figure 3.3 Daily-varying cumulative 24-hour average $PM_{2.5}$ concentrations – Receptor 6 - ambient (OEH Richmond) + NPI sources + facility increment

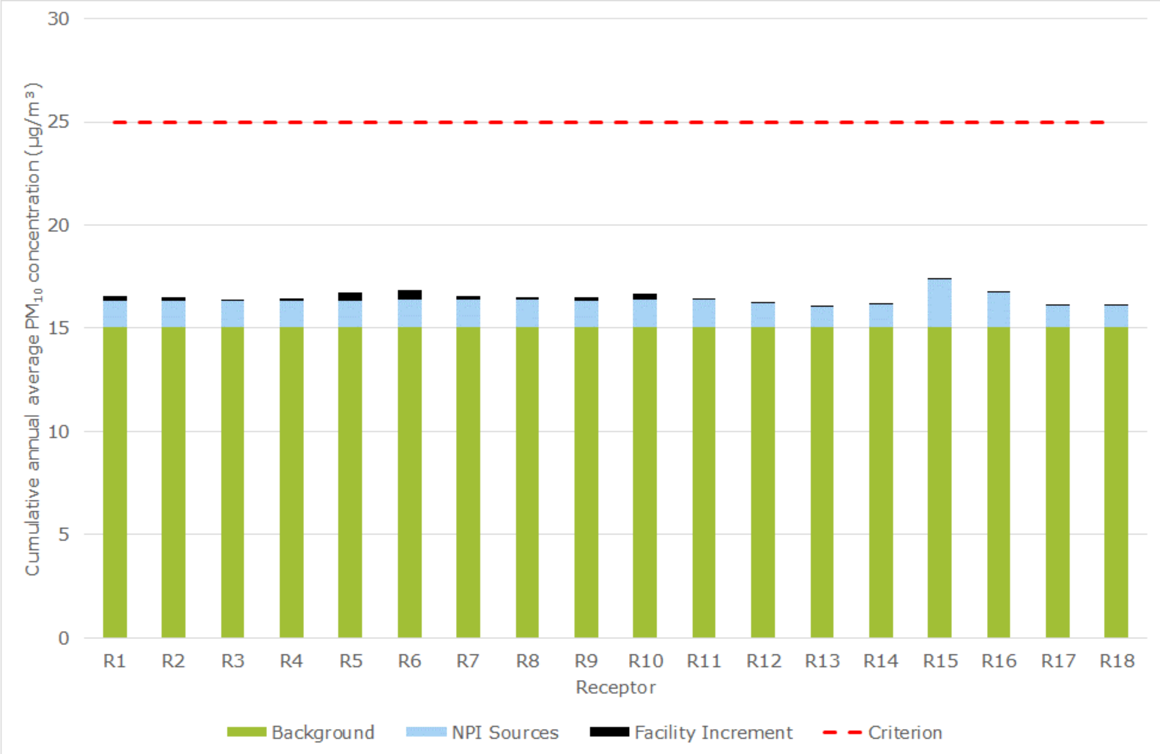


Figure 3.4 Cumulative annual average PM_{10} concentrations – all receptors – ambient (OEH St Marys) + NPI sources + facility increment

Figure 3.5 Cumulative annual average $PM_{2.5}$ concentrations – all receptors - ambient (OEH Richmond) + NPI sources + facility increment

3.3.1 Air quality management measures

The enclosed facility, in conjunction with proposed mains fed water misting at both the entrance and exit doors and similar dust suppression within the shed would result in reduced operational air quality impacts compared to the original proposal. Operation of the facility will comply with the applicable NSW EPA assessment criteria for TSP, PM_{10}, $PM_{2.5}$ and dust deposition at all the surrounding residential or industrial receptors including at the additional receptor R18.

Accordingly, the management measures provided in Section 6.3.2 of the EIS, applicable to the revised design of the facility, are considered appropriate and adequate in managing potential air quality impacts from the revised proposal. No further management measures are proposed.

3.4 Revised traffic impact assessment

A revised traffic impact assessment (revised TIA) has been prepared to incorporate and assess the following:

- revised traffic distribution routes; and
- updated waste input and recycling truck traffic generation estimates for the project.

The findings of the revised TIA are summarised below with the complete revised TIA appended as Appendix D of this RTS.

3.4.1 Revised traffic distribution routes

The revised traffic distribution routes for the project allow two alternative traffic routes for light vehicle traffic to access the site from Castlereagh Road, via either Peachtree Road or Mullins Road, as requested by the DPE, as detailed at Section 4.1.9viii. This will reduce the previously assessed extent of the project intersection capacity impacts at the Castlereagh Road/Peachtree Road intersection, as a proportion of the site light vehicle traffic movements, including all the employee car traffic and a proportion of the incoming waste vehicle traffic, will be able to travel via Mullins Road to and from Castlereagh Road.

The Peachtree Road route will remain the only feasible route for all site truck traffic movements to and from Castlereagh Road as the site access driveway designs at the Peachtree Road frontage have been angled to and from the east to facilitate trucks entering and leaving the site from this direction, travelling, to and from Castlereagh Road via Peachtree Road.

Waste material will not normally be brought to the site or products dispatched via Thornton Drive which connects to local areas to the east of Castlereagh Road from the Peachtree Road intersection.

Beyond the immediate locality of North Penrith, the future site traffic will be further distributed onto other major roads such as The Great Western Highway and Western Motorway, east of west of Penrith, such that the future project generated daily or peak hourly traffic volumes would be relatively minor on any traffic routes other than Peachtree Road and Castlereagh Road.

3.4.2 Revised operational traffic generation

Updated waste input and recycling truck traffic generation estimates for the project based on site records from the Benedict Chipping Norton recycling facility have been used to inform the Revised TIA.

The Chipping Norton recycling facility had an annual waste material processing throughput of 185,000 tonnes per annum during the financial year 2017/2018 which is directly comparable to the proposed 180,000 tonnes per annum throughput for the Penrith facility. A similar number and proportion of light and heavy vehicle movements are anticipated at the Penrith facility for the incoming waste material supply and subsequent despatch of sorted recycled waste and product material deliveries.

Accordingly, a revised estimate of 50,250 incoming waste deliveries is expected annually when the Penrith facility is operating at a maximum capacity of 180,000 tonnes of material processed annually. Variations may occur in the amounts of waste received on any given day. However, there will be a weekday average of 75 light vehicle loads and 95 heavy vehicle loads (170 vehicle loads in total) bringing waste material to the site, representing 340 daily vehicle movements for this activity.

For all waste receival, products/rejects dispatch, site employees, site visitors and maintenance vehicle traffic, there will be an overall total of 428 daily vehicle movements generated, comprising 194 light vehicle movements and 234 heavy vehicle movements compared to the 352 daily vehicle movements, including 134 heavy vehicle movements, estimated in the EIS.

The total daily generated by the maximum site activity with during extended hours of operation (refer Section 4.1.4 for discussion on hours of operation) are summarised in Table 3.6.

Table 3.6 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	44	44	0
Waste receivals	340	150	190
Recycled product and rejects	44	0	44
All site traffic	**428**	**194**	**234**

The peak hourly traffic movements generated by the maximum site activity during extended hours of operation are summarised in Table 3.7.

Table 3.7 Summary of site generated peak hourly traffic movements

Peak Hour (time of day)	Inbound site hourly traffic movements		Outbound site hourly traffic movements		All site hourly traffic movements	
	Cars/other light vehicles	Trucks	Cars/other light vehicles	Trucks	Cars/other light vehicles	Trucks
Morning peak hour (8.00 to 9.00 am)	2 site visitors +4 waste receivals	12 waste and product	2 site visitors +4 waste receivals	12 waste and product	12	24
Midday peak hour (1.00 to 2.00 pm)	2 site visitors +9 waste receivals	12 waste and product	2 site visitors +9 waste receivals	12 waste and product	22	24
Afternoon peak hour (4.00 to 5.00 pm) with standard hours	2 site visitors +6 waste receivals	7 waste and product	10 employees and site visitors +6 waste receivals	7 waste and product	24	14

Table 3.7 Summary of site generated peak hourly traffic movements

Peak Hour (time of day)	Inbound site hourly traffic movements		Outbound site hourly traffic movements		All site hourly traffic movements	
	Cars/other light vehicles	Trucks	Cars/other light vehicles	Trucks	Cars/other light vehicles	Trucks
Afternoon peak hour (4.00 to 5.00 pm) with extended hours	2 site visitors +4 waste receivals	12 waste and product	2 site visitors +4 waste receivals	12 waste and product	12	24

3.4.3 Traffic impacts on road network

The predicted daily traffic increases due to site operations' traffic movements (which are 428 daily vehicle movements including 234 heavy vehicle movements) when this traffic is distributed onto the surrounding road network is summarised in Table 3.8.

Table 3.8 Summary of daily traffic volumes and increases with the 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 (%)
Castlereagh Road (north of Mullins Road)	34,000	214	0.6%	1,220*	117	9.6%
Castlereagh Road (south of Peachtree Road)	37,000	214	0.6%	1,700*	117	6.9%
Peachtree Road west of Castlereagh Road	4,500	331	7.4%	360*	234	65%
Mullins Road west of Castlereagh Road	4,400	97	2.2%	280*	0	0%

Notes: *Existing daily traffic is eleven times the average am and pm peak hourly traffic. Daily heavy vehicle traffic movements are calculated using the upper limit of the range of surveyed am or pm peak hour proportions of heavy vehicle traffic.

The project-generated traffic increases on Castlereagh Road for all vehicles will be of the order of 0.6%. These traffic increases will not generally be noticeable to existing road users.

On the local industrial area access route via Peachtree Road, the project-generated increases in daily and heavy vehicle traffic movements will be more noticeable, being approximately 7.4% for all traffic and 65% for heavy vehicle traffic.

On the local industrial area access route via Mullins Road, the project-generated increases in daily traffic movements will be lower, being approximately 2.2% for all traffic. No heavy vehicles will leave access or leave the site via Mullins Road.

The traffic increases using Peachtree Road will probably be noticeable to other road users but would not generally affect the future road capacity or general maintenance requirements for the road which has been designed to carry industrial traffic, including heavy vehicle traffic.

3.4.4 Traffic impacts at intersections

The intersection traffic capacity impacts at the Castlereagh Road/Peachtree Road and Castlereagh Road/Mullins Road intersections were reassessed, using the updated vehicle movement statistics from the Benedict Chipping Norton site, for three traffic periods of a typical weekday which are:

- the morning peak traffic period for the surrounding road network, which is typically from 8.00 am to 9.00 am;
- the peak period for the site generated truck traffic movements, which is typically from 1.00 pm to 2.00 pm; and
- the afternoon peak traffic period for the surrounding road network, which is typically from 4.00 pm to 5.00 pm.

The impacts of the additional site traffic when distributed onto the relevant traffic movements at the intersections are summarised in Table 3.2 and Table 3.3. Detailed results are provided in Appendix C.

Table 3.9 Summary of existing and proposed intersection operation – Castlereagh Road/Peachtree Road

Intersection	Peak hour	Adjusted 2018 base traffic			With project operations traffic		
		LoS	DOS	AVD	LoS	DOS	AVD
Castlereagh Road/Peachtree Road	Morning peak hour (8.00 to 9.00 am)	B	0.858	26.8	C	0.881	30.4
	Midday peak hour (1.00 to 2.00 pm)	B	0.853	28.1	C	0.850	30.2
	Afternoon peak hour (3.30 to 4.30 pm) during standard hours	C	0.922	29.7	C	0.939	30.0
	Afternoon peak hour (3.30 to 4.30 pm) during extended hours	C	0.922	29.7	C	0.939	30.2

Notes: LoS – Level of Service, DOS – Degree of Saturation, AVD – Average Vehicle Delay.

Table 3.10 Summary of existing and proposed intersection operation – Castlereagh Road/Mullins Road

Intersection	Peak hour	Existing 2018 base traffic			With project operations traffic		
		LoS	DOS	AVD	LoS	DOS	AVD
Castlereagh Road/Mullins Road	Morning peak hour (8.00 to 9.00 am)	A	0.845	11.0	A	0.851	11.2
	Midday peak hour (11.45 to 12.45 pm)	A	0.593	7.3	A	0.600	7.5
	Afternoon peak hour (4.15 to 5.15 pm) during standard hours	B	0.959	17.1	B	0.965	17.9
	Afternoon peak hour (4.15 to 5.15 pm) during extended hours	B	0.959	17.1	B	0.966	18.1

Notes: LoS – Level of Service, DOS – Degree of Saturation, AVD – Average Vehicle Delay.

The results show that during the morning, midday and afternoon peak hours, there will be only minor changes to both intersections' operations. The projected future traffic operations at both intersections will have minimal impacts and retain some capacity for future traffic growth.

The future traffic impact of the proposed development to both Peachtree Road and Mullins Road is considered to be minimal.

4 Response to government submissions

As discussed in Section 2.2, submissions were received from eight agencies regarding the EIS from:

- Council;
- DPI;
- EPA;
- FRNSW;
- Heritage Council;
- OEH;
- RMS; and
- Sydney Water.

The outcomes of submissions were summarised by DPE in its DPE RTS request. While technically not a submission, the DPE RTS request provides a logical format for addressing agency and public submissions by subject area. In this chapter, the points raised in the DPE RTS request are addressed in Section 4.1, with the issues raised in agency submissions address in following sections. Submissions made by businesses and individuals are addressed in Chapter 5.

4.1 Department of Planning and Environment

4.1.1 Project alternatives - reduced annual tonnage

The DPE RTS request states:

> The Department is concerned the site will be unable to process the requested amount of waste per annum due to its size and other site constraints. The EIS provides an assessment of the 'do nothing' option with the site being developed for another industrial purpose. Provide an assessment of additional alternatives including an assessment of proposed reduced annual production rates at the facility.

As noted in Section 1.3, it is no longer proposed that the facility process materials via specialised equipment (eg screening plant or picking lines). Instead, materials will be sorted in the tipping areas and transferred to appropriate stockpiles. Further, the operational area of the site is fully enclosed in a warehouse, allowing for an open floor area with dedicated travel lanes. This updated proposal addresses the constraints noted by DPE and will allow for efficient operation of the site.

The significant capital expenditure related to the warehouse and the cost of additional off-site processing means that a lower annual volume for the site is not viable, and as such, has not been explored further.

4.1.2 Detailed breakdown of the waste recycling process

The DPE RTS request states:

> Provide a more detailed breakdown of the waste recycling process carried out on site, including timeframes for each individual component of the process.

With the removal of processing from the site, the waste recycling process has become simpler. The waste recycling process provided with the EIS has been updated for the new layout, and delivery, inspection and dispatch timeframes are provided in Table 1.4. The average time on-site for delivery and dispatch is based on weighbridge records from Benedict Industry's facility at Chipping Norton. It is expected that the average total time for vehicles on site will be 13 minutes.

It is also noted that these times are similar to the times described in the EIS for the Bingo Minto Resource Recovery Facility application (SSD 16_7462), where an average time of 17 minutes was expected. Unlike that proposal, this project does not include delivery or dispatches from larger B-double vehicles, will allow light and heavy vehicles to unload at the same time and will handle approximately 20% less material.

4.1.3 Minimum Standard for Managing Construction and Demolition Waste

The DPE RTS request states:

> Demonstrate the proposal meets the NSW EPA Minimum Standards for Managing Construction and Demolition Waste in NSW (October 2016). Provide a detailed justification for not enclosing the facility.

Minimum Standards for Managing Construction and Demolition Waste in NSW (EPA 2016) (the minimum standards) is a consultation paper outlining a series of proposed reforms relating to a variety of waste management topics. It outlines discussion points for a proposed future amendment to the (Protection of the Environment Operations (Waste) Regulation (POEO Regulation). As a discussion paper, it does not form formal government policy.

Since the minimum standards were released for comment, the EPA released a public consultation draft of *Standards for Managing Construction Waste in NSW* (EPA 2017a) (draft standards), *Reforms to the Construction Waste Recycling Sector* (EPA 2017b) (explanatory paper) and a draft amendment to the POEO Regulation (draft amendment). It does not appear that the draft regulation has been made, nor has additional information been released since the above documents were made available in October 2017.

However, Table 4.1 outlines the requirements of the draft standards and how the proposal meets those requirements

Table 4.1 Analysis of Standards for managing construction waste in NSW

Summary of standard	Response
1.1 At a weighbridge, inspect the top of each load and determine if the load contains asbestos waste. If asbestos is identified, reject the entire load and record details.	This has been proposed as part of the EIS Section 2.2.5.
1.2 Loads are to be tipped and spread, with surface areas check and the load turned. Where any asbestos waste is observed, the entire load is immediately re-loaded and rejected, with details recorded. Other unpermitted waste types are moved as required.	If asbestos is found in a load during inspection, it will be wet down, with the entire load reloaded, rejected, and detailed recorded.

Table 4.1 Analysis of Standards for managing construction waste in NSW

Summary of standard	Response
1.3 Staff are to be trained in the provision of the POEO Act and its regulations, the site's EPL, the draft standards, and complete a course in asbestos awareness and bonded asbestos removal.	All staff will be trained in the provisions of the POEO Act and its regulations and the site's EPL. Staff will be trained in the identification of special waste types as required by the POEO Regulation and supporting documents. This process will be described in the site's OEMP.
2.1 Following the above inspections, waste is to be sorted for further recovery at another facility, sorting at the facility, transport to a waste facility, or disposal.	Waste will be sorted on site for the purposes of recovery, sorted for the purposes of recovery at another facility or transport to a waste facility or for lawful disposal. (see EIS Section 1.1)
3.1 Inspected waste is not to be combined with other waste, unless it has also been sorted at the facility or is of the same waste type.	All waste will be inspected at the tipping and unloading areas and stockpiled by type (see Section 1.3.2).
4.1.1. Individual waste types are to be stored in separate storage areas, and signposted	Stockpiles are described in Section 1.3.2. The facility will sort materials into general waste types. Processing of materials into individual waste types will happen off-site. However, stockpiles will be maintained as per their descriptors.
4.1.2. Unpermitted waste types are to be transported to a lawful waste facility within one business day of receipt.	As per EIS Section 2.2.2, loads containing non-conforming waste will be entirely reloaded and removed from the site. If non-conforming waste is identified after a load is accepted, it will be immediately moved to the non-conforming waste area. As per EIS Section 2.2.2, non-conforming waste will be removed from the site when there is sufficient material to make up a small load. This has been clarified to mean 5 m^3 of material. This is justified due to the low volume of non-conforming waste that will be accepted by the facility due to the strict turn-away policy for non-conforming waste at the inspection phase. However, the site operations will be updated to meet the standard when it is adopted.
4.3 Storage areas are to be inspected each day, with any errant waste types moved to the correct area. Records are to be kept of wastes being kept in the wrong area.	Agreed.
5.1 Construction waste must not be transported from the facility unless it has been inspected, sorted and stored in accordance with the standards and consists of a single waste type.	This standard appears conflicts with standard 2.1. The purpose of the facility is not to process materials into individual waste types. Material will be transferred to a separate facility for processing.

Notes: 1. Adapted from Standards for Managing Construction Waste in NSW (EPA, 2017)

The facility will accept waste, primarily C&D waste and will be subject to future regulation amendments and standards should they be made. As noted above, and explained in the EIS, the proposed operations will largely comply with the latest draft standards.

The purpose of the facility is not to process materials into single waste types as per the waste classification guidelines. Instead, it is to sort waste into general waste types (eg masonry, timber and excavated material) which can then be transported to a separate facility for processing.

The facility represents a valuable addition to existing and future resource recovery operations, as it will allow for a more distributed operation that will reduce the travel requirements for C&D deliveries and consolidate loads at more specialised facilities.

4.1.4 Hours of operation

i Justification for extended hours of operations

The DPE RTS request states:

> Detailed justification is required for the extended hours of operation proposed which includes:
>
> - waste acceptance for 24-hour periods, on Sundays and Monday to Friday; and
> - dispatch between 6:00 pm and 10:00 pm on Monday to Friday.
>
> You are required to provide the following:
>
> - an assessment of the extended hours of operation against the sites processing and storage capacity.

a. Waste acceptance for 24-hour period, on Sundays and Monday to Friday

As explained in Section 1.3.1, a maximum of six 24-hour waste acceptance periods are proposed per year. These will not occur on public holidays.

These campaigns are proposed given the high likelihood of local major infrastructure projects requiring local facilities to deliver construction and demolition waste. Immediate and short-term examples include RMS roadworks along Castlereagh Road and Mulgoa Road, with regionally significant projects such as the Outer Sydney Orbital and Western Sydney Airport likely to be producing material in the short to medium term.

A review of environment protection licenses (EPLs) in the Penrith LGA of similar facilities has shown no facilities that are explicitly able to accept construction and demolition waste (eg excavated materials and spoil) from infrastructure facilities overnight. The lack of available facilities than can accept construction and demolition waste and spoil limits night-work capacity on infrastructure sites, requiring stockpiles to be maintained on-site until the morning. Allowing limited campaigns throughout the year will allow the projects listed above, as well as local infrastructure projects, to undertaken night-works more effectively.

Infrastructure waste accepted during night-time infrastructure waste acceptance campaigns will be excavated material generated by major infrastructure projects. Volumes of waste expected during these times are expected be much smaller than standard operations (approximately 1 truck per hour, as shown in Table 4.2). Between 300 and 400 tonnes of material could be received in a night. As processing is not proposed on the site, simple sorting with site equipment would be undertaken. Dispatches would be planned ahead of time to minimise impacts with standard operations.

It will be delivered in multiple-axle combination heavy vehicles. Outside of the normal delivery hours (ie between 10 pm and 6 am) there will be an average of one waste delivery per hour (two movements) (see Table 4.2). The associated traffic generation, including employee and heavy vehicle movements, are also provided in Table 4.2. Given that there may be no 24-hour infrastructure waste acceptance campaigns in a specific year, the *Traffic Impact Assessment* (EIS Appendix J) conservatively did not subtract these potential night time traffic movements from the assessed daytime traffic generation.

As for all periods of the day, waste will not be accepted at night if there is not capacity to stockpile the waste within the limits provided in Table 1.3. As explained in Section 4.1.6ii, dispatching of materials will largely be undertaken in the afternoon, after the peak period. This will ensure capacity during 24-hour operations.

It is also noted that as the proposal has been amended to enclose all operations in a building, so impacts related to extended operations will be further mitigated.

Table 4.2 Vehicle movements for 24-hour infrastructure waste acceptance campaigns (night)

	Trips/night[1]	Movements/ night	Average movements/ hour	Tonnes/night	Movements /year	Tonnes/year
Employees, visitors and maintenance						
Light vehicles (6 employees)	6	12	1.5	-	1,008	-
Light vehicles (visitors and maintenance)	0	0	0	-	0	-
Deliveries						
Light vehicles	0	0	0	0	0	0
Single- or dual-axle heavy vehicles	0	0	0	0	0	0
Multiple-axle combination heavy vehicles	12	24	2	348	2,016	29,232
Total	**18**	**36**	**3.5**	**348**	**3,024**	**29,232**

Note: 1. Generally 10 pm to 6 am weekdays

The traffic volumes on Peachtree Road are low at night as many of the businesses in the surrounding industrial area do not operate at night. Impacts to road noise would also be negligible due to the lack nearby residential receivers.

The average annual daily traffic (AADT) on Castlereagh Road is estimated to be 32,000 (*Traffic Impact Assessment,* EIS Appendix D, Table 4.1) of which about 4% are heavy vehicles (calculated from *Traffic Impact Assessment* Table 4.1). Generally, about 15% of traffic flow on major roads occurs at night (from 10 pm to 6 am). On this basis, there will be about 4,800 vehicle movements at night on Castlereagh Road or about 600 per hour. There is a greater portion of heavy vehicles at night on roads such as Castlereagh Road than during the day. Assuming that there are 10% heavy vehicles at night (ie twice the percentage during the day), there are about 60 heavy vehicle movements per hour on Castlereagh Road at night.

The 18 heavy vehicle movements and 12 light vehicle movements at night (see Table 4.2) to/from the site will be equivalent to an average of 2 heavy vehicles movements and 1.5 light vehicles movements per hour over the 12 hour period.

The vehicle movements associated with accepting waste from major infrastructure projects at night will increase total vehicle movements on Castlereagh Road by about 0.6% and will increase heavy vehicle movements on Castlereagh Road by about 3% on the nights when it occurs.

These heavy vehicles and light vehicles movements will be less than have no impact on the efficient operation of Peachtree Road or Castlereagh Road.

There will be a maximum of 84 nights when the proposed operations will contribute an additional two heavy vehicles movements per hour to Castlereagh Road (six 24-hour campaigns, each lasting two weeks).

The additional heavy vehicles movements (two per hour) will increase the hourly heavy vehicle movements from 60 to 62 on Castlereagh Street (although there are no residential receivers between Peachtree Drive and the Great Western Highway). As a result, noise levels noise from heavy vehicles will increase by only about 0.14 dB. Therefore, heavy vehicles movements associated with the 24-hour campaigns will not have a significant impact on traffic noise at night.

Therefore, allowing limited 24-hour campaigns at the facility will allow for more night-works to be performed for local and regionally significant infrastructure by providing an appropriately licensed and managed facility for the disposal of waste. This will reduce the impact of truck movements during the day in the Penrith and regional area, as well as reduce daytime impacts of infrastructure projects. The facility has been designed to mitigate impacts of night time operations, meeting the relevant criteria for all receptors.

b. Dispatch between 6:00 pm and 10:00 pm on Monday to Friday and assessment of the extended hours of operation against the site's processing and storage capacity.

As described above, operation of the site will rely on the rapid turn-over of waste, with short on-site residence times for most waste types. Dispatching of material will be controlled by the site manager, who will arrange for trucks to remove material from the site on demand.

Dispatching of material between 6.00 pm and 10.00 pm will allow for normal daytime operations to focus on the delivery of materials, helping minimise traffic movements within the site and minimise traffic movements on the road network during peak hours.

As per the EIS, it is anticipated that the site will receive, on average 600 tpd.

A model has been developed to understand the maximum delivery, sorting and dispatching capacity of the site. The model was based on the 'worst case scenario' of 1,500 tonnes being delivered in a day.

The model assumes heavy morning volume, gradually falling after the standard early afternoon peak described in Section 3.4. Materials are assumed to be relatively dense (1 m^3 of loosely packed bricks weighs approximately 1 t) and incoming vehicles are assumed to be 100% 19 m trucks. This would allow for a maximum capacity of approximately 30 t per truck, with a maximum of four trucks per hour, based on delivery timeframes in Section 4.1.2. The model also assumes that all materials (apart from low volume materials, such as metals) will be dispatched from site by the end of the day.

The outcomes of the worst-case scenario model are in Table 4.3.

Table 4.3 Worst-case scenario model (1,500 tonnes delivered in a day)

Hour	Tonnes delivered	Tonnes dispatched	Cumulative tonnes
6:00 – 7:00	120	0	120
7:00 – 8:00	120	60	180
8:00 – 9:00	120	90	210
9:00 – 10:00	120	90	240
10:00 – 11:00	120	90	270
11:00 – 12:00	120	90	300
12:00 – 13:00	120	90	330
13:00 – 14:00	90	90	330
14:00 – 15:00	90	90	330

Table 4.3 Worst-case scenario model (1,500 tonnes delivered in a day)

Hour	Tonnes delivered	Tonnes dispatched	Cumulative tonnes
15:00 – 16:00	90	90	330
16:00 – 17:00	90	120	300
17:00 – 18:00	90	120	270
18:00 – 19:00	60	120	210
19:00 - 20:00	60	120	150
20:00 – 21:00	30	120	90
21: 00 – 22:00	30	120	0

Notes: 1. Based on a maximum of 4 delivery and 4 dispatch trucks per hour

If the site manager determines it is likely that site would approach its maximum hourly tonnage, they would begin arranging for trucks to dispatch materials. This dispatching would ramp up through the day, with the maximum of four trucks per hour dispatching materials after 4:00 pm. This delay would allow for the proper sorting and moving of materials from the tipping area into appropriate stockpiles.

The new site arrangement allows the simultaneous delivery and dispatch of materials. In this scenario, up to 330 tonnes (in this case, 330 m^3) of material would be on site, which is within the 'heavy' and 'masonry' stockpile volume of 375 m^3, with the tipping area's 600 m^3 used for intermediate storage during inspection and sorting.

Therefore, dispatching of material after 6:00 pm would allow for more efficient operation of the site during the day, while also accommodating the 'worst-case scenario' modelled above.

Dispatching of materials would also support the operation of processing facilities that are licensed to accept materials after 6:00 pm. Materials would be dispatched to sites that are licensed to accept waste during the evening/night period such as Benedict Recycling's Chipping Norton facility.

ii Sunday and public holiday operations

The DPE RTS request states:

> Regarding Sunday and Public Holiday operations, specific details are required about how "on occasion" and "when there is sufficient demand' is defined. Detail how the public will be informed about the operating hours. Confirm that supporting reports (e.g. traffic, noise) have fully assessed the impacts of extended operation.

The as explained in Section 1.3.1, the application includes the delivery of wastes on Sundays between 8:00 am and 4:00 pm, will be closed on public holidays and with a maximum of six two-week 24-hour campaigns. Impacts are assessed in the revised NIA and revised AQIA. As detailed in Sections 3.2.1 and 3.3, the enclosure of the operational area of the site has resulted in noise and air quality impacts to be well within the relevant criteria, so no adverse impacts are predicted.

From a traffic perspective, most of the waste that would be delivered on a Sunday would be by members of the public delivering using light vehicles, often with trailers. It is anticipated that there will be fewer light vehicle movements on a Sunday than on a weekday. Few construction sites or industrial facilities operate on a Sunday so there are anticipated to be very few heavy vehicles deliveries on a Sunday. Given that it is not known whether opening the site on Sundays will be commercially viable until trialled, approval is sought for the site to accept deliveries on all Sundays between 8:00 am and 4:00 pm.

Opening the facility on a Sunday will allow for traffic impacts to be spread over all opening hours, providing the public with an opportunity to recycle materials rather than take to a landfill on both days of the weekend. Whether there is enough demand to open on all or occasional Sundays (say the first Sunday of each month) will be a commercial decision. This will be based on trailing accepting waste on a series of Sundays.

Traffic levels on the surrounding roads on a Sunday will be lower than during the weekday peak hours assessed and there will be fewer vehicle movements from the site than on weekdays. Therefore, the traffic impacts resulting from accepting waste deliveries on Sundays will be lower than the impacts predicted for weekdays.

No other impacts are predicted as a result of operating on Sundays.

4.1.5 Operations

i Truck loading

The DPE RTS request letter states:

> Provide further details of the method of loading and removal of outgoing material. This is to include a description of the:
>
> - location of trucks used for loading; and
> - frequency and method of loading.

a. Truck loading areas

As discussed in Section 1.3 and shown at Figure 1.1, the amended design of the facility has allowed the site to be divided into four key areas:

- truck unloading (north-west);
- small vehicle unloading (north-east);
- stockpiling and truck loading (south); and
- clear circulation (centre).

Truck loading will occur in the southern stockpile area, which can accommodate a 19 m truck, as shown in the swept path analysis at Appendix F.

b. Frequency and method of loading

As explained in Section 6.2.2 of the EIS and in the revised TIA, it is anticipated that 22 heavy vehicles will be loaded and dispatched from the site on an average day, between 6 am and 10 pm, as modelled on weighbridge records from a similar facility. These would generally be scheduled one truck per hour between 6 am and 2 pm and two trucks per hour between 2 pm and 10 pm to reduce overlap with peak-hour deliveries.

Given that truck and dog trailer vehicles have a capacity of just over 30 tonnes, this will allow for 660 tonnes of material to be dispatched on an average day, over the anticipated average input.

As explained in Section 4.1.4i, the 'worst-case' scenario would allow for up to 48 heavy vehicles to be loaded and dispatched from the site between 6 am and 10 pm. This would effectively add another two dispatch trucks per hour throughout the day, which would have negligible impacts on the road network.

Vehicles will be loaded directly from the stockpiles by an excavator with a claw grab or FEL. The excavator will grab materials from the stockpiles and deposit the materials into the waiting trailers. As discussed in Table 1.4, this process has been estimated to take 10 minutes, with dispatch trucks being on site for an average of 14 minutes.

Vehicles used for removal of materials will be scheduled and controlled by the applicant. During an average operational day, this will allow the 22 vehicles to arrive to the site every 30 to 60 minutes. In the event of a maximum day (1,500 tonnes), approximately 48 trucks will be required to dispatch all materials. This equates to one truck every 20 minutes during the 16-hour working day.

Both scenarios are within the 14 minute 'arrival-to-departure' loading time discussed in Table 1.4.

ii Waste bin storage

The DPE RTS request states:

> Confirm the location of any waste bins to be stored on site (including the location of the storage of containers with non-conforming waste) and demonstrate that the site has capacity to accommodate the storage of these bins.

Waste bins within the site will include:

- bins for waste generated by the business/employees:
  - small office waste bins located in weighbridge, office, and amenity areas;
  - one 240 L general waste bin to the east of the light waste stockpile;
  - one 240 L recyclable waste bin to the east of the light waste stockpile;
  - one 2 m^3 front lift bin to the east of the light-waste stockpile; and
- non-conforming waste bins in the non-conforming waste area adjacent to the truck tipping area (see Figure 1.1), comprising:
  - one 240 L bin for asbestos that will be marked and signposted; and
  - one 480 L bin for other non-conforming waste.

The non-conforming waste area will be kept clear of all vehicle movements and customers and allow for minimal handling of non-conforming waste.

It is noted that the EPA's letter dated 5 July 2017 states that:

> Picking of asbestos from a load is not permitted. If asbestos is found in a tipped load, the whole load must be rejected.

As stated in EIS Section 2.2.2 and 2.2.7, and further detailed in Table 4.1, asbestos will not be accepted by the facility. If asbestos is found during the inspection process, the load will be rejected, and the vehicle will be turned away. However, the applicant must plan for the event that materials are obscured or otherwise hidden (eg a small paint tin within a cupboard or similar).

iii Quantities of materials to be recycled and sent to landfill

The DPE RTS request states:

> Provide details of the expected quantities of material that will be recycled and sent to landfill per annum for each waste stream.

The proposed facility will sort materials for the purposes of dispatching and processing at other facilities, where materials will be fully recycled or recovered. While the facility will enable the recovery materials, the facility will generally not directly result in materials being recycled.

The EIS estimated that approximately 10% to 20% of material received by the proposed facility would be sent to landfill. This has been reduced to approximately 5% (approximately 10,000 tpa), reflecting obviously unrecyclable materials that can easily be segregated (eg dirty cardboard or paper, carpet or unrecyclable bulky synthetics).

iv Stockpile design

The DPE RTS request states:

> The Department is concerned that the size of the designated stockpile area is too small and constrained by shape to cater for the processing volumes proposed. Provide a justification that the stockpile area can cater for the proposed stockpile volume.

The stockpile area has been redesigned as part of the process of enclosing the site and removal of processing (eg screening/picking) facilities. This has allowed for a more centralised and accessible stockpile area, as shown in Figure 1.1.

The original design of the site allowed for stockpiles of approximately 950 m^3, with a hand unloading area of 50 m^3 and a truck tipping area of 500 m^3. The new design allows for stockpiles of approximately 1,100 m^3, with a hand unloading area of 125 m^3 and a truck tipping area of 600 m^3. The size of each stockpile is shown in Table 1.3.

While the larger tipping areas will aid in the temporary storage of materials, the major benefit to the site comes from the new orientation of the stockpiles. The original design proposed two stockpile areas in separate areas of the site. This was necessary, as certain stockpiles were required to be adjacent to processing equipment. However, as noted in the DPE RTS request, the configuration could have led to inefficiencies with transfer and loading of materials.

The new design resolves the issue by placing the main stockpiles in a horseshoe configuration that is isolated from unloading areas, travel areas and small vehicles. The stockpile area will only be accessed by loading vehicles, an excavator used to load vehicles and a front-end-loader used to transport materials from the tipping area to the stockpile area. The smaller metal and paper/cardboard bins can be directly picked up and moved onto a specialised vehicle and replaced with an empty bin.

As screening and picking are no longer proposed, previously separated materials (eg fines, aggregates and masonry) will instead be combined into a single stockpile (see Section 1.3 and Table 1.3). Materials will instead be generally sorted at the tipping area before transported to the more generalised stockpiles, with processing to occur off-site.

Approximately 22 vehicles are required throughout the day to clear approximately one average days' worth of stockpiled materials. These vehicles are controlled by the applicant and can be scheduled in advance or in an ad-hoc manner, if an uncharacteristically large delivery occurs. Assuming the full 22 vehicles are required in a single day, a dispatch vehicle would arrive every 25 to 30 minutes on average.

As shown in the swept paths at Appendix F, ingress and egress of loading vehicles will be limited if a truck parked is parked in the unloading area. Using the estimated timing at Table 1.4, if a truck is required to wait for an unloading vehicle, the maximum wait time is five minutes for each manoeuvre. In the worst case, this would extend the loading of a vehicle to 24 minutes, within the range of dispatching vehicle arrivals.

In summary, issues regarding stockpiles have been resolved by rearranging the stockpile area to allow for larger stockpiles, more centralised stockpiles and easier access for dispatching vehicles.

v Daily vehicle distribution

The DPE RTS request states:

> Regarding vehicle movements, the EIS states "assuming an even distribution over the ten hour daily operational period available for delivery ... ". Vehicles accessing the site are unlikely to be evenly distributed. Provide the following information for the peak period/s anticipated:
>
> - number of vehicles on site;
> - number of vehicles waiting to access the site;
> - breakdown of vehicles likely to be on site at the peak time/s (ie heavy and light vehicles);
> - length of time between arriving to site (queuing to access weighbridge) and exiting the site at peak time/s; and
> - differences between weekdays and weekends.

As detailed in Section 3.4, the revised TIA has been updated with a more detailed vehicle distribution model based on weighbridge data from a similar site.

As detailed in Table 2.2 of the revised TIA, the midday peak hour (1 pm to 2 pm) is expected to be the busiest portion of the day, with 11 light vehicles (two site visitors and nine waste receival) and 12 heavy vehicles (six rigid and six articulated) moving through the site. Of the 12 heavy vehicles, two articulated vehicles will be dispatching materials, and six rigid and four articulated vehicles will be delivering materials.

As shown in the swept path analysis (Appendix F), the hand unloading area allows for up to three light or medium sized rigid vehicles to unload at a time. As detailed in Table 1.4, these types of vehicles will completely move through the site in 12 minutes. This represents five vehicles per unloading area per hour. Therefore, the site is capable of handling up to 15 light or medium sized rigid vehicles per hour without stacking. The nine peak-hour light delivery vehicles will be able to move through the site per hour without stacking.

As detailed in Table 1.4, dispatching vehicles will move through the site in 14 minutes. Therefore, the two modelled 19 m dispatching vehicles will not require stacking. It is noted that the model has been increased from the one-dispatch-per-hour practice explained in 4.1.5v to reflect a conservative estimate.

Remaining heavy delivery vehicles are divided into six rigid (ie 10 m or under) and four articulated (ie 19 m) vehicles. During peak period, the truck tipping area will be prioritised for 19 m articulated vehicles. Where possible, rigid vehicles will be unloaded at the hand unloading area, which, as discussed above, is capable of servicing these types of vehicles.

While this peak-hour scenario allows for vehicles to move through the site without stacking, the site has been designed to allow the stacking of vehicles at the weighbridge and approach areas.

Drawing TX.02 at Appendix F shows three 19 m vehicles completely on-site. A fourth 19 m may also be on site at the exit weighbridge. The traffic lane to the 12 m weighbridge will remain clear if a 19 m truck is queuing at the entry weighbridge, allowing for further two 12 m vehicles may stack behind the 12 m weighbridge.

In summary, the revised site layout will allow for all vehicles will be able to be immediately serviced by the site, with stacking available if necessary, without traffic queuing in the street.

Weekends would be different from weekdays by significantly reducing 19 m articulated vehicle traffic, the traffic that is most constrained due to limited delivery areas. During weekends, larger rigid vehicles could be serviced at the truck tipping area, with the hand unloading area being reserved for lighter vehicles. Overall traffic would be less than peak hour traffic, with no vehicle stacking or queuing required.

vi Peak hour site management

The DPE RTS request states:

> Detail how peak times in relation to delivery will be managed. Provide details of the maximum safe capacity of the site in terms of vehicles and people, how often the sites capacity would be reached, measures to manage the site to ensure safe operations should this capacity be reached and how will staff be "reprioritised" to manage peak times as described on page 78 of the EIS.

As discussed in Section 1.3, there will be seven employees on site at any one time. Three of these staff, two inspectors and the site manager, will be responsible for traffic management during standard operations, and all staff will be trained in traffic management on the site.

As discussed in Section 4.1.4i, the 'worst-case' day is defined by exceptionally high deliveries. The peak hours for the site are explained in Section 3.4, based on an analysis of similar sites, with the primary peak time being 1 pm to 2 pm.

As described in Section 4.1.5v, the site has been designed to accommodate the anticipated delivery and dispatch vehicle movements during peak hours.

This has been managed by prioritising dispatches for later in the day. However, if required, the site manager may further ramp-down dispatches, should delivery traffic increase beyond expectations. The dispatch ramp-down will provide the following benefits:

- both incoming weighbridges will be able to be used for deliveries; and
- the truck tipping area and approaching paths will remain clear of delivery vehicles.

If required, dispatch trucks can be rescheduled to early the next morning and not conflict with site operations.

vii Detailed floor plan

The DPE RTS request states:

> Provide a revised processing shed floor plan which shows, to scale, the proposed internal setup including machinery, rainwater tank, intermediate stockpile bins etc. Additionally, detail how many intermediate stockpile bins are proposed to be used, what would be their maximum capacity and what types of materials would be placed into them.

A detailed floor plan is provided at Appendix A and described below:

- Machinery: other than sorting, processing is no longer proposed on site. Mobile plant will be restricted to a single FEL and a single excavator, which will be working between the truck tipping and stockpile areas.
- Rainwater tank: a 4,000 L rainwater tank is proposed adjacent to the manager's office.
- Intermediate stockpile bins: No intermediate stockpile bins are proposed.
- Stockpile bins: Two large stockpile bins (30 m^3) are proposed between the VENM stockpile and the hand unloading area. These will be used for storage of cardboard and metal.

viii Swept paths

The DPE RTS request states:

> Provide plans showing the swept paths of the front-end loader proposed to be used to move waste on-site and vehicles used for waste collection. The plans should include the stacking of vehicles within the site to demonstrate there is sufficient space onsite at peak periods for all the required operations to be carried out in unison.

As noted in Section 4.1.5vi, stacking and queuing will not be required in the operational area of the site.

A single FEL will be used to move materials between the truck tipping area and main stockpiles. Swept paths for delivery and dispatch vehicles are provided at Appendix F. The FEL will cross the circulation area between the tipping and stockpile areas. As noted above, two inspectors and the site manager will manage the flow of traffic within the site, including FEL movements. Risk associated with traffic movements may be further mitigated by:

- not allowing FEL movements across the circulation area during exceptionally high delivery volume periods, allowing a fourth staff member to supervise traffic movements; and

- not permitting customer vehicles to cross the circulation area when site plant is travelling through the circulation area.

Mitigation measures will be formalised as part of an OTMP.

ix Weight of waste brought by light vehicles

The DPE RTS request states:

> Detail how the weight of waste delivered by light vehicles would be determined.

Light vehicles will be weighed at the entrance and exit weighbridges. The difference between the weight and entry and the weight at exit will be used to determine the weight of waste delivered, with the docket being used to determine the type of waste delivered.

The slip lane at the exit has been removed, meaning that all vehicles exiting the site will leave via the exit weighbridge.

4.1.6 Proposed development

i Proportion of vehicle types

The DPE RTS request states:

> At the site inspection on 8 August 2017, the Applicant indicated that the majority of waste to be received at the facility would be from "Mum's and Dad's". This statement does not appear consistent with the EIS submitted. Clarify who the primary users of the facility will be.

The anticipated number and types of vehicles for the site is discussed at Section 3.4. Most vehicles throughout the day are within the light vehicle class (eg non-industry customers or 'mums and dads'). However, these vehicles will deliver the least amount of weight due to the low weight capacity.

It is also noted that the largest vehicles (eg 19 m articulated vehicles and truck and dog trailer vehicles) will have the fewest vehicles, but the largest contributor to waste by weight. This is due to the high weight capacity compared to other vehicle classes.

As such, most customers will be 'mums and dads', but most of the waste will be delivered by trucks associated with professional operators.

ii Site waste storage

The DPE RTS request states:

> Provide a detailed breakdown of the sites waste storage at any given time.

Section 4.1.4i includes a model of the worst-case 1,500 tpd scenario, including the maximum stockpile sizes during such a scenario. As per that model, the stockpiles within the site can accommodate the cumulative storage requirements for the worst-case scenario.

However, the average 600 tpd scenario is more likely. Table 4.4 shows an average day (6am to 10pm with 600 tpd).

The customer waste stream has been extrapolated from weighbridge data from another Benedict Recycling facility. The dispatch stream for the maximum day is based on the maximum dispatch vehicle capacity, conservatively allowing for only one dispatch vehicle on site at any one time.

Table 4.4 Incoming, outgoing and cumulative waste during average day

Time	Incoming		Outgoing		Cumulative
	Tonnes	m^3	Tonnes	m^3	m^3
6:00	36	54	0	36	43
7:00	36	54	0	72	86
8:00	42	63	25	84	100
9:00	42	63	25	96	115
10:00	42	63	25	113	135
11:00	48	72	25	136	163
12:00	48	72	25	159	190
13:00	54	81	25	188	225
14:00	54	81	50	192	290
15:00	42	63	50	184	220
16:00	42	63	50	176	211
17:00	36	54	50	162	194
18:00	30	45	50	142	170
19:00	24	36	50	116	139
20:00	12	18	50	78	93
21:00	12	18	50	40	48

Notes: 1. Extrapolated from weighbridge data from a similar facility. 2. Assumes 1.2 m^3 of material per tonne.

As noted in Table 1.3, the maximum stockpile capacity (not including tipping areas) is 1,057 m^3. As shown above, at no time does the cumulative stockpile exceed that amount during an average or 'worst case' day. A small amount of material is expected to remain on site at the end of an average day, reflecting a late load, or similar (see Section 4.1.4ib).

4.1.7 Site survey

The DPE RTS request states:

> A survey plan, as defined by the Surveying & Spatial Information Act 2002 is required. The survey is to be prepared by a registered surveyor, reference Australian Height Datum (AHD) and include the location of any easements, below ground services etc.

A survey plan, as defined by the *Surveying and Spatial Information Act 2002* is provided at Appendix A.

The site is not encumbered by any easements.

Services have been shown up to the site connection.

4.1.8 Water management

i Stormwater runoff

The DPE RTS request states:

> The Water Report (prepared by npc, dated May 2017) submitted does not specifically address outdoor stockpiles and the potential impacts of overland flows, stormwater and potential flooding.
>
> Further details are required to address water management, including:
>
> - separation of "clean" and "dirty" water;
> - justification for discharge to Councils drainage system;
> - water quality of all water leaving the site including identification of contaminants which may be immobilised from run-off, pollutant loads from storing stockpiles externally and mitigation measures;
> - drainage of wheel-wash area; and
> - management and location of the proposed indoor rainwater tank.
>
> The Department notes gross pollutant traps (GPT's) are proposed however this does not address finer particles and potential contaminants likely to be present in stormwater runoff.

A revised water assessment is provided at Appendix E and discussed at Section 3.1. As discussed in that section, the revised proposal results in substantial improvements in water quality by enclosing the operational area of the site.

- The operational area of the site is enclosed. All vehicles leaving the operational area of the site will pass through a wheel wash. As such, there is no 'dirty' stormwater and GPTs are no longer proposed.
- Stormwater collected from the roof will be collected in a 4,000 L rainwater tank adjacent to the hand unloading area for use in the site amenities (see Section 4.1.5vii).
- The average runoff volume for the site is estimated at 2,454 m^3. This will be released to Council's drainage system via downpipes connecting to sediment pits.
- Stormwater from the unroofed incoming and outgoing weighbridge areas will be directed drainage grates across the driveways. Water collected at the grates will be released to Council's drainage system via downpipes connecting to sediment pits.
- Sediment pits will be inspected on a six-monthly basis and cleared if required.

Given that the proposal no longer includes external stockpiles, with all operational areas indoors, it is no longer considered that GPTs would be beneficial. Instead, sediment pits will capture and separate sediment prior to discharge.

The surface water monitoring and mitigation plan discussed at EIS Section 6.6.3 has also been reassessed. While surface water monitoring would still form part of a water management plan, the extensive analytical suites proposed in the EIS are no longer considered appropriate. Instead, a monitoring plan will be developed as part of the water management plan that is more appropriate for the actual level of risk (ie monitor turbidity and nutrients for a set period after commencement of operations).

ii Floodwaters

The DPE RTS request states:

> The Water Report (prepared by npc, dated May 2017) submitted states the probable maximum flood (PMF) floodwaters "pond on the road verge and on the grass area along the site frontage." Further details are required regarding the impacts this could have on site access and the proposed stormwater drainage system if the stormwater outlets at the street are flooded.

The revised water assessment at Appendix E discusses flood risk at the site, with flood extents for the 100-year average recurrence interval (ARI) and probable maximum flood (PMF) are at Figures 6 and 7 of Appendix E. As shown in those figures, the 100-year ARI floodwater do not inundate the site frontage, with PMF floodwaters only ponding on the road verge and grassed area of the site.

While the site itself will not be affected by a 100-year ARI event, many of the roads leading to the site are. If a 100-year ARI even is anticipated, either through news reports or other alert systems, the site will begin shut down procedures, giving staff ample time to evacuate the site. If staff are not able to safely leave the site, the operational/amenity areas of the site are above the 1:100 AEP and PMF areas and would serve as a refuge.

In the event of a 1:100 AEP event, is likely that site and local stormwater drainage systems would be inundated. The practical effects of this are minimal, with the flooding of the sediment pits likely leading to mild turbidity and stored sediment being deposited in the street.

4.1.9 Traffic access and parking

i Peak operation vehicle stacking

The DPE RTS request states:

> Based on the proposed processing capacity, peak delivery times and the duration of time the truck is on-site, provide a worst-case scenario of vehicle stacking on site. This should be in the form of a scaled plan.

Peak delivery times and activities are discussed in Sections 4.1.4i, 4.1.5v and 4.1.5vi. As discussed in these sections, the site does not require stacking within the operational area of the site or queuing on the street. The servicing areas of the operational area will allow for the efficient processing of customer vehicles, with the weighbridge and queuing area adequately 'stacking' vehicles without impacting on Peachtree Road.

ii Emergency shutdown traffic management

The DPE RTS request states:

> Provide further details regarding the proposed operational measures to manage traffic arriving at the site during an emergency plant shutdown or similar.

As noted in EIS Section 5.6, an emergency and incident management plan (EIMP) will be prepared that describes procedures to management incidents that may occur at the site that have the potential to harm people or the environment. This will complement the Pollution Incident Response Management Plan (PIRMP), expected to be a requirement under the EPL, or as a component of the OEMP.

In addition to the management measures discussed in EIS Section 5.6, measures will be put in place to prevent unsafe vehicle operations. During a major incident, these will include:

- vehicle traffic within the site will be stopped;
- customers and staff will be instructed to leave vehicles and exit the site in an orderly manner;
- a staff member will be stationed at site entrance and exit to direct incoming traffic to other facilities; and
- a staff member will contact the Benedict main office to have all Benedict traffic redirected to another site.

The site will remain closed to traffic until it is determined that it is safe to enter by the site manager.

In the event of a minor incident (eg an FEL breakdown), the site will remain open in a limited capacity, as appropriate for the incident. This may include turning away heavy vehicles and allowing only hand unloading operations until the issue is resolved.

iii Vehicle movement timings

The DPE RTS request states:

> The EIS estimates the average waste disposal and collection time per truck will be 15 minutes (page 77). Confirm that the total time required for waste disposal and collection activities accounts for trucks manoeuvring on the site and waiting to unload.

Vehicle movement timings are discussed at Section 1.3.2. As noted in that section, the revised proposal and layout have noticeably simplified operations and movements on the site. The timings are based on weighbridge records from a similar Benedict Recycling site and are comparable to other non-Benedict Recycling facilities.

iv Road network safety and efficiency

The DPE RTS request states:

> Demonstrate how conflicts with existing traffic on the surrounding road network will be avoided during peak waste delivery periods to ensure the safety and efficiency of the road network is maintained. This should include a draft Traffic Management Plan.

A revised TIA is provided at Appendix D and discussed in detail at Section 3.4. As discussed in Section 4.1.5vi, further analysis of weighbridge records from similar facilities has demonstrated that the peak hour for the site is likely to be 1 pm to 2 pm. The revised TIA has also been updated to consider the impacts of light vehicle traffic exiting the area via the secondary Castlereagh Road/Mullins Road intersection, in addition to the main Castlereagh Road/Peachtree Road intersection, as per the DPE request discussed at Section 4.1.5.

As shown in Table 3.9 and Table 3.10, the proposal is predicted to have a marginal effect on the Castlereagh Road / Peachtree Road intersection during the standard morning peak hour (8 am to 9 am) and site peak hours (1 pm to 2 pm), reducing the level of service from B to C. There will be negligible effects during the afternoon peak hour (3.30 pm to 4.30 pm), with the level of service maintained at C. The peak hours for the Castlereagh Road/Mullins Road intersection are not predicted to experience a reduction in level of service.

With respect to the surrounding local road network, the project is within an existing industrial estate that currently services a mix of light and heavy vehicles. The project will not change the characteristic mix of vehicles and is not expected to have an impact on safety.

Given the minimal impacts on the surrounding road network, and the established nature of the industrial estate, there is no benefit to prepare a draft traffic management plan at this point. However, it is agreed that an operational traffic management plan would appropriate as part of a future OEMP.

v Swept path analysis

The DPE RTS request states:

> The Department notes swept path analysis has been provided for the largest vehicle proposed to enter the site. Swept paths must also be provided for light vehicle manoeuvres throughout the site including, but not limited to:
>
> - light vehicles exiting the site, adjacent to the outgoing weighbridge 3;
> - all on site car parking spaces to demonstrate safe manoeuvrability in and out of parking spaces;
> - light vehicle movements throughout the site, including consideration of heavy vehicles; and
> - the siting of "P10" (as shown on the site plan) appears to be within a highly-trafficked area of the site and located within proximity to materials storage bays. Further details are required identifying interactions between a vehicle parking in "P10" and foot traffic, other vehicles using the area, site infrastructure and materials stockpiles.

Revised swept path analyses are provided at Appendix F.

As noted in Section 1.3, the proposed site layout has been changed to allow for the facility to be fully enclosed. This has allowed for improvements to vehicle circulation. The following points respond to DPE's above concerns:

- Light vehicles are no longer proposed to exit the site adjacent to the outgoing weighbridge. All vehicles will exit by the outgoing weighbridge.
- Parking swept path analysis was restricted to the edge car parks, which would be the most difficult to access. It is noted that the path for P1 intersected the front fence, which has been moved to compensate.
- Light vehicles will enter via the 12 m incoming weighbridge and park tail-first to the hand unloading area (see Appendix F drawing TX.03). Two light vehicles have been shown to represent a vehicle with a trailer. These parks do not intersect the heavy vehicle swept paths. It is acknowledged that the light and heavy vehicles will share a path as the light vehicles manoeuvre to the hand unloading area. These movements will be monitored by staff.

- Car park P10 has been removed. All car parks are near the entrance of the site.

Not all vehicle movements will be able to occur simultaneously or under all circumstances. Appendix F shows that a 19 m long truck cannot move directly through the site if the truck unloading area is occupied. This will be managed by stopping relevant vehicles (eg 19 m long trucks) from entering the operational area of the site until it is clear. These trucks will be held at the entry weighbridge. This is common scenario, for example no vehicles are able to move through the recently approved Bingo Minto site if a 19 m truck is unloading (SSD 16_7462).

vi Weighbridge setback and queuing

The DPE RTS request states:

> Provide the distances between each incoming weighbridge and the front boundary line and address heavy and light vehicle queuing, including a further breakdown of wait and activity times, for the following scenarios:
>
> - vehicles waiting to access the site;
> - within the site, waiting to access unloading areas; and
> - when exiting the site.

As discussed at Section 4.1.5vi, the entry weighbridge and approach are capable of accommodating 19 m trucks at peak period without requiring stacking with the operational area of the site. As shown in Appendix F, the large weighbridge has been adjusted to allow for a 19 m truck to queue behind it while being completely within the site while allowing vehicles to access the second weighbridge.

As discussed in Section 4.1.5vi, no stacking or queuing of light vehicles is anticipated during the peak period. Therefore, vehicles waiting to access the site can be accommodated within the weighbridge/queuing area. Entrance of vehicles into the site will be managed at the weighbridge, where vehicles will not be allowed into the shed unless there is a clear destination for them. Therefore, vehicles will not wait within the operational area to access unloading area.

Activity times are discussed at Section 1.3 and are based on weighbridge records for a similar site. As shown in Table 1.4, a delivery vehicle in anticipated to spend 12 minutes on the site (entrance to exit), allowing for four to five deliveries per hour at the truck tipping area, and 12 to 15 deliveries per hour at the hand unloading area (assuming three vehicles are unloading as per the swept path diagrams). The outgoing weighing and invoicing process is two minutes, which includes time to clear the exit driveway.

The site has been designed to allow for clear views from the truck tipping and hand unloading areas to the exit weighbridge. Vehicles will not be sent to the exit weighbridge if there is a visible queue to enter the weighbridge. This will ensure that vehicles are not queuing within the site to leave via the exit weighbridge.

With the above controls, the only opportunity for extended queuing is if vehicles are unable to leave the site. This could be due to high traffic on Peachtree Road or an incident (eg vehicle breakdown). Given the low observed traffic on Peachtree road, this is highly unlikely. However, in such an event, a staff member will be sent to the site entrance and redirect incoming traffic to other facilities.

vii Daily vehicle movements

The DPE RTS request states:

> The Traffic Impact Assessment (TIA) submitted states that the traffic movements associated with 24-hour operations "have been averaged into the daily traffic movements." The TIA must assess impacts that accurately reflect the proposed hours of operation and provide worst-case scenarios.

The approach taken in the EIS's TIA was chosen to provide a single conservative estimate that was meaningful for normal peak hours for the surrounding area.

The revised TIA at Appendix D reflects traffic associated with a similar Benedict Recycling facility. Weighbridge records were analysed over a one-month period to determine peak hours, which then informed the traffic distribution model for the site. The revised TIA now accurately reflects the likely impacts throughout the proposed operation hours.

The worst-case scenario (1,500 tpd) is discussed at Section 4.1.4i. The maximum daily capacity was determined based on the maximum tonnage that could be accepted at the site via exclusive 19 m articulated vehicles during the standard operational hours of 6 am to 10 pm. However, this worst-case scenario would result in reduced overall traffic movements as it excludes light vehicle traffic, as light vehicles deliver a much lower tonnage per vehicle.

The month-long review of weighbridge records shows consistent daily vehicle movements throughout the month. The overall daily average for Monday to Friday waste deliveries was 169.6 vehicles. Business day (Monday to Friday) incoming averages were between 162 and 180 vehicles per day. Two individual date outliers with high deliveries were identified during the month: 190 and 193 deliveries. It was noted that the outlier dates experienced high deliveries outside of standard site peak hours (eg 6 am to 7 am and 3 pm to 4 pm), with the peak hour remaining consistent, generally at or below 20 deliveries between 1 pm and 2 pm. Traffic above the 20 deliveries was generally associated with additional light or 'rigid' vehicles (ie 12 m or under), which is not a constraining factor for the site.

viii Exiting vehicles

a. Traffic distribution

The DPE RTS request states:

> The EIS states "the TIA assumed that all site traffic will leave the area via ... Castlereagh Road/Peachtree Road Thornton Road intersection". The EIS and TIA also state that vehicles may leave via the Castlereagh Road/Mullins Road. The impacts of traffic accessing and leaving the site via Mullins Road must be assessed.

The site has been designed so that all traffic associated with heavy vehicles would enter and leave the site as 'right-in' and 'left-out.' Peachtree Road does not allow for 'left-in' and 'right-out' turns for 19 m vehicles without substantial removal of on-street parking. This is not proposed.

However, it is agreed that light vehicles may travel 'left-in' and 'right out.' The revised TIA at Appendix D has assessed the road network, including Castlereagh Road/Mullins Road intersection. As discussed at Section 3.4.3 and 3.4.4, the impacts at this intersection are negligible.

b. Exit lanes

The DPE RTS request states:

> Confirm whether light vehicles and heavy vehicles would be permitted to exit the site at the same time. Detail how safety will be managed, particularly when a light vehicle is turning left and a heavy vehicle is turning right.

The second exit lane has been removed from the proposal. All vehicles will exit via the weighbridge.

c. Exit driveway

The DPE RTS request states:

> The site plan provided indicates that the proposed new driveway at the south-western corner of the site is to be constructed to the boundary. You are required to provide the following:
>
> - the distance between the proposed driveway and the existing driveway to the west;
> - address safety of vehicles and pedestrians using these driveways;
> - address the existing trees located immediately to the west of the proposed driveway (on the adjacent site) and demonstrate they will have no impact on safety and lines of sight;
> - the width of the proposed driveway at its widest point; and
> - identify the rectangular box sited within the proposed new driveway as shown on the site plan and provide relevant details regarding the impact of the proposed driveway on this box.

The proposed entry driveway is generally 12.5 m across and designed with an overturn area to minimise the loss of off-street parking.

The proposed exit driveway is approximately 10 m wide at the shed and site boundary. The driveway then flares out to approximately 16 m wide at the street.

The proposed exit driveway is approximately 7 m from the existing driveway at 44 Peachtree Road. It is noted that vegetation near the site boundary may partially obscure views to the west when existing the site. However, the exit weighbridge is well away from the site boundary, which will give clear lines of sight on approach to Peachtree Road and complimented by safety mirrors and will allow for uninterrupted views to the west.

Service infrastructure pits are located on the verge within the road reserve. The box on the exit driveway as shown on Figure 1.1 represents one of these pits. The pit would likely be relocated to the east of the proposed driveway, with approval from the asset owner, with approval occurring as part of the post-approvals process.

ix Signage and pedestrian movements.

The DPE RTS request states:

> Provide details of internal directional signage and line marking for pedestrian and vehicle safety.

As discussed at Section 1.3.2, the revised layout of the project will separate site vehicle traffic from the general circulation area and allow for safer vehicle and pedestrian circulation throughout the site.

The relocated hand unloading area is now close to site amenities, with pedestrian areas being separated from vehicle circulation areas.

The movement of plant has also been simplified to a north-south movement, perpendicular with the general east to west movement associated with customer traffic. As such, plant will not be required to move against the flow of traffic through the site.

Internal wayfinding signage for site will identify the following site components:

- entrance and exit weighbridges;
- hand unloading area;
- site amenity area;
- truck tipping area;
- and stockpile and dispatch area.

Proposed vehicle and pedestrian line marking areas are shown at Figure 4.1.

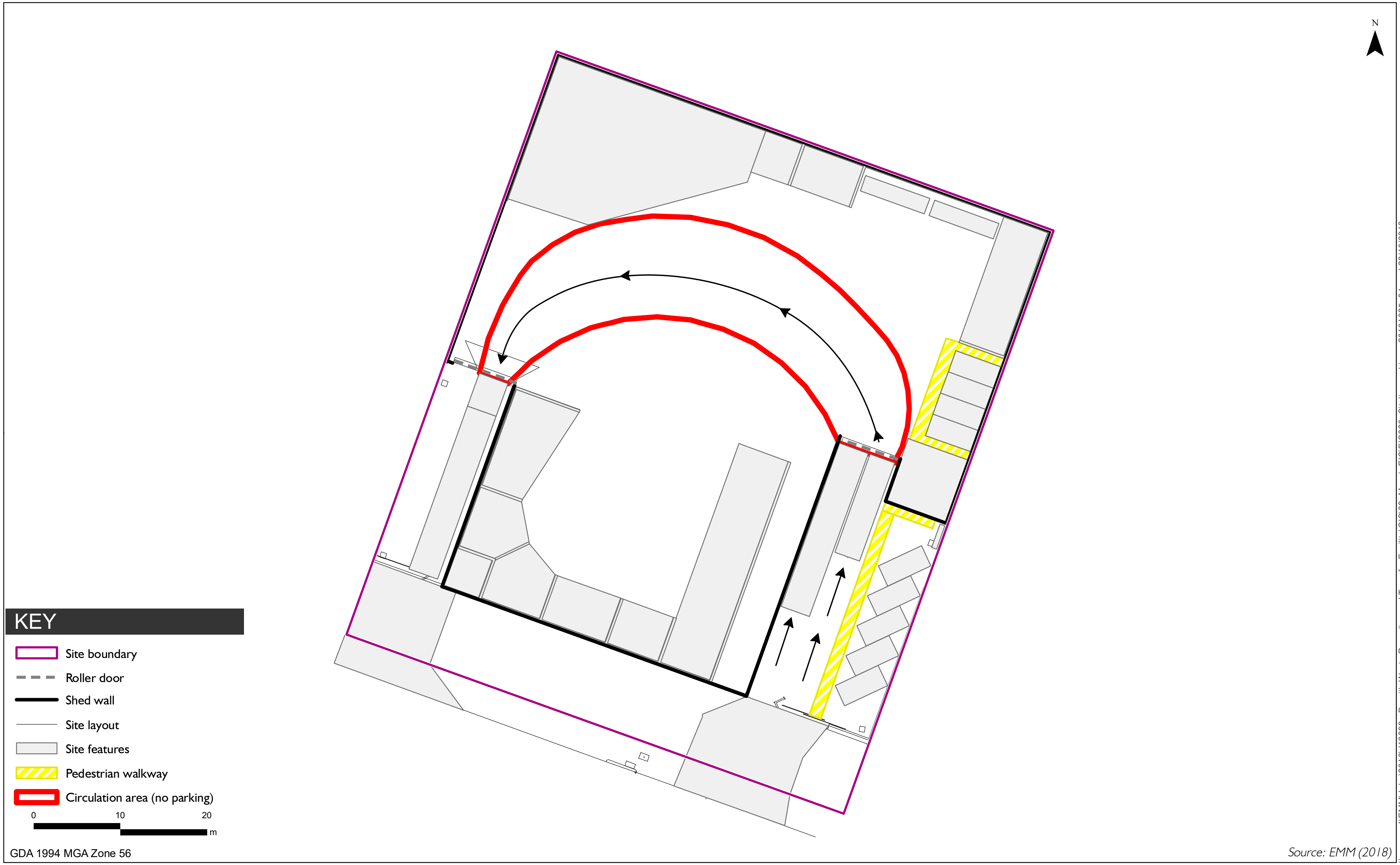
Line markings will designate lanes to the entrance weighbridges and circulation-only areas (ie travel paths between the entrance and exit weighbridges and unloading areas). The circulation area for the site is shown at Figure 4.1. These areas will be no-parking and no-unloading areas for customer vehicles, with stopping only permitted at the direction of site employees.

Pedestrian markings will identify pathways between the hand unloading area and site amenities without entering vehicle circulation areas.

The final line markings for the site will be identified as part of an operational traffic management plan (OTMP), developed as part of an OEMP. The line markings will be consistent with the swept path analysis at Appendix F, or as supported by swept path analysis included as part of the OTMP.

The circulation area shown in Figure 4.1 partially overlaps with the unloading truck figure on Appendix F Drawing TX.02. The circulation area, as shown in Figure 4.1, is an amalgamation of the common swept path elements from Appendix F and is meant to demonstrate the general nature of the management measure (ie that the common path of vehicles will be kept clear so that site plant and customer vehicles will not interact).

The final location of the unloading and circulation areas will be provided in the OTMP and are contingent on final detailed engineering drawings being produced for the facility. The unloading area will not be identified as a circulation area (ie not a ‘no-unloading area’) Management of traffic through the site and around the unloading area is described at Section 4.1.9v.



Site line markings

Penrith Waste Recycling and Transfer Facility

Response to Submissions

Figure 4.1

4.1.10 Contamination and hazardous materials

i Site contamination

The DPE RTS request states:

> The initial contamination investigation (prepared by EMM, dated 20 April 2017) has determined the site is potentially contaminated. As such, the Department requires the submission of a detailed investigation in accordance with the State Environmental Planning Policy No. 55 – Remediation of Land and relevant corresponding Guidelines.

a. Enhanced PCA

In order to address the concerns raised the DPE RTS request, an enhanced PCA has been prepared, attached at Appendix G. The enhanced PCA is supported by soil sampling, a detailed walkover of the site and a more detailed historical analysis of the site and surrounds.

Chapter 3 of the enhanced PCA detailed previous uses of the site dating back to 1936. Between 1936 and approximately 1985, the site was used for agricultural uses, including grazing. At around 1965, the site may have been used as a low intensity piggery and grazing area. Due to the low level of intensity of agricultural uses on the site and surrounding area, including the lack of significant infrastructure associated with the piggery, historical uses before the establishment of the industrial uses do not indicate a high risk for contamination.

Section 3.3 of the enhanced PCA provides the findings of a further detailed walkover of the site. As described in the original PCA, oil and grease has accumulated on the slab, with two oil sumps identified. No oil was observed off the concrete slab. Cracks were identified on the slab. The cracks were chipped to determine if they extended through the slab. The chipping indicated that the cracks do not extend through the slab. One area of the concrete was damaged to the extent that the natural soil surface was exposed. This area was tested for contaminants, as discussed below. The verge area did not show any visual or odour signs of contamination.

The method for the site survey is in Chapter 6 of the enhanced PCA.

A targeted site survey was undertaken, with surface samples taken from the damaged concrete area (site 1) and two samples taken from the exposed southwestern area of the site (site 2 and 3). These areas were chosen as they would have the highest likelihood of contamination and reflect areas that require limited excavation for footings. Site 2 was adjacent to the front wall. This area was chosen to indicate if contamination was leaving the site.

Site 1 is expected to represent the worst-case scenario for contamination on the site, as only surface level sampling could be undertaken due to concrete debris blocking auger equipment. The sample from site 1 had petroleum-type odours and associated staining.

Sites 2 and 3 did not present odour or staining.

Samples were analysed for:

- metals and metalloids (As, Cd, Cr, Cu, Pb, Ni, Zn, and Hg);
- total recoverable hydrocarbons;

- total petroleum hydrocarbons;
- polycyclic aromatic hydrocarbons; and
- BTEX (benzene, toluene, ethylbenzene, and meta, para and ortho-xylene).

As discussed in Section 7.3.1 of the enhanced PCA, measured concentrations in all samples were less than the adopted human health assessment for direct contact. Therefore, it is unlikely that construction or site staff will be exposure to contamination is a risk for the site.

As discussed at Section 2.3.5 of the enhanced PCA, groundwater has been recorded between 6.6–8.1 m below ground level in the area around the site, and not proposed activity is likely to intersect groundwater. Therefore, the proposal presents a low risk for contamination of groundwater, and vapour intrusion is unlikely to present a risk for the site.

However, as discussed below, the CEMP will include a robust testing and unexpected finds protocol to resolve any issues that arise during construction.

b. Recommendation

The enhanced PCA makes the following recommendations:

- The compromised slab (site 1) and areas where the slab is significantly cracked will be cut and removed, with the soil immediately below the removed slab excavated and tested for petroleum hydrocarbons. If relevant limits are exceeded, the material will be disposed of at a licensed facility.
- The oil sumps will be emptied, with contents disposed of at an appropriately licensed facility. The sumps will be inspected for damage. If any damage could allow for leakage, the sumps will be removed, with the soil immediately surrounding the sump tested for petroleum. If removal is required, and soil sampling outcomes exceed relevant limits, the material will be disposed of at a licensed facility. Otherwise, the sumps will be backfilled with concrete.
- Removed sections of the slab will be backfilled with VENM and resealed.
- During the initial construction stage, section of the slab will be progressively bunded, treated with a solvent/degreaser and steam cleaned. The entire slab will be cleaned in this way. Waste water will be pumped out and disposed at an appropriately managed facility.
- A construction environmental management plan will be prepared for the development phase of the site, this will include an unexpected finds protocol to ensure that if any contamination is encountered during construction it can be appropriately managed. This plan will inform contractors of the potential for subsurface soil contamination and will be required to look out for staining and odours when excavating. Contractors will also use a photoionization detector during excavations so volatile organic compounds (petroleum hydrocarbons) can be assessed.

No contamination issues have been identified that would preclude the proposed future land use as a waste recycling and transfer facility with minimal opportunities for soil access. The site is suitable for the proposed use; however, some remediation works are recommended on site associated with potential contamination pathways.

As such, the additional information provided in the enhanced PCA is sufficient to meet the requirements of Clause 7 of SEPP 55 and the SEPP 55 Guidelines. Therefore, detailed investigation should not be required for the application.

ii Storage location of hazardous materials

The DPE RTS request states:

> Details are required clearly identifying the storage location of dangerous goods and hazardous materials on site including the location of the refuelling area referred to in the EIS (section 5.6.1). Clarify what type of tank/vessel is proposed for the site and what type of bunding is proposed.

Dangerous good and hazardous materials are discussed in Sections 3.3.5 and 5.2 of the EIS. Materials identified in Table 5.1 of the EIS will be kept at the end of the protected area to the east of the light waste area. This area is protected by walls on three sides and well away from site traffic.

Refuelling is discussed in Section 2.1.6 of the EIS, including management measures. As noted in that section, diesel will be supplied to mobile plant (ie the excavator and FEL) by an on-site refuelling contractor. Mobile plant will be fuelled in place, rather than a dedicated refuelling area. Nothing that the floor of the facility will be a concrete slab, which will be surrounded by a bund (see Section 4.1.15). As discussed in Section 2.1.6, diesel spill kits will be available within the site.

Diesel storage, aside from the limited quantity listed in EIS Table 5.1 (the approximately quantity of all oils is 840 L), is not proposed for the site. As such, a permanent and bunded fuelling is not proposed.

4.1.11 Overnight parking

The RTS states:

> Provide justification for parking trucks on site overnight and include details such as location of overnight parking and the maximum number of vehicles proposed to be parked overnight.

On-site overnight parking is no longer proposed.

4.1.12 Waste processing

i Non-recyclable materials

The DPE RTS request states:

> The EIS states non-recyclable material, for the purposes of the development and the EIS, is considered waste "not able to be recycled on site". Confirm whether there would be any sorting of non-recyclable materials on-site and subsequently how it will be determined where the nonrecyclables are to be sent (i.e. further processing or landfill). The location of the non-recyclables storage area is to be shown on the relevant plans.

As noted in Section 1.3, processing (eg screening/picking) is no longer proposed. Material will be sorted in the truck tipping area into general categories as described in Table 1.3). These stockpiles will generally be processed at a separate facility.

As discussed in Section 4.1.5iii, approximately 5% of materials accepted by the facility (approximately 30 t on an average day) will be sent to landfill. Due to the low volume of the materials expected, these materials will be kept in the 'light waste' stockpile.

ii Light and vegetative waste

The DPE RTS request states:

> Detail how light waste and vegetative waste stockpiles will be separated. The EIS states that light waste includes materials such as plastic, paper and cardboard and states that these materials will be sent to landfill. Detail why these materials are not being recycled. The EIS also states that vegetative waste will be monitored daily for signs of composting, specified as odour and increased temperature. Detail how odour and temperature would be measured and what are the thresholds for removing the waste. Provide justification for waiting for vegetative waste to compost and smell before removing it from the site.

a. Separation

The site plan has been amended so that light, green and timber waste are in separate stockpiles.

b. Recyclable waste

As stated in EIS Section 3.1, the original proposal would result in dry paper and cardboard being recycled (as far as practical). EIS Table 2.3 states that rubbish to landfill includes, in part, plastic, paper and cardboard. This represents wet or dirty paper and cardboard that is unrecyclable and unrecyclable plastics. The materials are generally unrecyclable as it can jam recycling machinery and breaks down in such a way that it is unusable.

As noted above, unrecyclable materials will be stored in the light-waste area, while recyclable paper and cardboard will be sent to the paper and cardboard bin for processing at another facility. This will prevent contamination of recyclable materials on site.

c. Vegetative waste

The vegetative waste management measures are discussed at EIS Section 2.6.

The EIS states that vegetative waste will be dispatched as soon as there is a load or if there is evidence of composting, whichever is sooner. As explained in the EIS, the facility is designed to be a waste recovery and transfer facility with short turnaround times. However, it is proposed that testing will be done daily, including:

- ranged infrared testing;
- visual checks; and
- odour testing.

In the first instance, a ranged infrared thermometer will be used to determine if the vegetative waste is warmer than the ambient temperature and other stockpiles. These devices commonly have accuracy within 2 degrees Celsius. If readings show that the vegetative waste stockpile is more than 5 degrees warmer than the ambient temperature and neighbouring stockpiles, it will be removed.

However, given that the operational area of the site, including the wood and green waste stockpile, is proposed to be enclosed, this waste will have negligible direct exposure to sunlight once within the site. As such, it is not expected that any material will remain on site long enough for composting to occur, and the proposed monitoring and management measures are considered appropriate.

iii Waste rejection

The DPE RTS request states:

> Specify how vehicles with unacceptable loads turned away at the weighbridge will be directed to leave i.e. through the site or reversing out. Please note that all vehicles should be able to enter and exit the site in a forward direction. Further details are required regarding the process for determining whether vehicle loads are acceptable e.g. visual inspection only.

and

> Specify management procedures in the event unacceptable materials (e.g. putrescible waste, contaminated waste) are found to have been unloaded and located within a stockpile (the Department notes the EIS addresses asbestos only in this regard).

The process for rejection of loads containing asbestos is discussed at 4.1.3. Rejection of other loads will happen in a similar manner:

If a load is suspected of containing any unacceptable material (eg rotting green waste, paint tins, tyres, or other wastes not permitted by the EPL) at the weighbridge, the details of the vehicle will be logged, and the driver will be directed to exit via the exit weighbridge, as guided by a site employee. This will primarily be a visual inspection via cameras at the weighbridge, with other triggers if obvious (ie rotting smells). A second inspection will be undertaken when the load is tipped. The driver will not be able to leave until the tipped material has been inspected at accepted (See EIS Section 2.2.7 for commercial reasons not to accept bad loads).

It is noted that the EPA's draft standards support accepting unpermitted waste types (other than asbestos) at the tip and spread inspection area at Section 1.2:

> 5. Ensure that all unpermitted waste types identified within the load are immediately moved to the appropriate waste storage area as required by Standard 4.

However, as discussed in the EIS Section 2.2.7, if unacceptable materials are identified as part of the inspection process at the truck tipping area or hand unloading area, the vehicle will be reloaded and logged, a reloading fee will be issued and the driver will be directed to exit via the exit weighbridge.

If incorrect materials are identified within existing stockpiles, they will be either be transferred to the appropriate stockpile (eg a brick is found in the cardboard bin). If unacceptable waste is identified, it will be moved to the non-conforming waste area. Corrections will be logged and site employees will be informed of the mistake and retrained if necessary.

4.1.13 Job generation

The DPE RTS request states:

> Confirm how many operational and construction jobs will be generated by the proposed development. Provide details of staff numbers and arrangements for proposed 24 hour operations.

The site will generate approximately 25 construction jobs across a range of professions.

The site will generate approximately 12 operational jobs, with one shift of seven employees and a second shift of five employees.

A 24-hour operation will consist of three eight-hour shifts, generally with 15 employees rostered across three shifts for a period of two weeks.

4.1.14 E3 Environmental Management zone assessment

The DPE RTS request states:

> There are several allotments zoned E3 Environmental Management located approximately 340 m north-east of the site where dwellings are a permissible form of development with consent, including an existing dwelling on one allotment. The impacts on this land are required to be addressed.

The E3 Environmental Management zone (E3 zone) is approximately 340 m from the site. A single dwelling has been identified in the E3 area. The relevant impacts of the project on the E3 zone are noise and air quality. The revised noise assessment (attached at Appendix B and discussed at Section 3.2) and air quality assessment (attached at Appendix C and discussed at Section 3.3) have considered the projects impacts on the E3 zone.

As discussed in those sections, the noise and air quality impacts on the E3 zone are below all criteria.

4.1.15 Fire safety

The DPE RTS request states:

> Provide a plan showing the proposed location of all fire safety measures.
>
> Provide a detailed assessment of the sites ability to store firewater.

The proposed locations of fire safety measures are provided at Figure 4.2 and will be finalised as part of the detail design process in accordance with BCA provisions.

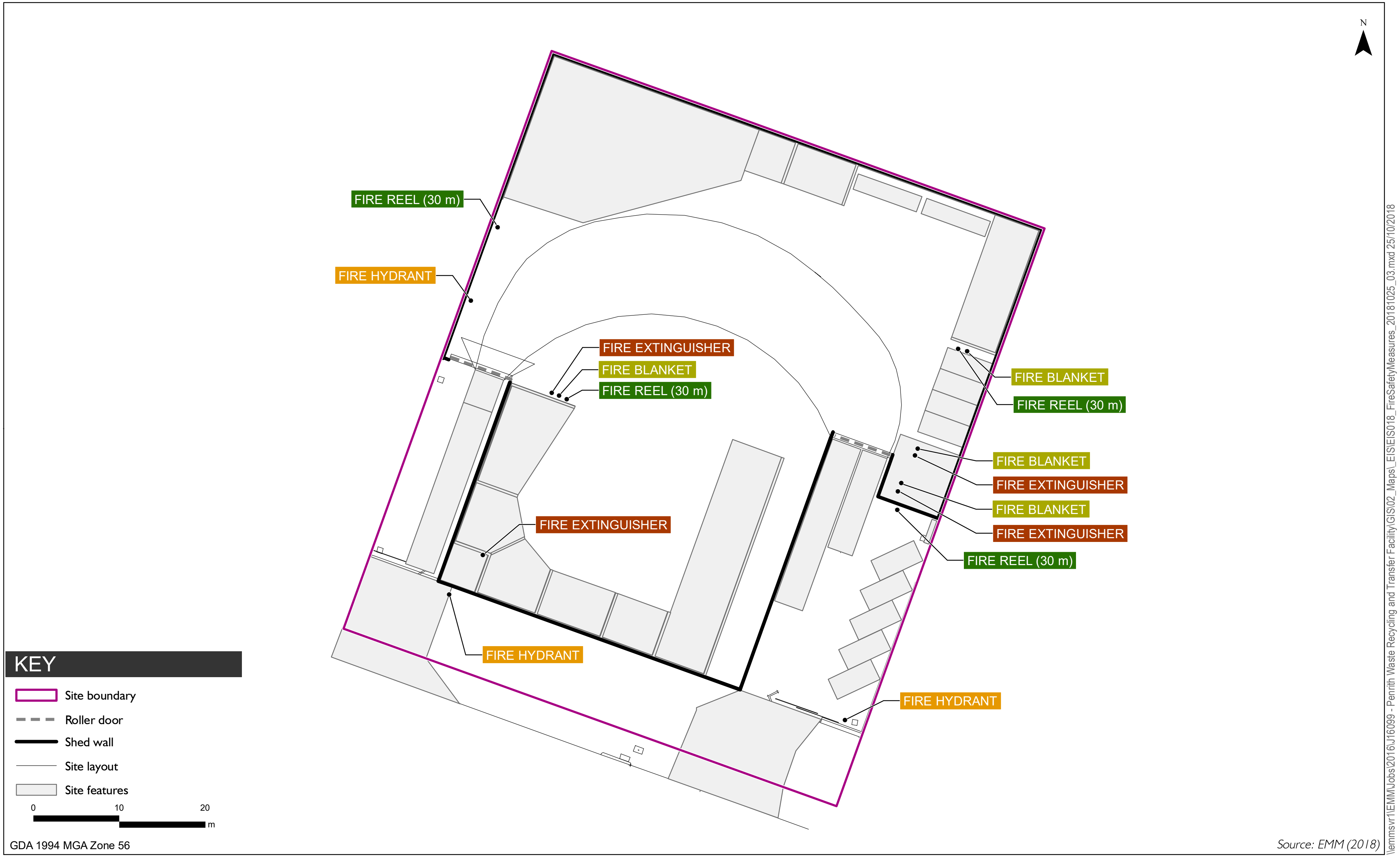
In summary, the following fire safety measures are proposed at a minimum:

- four fire hydrants;
- four fire extinguishers;
- four fire blankets;
- four fire hose reels; and
- smoke alarms.

A statement of available pressure and flow for the site (Appendix H) indicates that site can service all four hydrants at 10 L/s (40L/s) with no water storage required on site. Hydrants will be available inside and outside of the operational area of the site.

As shown in the plans at Appendix A, the ridge of the facility's roof is vented with a mesh covering. This vent will allow for smoke to escape from the facility without the need for mechanical ventilation. The vent and BCA requirements are discussed in the fire safety strategy provided at Appendix I. As discussed in the strategy, the proposed vent, subject to detailed design, would vent hot smoke for the purposes of evacuation of the facility.

As noted in Section 1.3, the entire operational area will be bunded with 0.1 m kerb, including at site entrances (site entrances will be ramped to allow for vehicle movement). This will ensure that, in the event of a fire, the site can store approximately 300 m^3 (300,000 L) of firewater. At 40 L/s, the bunded area would allow for approximately two hours of fire water storage. After a fire event, water will be tested to determine if it is safe to discharge into the stormwater system. If not, firewater will be pumped out of the site and disposed of at an appropriately licensed facility. This process will be detailed as part of a water management plan for the site.



[redacted]

Indicative fire safety measures

Penrith Waste Recycling and Transfer Facility

Response to Submissions

Figure 4.2

4.1.16 Scenic and Landscape Values

The DPE RTS request states:

> The Penrith Local Environmental Plan 2010 identifies the subject site to have Scenic and Landscape Values in accordance with Clause 7.5. This is required to be addressed.

The Scenic and Landscape Values clause of PLEP 2010 states:

> 7.5 Protection of scenic character and landscape values
>
> (1) The objectives of this clause are as follows:
>
> (a) to identify and protect areas that have particular scenic value either from major roads, identified heritage items or other public places,
>
> (b) to ensure development in these areas is located and designed to minimise its visual impact.
>
> (2) This clause applies to land identified as “Land with scenic and landscape values” on the Scenic and Landscape Values Map.
>
> (3) Development consent must not be granted for any development on land to which this clause applies unless the consent authority is satisfied that measures will be taken, including in relation to the location and design of the development, to minimise the visual impact of the development from major roads and other public places.

The site is identified on Council’s Scenic and Landscape Values Map (Sheet SLV_005) as ‘land with scenic and landscape values.’

The closest major road is Castlereagh Road, approximately 200 m to the east of the site. Views to the site will almost entirely be obscured by existing structures between Castlereagh Road and the site. No views to the site exist from formal open space (ie parks and public reserves). Any views from the closest public area of this type, Weir Reserve, is completely obscured by trees at Peach Tree Creek.

Minor views to the front of the site may be possible from the Castlereagh Road its intersection with Peachtree Road. The site will be visible from publicly accessible space, being Peachtree Road and the associated footpaths. Views from Peachtree Road will be improved, with the new shed replacing the existing aging shed and perimeter walls and enhanced landscaping forming an appropriate screen (See Section 4.2.3). From a scenic and landscape values perspective, this change will be beneficial, and the proposal is considered to comply with the objectives of the clause.

4.1.17 Amended drawings

The DPE RTS request states:

> Submit amended plans addressing the following:
>
> - the shed elevations identify "existing metal shed to be demolished" however all other plans identify a metal awning to be demolished in this location;
> - an elevation plan removing the boundary fence;

- the relationship between the north point and the orientation of the existing floor plan (labelled ""01 Shed Floor Plan, Drawing A201, Revision A) and the shed mezzanine plan (labelled ""01 Shed Mezzanine Plan, Drawing A202, Revision A) appear to be inconsistent with the other plans and drawings provided; and
- the EIS states that car parking spaces provided are minimum "2.7m wide by 5.4m long" which is inconsistent with the dimensions of the car parking spaces shown on the site plan and relevant Australian Standards.

As discussed in Section 1.3, the proposal has been revised. Revised drawings are attached at Appendix A. In response to the above points:

- the plan shows the existing shed and front boundary fence and gates being demolished;
- elevation plans now show the boundary fences as dotted lines with the shed structure visible;
- figure north points and orientations are now consistent; and
- car parking spaces are 2.6 m wide and 5.5 m deep, which is consistent with the relevant Australian standard's (AS 2890.1) requirement for off-street car parking for short term parking (2.6 m wide and 5.4 m deep).

4.2 Penrith City Council

Penrith City Council (Council) provided comments for consideration in the assessment of the project. These are summarised and responded to below.

4.2.1 Traffic management

i Daily truck movements

Council's submission states:

> Appendix D (Traffic Impact Assessment) proposes 134 "daily truck movements", but it is not clear whether these are return trips or single trips. This needs to be clarified as it is not possible to assess the traffic impacts of this proposal without this information / clarification.

As noted in EIS Section 6.2.2 and TIA Section 3.2., daily movements are based on two movements for each vehicle.

ii Traffic generation

Council's submission states:

> The proposed daily traffic movements appear to be based on a 10-hour day operation, however the proposal raises the possibility of 24-hour / 7-day-week operation. A summary of site-generated daily traffic trips for this level of operation is required to be submitted for assessment if this operation is sought as part of the current application.

The revised TIA has been updated with a traffic model that reflects weighbridge records for a similar facility operated by Benedict Recycling. The revised TIA focuses on daily operations that end at 4 pm and 10 pm. 24-hour operations would add one truck per hour (two vehicle movements) between the hours of 10 pm and 6 am.

Traffic impacts associated with the operations during this time are considered negligible given the low additional traffic movements and low general traffic expected at night (see Section 4.1.4ia and Section 4.1.4ib).

Traffic associated with Saturday and Sunday operations would be lower than weekdays and biased towards smaller rigid and light vehicles, with reduced dispatching requirements. Given that traffic on the surrounding road network would be less than standard peak hours, impacts are expected to be minor (see Section see Section 4.1.4ii).

iii Performance of Castlereagh Road/Peachtree Road intersection

Council's submission states:

> The queue distances in the SIDRA analysis (in Appendix B) doesn't appear to reflect the percentage of heavy vehicles in the mix (as a 19m heavy vehicle effectively takes up a queue length of 4 or more cars). For example, the proposed queue distance for right-turn movements from Castlereagh Road into Peachtree Road (i.e. from the northern approach), after operation of the facility commences, is forecast to be 14.7m in the AM peak, and 6.1m in the PM peak. As both distances are less than the length of a single 19m heavy vehicle, and given the numbers of heavy vehicles proposed to access the site at these times, clarification of the application of data in determining these queue distances is required.

Maximum traffic queue length, as represented by SIDRA analysis is a function of the both the mix and number of vehicles that pass through an intersection, not the absolute longest vehicle that passes through an intersection. Maximum traffic queue length is calculated at the 95% confidence interval, where the number of vehicles is calculated to the nearest 0.1 of a vehicle and the average length of a vehicles is taken as the average length of the total hourly numbers of light and heavy vehicles making that turning movement. This means that in low traffic situations, the SIDRA model can produce results such as those indicated for southbound right hand turns from Castlereagh Street to Peachtree Road, where the maximum number of vehicles queued is less than 1.0 and the maximum queue length is less than the length of a typical truck.

Given that the SIDRA analysis including the project traffic has nine heavy vehicles in the 8 am-9 am peak hour, ten heavy vehicles in the mid-day peak hour and four heavy vehicles in the 3.30 pm-4.40 pm peak, it is not unreasonable for the 95% confidence interval maximum queue length to be under the largest vehicle size of 19 m during some of the three peak traffic periods considered.

However, during the mid-day peak hour, when there is a higher number of trucks using the intersection in the baseline traffic situation, the 95% maximum queue length for the right turn movement from Castlereagh Road is notably higher than during either the am or pm peak hours, being 38 m in the baseline traffic situation and 40 m with the additional project traffic included.

Nevertheless as the dedicated right hand turn bay length is actually over 60 m, the current intersection design allows for ample queue length compared to the predicted requirements, so the approximations which are used by the SIDRA intersection program to calculate the 95% maximum traffic queue lengths for turning movements containing a combination of light and heavy vehicles should not be a major concern, because the actual length of the right turn bay is still significantly higher than the forecast maximum traffic queue length for any of the future traffic scenarios considered.

Council's submission states:

> The SIDRA analysis (in Appendix B) of the PM peak indicates that average delay times (on the western approach to the intersection) will actually decrease after all their additional traffic is added to the road network. This does not seem realistic and requires further explanation.

In the revised TIA report, the SIDRA analysis results show the pm Peak Peachtree Road average intersection delay now increases from 77.4 seconds to 77.6 seconds with the project traffic during standard operations. The average delay times are calculated separately by SIDRA for each intersection approach and are based on per-vehicle delays for the combination of light and heavy vehicles using each intersection approach. At this intersection the delays are generally highest for the Peachtree Road and Thornton Drive traffic as the traffic signal timing prioritises Castlereagh Road traffic. As the SIDRA model normally calculates that light vehicles have a lower delay than heavy vehicles at a minor road approaches to an intersection, the SIDRA model can interpret additional light vehicle traffic at an intersection as causing a net reduction in the average intersection delay for that approach, or even a reduction in the overall average intersection delay in some cases.

Council's submission states:

> The survey data provided in Table 2.2 of Appendix D (Traffic Impact Assessment) indicates that the western leg of the Peachtree/Castlereagh Road intersection has an existing AM peak of 30 heavy vehicles and an existing PM peak of 14 heavy vehicles, yet Table 4.1 indicates existing daily heavy vehicles at this leg of the intersection is calculated to be 360. This needs to be clarified, since an over-estimation of the existing heavy vehicle count tends to minimise the proportion of increase in the proposed numbers of heavy vehicles on this leg of the intersection.

Peak hour traffic is primarily a result of commuter traffic in light vehicles, not commercial vehicles. Businesses in industrial areas, such as Peachtree Road, prioritise their heavy vehicles for non-peak hour journeys, in particular in the early morning and mid-morning daytime periods. This is done for two main reasons: to reduce labour costs associated with each journey and to increase the number of jobs each heavy vehicle can complete throughout the day. In other words, it is inefficient to have heavy vehicles on the road during peak hour.

Therefore, it is normal for the average daily traffic percentage of heavy vehicle movements to be significantly higher than either the morning or afternoon peak hour traffic proportions of heavy vehicle movements for this type of road.

Council's submission states:

> As mentioned in the paragraphs above, the Traffic Impact Assessment shows Level Of Service (LOS) 'C' for the Peachtree/Castlereagh Rd intersection both before and after the proposal, but this is because the report has used the LOS for the entire intersection (all legs), when actually the critical leg of the intersection (the western leg) is LOS 'F' (or at best 'E', depending on the time period). It would unacceptable (in terms of safety, amenity and accessibility), without some level of upgrade, to have this scale of increase in heavy vehicle traffic at an intersection leg that is already failing.

For traffic signal-controlled intersections, according to the RMS guidelines, it is correct to interpret the intersection performance as the overall average traffic delay for all traffic using the intersection, which has been done in the TIA. The alternative interpretation of assessing the average intersection delay for the worst affected intersection movement, is only applicable to intersections which are controlled by either Give Way, Stop Sign or roundabouts. As Peachtree Road/Castlereagh Road is a signalised intersection, this is not applicable.

Council's submission states:

> The applicant should be requested to consult with RMS on the scope for upgrading the western leg of the intersection in association with the proposed intersection upgrade for the other intersection legs. The applicant should demonstrate that upgrade proposal/s would result in LOS 'C' or above for the western leg of the intersection.
>
> As requested in the SEARs, plans of any proposed road upgrades/infrastructure works required for the development must be provided (specifically with regard to the above point).

The EIS, including the TIA, were provided to the Roads and Maritime Services for comment as part of the public exhibition process. Comments and recommendations from the RMS are discussed in Section 4.7. The RMS did not raise any concerns regarding the Peachtree Road/Castlereagh Road intersection.

As there is no assessed requirement to undertake any intersection upgrades, there is no corresponding requirement to provide plans for any upgrades to the intersection. As noted above, delays appear to be attributable to light phasing, as opposed to saturation or complexity. Therefore, adjustments to phasing would be a more practical and cost-effective manner of increasing the level of service.

iv Swept path analysis

Council's submission states:

> The heavy vehicle swept paths provided (in Appendix B) indicate that both ingress (right-turn in) and egress (left-turn out) require the vehicle to take up the full road width kerb-to-kerb, which is unsafe and would also eliminate parking on both sides of the street. This is unacceptable and access driveways would need to be widened to ensure that swept paths can be safely accommodated from/within the travel lanes.

Updated swept path analysis drawings are provided at Appendix F. The swept path diagrams provided with the original TIA modelled ingress, circulation and egress of 19 m articulated trucks for the site. Peachtree Road is shown as four green lines. The outermost lines represented the kerbs, while the inner lines represent the bounds of the parking lanes. The swept path analysis demonstrates that ingress and egress of the modelled 19 m articulated truck did not overlap with the southern parking lane on Peachtree Road. The updated swept paths demonstrate the same.

As noted in Section 2.1.7 and 6.2.2vi of the EIS, no-stopping areas will need to be established on the northern side of Peachtree Road to accommodate the swept paths. This is a common method of allowing for the movement of larger vehicles, as evidenced by the No Stopping area on the northern side of Mullins Road outside the Holden Dealership.

Driveways, as shown in Appendix A will allow for trucks to enter and egress without travelling onto unpaved areas. While it is possible to extend the driveways to encompass the required No Stopping area, this would have the effect of increasing impermeable surface area without improving traffic movements.

Council's submission states:

> The heavy vehicle swept paths provided (in Appendix B) also indicate that truck manoeuvring onsite is in conflict with proposed structures onsite.

The plans at Appendix A have been updated with minor adjustments to resolve conflicts identified in the swept path analysis at Appendix F. Given that an OTMP with swept path analysis for approved drawings will likely be required as part of an OEMP, this minor inconsistency is not considered to be an issue.

Council's submission states:

> The proposal does not clearly state the size and type of the largest vehicle proposed to enter the site, however I have assumed it to be a 19m general access vehicle. If anything larger (or heavier) is proposed or anticipated (or is even a possibility) it needs to be stated.

As noted in Section 2.2.5 of the EIS, the largest vehicle to be permitted on the site would be a 19 m articulated truck. This has not changed with the revised proposal.

Council's submission states:

> The Traffic Impact Assessment mentions the provision of truck parking onsite, but it is not clearly shown on the plans provided unless it is referring to the truck manoeuvring area (which cannot be counted as a truck parking area).

It is no longer proposed to have out-of-hours truck parking on-site.

Council's submission states:

> The Traffic Impact Assessment addresses road network peaks, but does not give any indication of the operational peaks of the proposal. This information is required.

The Revised TIA addresses operational peaks, with impacts discussed in Sections 3.4 and 4.1.5vi.

Council's submission states:

> The proposal is for 8 staff members on-site, however the GFA for the site needs to be provided for parking calculation purposes, as Penrith DCP 2014 requires that the greater rate be applied.

Chapter C10 of Penrith DCP 2014 includes car parking controls for 'Industrial' uses, with subcategories of 'industries' and 'other uses'. The DCP requires 'Industries' to have 1 space per 75 m^2 of gross floor area, with 'other uses' requiring parking as per RMS guidelines. If RMS guidelines are not available, a site-specific car parking analysis is required. The term 'industries' is not defined in the chapter or in the DCP definitions.

The GFA of the proposed shed is 3,042 m^2. If the site is classified as 'industries', this would require 40 car parking spaces. Given that the site will employ seven people at any one time, this is not considered reasonable. Instead, the 'other use' subcategory is more appropriate, and is supported by the revised TIA, which justifies one car parking space for each employee, with two on-site car parking spaces for visitors.

Council's submission states:

> The Traffic Impact Assessment does not consider the capacity and impacts on the Mullins/Castlereagh Road intersection, nor does it provide analysis of this intersection as a possible alternative route to/from the site. This analysis is required in order to fully determine the traffic impacts on the local road network (and any remedial measures that may need to be undertaken).

The revised TIA has been updated to include an analysis of impacts at the Mullins Road/Castlereagh Road intersection. This is discussed at Section 4.1.9iv. As discussed in that section, only light vehicles are expected to approach the site from the intersection, given turning restrictions into and out of the site. Impacts to the intersection are minimal, with no reduction in level of service predicted.

Council's submission states:

> As requested in the SEARs, plans of any proposed road upgrades/infrastructure works required for the development must be provided (specifically with regard to the above point).

The only road upgrades or infrastructure works required are to accommodate the driveways and No Parking areas. Costs for signage will be borne be the applicant.

Council's submission states:

> An accurate description of haul routes is required (as per SEARs) in order to determine any additional traffic impacts on our local roads, whereas the Traffic Impact Assessment states only that 50% of vehicles will travel north via Andrews Road and 50% will travel south via Mulgoa Road. More information is required with regard to where heavy vehicles are travelling from and where their destination points will be.

Incoming material will be delivered from the surrounding area. The 50/50 distribution at Castlereagh Road is considered an appropriate approximation of the deliveries, given the generally even distribution of developed areas in the surrounds.

Dispatching vehicles are generally limited to egressing two vehicles per hour, and as such, any other distribution is not practical.

Council's submission states:

> The application requires comment from the NSW Roads and Maritime Service and it is requested that the NSW Department of Planning and Environment discuss the above traffic management concerns with the RMS.

Comments have been received from the RMS and are addressed at Section 4.7.

Council's submission states:

> If the application is supported, it must be that the above issues have been resolved and / or suitable intersection upgrades are included within the scope of works to ensure a satisfactory service level is provided without adverse impact on the local road network.

As discussed at above and at Section 4.1.9iv, the existing road network can accommodate the traffic impacts of the site with additional capacity for future development.

4.2.2 Environmental management

Council's submission states:

> The EIS states that stockpiles shall be 5m high with stockpile separation walls being 4m high. The maximum height of stockpiles should be reduced to no greater than 4.0m to coincide with the height of the separating walls.

Given that the stockpile areas are now fully enclosed, the stockpiles will not be visible from public areas. The stockpile heights are proposed to be 5 m. Stockpile capacities have assumed that materials will slope into the 4 m walls.

Council's submission states:

> Concern is raised at the proposed reliance upon sprinkler systems as the main method of control of outdoor dust generation, particularly in regard to operational practicality (giving consideration to onsite activities) as well as the resultant wastewater that may be generated. Given the proximity of existing surrounding commercial/industrial receptors and the potential for dust to impact these receptors, it must be assured that the dust control system for the site is compatible with site operational needs and will not create other adverse environmental impacts such as water pollution.

As explained in Section 1.3, the site is now fully enclosed. As explained in the revised air quality assessment and explained at Section 3.3, misting curtains at the vehicle entrance and exit, along with additional internal misting will suppress dust. These are widely used at similar facilities.

The revised air quality assessment remodelled air quality impacts for the surrounding area, as discussed at Section 3.3. Impacts for all residential receptors are below applicable impact assessment criteria, and all surrounding industrial receptors are at or below relevant criteria. Only one industrial receptor was at a criteria level (R6 for cumulative concentrations of $PM_{2.5}$).

As operational areas of the site are enclosed, misting will not have an impact on water quality. Any misting outside of the facility will be clean water on a clear area of the site.

Council's submission states:

> The EIS refers to the installation of a gross pollutant trap however does not provide details of the proposed device and the range of contaminants that the device will satisfactorily treat prior to disposal to the stormwater system. It is requested that this aspect of the application be reviewed by the EPA with assurance given that all potential contaminants (including nutrients, heavy metals and hydrocarbons etc), not just sediment, are appropriately captured and disposed of and not directed to Council's stormwater system.

GPTs are no longer proposed given that the operational areas of the site are now fully enclosed and bunded. The weighbridge and driveway areas are considered clean areas on the site. Stormwater from these areas will pass through sediment traps before leaving the site.

Council's submission states:

> Whilst the air quality impact assessment assesses the potential for odour from green waste it does not discuss the potential for odour from the presence of cloths, plastics and the like. It is requested that the EPA in conducting its assessment, consider all potential sources of odour within the waste stream, as appropriate.

The site will not accept odorous material. Green waste has been considered due to the potential for it to generate odour. However, all stockpiles are also expected to be cleared of material within days of receipt, minimising the opportunity for any material to generate odour. However, if an odour is detected from a stockpile, the site manager will arrange for material to be dispatched immediately.

Council's submission states:

> The EIS discusses the storage of asbestos in a 240L wheelie bin which is then removed when there is sufficient amount to make up a small load.

> Further clarification and detail is required from the applicant to confirm the storage location and quantity of asbestos and confirming what quantity is actually stored on site and where, before it is of a quantity considered to be a "small load" for disposal.

Asbestos is considered at Section 4.1.3. No asbestos will be accepted on site. If it is identified during the unload and inspection procedure, the entire load will be re-loaded and rejected. If it is found after the inspection (ie during sorting), it will be placed in the asbestos bin at the non-conforming waste area and removed from the site within one business day, as per the EPA's draft standards discussed at Section 4.1.3.

Council's submission states:

> The EIS states that materials with the potential to generate leachate will be processed in the processing shed. It is requested that appropriate controls be required to ensure the satisfactory capture, treatment and disposal of any leachate or contaminant impacted runoff and wastewater.

As the site is fully enclosed, materials are not expected to generate leachate.

Council's submission states:

> The application does not detail whether any servicing and maintenance of plant and machinery shall be carried out on site. Confirmation is required as to whether any servicing or repairs of vehicles and/or equipment is proposed on site, and if so, details of management and pollution controls need to be provided for consideration.

Servicing and repairs of site plant will be undertaken on site by a qualified contractor. All waste materials will be collected by the contractor and removed from the site when services are completed.

Council's submission states:

> The Preliminary Contamination Assessment identifies that subsurface contamination is likely on the site and that minor ground disturbance works could expose contractors to potentially contaminated soil, and soil vapour. The Contamination Assessment makes a number of recommendations to be implemented during construction activities, including the use of a photoionization detector during excavations to monitor volatiles. Whilst the Contamination Assessment report states that "no contamination issues have been identified that would preclude the proposed future land use as a waste recycling and transfer facility", it does not conclusively state that the site is suitable in its present state for the proposed use. As the Contamination Assessment identifies that the presence of subsurface contamination is likely and that workers could be exposed to contamination, it is considered appropriate that further site investigation works be required prior to determination of the application. Further investigation works will identify and delineate the extent of contamination, if any, and will guide any required remediation process at the site, as well as construction activities and necessary environmental and health controls. Furthermore, the Contamination Assessment recommends a procedure (refer to dot point 3 of section 6.1) should subsurface contamination be identified during excavation works. Importantly, it does not acknowledge that should contamination be present on site and should remediation be required, that consent is required for those remediation works as all remediation work in the Penrith Local Government Area is Category 1 work in accordance with SEPP 55 – Remediation of Land and SREP 20.

The PCA provided with the EIS does not indicate contamination is likely. The PCA notes the potential for contamination, given the industrial nature of the area. The purpose of a PCA is described in the *SEPP 55 Guidelines*:

> The main objectives of a preliminary investigation are to identify any past or present potentially contaminating activities, provide a preliminary assessment of any site contamination and, if required, provide a basis for a more detailed investigation. A preliminary investigation is not necessary where contamination is not an issue.
>
> …
>
> If contamination or a contaminating activity, whether previous or existing, is confirmed should the proponent conduct a detailed investigation to further define the extent and degree of contamination?
>
> …
>
> If there is sufficient information to satisfy the planning authority that the site is suitable for the proposed use, the planning process should proceed in the normal way.

As such, the purpose of a PCA is not to conclusively state that a site is not contaminated, only consider the potential risk of any contamination. Even if contamination is identified, a detailed investigation is not necessarily required, if the contamination does not make the site unsuitable for the proposed use.

The findings of the enhanced PCA are discussed at Section 4.1.10i.

The recommendations of the enhanced PCA outline an unexpected finds protocol that any development that requires a PCA would likely recommend and include complete removal of the oil sump and surrounding soils as a precautionary measure. Approval of the proposal would include approval of the recommendations and meet the remediation requirements of *Sydney Regional Environmental Plan No 20 – Hawkesbury Nepean River (No 2 – 1997)* (SREP 20).

4.2.3 Landscaping

Council's submission states:

> The proposed landscape plan and planting detail is inadequate. The indicated 'lomondra' and 2 x native trees is inadequate planting to suitably treat the existing streetscape in front of the exposed building and setback east of the driveway. An embellished landscape plan is to be provided which outlines embellishment of the front setback zone with specific species, pot size and quantities including a mix of tree and shrub plantings. At a minimum 3 trees across the frontage should be proposed with understorey shrub landscaping to supplement. This could be addressed through conditions of consent if the application was supported.

A revised landscape plan has been provided at Appendix J. Given the extent of works now proposed on the site, all trees and shrubs at the front of the site will be required to be removed. The ground cover at the front of the site will comprise *Lomondra longifolia,* with the front of the shed will be lined with Grevillea boongala spinebill, a 2 m native shrub. Clusters of *Eucalyptus tereticornis* (Forest Red Gum) will be planted at either end of the verge in order to preserve sight lines from driveways while providing shade.

4.3 Department of Primary Industries

The Department of Primary Industries (DPI) provided a request for additional information relating to the following points:

- The groundwater trigger criteria that are to be used for comparative purposes to the surface water quality monitoring;
- An outline on how these groundwater trigger criteria were derived and from what data; and
- Information on how the groundwater monitoring would occur in a ‘validation mentoring program.’

The DPI also noted that if more than 3 ML/year of water is taken from groundwater sources, a license will need to be sought from DPI Water.

Given that the operational area of the site is proposed to be fully enclosed, and proposed excavations are not expected to approach existing groundwater levels (6.6 to 8.1 m BGL), no impacts are expected to groundwater, and minimal groundwater extraction is expected.

4.4 Environment Protection Agency

4.4.1 Enclosure of operational areas

In its letter, the EPA recommended refusal for the original proposal, as it was not enclosed, and declined to review technical reports until the proposal was amended.

However, the applicant has agreed to enclose the operational areas of the site. This has further reduced impacts, as detailed in Chapter 3.

4.4.2 Additional requirements and issues

Additional requirements and issues raised by the EPA are discussed below:

- provision of a waste management plan for the Proposal;

Construction of the site will result in the demolition of the existing shed, front wall, concrete and natural material. The resulting construction waste, which will comprise materials associated minor demolition works, will be managed via a construction waste management plan, which will be provided as part of a CEMP. By incorporating the plan into the CEMP, it will accurately reflect the outcomes of other elements of the CEMP or related plans or strategies (eg construction noise, water management or transport requirements).

The details of a waste quality management plan (eg the checking, inspection, rejection and recording associated with incoming material) are provided at EIS Figure 2.2 and Sections 2.2.5, 2.2.7 and 2.4. Further details are provided at Section 4.1.3 of this RTS. Formalisation of a waste management plan would be appropriate as a condition of consent, based on the principles of the EIS and this RTS (see condition B13 of SSD 16_1698).

- provision of quantities of each type of waste to be received;

A summary of stockpile waste types is provided in Table 1.3.

- details of any materials that will be produced under a Resource Recovery Order, and the controls in place for meeting the conditions of that order;

Materials will be sorted into general waste types, as opposed to individual waste types. As such materials will not be produced under a resource recovery order. Instead, materials will be transferred to other facilities for processing.

- dust control measures (e.g. sprinklers) are not shown on the site plan;

Dust control measures include misting curtains at the site entrance and exit and the southern stockpile area, as discussed in Section 3.3.1 and at the AQMP at Appendix C. The specific details of the misting curtains and internal misting systems will be finalised as part of an operational air quality management plan.

- any external area where waste vehicles wait for loading/unloading must drain to a stormwater quality treatment device sufficient to remove any contaminants, both solid and dissolved prior to discharge to the offsite stormwater system;

Loads will be covered until vehicles are on the weighbridge. Wait times on the weighbridge will be short (approximately two minutes). There will be minimal opportunity for water to enter the load and drain out of the vehicle. As explained in the revised water assessment at Appendix E, the enclosure of the operational area negates the need for stormwater quality treatment devices outside of sediment pits.

- the reason for welding and consideration of any potential odours;

Oxygen and acetylene tanks are no longer proposed to be stored on-site.

- details of the above-ground diesel tank and bunding; and

Diesel storage was not proposed in the EIS and is not currently proposed. Provision of fuel on site is discussed at Section 4.1.10ii.

- consideration of any previous contamination.

Contamination has been considered as part of the enhanced PCA at Appendix G and is discussed at Section 4.1.10i.

- excavated natural material (ENM) is not a waste classification listed in the EPA's Waste Classification Guidelines (2014) and is not appropriate to be listed as a waste type to be received on an environment protection licence.

As discussed in Section 1.3, the waste classification guidelines includes pre-classified waste types and methods of identifying waste types that are not pre-classified. While ENM is not a pre-classified waste type, it is a type of general solid waste (non-putrescible) (See RMS Waste Fact Sheet 2 at Appendix K). Further, this has been included on recently issued EPLs (See EPL 20771 dated 11 October 2016).

However, for the sake of clarity, the site will accept excavated material that meets the general solid waste (non-putrescible) classifications, as defined by steps 5 and 6 of the waste classification guidelines. The material will be kept in a separated stockpile from VENM.

- Testing of recycled material must meet the requirements of a Resource Recovery Order. A Resource Recover Exemption must be complied with by the user of the material.

Materials will be sorted into general types, as per the stockpiles at Table 1.3. materials will not be produced under a resource recovery order. Instead, materials will be transferred to other facilities for processing.

- We remind the Proponent that the EPA is currently working on new minimum standards for managing construction and demolition waste in NSW. The Proposal will need to meet these standards once released.

The draft standards are addressed at Section 4.1.3.

- Further information is required on how the existing concrete surface (including oil pit) will be cleaned and how waste / waste water will be disposed of.

The revised PCA and recommendations are discussed at 4.1.10i.

Cleaning of the surface will be performed by a professional cleaner using a concrete pressure cleaning device. The surface of cleaning area will likely need to be prepped with a solvent or degreaser to emulsify oils. Cleaning will be undertaken progressively across the site with cleaning areas being bunded with sandbags. Areas of significant damage will be bunded around to prevent water from draining to exposed soil. Waste water will be pumped out of bunded areas and disposed of at an appropriately licensed facility.

Oil sumps will be drained of oil, surfaces prepped with a solvent or degreaser and steam cleaned in a similar manner. Waste water will be pumped out of the pit disposed of at an appropriately licensed facility.

- Further information is required on on-site refuelling. Is there a fuel storage on site? Does the fuel contractor remain on site or attend the Premises as required? Is there a designated re-fuelling area on site?

Fuelling of vehicles is discussed at Section 4.1.10ii.

- Picking of asbestos from a load is not permitted. If asbestos is found in a tipped load, the whole load must be rejected.

Handling of asbestos is discussed at Section 4.1.3. As noted in that section, and in the EIS, if asbestos is found in a tipped load, the entire load will be re-loaded and rejected.

- We do not consider it appropriate to list every single pre-classified ‘general solid waste (non-putrescible) on the licence. Only targeted wastes will be listed on a licence and must be identified in the EIS.

As noted in Section 1.3, the primary pre-classified waste types for the site include:

- building and demolition waste;

- virgin excavated natural material;
- paper or cardboard;
- garden waste;
- wood waste;
- mixed pre-classified waste; and
- household waste from municipal clean-up that does not contain food waste.

The general acceptance of general solid waste (non-putrescible) is considered the most appropriate approach for the site, given its focus on non-commercial customers and off-site processing. Restricting the facility to only certain pre-classified waste types would limit the potential for the recovery of resources at other facilities and ultimately lead to recoverable resources being sent to landfill by potential customers. Including a wider array of waste types is also supported by recently issued EPLs (See EPLs 20771 and 20870).

- Section 1.4 of the EIS states that plastics will be segregated and recycled while Table 2.3 indicates that plastic will be sent to landfill?

This is address in Section 4.1.12ii.

- Hours of operation – the EPA does not support any operations on Sundays or public holidays. The EPA does not typically support operations outside of 'daytime' hours (being 7 am to 6pm), without sufficient justification and assessment – please note that as the Proposal does not meet current best practice, the EPA has not undertaken a technical review of the EIS including the 'Noise impact assessment'.

Operation during public holidays is no longer proposed. However, operation during limited Sunday hours is proposed. As discussed at 4.1.4i and 4.1.6i, this will allow for light vehicles (eg mums and dads) to access the facility across the weekend, reducing impacts on Saturday.

The revised noise impact assessment at Appendix B considers the noise impacts associated with the revised proposal. The revised proposal is well within the relevant noise criteria as discussed and justified at Section 3.2.

- The EIS refers to 'vegetative' waste – this is not listed in the EPA's Waste Classification Guidelines (2014). The EIS must use definitions provided in the POEO Act for garden waste and wood waste.

Table 1.3 identifies the waste types of garden waste and wood waste.

- Section 6.7 of the EIS states that 'there have been potentially contaminating activities in the site and surrounds" and that "there is the potential for interaction by contractors with impacted soil and soil vapour during the construction phase only, if contamination is present " Given that the potential for contamination, why is testing for petroleum hydrocarbon only being undertaken post excavation of soils?

Potential contamination of the site and remediation measures are discussed at Section 4.1.10i.

4.5 Fire and Rescue NSW

Fire and Rescue NSW (FRNSW) comments and recommendations for the project are discussed below.

FRNSW noted that stockpiled recyclable materials present special problems for the fighting of fires, citing experience with recent fires at other facilities that required to deployment of large numbers of FRNSW resources. The long duration of fires is attributable to 'special problems of fire fighting' as referenced in Clause E1.10 of the National Construction Code (NCC)

FRNSW has not commented on the specifics of this project. Instead, FRNSW has recommended conditions relating to stockpile management, fire safety systems and firewater management. FRNSW's recommended conditions and relevant findings of the fire risk report and summarised in Table 4.5.

Table 4.5 FRNSW response table

FRNSW Recommended Condition	Response
a) That Clauses E 1.10 and E2.3 of Volume One of the NCC be complied with to the satisfaction of FRNSW. In particular that the following aspects of the development be assessed and appropriately addressed	The DPE (through the Secretary and appropriate delegations) should be the consent authority for matters relating to the construction of the facility. Conditioning aspects to be completed to the satisfaction of other agencies effectively makes multiple consent authorities, which creates opportunities for uncertainty. Consultation requirements are considered to be more appropriate.
i) That stockpile storage within any building and/or open yard storage on the allotment be limited in size and volume and arranged to minimise the likelihood of fire spread.	Stockpile sizes and volumes are set out in Table 1.3. As per that table, a maximum of approximately 650 m^3 of flammable material could be kept within stockpiles at any one time. Light waste, timber and vegetation waste Stockpiles will be separated by block walls, with cardboard and unloading areas kept in separate locations.
ii) That the arrangement of stockpiles of combustible material, stored externally, on the allotment be sufficient separated to permit FRNSW vehicle access between stockpiles	Stockpiles are now within an enclosed area. Stockpile locations are set out in Figure 1.1, with additional detail at Appendix A. Swept path diagrams have been provided at Appendix F, which demonstrate possible FRNSW vehicle access to the site.
iii) That the site is served by a fire hydrant system that has a minimum water supply capability appropriate	Four fire hydrants are proposed, with a total capacity of 40 L/s.
iv) That significant buildings used to process recyclable material are provided with a smoke hazard management system that facilitates FRNSW firefighting operations.	Specialised processing machinery is no longer proposed. However, basic sorting will be undertaken in the main shed. As shown in Appendix A, the shed has been designed with a long vent area it its ridge to allow for smoke to escape from the building without the need for mechanical ventilation.
v) If deemed necessary, by virtue of applying Clauses E1.10 and E2.3 to the development, that any significant building used to process recyclable material is provided with an appropriate automatic fire suppression system.	Specialised processing equipment is no longer proposed on the site. Materials will be sorted by plant. Fire safety systems are discussed at Section 4.1.15.
vi) That the site be provided with an effective means to contain an appropriate volume of contaminated fire water runoff. The capacity of containment to be commensurate with the concurrent discharge rate of the facilities hydraulic fire systems.	The entire shed will be bunded with a 0.1 m kerb. As discussed in Section 4.1.15, this will allow for storage two hours of fire water applied at 40 L/s.

4.6 Office of Environment and Heritage

Office and Environment and Heritage (OEH) raised no objections and requested no additional information.

The OEH noted that the project does not contain biodiversity, natural hazards or Aboriginal cultural heritage issues.

The OEH also provided comment from the Heritage Council of NSW confirming that there are no potential impacts to heritage items within a 1.2 km radius of the site and that a heritage assessment is not required.

4.7 Roads and Maritime Services

The RMS comments and recommendations for the project are discussed below.

The RMS letter stated:

- All vehicles are to enter and exit the site in a forward direction. Provision for vehicles to turn around must be provided within the property boundary.

As shown in the swept path analysis at Appendix F, all vehicles will enter and exit the site in a forward direction.

The RMS letter stated:

- The swept path of the longest vehicle entering and exiting the subject site, as well as manoeuvrability through the site, shall be in accordance with AUSTROADS. In this regard, a plan shall be submitted to Council for approval which shows that the proposed development complies with this requirement.

Swept paths are provided at Appendix F for the longest vehicle, a 19 m articulated truck. It is assumed that the mention of Council is an error and should refer the DPE.

The RMS letter stated:

- A Construction Traffic Management Plan detailing construction vehicle routes, number of trucks, hours of operation, access arrangements and traffic control should be submitted to Council for determination prior to the issue of a construction certificate.

Construction traffic is considered in EIS Section 6.2.2iv and revised TIA Section 3.1.1. Approximately 10 light vehicles and 10 heavy vehicles are expected on each weekend, for approximately 40 daily traffic movements.

EMM agrees that construction traffic should be considered prior to issuing of a construction certificate and that it can be a conditioned as a requirement of the CEMP, as opposed to a standalone report.

As above, it is assumed that the mention of Council is an error and should refer to the DPE.

The RMS letter stated:

- All works/regulatory signposting associated with the proposed development are to be at no cost to Roads and Maritime.

Costs associated with required works and signposting will be borne by the applicant.

The RMS also noted that an upgrade of the Mulgoa Road/Castlereagh Road Corridor is currently being investigated, with designs being preliminary until funding is secured. Since the RMS comment, a Review of Environmental Factors has been produced for the section of the upgrade at the M4 Motorway, approximately 3.5 km to the south of the site. The upgrade would begin construction in 2020 and be completed in 2022. Construction of the facility is expected to be completed prior to the road upgrades.

Locally, the RMS has identified intersection upgrades for Peachtree Road and Castlereagh Road, including a separated left hand turn northbound on Castlereagh Road.

This is expected to improve northbound traffic impacts by separating movements from the light cycle. Southbound traffic impacts for the right-hand turn to the site will be minimal, as the primary improvement is the addition of a third lane.

The Coreen Avenue and Castlereagh Road intersection is proposed to be converted from a roundabout to a large signalised intersection. No details regarding light timings are provided, and as such, further analysis cannot be provided.

As noted in the RMS letter, funding for these upgrades has not been secured. Given the timing for the upgrades at the M4 Motorway, the earliest the upgrades could be expected would be after 2022, when the site would be well established.

However, as per the Section 3.1 of the revised TIA, the existing intersections are sufficient to accommodate the proposal without the upgrades.

4.8 Sydney Water

Sydney Water raised no objections and requested no additional information.

Sydney Water noted that local water and wastewater systems have adequate capacity to service the proposed development based on existing drinking water and wastewater mains in Peachtree Road.

5 Community submissions

As discussed in Section 2.3, the most common matters raised in the community submissions were classified as 'social and economic' which included concerns regarding the proposed facilities proximity to residences and potential to impact on the value of these residences. Other key matters raised include noise, air quality, traffic, ecology and the proposal's potential to conflict with the surrounding land use.

This chapter summarises community submissions received and provides responses. The section is structured to present matters in order of how frequently they were raised by community submissions.

5.1 Socio-economic and land use

5.1.1 Proximity to residences

There were 14 individual submissions that raised proximity of the facility to residences. One of these submissions noted proximity to children living within the residential areas. Within these 14 submissions, three submissions also raised reduced quality of life.

The closest residences are 620 m from the site with a range of industrial sites between these residences and the site.

Based on the application of EPA guidelines, the facility site is not too close to residences.

Residences are generally afforded the greatest level of protection by the EPA noise and air quality criteria used in the assessments as residences are occupied at all hours by all members of the community including children and the elderly. The revised noise and air quality assessments considered the potential impacts of the now enclosed facility on the closest residences. The revised assessments found that predicted air quality and noise levels will be well within EPA criteria at these residences.

Air quality and noise management measures that will be implemented at the facility are described in Sections 3.2.3 and 3.3.1.

Vehicles will access the facility from Peachtree Road within the industrial area and arterial roads and will generally not travel via Thornton Drive which connects to local residential areas to the east of Castlereagh Road from the Peachtree Road intersection.

Based on the above, the facility will not result in a reduced quality of life for residents living in the residential areas of Penrith.

5.1.2 Conflict with surrounding land use

There were six individual submissions that were concerned that the proposed facility would conflict with the surrounding land use, including one who expressed concern that the proposal was at odds with the future urban plan of Penrith.

In addition, five business submissions noted concern regarding the proposed facility's conflict with the surrounding light industrial and commercial premises and the potential for the proposed facility to impact on existing businesses, particularly existing food premises and the Peachtree Hotel.

While the original proposal also met the relevant criteria, the impacts of the revised proposal have been further reduced with the enclosure of the operational areas of the facilities, as discussed in Chapter 3. While all assessment criteria for receptors in the industrial area were met, it is noted that receptor R4, at the western boundary of the Peachtree Hotel met the reduced noise impact levels normally associated with residential receivers during construction and operations (See Tables 3.1 and 3.3). Air quality impacts, both incremental and cumulative were below the relevant criteria (criteria are the same for both residential and industrial receptors). As such, impacts on the surrounding area are considered to be acceptable.

Three of the business submissions felt the proposed facility was not consistent with the IN1 General Industrial zoning of the site.

The site is within a large existing industrial estate that is zoned IN1 General Industrial and will be consistent with the character of the industrial estate, particularly with the implementation of the project design and environmental management measures.

As outlined in Section 3.3.2 of the EIS, the facility is an industry that is permissible with consent within the IN1 zone, and is consistent with the following objectives of the IN1 zone:

- 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 promote development that makes efficient use of industrial land; and
- to permit facilities that serve the daily recreation and convenience needs of the people who work in the surrounding industrial area.

5.1.3 Value of homes

There were five individual submissions that raised concerns regarding the value of homes in the locality should the facility be approved.

As noted above and outlined in Section 6.9.2 of the EIS, the site is within a large existing industrial estate that is zoned IN1 General Industrial and will be consistent with the character of the industrial estate, particularly with the implementation of the project design and environmental management measures.

The closest residences are 620 m from the site with a range of industrial sites between these residences and the site.

Therefore, the facility it is not expected to reduce the value of local homes.

5.1.4 Health

Three individual submissions and four business submissions raised health concerns including the potential introduction of vermin. One of these businesses also raised safety concerns about the storage of diesel and acetylene onsite.

The facility will only accept inert waste. It will not accept putrescible waste so there will be no risk from pathogens from the facility. It will not accept hazardous waste so there will be no toxicological risk.

There will be no putrescibles, for example food waste, accepted on to the site. Therefore, animals (native animals or vermin) will not be introduced to the site through waste loads and will not be attracted to the site. Delivered waste will have a short residence time on the site before being sorted, and the sorted waste dispatched. Waste will not be stockpiled for sufficient time to allow animals (eg rats or termites) to construct nests that could facilitate increasing numbers in the area.

As described in Sections 3.3 all EPA air quality criteria set to protect human-health will be met.

As outlined in Section 5.2.1 of the EIS, approximately 840 L of oils (engine, hydraulic and diesel) will be stored on site. The quantities of these goods are below the thresholds outlined in State Environmental Planning Policy No 33 – Hazardous and Offensive Development (SEPP 33) and therefore the facility is not deemed a hazardous development. Oxygen and acetylene tanks are no longer proposed to be stored on site.

5.1.5 Proximity to social infrastructure and businesses

Two individual submissions raised proximity to social infrastructure, including one which raised proximity to a child care centre.

The nearest child care facility is located 920 m to the south-east. This centre is not located on an arterial road that would potentially be used by site traffic; therefore, there will be no impact of this childcare centre from site operations.

This submission also raised proximity of the proposed facility to other business. The site is within a large existing industrial estate and will be consistent with the character of the locality, particularly with the implementation of the revised proposal and environmental management measures. The revised air quality and noise assessments found the facility will meet air quality criteria and noise criteria at all receptor locations, including adjacent businesses.

The other submission raised proximity to Riverside Park with concerns relating to noise and dust pollution. As outlined in Section 6.9.1 of the EIS, the closest recreational space to the facility is Weir Reserve (assessment location R16), about 230 m west of the site.

As noted above, the revised air quality and noise assessment found that air quality criteria and noise criteria will be met at Weir reserve during construction and operation of the facility.

5.2 Air quality

5.2.1 Air pollution

Five individual submissions and one business submission raised air pollution concerns.

As noted in Section 1.3, the design of the proposed facility has been revised to enclose all waste acceptance, stockpiling and despatching activities. This has accordingly reduced the potential for air quality impacts. The potential impacts of airborne dust are assessed in the revised AQIA (Appendix C) and summarised in Section 3.3. As noted throughout this RTS, the revised air quality found the facility will meet air quality criteria at all receptor locations.

The facility will not accept any hazardous waste and will not generate toxic air pollution.

5.2.2 Odour

Three individual submissions and three business submissions raised concerns regarding odour.

An odour assessment is provided in the revised AQIA (Appendix C) and summarised in Section 3.3. The predicted odour concentrations generated by the facility will be well below the corresponding NSW EPA criteria at all assessment locations. The highest odour level for residential receivers predicted was less than one Odour Unit, with industrial receivers being one or less than one Odour Unit. This is under the most sensitive NSW EPA criteria of 2.0 Odour Units, which applies to urban areas.

Even with the highly conservative assumptions used in the odour assessment, there will be no offensive odours at any locations due to activities associated with the revised proposal.

Effective procedures for handling of green waste has meant that Benedict Recycling has not received any odour complaints in over 30 years of operations at its facilities that except the same types of wastes as would be accepted by the Penrith Waste Recycling and Transfer Facility.

5.2.3 Dust

There were three individual submissions and five business submissions that raised dust concerns. One of the business submissions also raised the potential for asbestos dust.

The EPA incremental dust deposition criterion of 2 g/m^2/month is designed to protect against the potential nuisance caused by deposited dust, while TSP, PM_{10} and $PM_{2.5}$ criteria are designed to protect against the potential health effects of high airborne dust levels.

As noted above, the revised AQIA (Appendix C) for the revised design of the facility found predicted dust depositional rates and airborne dust levels well below the corresponding NSW EPA criteria at all the assessment locations. The results show a measurable reduction from concentrations predicted from the original proposal design.

Asbestos will not be accepted at the facility. As described in Section 2.2.7 of the EIS, any incoming waste loads that are suspected to contain contaminants will be rejected, reloaded (if it has been tipped) and the customer will be required to take the contaminated load out of the waste recycling and transfer facility immediately. Information on rejected loads (date, time, vehicle registration number and customer name) will be logged in a register that will be available for EPA inspection. EPA can follow-up regarding these rejected loads.

5.3 Traffic and transport

Five individual submissions were received relating to traffic concerns with a further five business submissions received particularly concerned with the increased heavy traffic along Peachtree Road. An additional individual submission received was concerned with the potential for damage to council roads from heavy vehicle usage.

Traffic impacts are discussed in the Revised TIA contained in Appendix D and summarised in Section 3.4. Project-generated traffic increases on Castlereagh Road for all vehicles will be of the order of 0.6%. These traffic increases will not generally be noticeable to existing road users. While traffic increases along Peachtree Road are expected to be noticeable to other road users, they will not generally affect the future road capacity or general maintenance requirements for the road which has been designed to carry industrial traffic, including heavy vehicle traffic.

5.4 Noise

There were five individual submissions and three business submissions that raised noise levels as a result of the facility.

As outlined in the revised NIA contained in Appendix B and summarised in Section 3.2, operational noise emission levels are predicted to meet the relevant criteria at all assessment locations. Given predicted noise levels satisfy criteria, it is unlikely that noise emissions from the facility would cause adverse impacts on the surrounding locality.

5.5 Natural environment

Four individual submissions raised concerns regarding the proposed facility's impact on the environment. One business submission noted the environmental sensitivity of the Peachtree Creek corridor. Three business submissions and one individual submission also raised the potential for the facility to cause water pollution and contamination.

The proposed facility is not expected to result in any adverse impacts to the surrounding natural environment including Peachtree Creek.

As outlined in Section 1.3, the proposal no longer includes external stockpiles, with all operational areas indoors. All vehicles leaving the operational area of the site will pass through a wheel wash. As such, there is no potential for stormwater to interact with stockpiled waste material on site and therefore no adverse impacts on Peachtree Creek.

5.6 Hours of operation

There were two individual submissions and three business submissions that raised concerns regarding the proposed facility's hours of operation, including concerns regarding the 24-hour operations.

Proposed hours of operation and their rational are discussed in Sections 1.3 and 4.1.4 of this RTS.

5.7 Visual

One submission raised a concern that the proposed facility will make the street dirty.

It is illegal to transport waste in an uncovered tray or trailer. Signs will be erected at the facility regarding drivers' legal obligation to ensure that waste is covered during transport. Covers on vehicles or trailers delivering waste will be removed once inside the facility. Vehicles dispatching products or residue will be covered prior to leaving the site.

All waste unloading, sorting, stockpiling and despatch will be carried out within an enclosed shed which will prevent any light waste being blown off the site.

Consistent with its other operations, Benedict Recycling will ensure that the area around the entrance to the facility is kept tidy and litter free.

An outbound wheel wash will be used to clean truck tyres to prevent mud or sediment being carried to and deposited on the access road (and public roads).

5.8 Management measures

There were three submissions from businesses that raised that insufficient management measures are proposed.

A range of management measures are proposed in the EIS that have been developed to minimise impacts from the facility. Revised noise, air quality and water management measures are outlined in Chapter 3 to account for the updated proposal. These will be included in the OEMP for the site. The proposed measures are appropriate for the predicted level of impact.

5.9 Size of development

Three business submissions received were concerned that the proposed facility was too large for the site and raised issues concerning the facility's capacity to manage the quantity of material proposed. Concern was raised in relation to heavy vehicles queuing to access the site.

The facility has been redesigned to accommodate the quantity of throughput proposed and the removal of processing capabilities from the site have simplified operations significantly. Swept path analysis, Heavy vehicle timing analysis is discussed at Section 1.3.2, 4.1.5 and 4.1.9 and swept path analysis is provided at Appendix F. As shown and discussed in those sections, the facility can accommodate the proposed operations without queuing occurring on Peachtree Road.

6 Revised statement of commitments

Chapter 7 of the EIS included a table of commitments made to negate or minimise potential environmental impacts arising from the proposed facility. Table 6.1 provides updated commitments for the facility, reflecting the updates to the proposal outlined in this response to submissions. The management measures will be included as part of a construction environmental management plan (CEMP), operational environmental management plan (OEMP), supporting plan to the CEMP or OEMP, or otherwise undertaken prior to the commencement of construction or operations.

Table 6.1 Revised summary of management measures

Key issue	Management measure
Air quality	• The CEMP will include the following air quality management measures: - dust and air quality complaints will be recorded, identifying cause (stake appropriate measures to reduce emissions in a timely manner and record the measures taken; - any incidents that cause exceptional dust emissions and the actions taken to resolve the situation will be recorded; - carry out regular site inspections, record inspection results and make an inspection log available to the local authority when asked; - the site speed limit will be 20 km/h; - idling vehicles will be shut-down where practicable; - plant engines will be tuned and maintained regularly; - all loaded vehicles entering and leaving sites will be covered to prevent escape of materials during transport; and - mains water will primarily be used for effective dust suppression. • The OEMP will include an air quality management plan (AQMP) that will detail the implementation of the following air quality management measures: - misters will operate at the shed's vehicle ingress and egress points; - misters will operate at the southern stockpile area; - the entire site will be sealed (as it is already) except for the landscaped verge along Peachtree Road; and - a wheel wash will be used to clean truck tyres to prevent mud or sediment being carried to and deposited on public roads. • The OEMP will include the following management measures to prevent odour emissions from the site: - putrescible waste will not be accepted on site; - odorous materials will not be accepted on site; - garden waste will be dispatched to another facility licensed to accept it, as soon as there is enough to fill a dispatch vehicle, or if the material starts to compost (whichever is sooner); and - no composting will be undertaken on site, as verified by daily infrared, visual and odour testing as outlined in Section 4.1.12iic.

Table 6.1 Revised summary of management measures

Key issue	Management measure
Greenhouse gases	• The CEMP and OEMP will include the following management measures to prevent minimise greenhouse gas emissions associated with the site: - on-site equipment will be regularly maintained and serviced to maximise fuel efficiency; - vehicle kilometres travelled on site will be minimised; and - energy efficiency will be progressively reviewed and implemented throughout the life of the facility.
Noise	• The CEMP will include the following management measures to minimise noise impacts: - choosing quieter plant and equipment, including installing best-practice noise suppression equipment, based on the optimal power and size to most efficiently perform the required tasks; - plant and equipment will be regularly maintained and serviced and operated in the quietest and most efficient manner; - concurrent plant operation will be minimised as practical; - vehicle and plant reversing will be minimised as practical; - use of amplified devices for communication (eg public address systems or similar) will be minimised as practical; - use of equipment that generates impulsive noise will be avoided, as practical; - work will be scheduled to coincide with non-sensitive periods, as practical; - neighbouring businesses will be informed of construction dates and provided contact details for the site manager for questions or complaints; and - noise mitigation measures will be regularly enforced (eg toolbox talks). • The OEMP will include the following management measures to minimise noise impacts: - material sorting will not take place on public holidays, Sundays or before 7 am on Saturdays; - noisy activities and adoption of improvement techniques will be identified; - the movement of materials and plant and unnecessary metal-on-metal contact will be minimised; - material drop heights and the dragging of materials will be minimised; - quieter plant and equipment will be chosen based on the optimal power and size to most efficiently perform the required tasks; - plant and equipment will be operated in the quietest and most efficient manner; - plant and equipment will be regularly inspected and maintained to minimise noise and vibration, and to ensure that all noise and vibration reduction devices are operating efficiently; - noise-related complaints will be handled promptly; and - a complaints register will be maintained.

Table 6.1 Revised summary of management measures

Key issue	Management measure
Visual	• Prior to the commencement of operations: - the street verge along Peachtree Road will be landscaped as outlined at Appendix J. Minor amendments may be required as per the outcomes of detail design and service requirement; - the new shed will be painted; and - new walls and automated gates will be installed. • The OEMP and CEMP will require the site's frontage be kept tidy and litter free. • The OEMP will include a management plan for the landscaped area of the site.
Water	• The CEMP will include the following management measures to mitigate water related impacts: - existing drainage systems will be cleaned before commencement of construction; and - an erosion and sediment control plan will be prepared to manage runoff from the site outlining the use of geotextile cloth, gravel filled bags and silt fences to prevent sediment and debris from entering the existing drainage system or otherwise leaving the site. • the following infrastructure will be constructed prior to the commencement of operation, as outlined in appendix E: - grated permitter drainage lines will be installed at the entrance and exit driveways; - runoff sediment traps will be cleaned and installed; - drainage infrastructure will be relocated and/or upgraded to accommodate a 10-year ARI event; - a 4,000 L rainwater tank will be installed; - water efficient fixtures will be installed in the amenity area. • The OEMP will include the following management measures to minimise water impacts: - the shed's guttering system will be inspected on an annual basis to remove accumulated debris; - the rainwater tank will be inspected on a six-monthly basis for structural integrity; - drainage inlet pit sediment traps will be inspected on a monthly basis and cleared as necessary; - the drainage system will be inspected on a six-monthly basis and cleared to remove accumulated materials; - driveways will be swept and cleaned daily; - groundwater will not be used; - a water management plan will be prepared that will outline the procedures and duration for the monitoring of relevant water quality aspects (eg turbidity and nutrients), including trigger values and responses and contingency measures.

Table 6.1 Revised summary of management measures

Key issue	Management measure
Contamination	• The CEMP will include the following management measures to mitigate potential contamination impacts: - The compromised slab (site 1) and areas where the slab is significantly cracked will be cut and removed, with the soil immediately below the removed slab excavated and tested for petroleum hydrocarbons. If relevant limits are exceeded, the material will be disposed of at a licensed facility. - The oil sumps will be emptied, with contents disposed of at an appropriately licensed facility. The sumps will be inspected for damage. If any damage could allow for leakage, the sumps will be removed, with the soil immediately surrounding the sump tested for petroleum. If removal is required, and soil sampling outcomes exceed relevant limits, the material will be disposed of at a licensed facility. Otherwise, the sumps will be backfilled with concrete. - Removed sections of the slab will be backfilled with VENM and resealed. - During the initial construction stage, section of the slab will be progressively bunded, treated with a solvent/degreaser and steam cleaned. The entire slab will be cleaned in this way. Waste water will be pumped out and disposed at an appropriately managed facility. - A construction environmental management plan will be prepared for the development phase of the site, this will include an unexpected finds protocol to ensure that if any contamination is encountered during construction it can be appropriately managed. This plan will inform contractors of the potential for subsurface soil contamination and will be required to look out for staining and odours when excavating. Contractors will also use a photoionization detector during excavations so volatile organic compounds (petroleum hydrocarbons) can be assessed.
Diesel spill	• The OEMP will include the following management measures to minimise impacts associated with a diesel spill: - diesel will be supplied to mobile plant by an appropriately licensed and qualified on-site refuelling contractor using a mini-tanker; - refuelling and emergency spill response activities will be detailed; and - there will be a diesel spill kit stored within the shed.
Traffic and vehicle movement	• The CEMP will include a driver code of conduct will outline that will outline processes for minimising road traffic noise. • Prior to the commencement of operations, car parking will be provided as per the plans at Appendix A. • The OEMP will include an operational traffic management plan that will: - restrict queuing or parking of vehicle on Peachtree Road; - outline routes for light and heavy vehicles, including restricting access for heavy vehicles from the west of the site; - detail on-site measures to control the movements of light and heavy vehicles into, within and out of the site; - detail the responsibilities of traffic controller on site; and - detail parking and stopping arrangements within the site (eg the requirements for the circulation, truck tipping, hand unloading and car parking areas).

7 References

Department of Environment and Conservation 2005, *Modelling and Assessment of Air Pollutants in New South Wales*.

Department of Environment & Climate Change (DECC) 2009, *Interim Construction Noise Guideline*.

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

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

- 2014, *Waste Classification Guidelines (Part 1: Classifying waste)*.
- 2016, *Minimum Standards for Managing Construction and Demolition Waste in NSW*.
- 2017a, *Standards for managing construction waste in NSW*.
- 2017b, *Reforms to the construction waste recycling sector*.
- 2017c, *Noise Policy for Industry*.

Appendix A

Revised architectural plans

A1

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- SEWER MANHOLE
- SEWER VENT
- COMMS. PIT
- SEWER INSPECTION POINT
- SIGN POST
- WATER METER

VC DENOTES VEHICULAR CROSSING
TK DENOTES LEVEL AT TOP OF KERB
LIN DENOTES LEVEL AT TOP OF LINTEL

OH — OVERHEAD POWER
S — APPROX SEWER
SW — APPROX STORMWATER
W — APPROX WATERMAIN

NOTES :

1. DATUM OF LEVELS : AUSTRALIAN HEIGHT DATUM
2. ALL AREAS AND DIMENSIONS HAVE BEEN COMPILED FROM PLANS MADE AVAILABLE BY THE OFFICE OF LAND & PROPERTY INFORMATION (NSW) AND ARE SUBJECT TO FINAL SURVEY.
3. PRIOR TO ANY CONSTRUCTION THE RELEVANT SERVICE AUTHORITY SHOULD BE CONTACTED FOR LOCATION OF SERVICES.
4. THE POSITION OF IMPROVEMENTS IN RELATION TO BOUNDARIES IS DIAGRAMMATIC ONLY.
5. VISIBLE, ACCESSIBLE SERVICES LOCATED ONLY
6. SIGNIFICANT TREES LOCATED ONLY.
7. NEIGHBOURING HOUSES, RIDGE AND ROOF POSITIONS ARE APPROXIMATE ONLY.
8. THIS TITLE BLOCK AND NOTES IS AN INTEGRAL PART OF THIS DRAWING WHICH IS NOT TO BE REMOVED.
9. CONTOURS ARE INDICATIVE ONLY. SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION.

1:200
5 0 5 10 15 20 25
METRES

RHCO RICHARD HOGAN & CO.
SURVEYING & DEVELOPMENT CONSULTANTS
ABN 59 082 453 165
P.O. BOX 4365, Penrith Plaza, NSW 2750.
Phone: (02) 4732 6599
Web: www.rhco.com.au Email: admin@hoganco.com.au

SURVEYOR: SR/SA
DRAWN: SR
REDUCTION RATIO: 1:200 @ A1
CONTOUR INTERVAL: 0.2m
SHEET 1 OF 1

ORIGIN OF LEVELS:
BENCHMARK - NAIL IN TOP OF KERB
RL. = 24.30 (GNSS)
DATUM: AUSTRALIAN HEIGHT DATUM
DATE: 10.03.2017
VERSION No.: B

PLAN OF DETAIL AND LEVELS OVER LOT 45 IN DP 793931 BEING No. 46 PEACHTREE ROAD, PENRITH.

CLIENT: NSW RECYCLING
L.G.A.: PENRITH
JOB REF: 17147

CAD FILENAME: X:\2017 - RHCO\17147 - 46 Peachtree Rd Penrith\ACAD\17147 - 46 Peachtree Road Penrith - DETAIL SURVEY ver B.dwg

PROPOSED
WASTE MANAGEMENT FACILITY
AT
46 PEACHTREE ROAD PENRITH

DOCUMENT REGISTER

DOC No	DOCUMENT TITLE
A100	COVER SHEET
A101	EXISTING SITE PLAN
A102	DEMOLITION PLAN
A103	PROPOSED SITE PLAN
A104	PROPOSED ROOF PLAN
A200	SITE ELEVATIONS 1
A201	SITE ELEVATION 2
A202	SECTION AA

REFERENCES

DRAWINGS TO BE READ IN CONJUNCTION WITH BUT NOT LIMITED TO ALL STRUCTURAL ENGINEERS, STORMWATER ENGINEERS, LANDSCAPE ARCHITECTS, AND OTHER ASSOCIATED PLANS & REPORTS

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Scale
m
0

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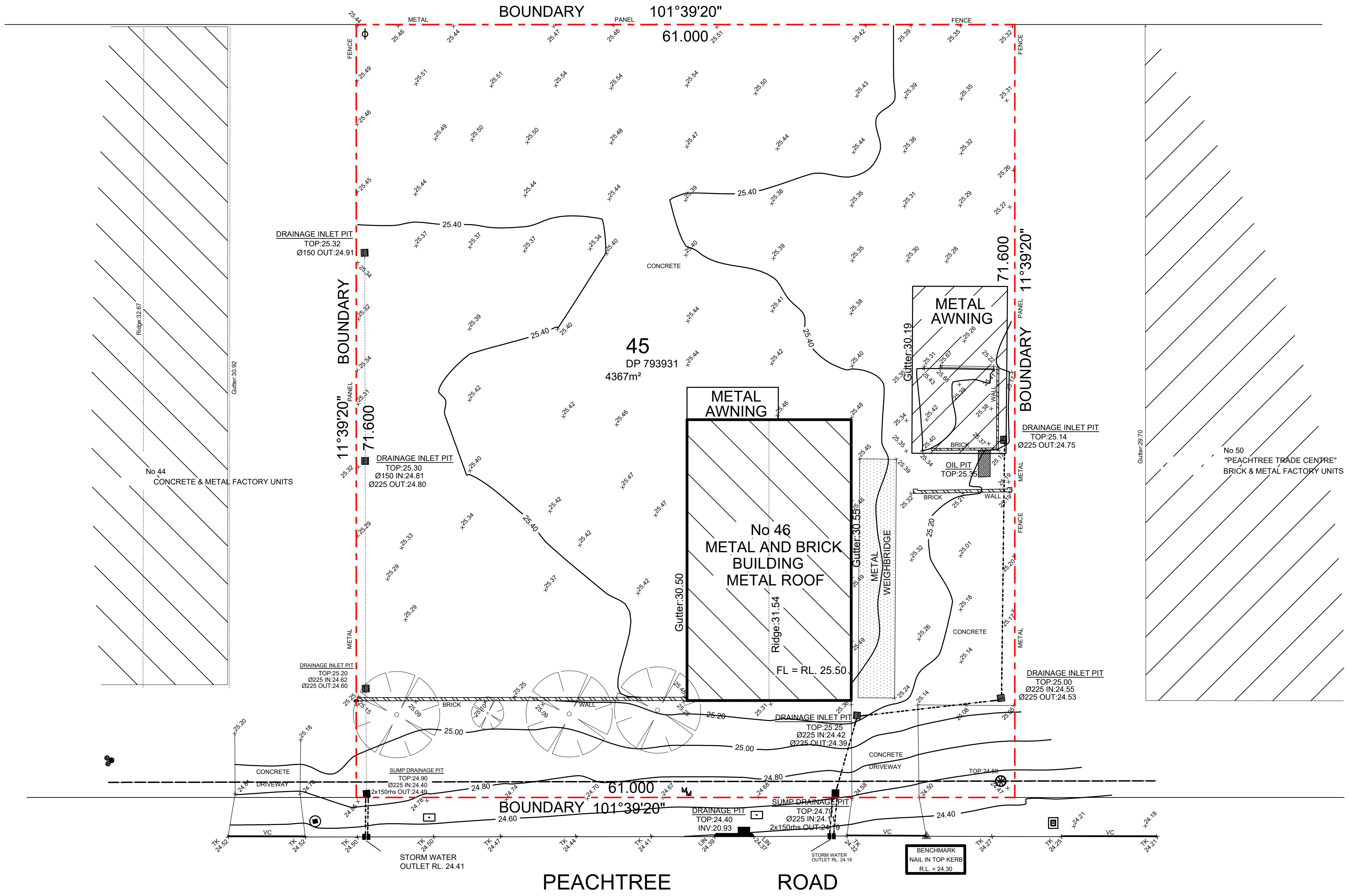
Project
PROPOSED
WASTE MANAGEMENT FACILITY

46 PEACHTREE ROAD, PENRITH
NSW 2750

Drawing Title
COVER SHEET

Job no.	Drawing no.	Rev.
J17401D	A100	A

Drawn by	Checked by	Approved by	Date
LW	JY	JY	APR 2017



01 EXISTING SITE PLAN
SCALE 1:500

REFERENCES

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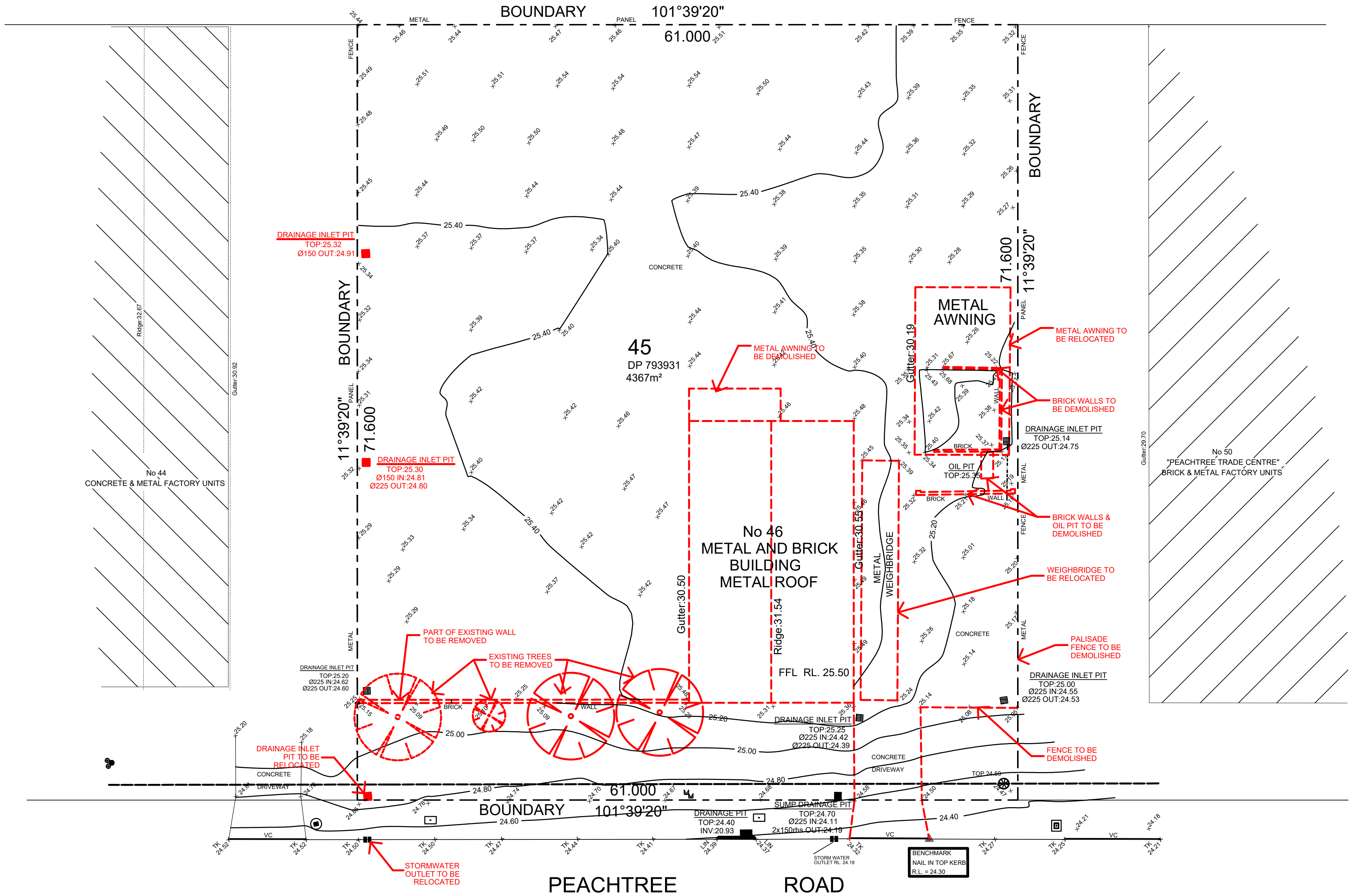
Drawing Title
EXISTING SITE PLAN

Job no.	Drawing no.	Rev.
J17401D	A101	A

Drawn by	Checked by	Approved by	Date
LW	JY	JY	APR 2017



01 DEMOLITION PLAN
SCALE 1:500

REFERENCES

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Project
PROPOSED WASTE MANAGEMENT FACILITY

46 PEACHTREE ROAD, PENRITH
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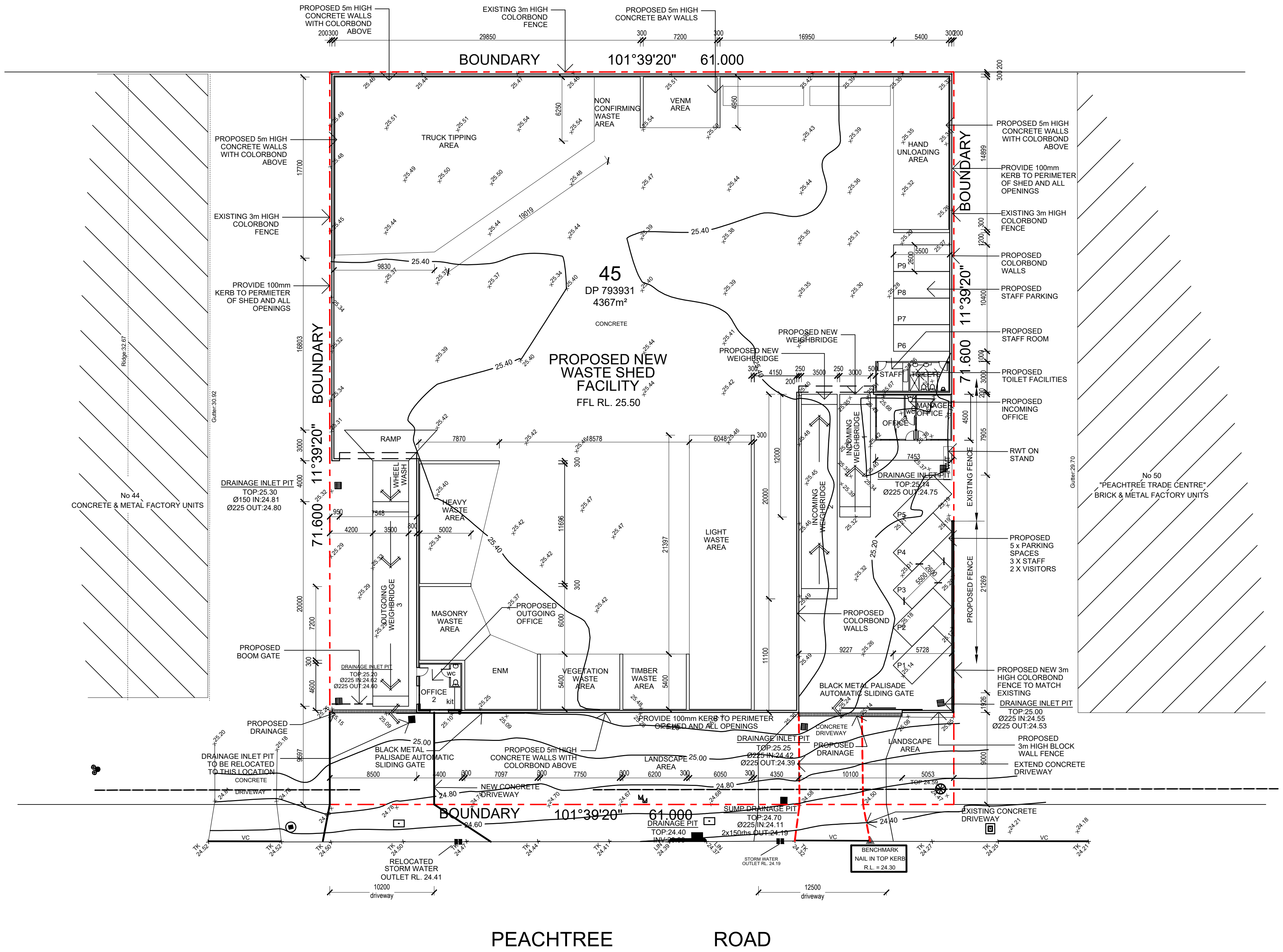
Drawing Title
DEMOLITION PLAN

Job no.	Drawing no.	Rev.
J17401D	A102	A

Drawn by	Checked by	Approved by	Date
LW	JY	JY	APR 2017



01 PROPOSED SITE PLAN
SCALE 1:500

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Rev.	Date	Description
C	19.10.18	GENERAL AMENDMENTS
B	03.10.18	GENERAL AMENDMENTS
A	28.06.18	DA SUBMISSION

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1:500 at A3

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46 PEACHTREE ROAD, PENRITH
NSW 2750

Drawing Title
PROPOSED SITE PLAN

Job no.	Drawing no.	Rev.
J17401D	A103	C

Drawn by	Checked by	Approved by	Date
LW	JY	JY	APR 2017

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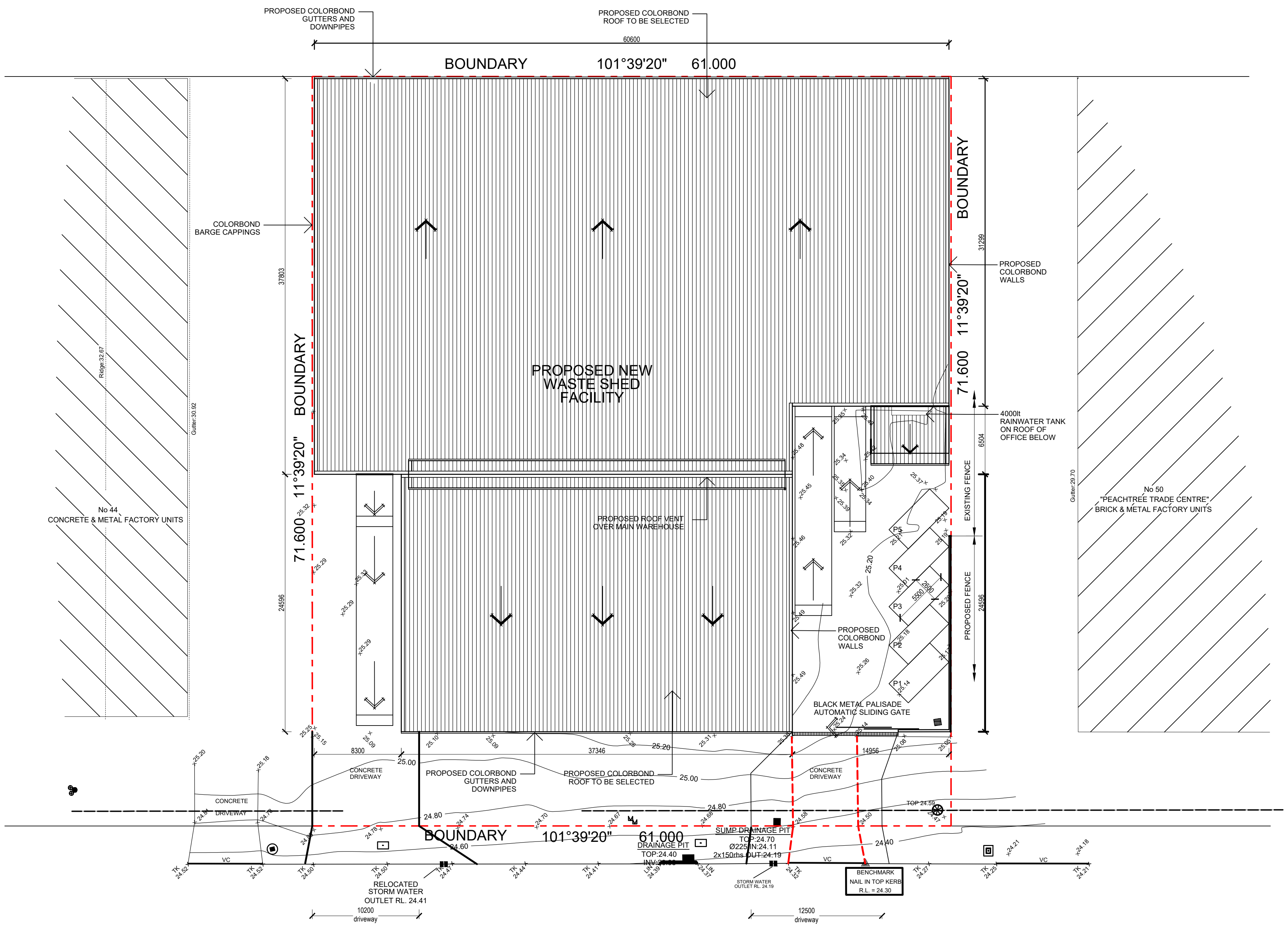

01 PROPOSED ROOF PLAN
SCALE 1:500

Rev.	Date	Description
A	28.06.18	DA SUBMISSION

Scale m 0 5 10 15 20
1:500 at A3

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PROPOSED WASTE MANAGEMENT FACILITY

46 PEACHTREE ROAD, PENRITH
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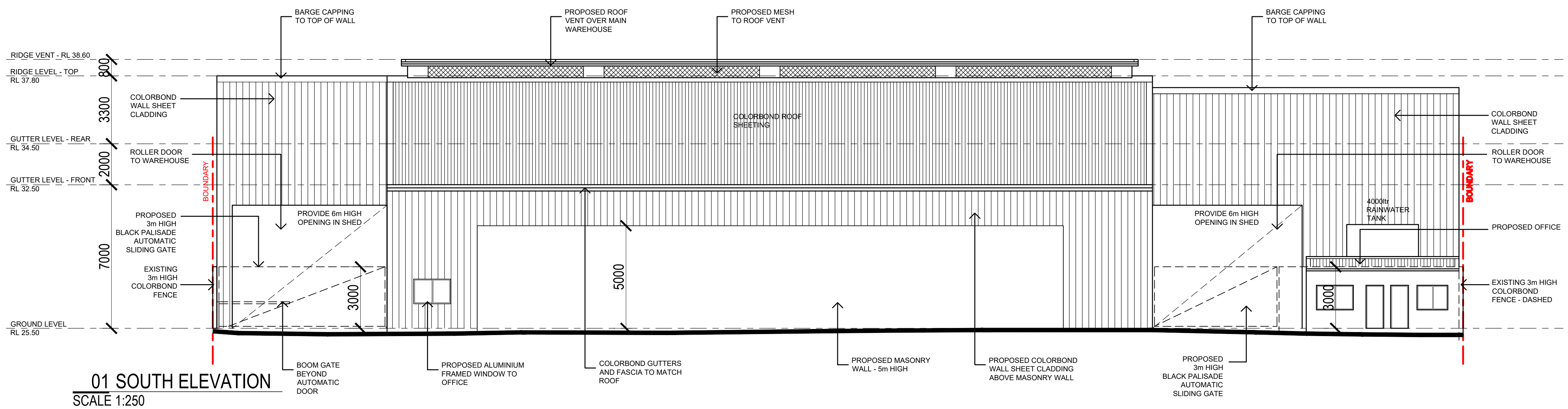
Drawing Title
PROPOSED ROOF PLAN

Job no.	Drawing no.	Rev.
J17401D	A104	A

Drawn by	Checked by	Approved by	Date
LW	JY	JY	APR 2017



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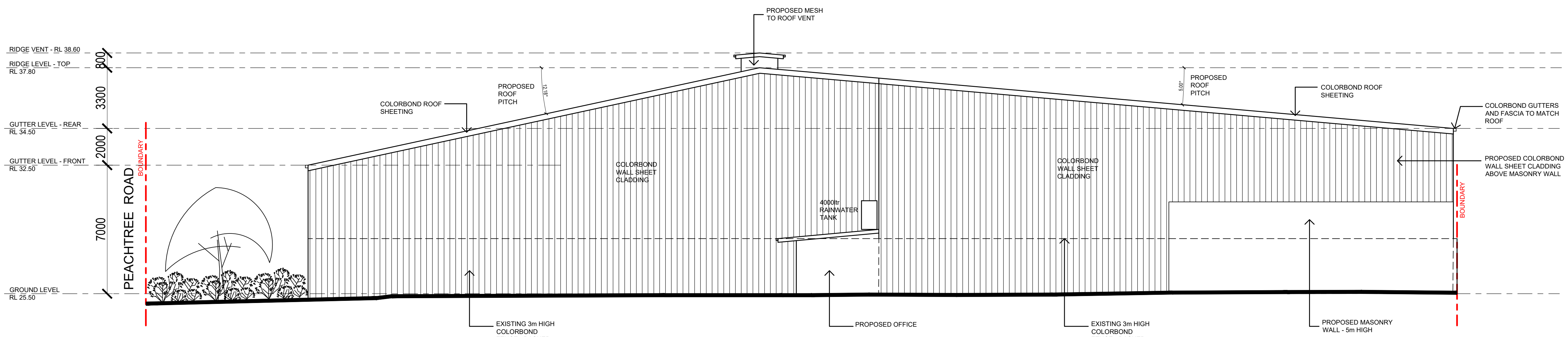
SCALE 1:250

SOUTH ELE



02 EAST ELEVATION

SCALE 1:250

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Rev.	Date	Description
B	03.10.18	GENERAL AMENDMENTS
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Scale
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1:250 at A3

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46 PEACHTREE ROAD, PENRITH
NSW 2750

Drawing Title
SITE ELEVATION 1

Job no.	Drawing no.	Rev.
J17401D	A104	B

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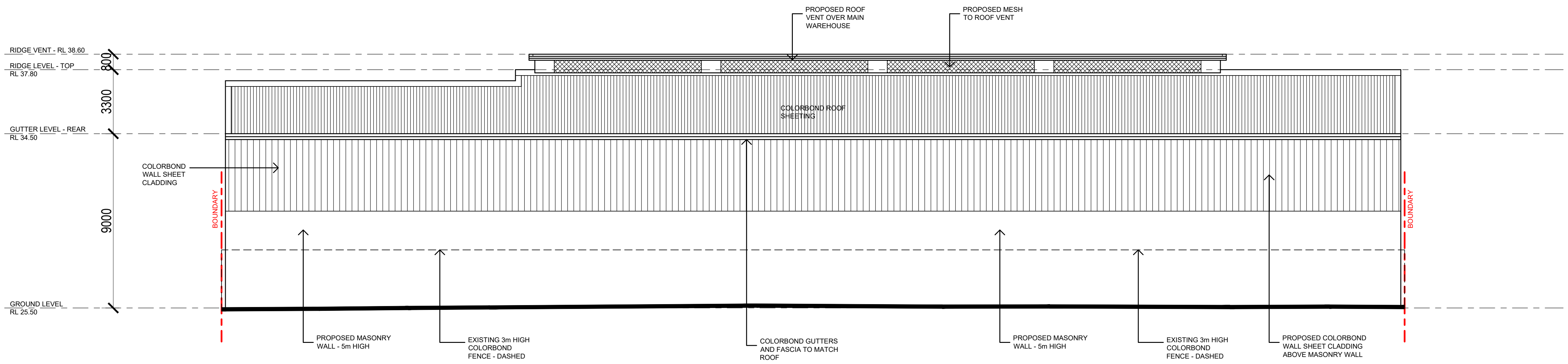

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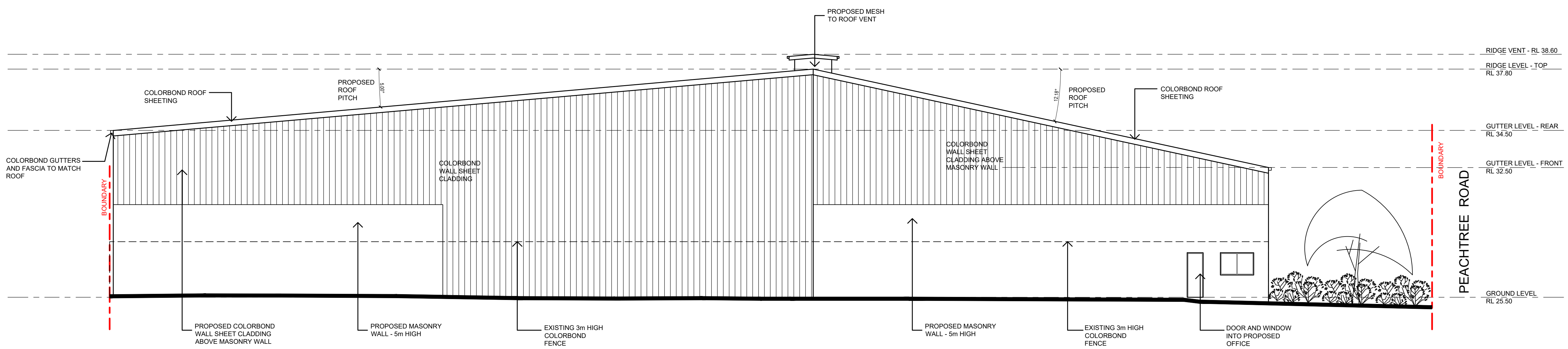

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Rev.	Date	Description
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A	28.06.18	DA SUBMISSION

Scale m 0 2.5 5 7.5 10
1:250 at A3

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PROPOSED WASTE MANAGEMENT FACILITY

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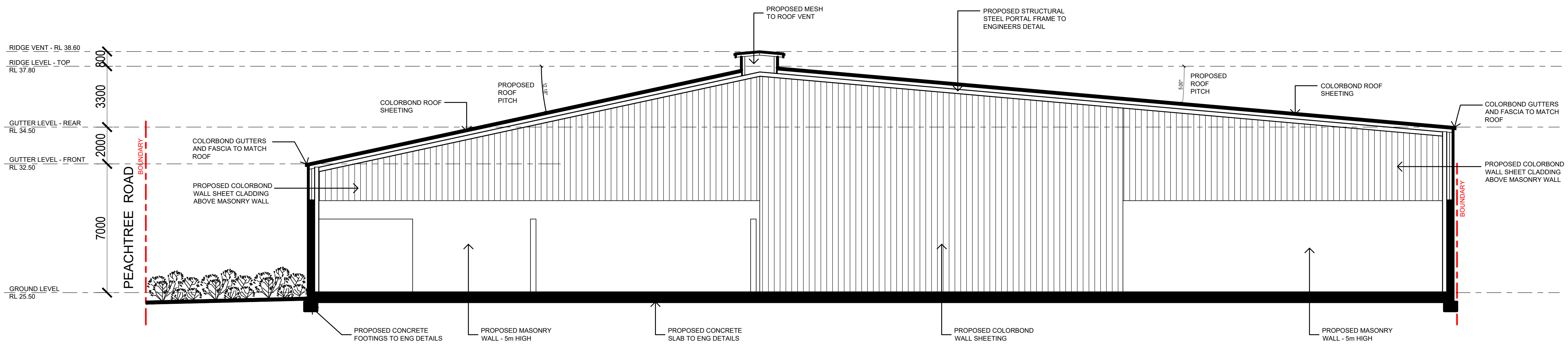
Drawing Title
SITE ELEVATION 2

Job no.	Drawing no.	Rev.
J17401D	A104	B

Drawn by	Checked by	Approved by	Date
LW	JY	JY	APR 2017



02 SECTION AA
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Scale
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1:250 at A3

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Drawing Title
SITE ELEVATION

Job no.	Drawing no.	Rev.
J17401D	A104	A

Drawn by	Checked by	Approved by	Date
LW	JY	JY	APR 2017

Appendix B

Revised noise impact assessment

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24 October 2018

Ernest Dupere
Director
Benedict Industries Pty Ltd
PO Box 431
Frenchs Forest NSW 2086

Re: Penrith Waste Recycling Facility - Response to submissions - Noise

1 Introduction

Benedict Industries Pt Ltd (Benedict Industries) proposes to construct and operate a waste recycling and transfer facility (the facility) at 46-48 Peachtree Road, Penrith (the site). The facility will have a capacity of up to 180,000 tonnes per annum (tpa) of pre classified general solid (non-putrescible waste, including construction and demolition waste, selected commercial and industrial waste, soils, vegetation, virgin natural excavated materials, excavated natural material, rail ballast and spoil.

The facility proposes to accept and dispatch material between the hours of 6 am to 10 pm Monday to Friday, 6 am to 6 pm on Saturdays and 8 am to 4 pm on Sundays. No operations are proposed for Public Holidays. Materials sorting is proposed between the hours of 6 am to 10 pm Monday to Friday and 7 am to 6 pm on Saturdays.

EMM Consulting Pty Limited (EMM) prepared and submitted development application (DA) SSD 7733 in this regard. The NSW Department of Planning & Environment (DPE) received a submission regarding the DA from the Environment Protection Authority (EPA). This submission determined that the EPA would not issue an environment protection license (EPL) for the proposal in its current form. This letter report has been prepared in response to the EPA's request and should be read in conjunction with the noise impact assessment previously prepared by EMM for the DA; *Noise Impact Assessment – Penrith Waste Recycling and Transfer facility* (herein referred to as "noise assessment") dated 26 May 2017.

2 EPA submission and proposal amendments

The EPA submission to DPE regarding the facility is reproduced below.

> **The EPA does not recommend approval of this Proposal**
>
> The EPA has reviewed the information provided and has determined that it will be unable to issue an environment protection licence for the Proposal as currently presented.
>
> We have concerns that the proposal does not meet current best practice. As specified in our SEARs, the EPA expects that all waste handling activities, inclusive of the receival, sorting, processing, sampling, quarantine and storage are conducted within an enclosed building. However, much of the proposed operations, including receipt, sorting and storage of waste are proposed to occur outside.

The EPA has not reviewed technical information

We advise that as the Proposal does not meet current best practice, the EPA has not undertaken a technical review of the EIS. We have not reviewed the 'Air quality and greenhouse gas assessment', 'Noise impact assessment', 'Water assessment' or 'Contamination assessment'. This is because impacts would be different if all operations were conducted within an enclosed building as required.

The EPA submission also suggested that the proposal is expected to be meet current best practice and, as such, Section 140 of the Protection of the Environment Operations Act 1997 (POEO Act). Section 140 of the POEO Act states:

140 Dealing with materials

(1) The occupier of any premises who with materials in or on premises in such a manner as to cause the emission of noise from those premises is guilty of an offence if the noise so caused, or any part of it, is caused by the occupier's failure to deal with those materials in a proper and efficient manner

(2) In this section:

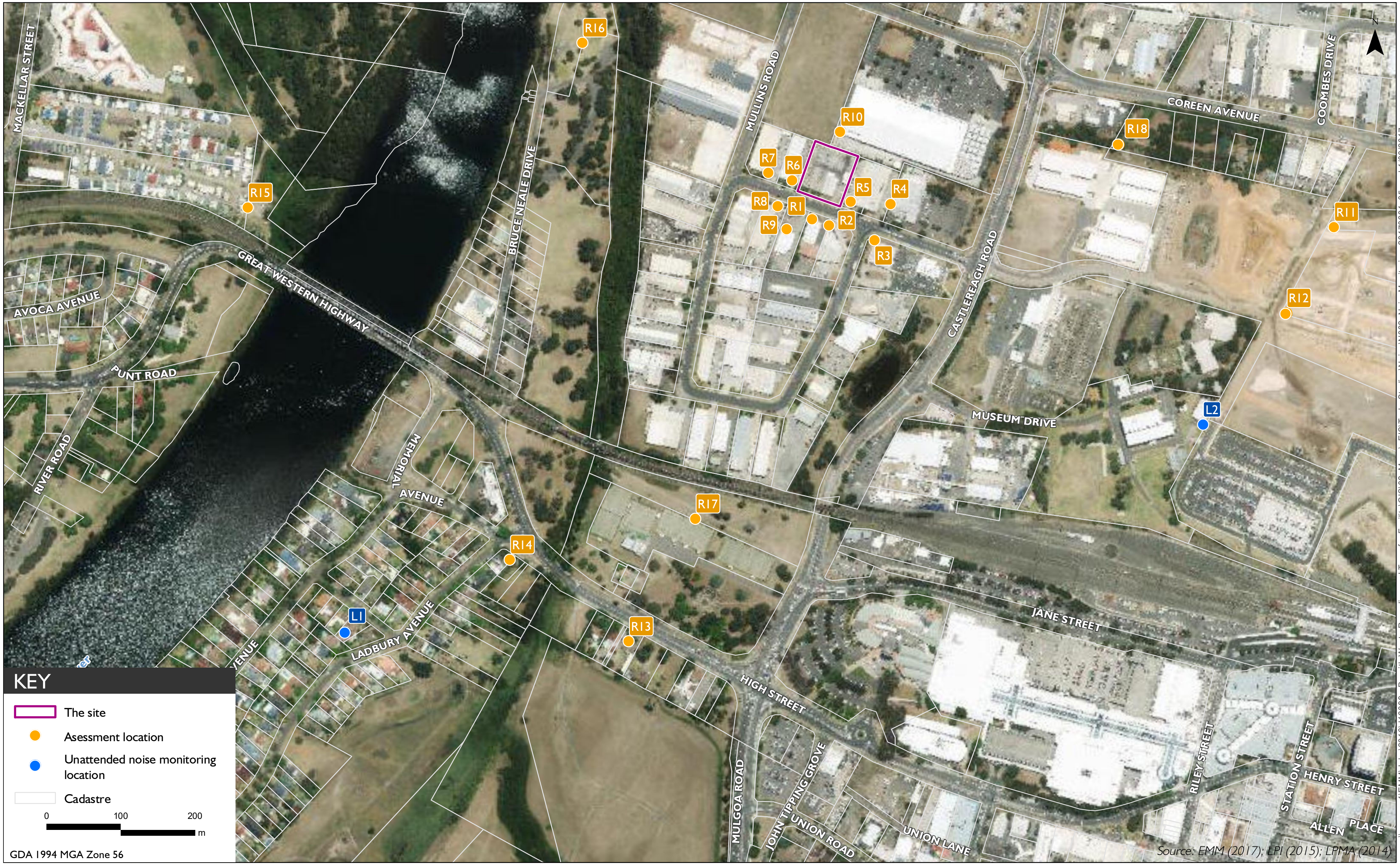
"deal" with materials means process, handle, move, store or dispose of the materials.

"materials" includes raw materials, materials in the process of manufacture, manufactured materials, by-products, or waste materials.

In response to these submissions the proposal has been amended. The facility is no longer proposed to include processing capabilities. Instead, materials will be sorted in the tipping area and transferred to appropriate stockpiles. Further, the operational area of the site is proposed to be fully enclosed in a warehouse, allowing for an open floor area. This will allow for a simpler operation that will allow for more material to be passed through the site. Plans showing the proposed layout are shown in Appendix A.

An additional noise assessment location at 236-248 Coreen Avenue, Penrith was also included in the assessment at the request of DPE. This assessment location is described by DPE as an existing dwelling, is zoned E3 Environmental management and is located approximately 340 metres to the north-east of the site (refer Figure 1).

It is of note that this assessment has been carried out in accordance with the NSW Industrial Noise Policy (INP) (EPA 2000) (now superseded) and not the NSW Noise Policy for Industry (NPfI) (EPA 2017). This is due to the SEARs referencing the INP and the fact that the noise assessment had been significantly commenced before the NPfI was released in October 2017.



\\emmsvr1\EMM\Jobs\2016\J16099 - Penrith Waste Recycling and Transfer Facility\GIS\02_Maps_EIS\Tech_Studies\Noise\N002_NoiseMonitoring_20170601_05.mxd 1/06/2017

EMM

Noise monitoring and assessment locations

Penrith Waste Recycling and Transfer Facility

Noise Imapct Assessment

Figure 1

3 Noise limits

3.1.1 Project specific noise levels

As detailed in Section 5.1 of the noise assessment, the project-specific noise level (PSNL) is the more stringent of the calculated intrusive or amenity criteria. The relevant PSNLs for the proposed operational periods are presented in Table 1. Relevant assessment locations are shown in Figure 1.

Table 1 Project specific noise levels

Receiver	Period[1]	Intrusive criteria dB, $L_{Aeq,15\ minute}$	Amenity criteria dB, $L_{Aeq,period}$	Project Specific Noise Level (PSNL), dB
R11 to R15, R18[3] (Residential - Urban)	Day	48	65	**48**
	Evening	47	55	**47**
	Night	45	50	**45**
	Morning Shoulder	47	-	**47**
Industrial premises (R1 to R10)	When in use	-	70	**70**
Commercial premises	When in use	-	65	**65**
Active recreation	When in use	-	55	**55**
Passive recreation	When in use	-	50	**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; morning shoulder: 6 am to 7 am.*

2. *Urban amenity category used for R11 and R12 given their proximity to industry.*

3. *For the purposes of this assessment, R18 (E3 zoned land) has been assessed as a residential assessment location.*

3.1.2 Sleep disturbance

As detailed in Section 5.3 of the noise assessment, operational criteria are appropriate for assessing noise from steady-state sources, however impact noise from sources need to be assessed using the L_1 or L_{max} noise metrics when determining the potential for sleep disturbance. Table 2 provides the sleep disturbance criteria for the residential assessment locations outlined in Figure 1.

Table 2 Sleep disturbance screening criteria

Assessment location	Adopted RBL, dB[1]	Sleep disturbance criteria dB, L_{Amax}
R11–R15, R18	40	55

Notes: 1. *Night-time RBL adopted.*

2. *Sleep disturbance screening criteria applies to residential assessment locations only.*

3.1.3 Construction noise

As detailed in Section 5.2 of the noise assessment, the construction noise management levels (NMLs) for this assessment have been developed using the noise monitoring data (Section 4 of the noise assessment) and in accordance with the ICNG. The relevant NMLs are presented in Table 3.

Table 3 Construction noise management levels

Receiver	Period	Representative RBL, dB	NML, $L_{Aeq,15\ minute}$, dB
R11 to R15, R18[2]	Day	43	53 (noise affected) 75 (highly noise affected)
	Evening	42	N/A
	Night	40	N/A
Offices, retail outlets	When in use	N/A	70
Neighbouring industrial premises (R1 to R10)	When in use	N/A	75

Notes: 1. N/A = not applicable since construction activity is not proposed to occur during these periods.

2. For the purposes of this assessment, R18 (E3 zoned land) has been assessed as a residential assessment location.

4 Noise modelling and assessment

4.1 Noise modelling method

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 11.00 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 site and surrounding area; and
- applicable meteorological conditions (refer to Table 5).

The amendments to the proposal, which have been incorporated into the noise model, include;

- The operational area of the site is proposed to be fully enclosed in a warehouse, which allows for an open floor area. This allows for a simpler operation and more material to be passed through the site.
- The proposal will no longer include material processing capabilities. Instead, materials will be sorted in the tipping area and transferred to appropriate stockpiles.

Plans showing the proposed layout are shown in Appendix A.

Plant and equipment was modelled at locations and heights representing maximum likely activity during operations using representative equipment sound power levels and quantities provided in Table 4. The sound power levels adopted have been taken from an EMM database of similar equipment.

Table 4 Operational plant and equipment sound power levels

Plant and equipment	Typical activities	Location	Assumed utilisation[2]	Quantity	Lw $L_{Aeq,15\ minute}$, dB
Main operations (daytime)					
Excavator	Sorting waste using a variety of excavator attachments Loading feed to processing plant	Inside main shed	100%	1	104
Front-end loader (FEL)	Loading trucks Moving waste products	Inside main shed	100%	1	108
Road truck	Returning to/leaving the site	Delivery/dispatch route	40%	1	104
	Unloading waste	Inside main shed	20%	1	104
Idling road truck	Standing at weighbridges	Weighbridges	10%	2	90
	Being loaded by FEL	Inside main shed	60%	1	90
Transporting product + deliveries (evening/morning shoulder)					
Front-end loader (FEL)	Loading trucks	Inside main shed	75%	1	108
Road truck	Returning to/leaving the site	Delivery/dispatch route	20%	1	104
	Unloading waste	Inside main shed	10%	1	104
Idling road truck	Standing at weighbridges	Weighbridges	5%	2	90
	Being loaded by FEL	Inside main shed	30%	1	90
Deliveries only (night)					
Road truck	Returning to/leaving the site	Delivery/dispatch route	10%	1	104
	Unloading waste	Inside main shed	5%	1	104
Idling road truck	Standing at weighbridges	Weighbridges	2.5%	2	90

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; morning shoulder: 6 am to 7 am

2. Assumed utilisation per 15 minute period.

4.2 Modelled meteorological conditions

Noise modelling was completed for daytime, evening, night and morning shoulder periods for the meteorological scenarios presented in Table 5.

Table 5 Weather conditions considered in noise modelling

Assessment period	Meteorological condition	Air temperature	Relative humidity	Wind speed[1]	Wind direction[2]	Atmospheric Stability Class
Day	Calm	20˚C	70%	0 m/s	N/A	D class
	Winds	20˚C	70%	2.4 m/s	45°	D class
Evening	Calm	20˚C	70%	0 m/s	N/A	D class
	Winds	20˚C	70%	2.5 m/s	All	D class
Night/ Morning Shoulder	Calm	10˚C	90%	0 m/s	N/A	D class
	Calm	10˚C	90%	2.4 m/s	All	D class
	Temperature inversion	10˚C	90%	0 m/s	N/A	F class

Notes: 1. Based on the upper 10th percentile wind speed of all winds present for 30% of the time during the relevant period.

2. Wind directions modelled are at 22.5° intervals from north (0°) based on data from the Penrith Lakes AWS.

4.3 Noise modelling results and discussion

Predicted facility noise emission levels at the assessment locations are provided in Table 6. Operational noise level predictions for the revised, proposed layout has been compared to those provided in the previous noise assessment based on the original layout showing a general improvement in noise emissions.

Table 6 Operational noise modelling results – worst-case

Assessment locations		Predicted operational noise level, dB						Project Specific Noise Level, dB
		Original layout			Proposed layout			
ID	Type	Day	Evening/MS	Night	Day	Evening/MS	Night	
R1	Industrial	62	59	45	57	57	45	70
R2	Commercial	63	60	47	60	60	50	65
R3	Industrial	53	50	40	50	50	38	70
R4	Industrial	48	45	35	46	46	34	70
R5	Industrial	60	57	47	58	58	46	70
R6	Industrial	61	58	48	62	62	47	70
R7	Industrial	53	50	39	50	50	38	70
R8	Industrial	61	59	45	57	57	48	70
R9	Industrial	59	56	45	57	57	45	70
R10	Commercial	61	58	47	43	43	31	65
R11	Residential	39	39	28	26	29	22	47
R12	Residential	39	39	29	27	30	23	47
R13	Residential	41	38	27	36	36	26	47
R14	Residential	40	37	26	35	36	25	47
R15	Residential	38	35	23	33	33	22	47
R16	Passive Recreation	44	40	30	32	33	24	50
R17	Active Recreation	45	41	29	39	39	28	55
R18[1]	Residential	N/A	N/A	N/A	27	33	26	47

Notes: 1. For the purposes of this assessment, R18 (E3 zoned land) has been assessed as a residential assessment location.

Operational noise emission levels are predicted to meet the relevant PSNLs at all assessment locations. Given predicted noise levels satisfy criteria, it is unlikely that noise emissions from the facility would cause adverse impacts at the assessment locations.

4.4 Sleep disturbance assessment

The loading and/or unloading of trucks during the night/morning shoulder period has been assessed for the potential to cause sleep disturbance. Typical maximum noise events are likely to include impacts associated with loading/unloading activities. A typical impact L_{Amax} sound power level of 126 dB has been used to predict potential sleep disturbance impacts (refer Table 7).

Table 7 Predicted maximum noise levels at residential assessment locations

Assessment locations	Predicted L_{Amax} noise level, dB		L_{Amax} screening criteria, dB
	Original layout	Proposed layout	
R11	57	<30	55 L_{Amax}
R12	57	<30	
R13	55	35	
R14	53	34	
R15	50	32	
R18[1]	N/A	<30	

Notes: 1. For the purposes of this assessment, R18 (E3 zoned land) has been assessed as a residential assessment location.

Based on the revised proposed layout, results of noise modelling indicate that the INP sleep disturbance screening criteria will be met at all residential assessment locations during calm and adverse meteorological conditions.

4.5 Construction noise

Noise levels from proposed construction activities were predicted at the assessment locations.

Simultaneous operation of two delivery trucks, two concrete trucks, one crane and one excavator (30 tonne) were used to represent typical construction activities and are considered to represent an acoustically worst-case 15-minute period during standard construction hours.

Representative sound power levels associated with this equipment used in noise modelling are summarised in Table 8.

Table 8 Representative equipment sound power levels

Equipment	Quantity	$L_{Aeq,15 minute}$ Sound Power Level, dB
Delivery Truck	2	103
Concrete truck	2	113
Excavator	1	104
Crane	1	106

It has been assumed that construction activity will generally take place during standard construction hours. Activities outside standard construction hours may be permitted where there is a safety requirement or emergency work needs to be undertaken or where it can be demonstrated that construction activity will not cause noise impact at nearby residences.

Indicative construction noise emission predictions for the facility are provided in Table 9.

Table 9 Predicted construction noise

Assessment locations	Indicative construction noise level $L_{Aeq,15\ minute}$, dB		Construction noise management level, dB
	Original layout	Proposed layout	
R1	69	72	75 $L_{Aeq,15\ minute}$ (external)
R2	66	71	
R3	54	65	
R4	49	52	
R5	64	67	
R6	68	69	
R7	58	63	
R8	65	69	
R9	66	69	
R10	68	67	
R11	40	38	53 $L_{Aeq,15\ minute}$ (noise affected) 75 $L_{Aeq,15\ minute}$ (highly noise affected)
R12	40	39	
R13	40	42	
R14	40	42	
R15	40	44	
R16	45	47	65 $L_{Aeq,15\ minute}$ (external)
R17	42	44	60 $L_{Aeq,15\ minute}$ (external)
R18[1]	N/A	41	53 $L_{Aeq,15\ minute}$ (noise affected) 75 $L_{Aeq,15\ minute}$ (highly noise affected)

Notes: 1. For the purposes of this assessment, R18 (E3 zoned land) has been assessed as a residential assessment location.

Construction noise levels are predicted to be below the noise-affected management levels at all assessment locations. The predictions assume all equipment is operating simultaneously and at the nearest locations within the site to the relevant residential dwellings (R11–R15 and R18), it is likely that actual construction noise levels would be less than those predicted for the majority of the time.

5 Road traffic noise

As outlined in the noise impact assessment, there are no residences fronting roads that will experience a significant increase in road traffic volumes as a result of the facility. The *Penrith Traffic Impact Assessment* (EMM 2016) states that the predicted total traffic volume increase as a result of vehicles associated with operation of the facility is up to 0.6% on Castlereagh Road with an associated increase in heavy vehicles of 5%.

Traffic generated by the facility will not generate any noticeable increase in road traffic average noise levels at the nearest residential locations. This increase in traffic volume would lead to a negligible increase (<0.5 dB) in road traffic noise. Therefore, the impact of road traffic noise associated with the facility will be within the 2 dB allowable increase for land use developments.

6 Conclusion

EMM has prepared a response to submissions received by the NSW Department of Planning & Environment (DPE) from the Environment Protection Authority (EPA) regarding Development Application SSD 7733.

The facility is no longer proposed to include processing capabilities. Further, the operational area of the site is fully enclosed in a warehouse, allowing for an open floor area. An additional noise assessment location at 236-248 Coreen Avenue, Penrith was also included in the assessment at the request of the EPA.

Project specific noise levels (noise criteria) have been established based on the results of ambient noise monitoring and the methodology provided in the INP.

Operational noise levels have been assessed for the daytime, evening, night and morning shoulder periods during calm and adverse weather conditions. Operational noise emission levels are predicted to meet the relevant PSNLs at all assessment locations.

Sleep disturbance from operation of the facility during the night and morning shoulder period has been assessed. Results of noise modelling indicate that the INP sleep disturbance screening criteria will be met at all residential assessment locations during calm and adverse meteorological conditions.

A quantitative approach has been taken regarding the assessment of construction noise from the facility. It is predicted that noise emission from proposed construction activity will be below the recommended noise management levels at all assessment locations.

In summary, the enclosed processing facility would result in reduced operational impacts and compliance with PSNLs at all assessment locations, and would therefore align with POEO Section 140. Further, noise modelling indicates that there are no acoustic impacts predicted at 236-248 Coreen Avenue, Penrith (R18) (E3 zoned land).

Yours sincerely

Lucas Adamson
Acoustic Consultant
ladamson@emmconsulting.com.au
Review: Katie Teyhan (25/7/2018)

Appendix A

Site layout

PROPOSED
WASTE MANAGEMENT FACILITY
AT
46 PEACHTREE ROAD PENRITH

DOCUMENT REGISTER

DOC No	DOCUMENT TITLE
A100	COVER SHEET
A101	EXISTING SITE PLAN
A102	DEMOLITION PLAN
A103	PROPOSED SITE PLAN
A104	PROPOSED ROOF PLAN
A200	SITE ELEVATIONS 1
A201	SITE ELEVATION 2
A202	SECTION AA

REFERENCES

DRAWINGS TO BE READ IN CONJUNCTION WITH BUT NOT LIMITED TO ALL STRUCTURAL ENGINEERS, STORMWATER ENGINEERS, LANDSCAPE ARCHITECTS, AND OTHER ASSOCIATED PLANS & REPORTS

REFER TO THE BASIX REPORT FOR ADDITIONAL REQUIREMENTS TO THE ONES NOTED ON THE DRAWINGS.

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Scale
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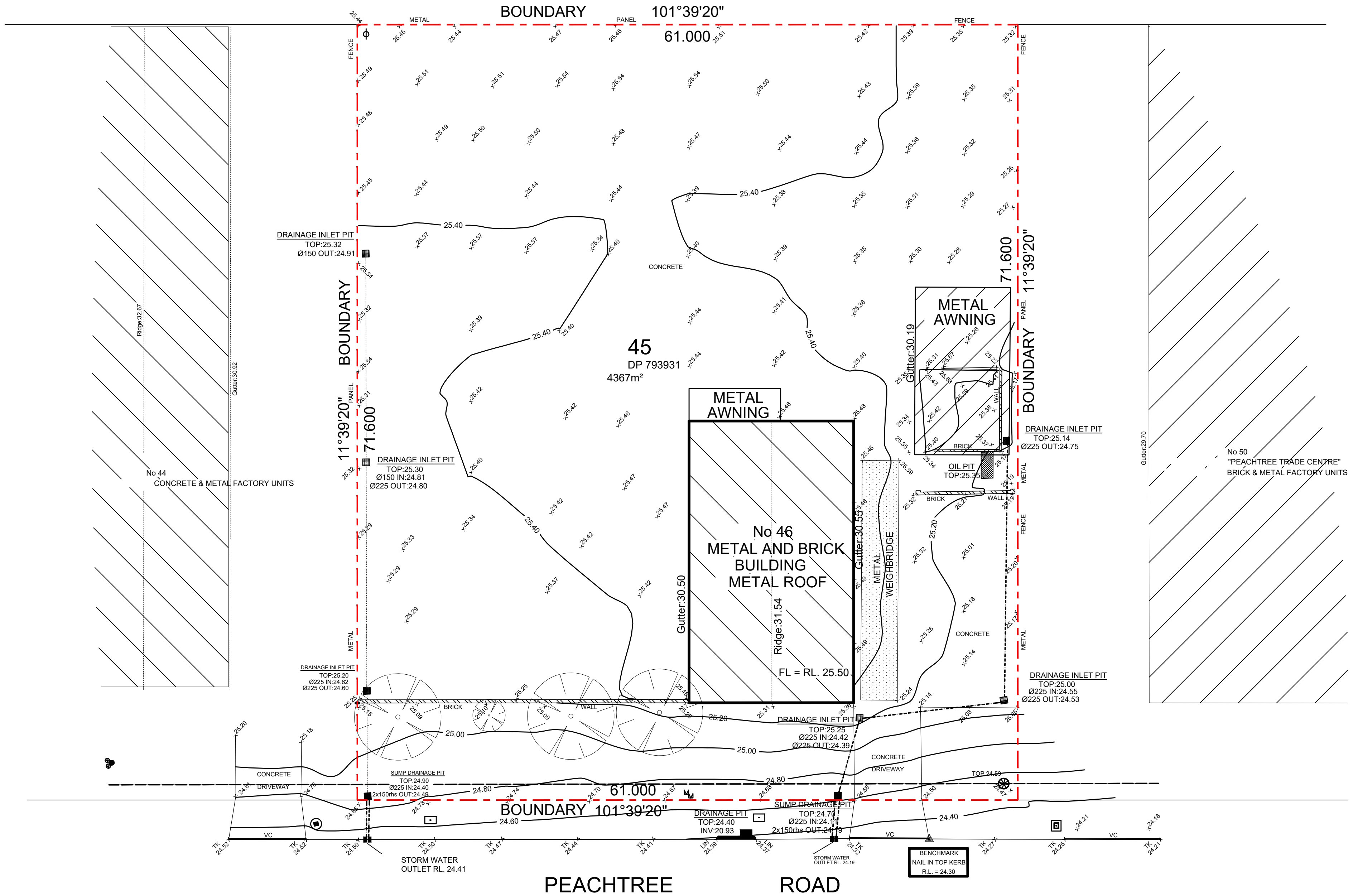
Project
PROPOSED
WASTE MANAGEMENT FACILITY

46 PEACHTREE ROAD, PENRITH
NSW 2750

Drawing Title
COVER SHEET

Job no.	Drawing no.	Rev.
J17401D	A100	A

Drawn by	Checked by	Approved by	Date
LW	JY	JY	APR 2017



01 EXISTING SITE PLAN
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Drawing Title
EXISTING SITE PLAN

Job no.	Drawing no.	Rev.
J17401D	A101	A

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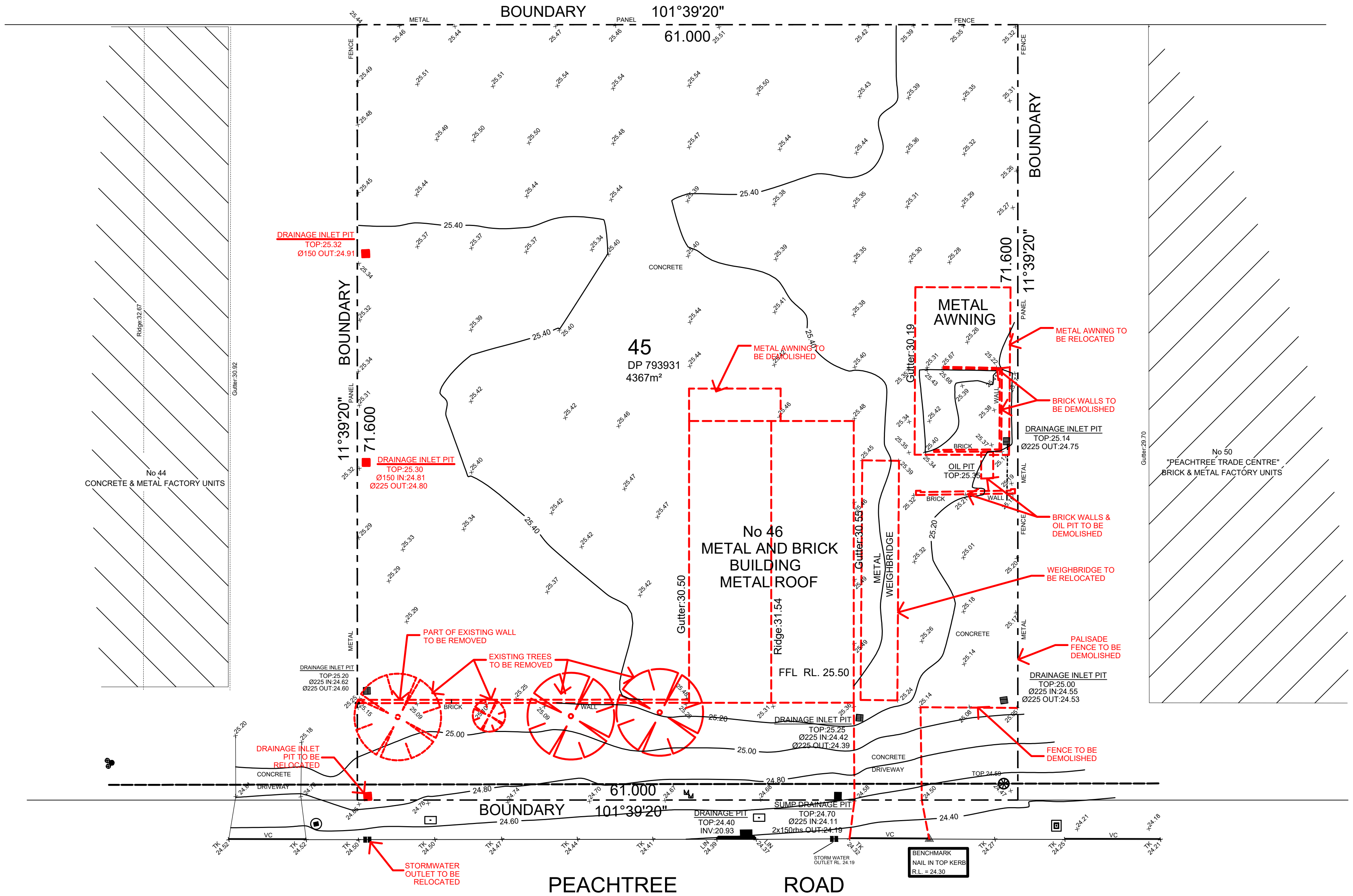

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46 PEACHTREE ROAD, PENRITH
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Drawing Title
DEMOLITION PLAN

Job no.	Drawing no.	Rev.
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Drawn by	Checked by	Approved by	Date
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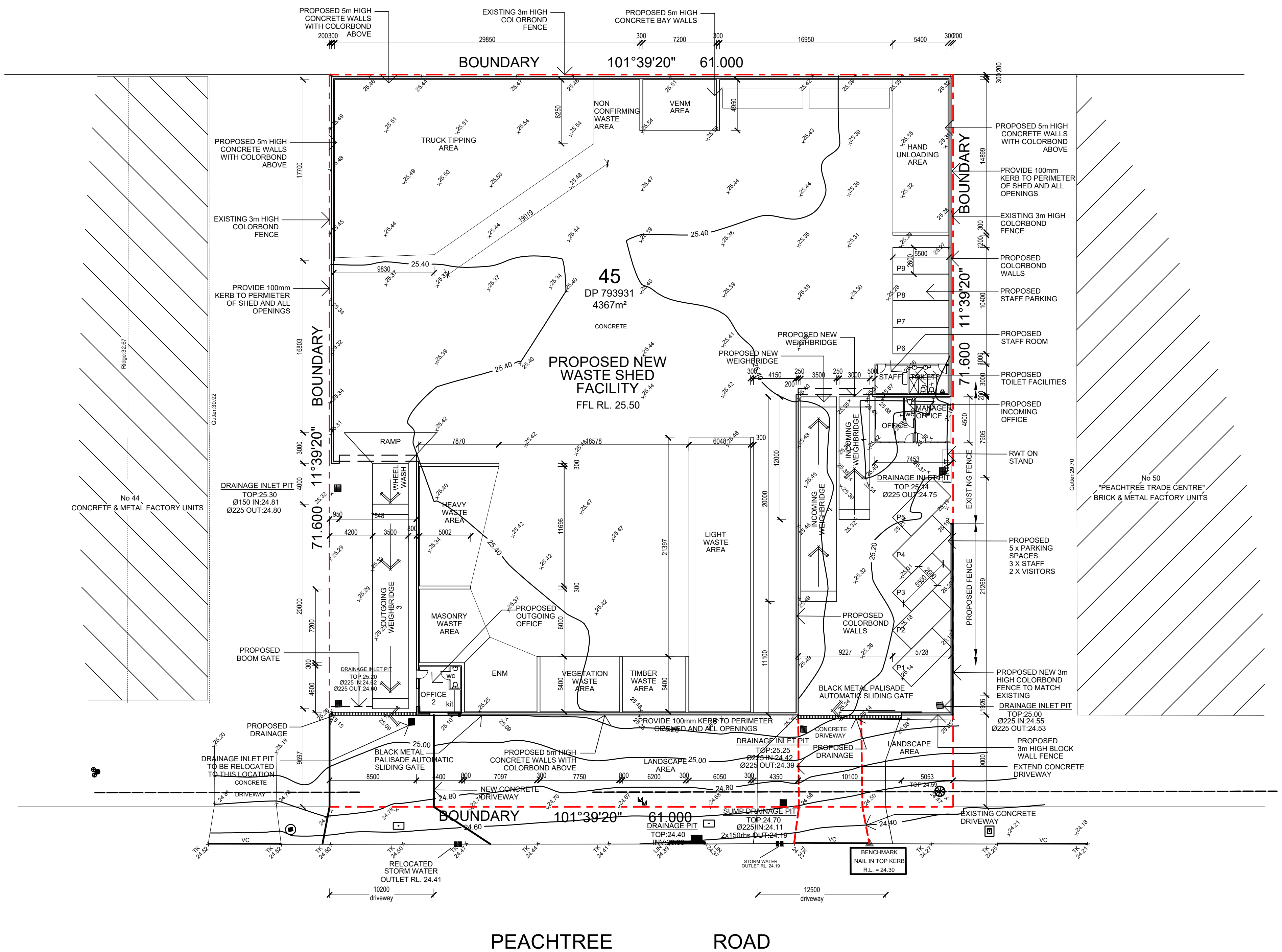

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B	03.10.18	GENERAL AMENDMENTS
A	28.06.18	DA SUBMISSION

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46 PEACHTREE ROAD, PENRITH
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Drawing Title
PROPOSED SITE PLAN

Job no.	Drawing no.	Rev.
J17401D	A103	C

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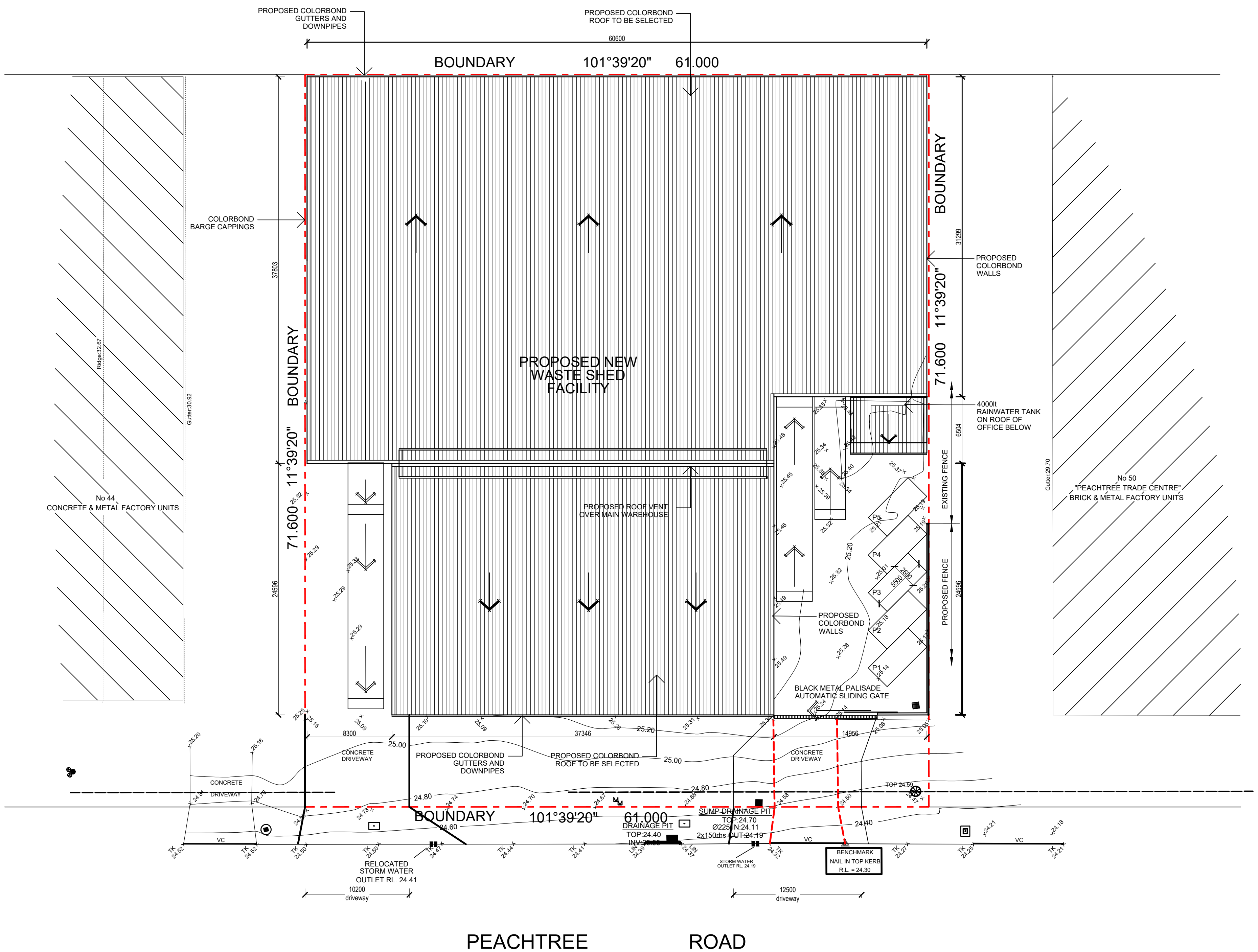

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46 PEACHTREE ROAD, PENRITH
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Drawing Title
PROPOSED ROOF PLAN

Job no.	Drawing no.	Rev.
J17401D	A104	A

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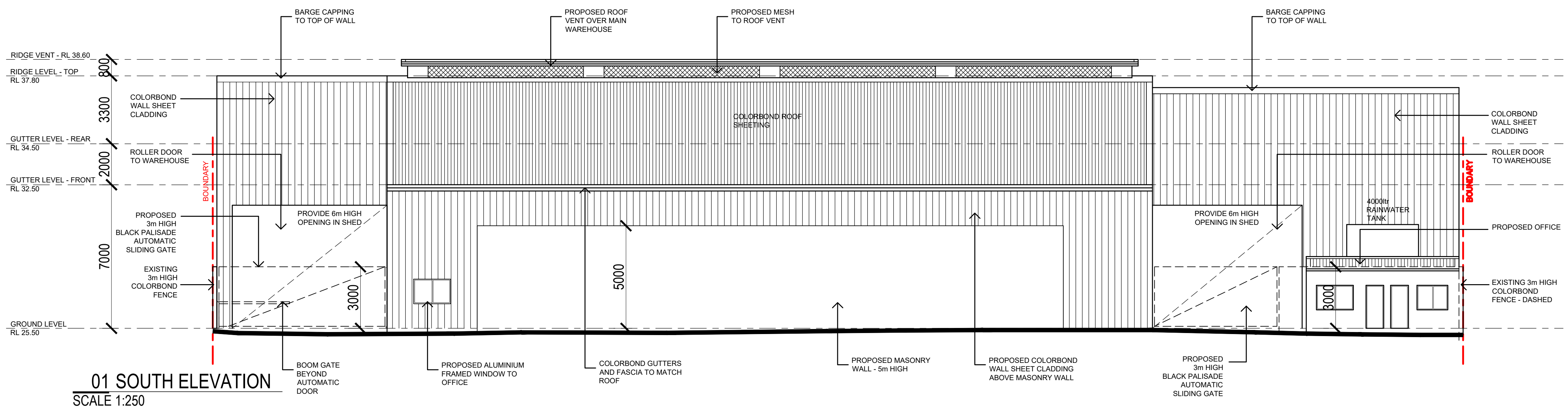

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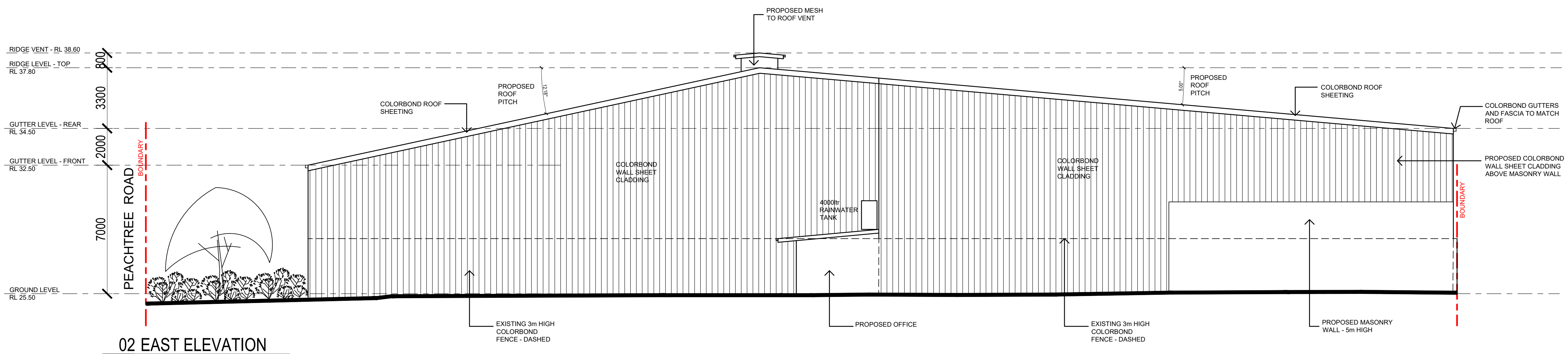

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Rev.	Date	Description
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A	28.06.18	DA SUBMISSION

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46 PEACHTREE ROAD, PENRITH
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Drawing Title
SITE ELEVATION 1

Job no.	Drawing no.	Rev.
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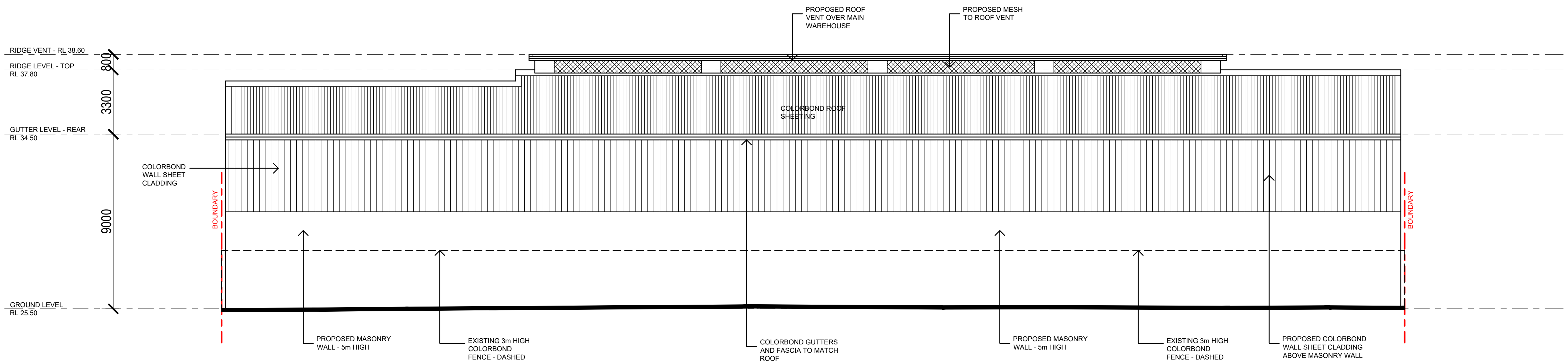

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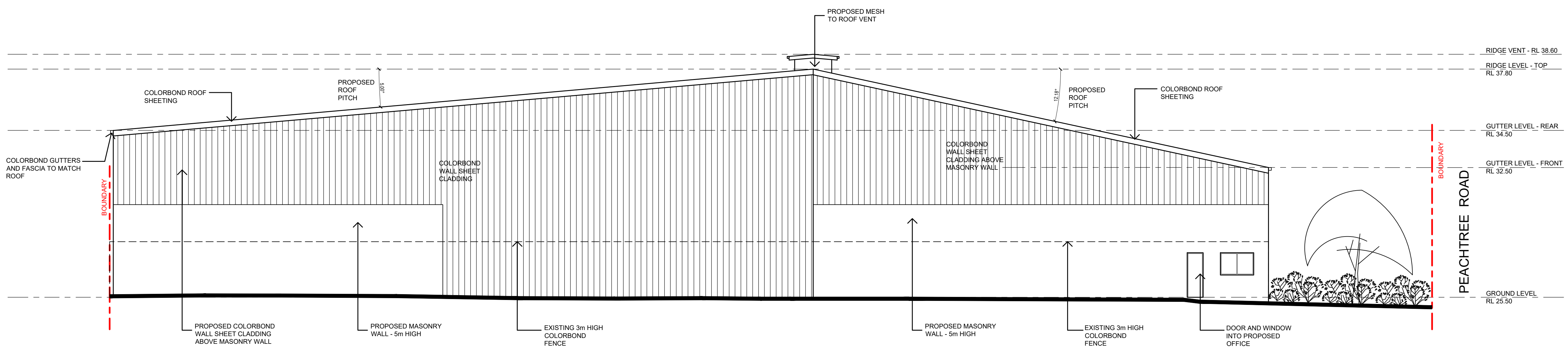

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Drawing Title
SITE ELEVATION 2

Job no.	Drawing no.	Rev.
J17401D	A104	B

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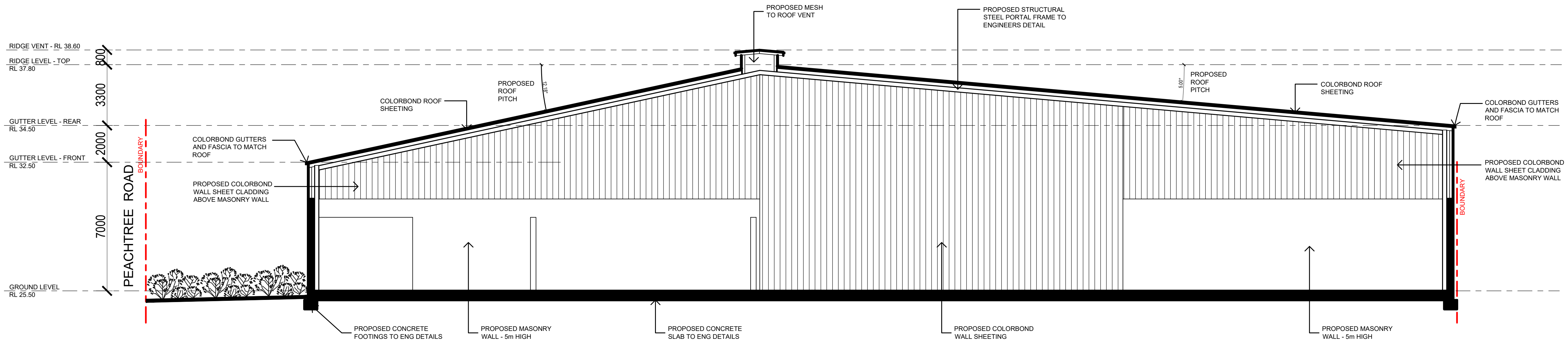

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Drawing Title
SITE ELEVATION

Job no.	Drawing no.	Rev.
J17401D	A104	A

Drawn by	Checked by	Approved by	Date
LW	JY	JY	APR 2017

Appendix C

Revised air quality assessment

Intended for
EMM Consulting Pty Ltd

Document type
Report

Date
October 2018

PENRITH WASTE RECYCLING AND TRANSFER FACILITY
AIR QUALITY AND GREENHOUSE GAS ASSESSMENT

PENRITH WASTE RECYCLING AND TRANSFER FACILITY
AIR QUALITY AND GREENHOUSE GAS ASSESSMENT

Version	Date	Made by	Checked by	Approved by	Signature
Final	22/10/2018	S. Fishwick	R.Kellaghan	R.Kellaghan	Ronan Kellaghan

Ref AS122019

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AS122019_PenrithRecycling_AQIA_221018.docx

CONTENTS

FIGURES

TABLES

APPENDICES

Appendix 1
Wind Roses

Appendix 2
Emissions Inventory

Appendix 3
Incremental Isopleth Plots

EXECUTIVE SUMMARY

Benedict Recycling Pty Ltd (Benedict Recycling) proposes to construct and operate a waste recycling and transfer facility at 46–48 Peachtree Road, Penrith, NSW (the facility). Ramboll Australia Pty Ltd (Ramboll) has been commissioned by EMM Consulting Pty Ltd (EMM) on behalf of Benedict Recycling to conduct an air quality and greenhouse gas assessment of the proposed facility.

Emissions of TSP, PM_{10}, $PM_{2.5}$ and odour were estimated for average day and peak day proposed operations associated with the facility. Atmospheric dispersion modelling predictions of air pollution emissions for proposed operations were undertaken using the AERMOD dispersion model.

Existing air quality and meteorological conditions were analysed through a number of data resources, with particular weighting given to the Bureau of Meteorology Penrith Lakes and NSW Office of Environment and Heritage St Marys and Richmond monitoring stations.

The results of the dispersion modelling conducted indicated that the operation of the proposed facility was unlikely to result in exceedances of the applicable NSW EPA assessment criteria for TSP, PM_{10}, $PM_{2.5}$ and dust deposition at any of the surrounding residential or industrial receptors.

Potential odour impacts from the facility were conservatively assessed, with resultant predicted odour concentrations well below applicable impact assessment criterion.

A greenhouse gas quantification assessment was undertaken for the facility. The annual Scope 1 and Scope 3 emissions at full production represent approximately 0.0005% of total GHG emissions for NSW and 0.0001% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2014.

1. INTRODUCTION

Benedict Recycling Pty Ltd (Benedict Recycling) proposes to construct and operate a waste recycling and transfer facility at 46–48 Peachtree Road, Penrith, NSW (the facility). Ramboll Australia Pty Ltd (Ramboll) has been commissioned by EMM Consulting Pty Ltd (EMM) on behalf of Benedict Recycling to conduct an air quality and greenhouse gas assessment of the proposed facility.

An air quality impact assessment was original completed by Ramboll (then Ramboll Environ) in May 2017 as part of the original EIS for the facility. Hereafter, this report is referenced as the 2017 AQIA. Following receipt of submissions from regulatory agencies, the design of the facility has been revised. The key changes with regard to air quality emissions are as follows:

- with the exception of entry and exit paths, all activities associated with the facility are contained within a built structure;
- the built shed structure will feature mains fed water misting at both the entrance and exit doors, along with similar dust suppression within the shed; and
- there will be no processing machinery (e.g. trommel screen) associated with the facility.

The 2017 AQIA conducted modelling for the 2015 calendar year, which at the time of reporting was the period with the most complete meteorological and air quality monitoring datasets for the local region. Wherever possible, the resources developed for the 2017 AQIA have been retained for this study.

This report provides:

- characterisation of the existing environment, specifically the existing air quality, prevailing meteorology and regulatory context;
- review of potential emission sources and mitigation measures;
- calculation of annual particulate matter emissions from the proposed facility;
- atmospheric dispersion modelling of emissions for proposed operations at facility to predict potential air quality impacts at surrounding sensitive receptor locations; and
- quantification of greenhouse gas emissions from the peak operations of the facility.

The air quality assessment is guided by the NSW Environment Protection Authority (NSW EPA) Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales ("the Approved Methods for Modelling"), (NSW EPA, 2016).

1.1 Changes from the 2017 AQIA

The original EIS for the facility received a number of submissions from regulatory agencies in relating to air quality impacts. The following changes to the proposed facility and air quality assessment approach have been made in response to these submissions:

- operational emissions and modelling have been revised to account for all facility operations occurring within a building; and
- inclusion of an additional sensitive receptor location (R18) representative of existing and potential future residential development at that location.

2. PROJECT DESCRIPTION AND LOCAL SETTING

2.1 Project Description

Benedict Recycling proposes to construct and operate a waste recycling and transfer facility on the site. The project setting and layout of the facility are illustrated in **Figure 2-1** and **Figure 2-2** respectively.

2.2 Site components

The development will include the installation and use of the following site components:

- repairs to the existing concrete surface of the site where required;
- demotion of the existing structures on the site and walls fronting Peachtree Road;
- upgrade of the entry driveway at the south-east boundary to Peachtree Road;
- construction of an exit driveway at the south-west boundary to Peachtree Road;
- a surface water management system;
- landscaping;
- nine on-site parking spaces with seven spaced for staff and two spaces for visitors;
- two weighbridges at the site entry and one weighbridge at the site exit;
- a wheel wash at the site exit;
- construction of a 3,042 m^2 shed enclosing the operational area including:
  - two weighbridge offices;
  - manager’s office;
  - break room;
  - toilets;
  - product bays and unloading areas with 4 m high block walls and associated stockpiles;
  - misting systems at entrances and at the main stockpile area;
- 3 m block walks with palisade automated gates at ingress and egress points;
- extension of 3 m colorbond fence at the south-east corner.

As noted above, the relevant changes to the project are the enclosure of the operational area of the facility, materials will be sorted and not processed, and misting will be used for dust suppression at the shed ingress and egress and main stockpile areas.

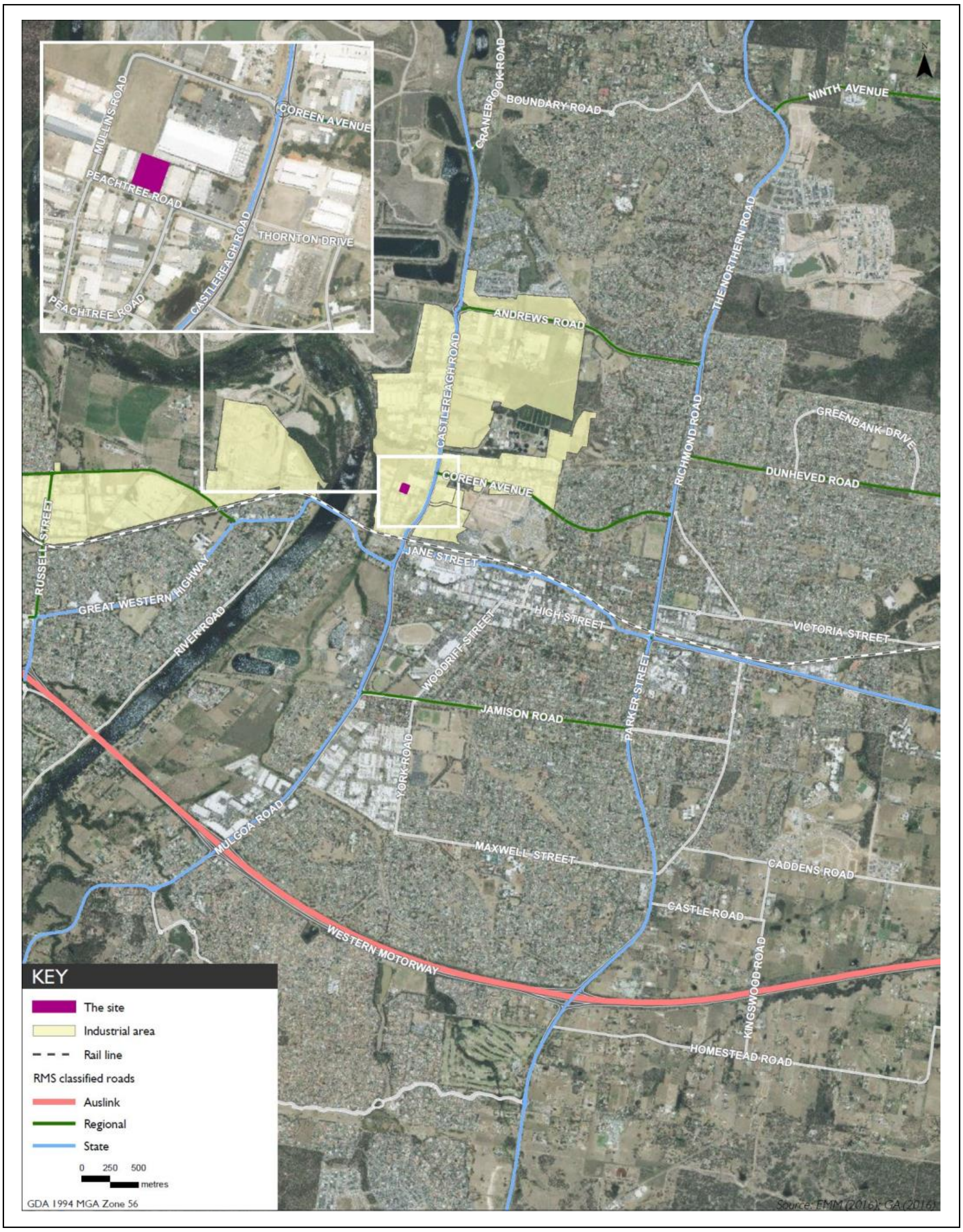


Figure 2-1: Site Location

Source: EMM (2016)

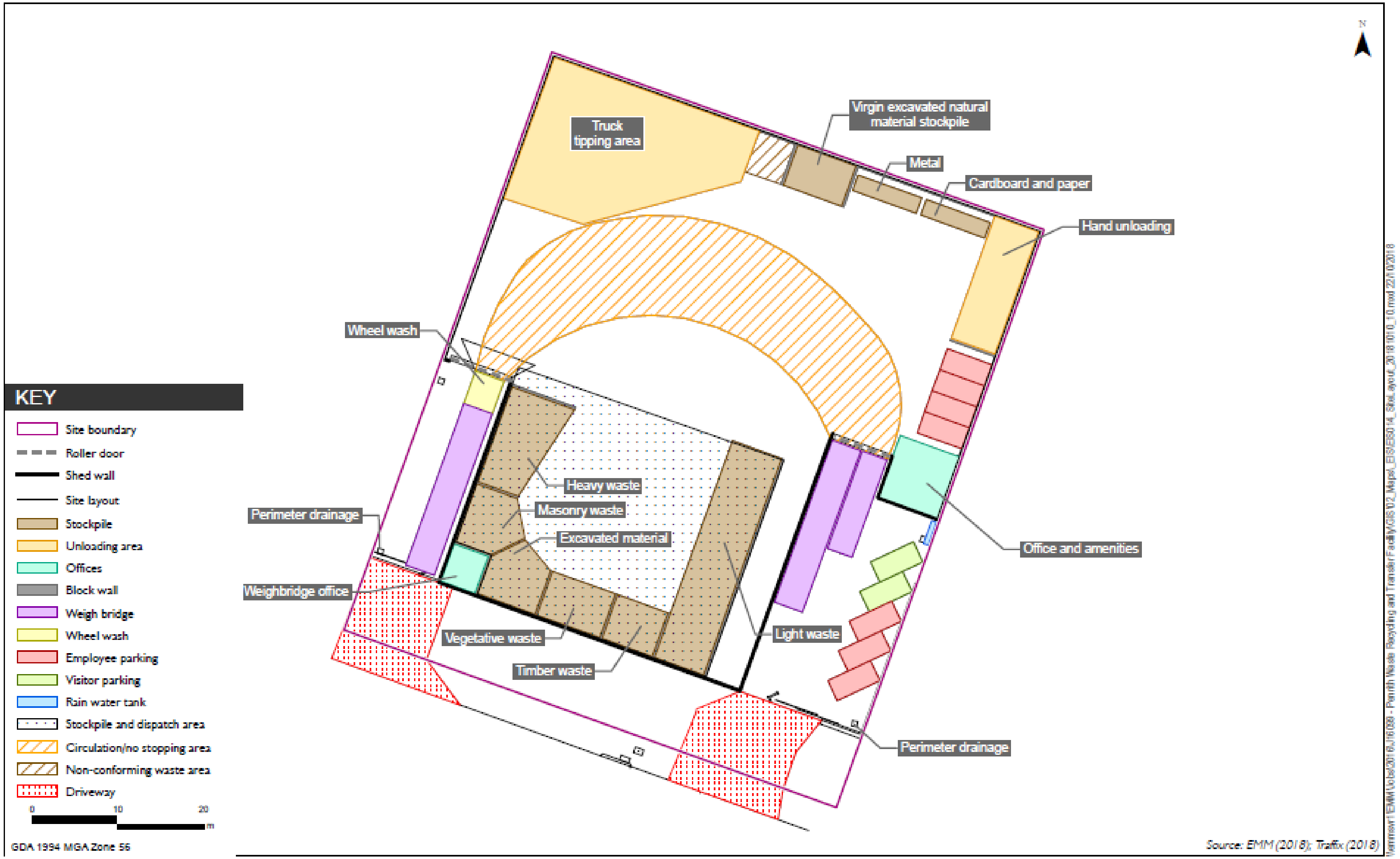


Figure 2-2: Proposed Site Layout

Source: EMM (2018)

2.3 Surrounding landuse and receptor locations

The site is within an industrial estate to the northwest of the Penrith central business district. The site was previously a scrap metal yard, and is currently used by an autowreckers. The land is covered by a concrete hard stand and a shed. The site covers 4,367 m^2 in area and is flat (approximately 26 m Australian Height Datum (AHD).

The neighbouring properties are a mixture of commercial and industrial operations. In addition to the closest surrounding commercial and industrial receptors, the closest residential and recreational receptors have also been included as discrete assessment locations. The selected receptor locations are presented in **Table 2-1** and illustrated in **Figure 2-3**. It is noted that receptor 18 is additional to the receptors assessed in the 2017 AQIA and accounts for existing and potential future residential development in that area.

Table 2-1 Sensitive receptor locations surrounding the site

Receptor ID	Location (m, MGA56S)		Elevation (m, AHD)	Receptor Type
	Easting	Northing		
1	285890	6263716	25	Commercial / Industrial
2	285913	6263717	25	Commercial
3	285969	6263718	25	Commercial
4	285992	6263719	28	Commercial
5	285937	6263720	25	Commercial / Industrial
6	285859	6263721	25	Commercial / Industrial
7	285827	6263722	26	Industrial
8	285839	6263723	25	Commercial / Industrial
9	285859	6263724	25	Commercial / Industrial
10	285931	6263725	24	Commercial
11	286593	6263726	30	Residential
12	286529	6263727	25	Residential
13	285651	6263728	29	Residential
14	285483	6263729	26	Residential
15	285130	6263730	26	Residential
16	285581	6263731	31	Recreation
17	285731	6263732	27	Recreation
18	286462	6263803	29	Residential

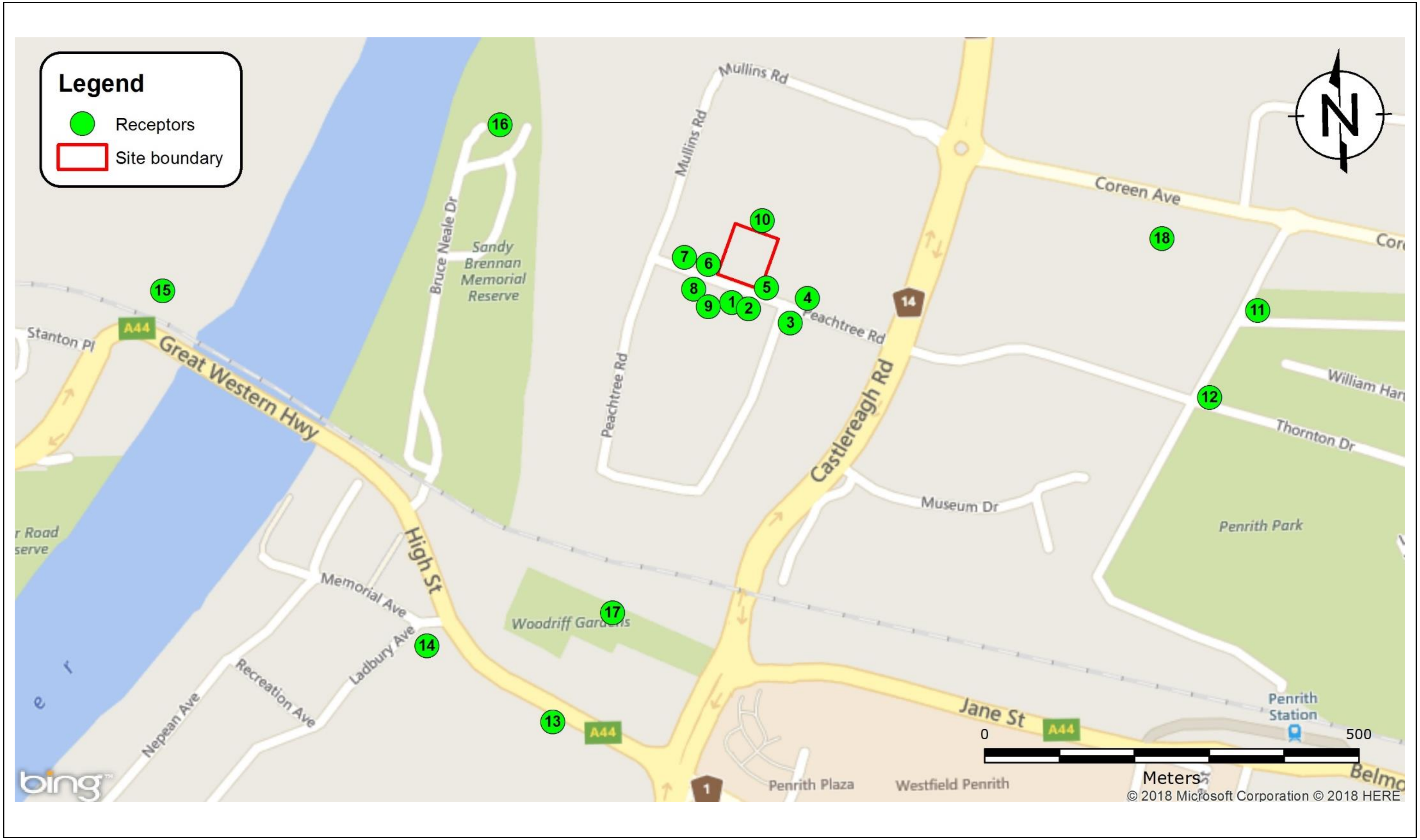


Figure 2-3: Surrounding sensitive receptor locations

3. AIR QUALITY ASSESSMENT CRITERIA

The project must demonstrate compliance with the impact assessment criteria outlined in the Approved Methods for Modelling (EPA, 2016). The impact assessment criteria are designed to maintain ambient air quality that allows for the adequate protection of human health and well-being.

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

For this assessment, focus has been given to the emissions of primary particulate matter (PM), including total suspended particulate matter (TSP) and particulate matter with an equivalent aerodynamic diameter of less than 10 microns (PM_{10}) and 2.5 microns ($PM_{2.5}$). Dust deposition, as a result of the TSP emissions, is also assessed.

Relevant ambient air quality criteria applicable to the facility are presented in this section. For proposed developments within NSW, ground level assessment criteria specified by the NSW EPA within the *Approved Methods for Modelling* are applicable. These assessment criteria are designed to maintain an ambient air quality that allows for adequate protection of human health and well-being.

3.1 Goals applicable to airborne particulate matter

When first regulated, airborne PM was assessed based on concentrations of TSP. In practice, this typically referred to PM smaller than about 30-50 micrometres (µm) in diameter. As air sampling technology improved and the importance of particle size and chemical composition become more apparent, ambient air quality standards have been revised to focus on the smaller particle sizes, thought to be most dangerous to human health. Contemporary air quality assessment typically focuses on "fine" and "coarse" inhalable PM, based on health-based ambient air quality standards set for PM_{10} and $PM_{2.5}$[2].

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

The air quality criteria applied for PM in this assessment are presented in **Table 3-1**.

The revised AAQ NEPM also establishes long-term goals for $PM_{2.5}$ to be achieved by 2025 (NEPC, 2015). It is noted that the purpose of the AAQ NEPM is to attain '*ambient air quality that allows for the adequate protection of human health and wellbeing*', and compliance with the AAQ NEPM is assessed through air quality monitoring data collected and reported by each state and territory. The long-term goals for $PM_{2.5}$ are therefore not applicable to the assessment of impacts of emissions sources on individual sensitive receptors, and are shown in **Table 3-1** for information only.

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

[2] Particulate matter with an aerodynamic diameter of less than 10 µm and 2.5 µm respectively.

Table 3-1 Impact assessment criteria for PM

Pollutant	Averaging Period	Concentration (µg/m³)	Reference
TSP	Annual	90	NSW EPA impact assessment criteria
PM_{10}	24 hours	50	
	24 hours	50	
	Annual	25	
	Annual	25	
$PM_{2.5}$	24 hours	25	AAQ NEPM long term goal for 2025
	Annual	8	

3.2 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 3-2** 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 3-2 Impact assessment criteria for 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, EPA 2016

3.3 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 a 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, 2016), and summarised in **Table 3-3**. They are expressed as the 99th percentile value, nose response time average (approximately one second).

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

Table 3-3 EPA odour performance criteria vs. population density

Population of Affected Community	Odour Performance Criteria (OU$^{(1)}$)
Urban area (> 2000)	2
500 – 2000	3
125 – 500	4
30 – 125	5
10-30	6
Single residence (< 2)	7

Source: Approved Methods for Modelling, EPA 2016

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

4. CLIMATE AND DISPERSION METEOROLOGY

Meteorological mechanisms govern the generation, dispersion, transformation and eventual removal of pollutants from the atmosphere. Emission generation rates are particularly dependent on wind energy and on the moisture budget, which is a function of rainfall and evaporation rates.

A combination of local area observational data and meteorological modelling techniques were used. Details regarding the meteorological modelling are presented in **Section 4.1**. The following report sections are retained from the 2017 AQIA.

The following data were used in the meteorological analysis:

- 1-hour average meteorological data and historical climate data from the BoM Automatic Weather Station (AWS) at Penrith Lakes (Station Number 067113) and Richmond RAAF Airport (Station Number 067105) located 2.9 km north-northwest and 17.9 km north-northeast of the facility respectively.

4.1 Meteorological Modelling

Section 4.1 of EPA (2016) specifies that meteorological data representative of a site can be used in the absence of suitable on-site observations. Data should cover a period of at least one year with a percentage completeness of at least 90%. Site representative data can be obtained from either a nearby meteorological monitoring station or synthetically generated using the CSIRO prognostic meteorological model The Air Pollution Model (TAPM).

As stated, hourly average meteorological data from the BoM Penrith Lakes and Richmond RAAF locations were obtained. Data from the Penrith Lakes AWS was used as the primary resource, with observations from the Richmond RAAF AWS adopted for cloud cover observations.

To supplement these meteorological observation datasets, the CSIRO meteorological model TAPM was used to generate parameters not routinely measured, specifically the vertical temperature profile.

TAPM was configured and run in accordance with the Section 4.5 of the Approved Methods for Modelling, with the following refinements:

- Modelling to 300 m grid cell resolution (beyond 1 km resolution specified).
- Inclusion of high resolution (90 m) regional topography (improvement over default 250 m resolution data).

The TAPM vertical temperature profile for every hour was adjusted by first substituting the predicted 10 m above ground temperature with hourly recorded temperature at 10 m (sourced from the Penrith Lakes AWS). The difference between the TAPM predicted temperature and the measured 10 m temperature was applied to the entire predicted vertical temperature profile. This modified vertical profile was used in combination with the ambient air temperature throughout the day to calculate convective mixing heights between sunrise and sunset.

4.2 Prevailing Wind Regime

A wind rose showing wind speed and direction data recorded at the Penrith Lakes AWS is presented in **Figure 4-1**. The annual recorded wind pattern is dominated by southwesterly airflow. A less common north to east quadrant airflow component is also experienced. The highest wind speeds recorded are most frequently experienced from the south to west quadrant. The average recorded wind speed for 2015 was 2.2 m/s, with a frequency of calm conditions (wind speeds less than 0.5 m/s) occurring in the order of 14% of the time.

Additional inter-annual, seasonal and diurnal wind roses for the Penrith Lakes AWS are provided in **Appendix 1**.

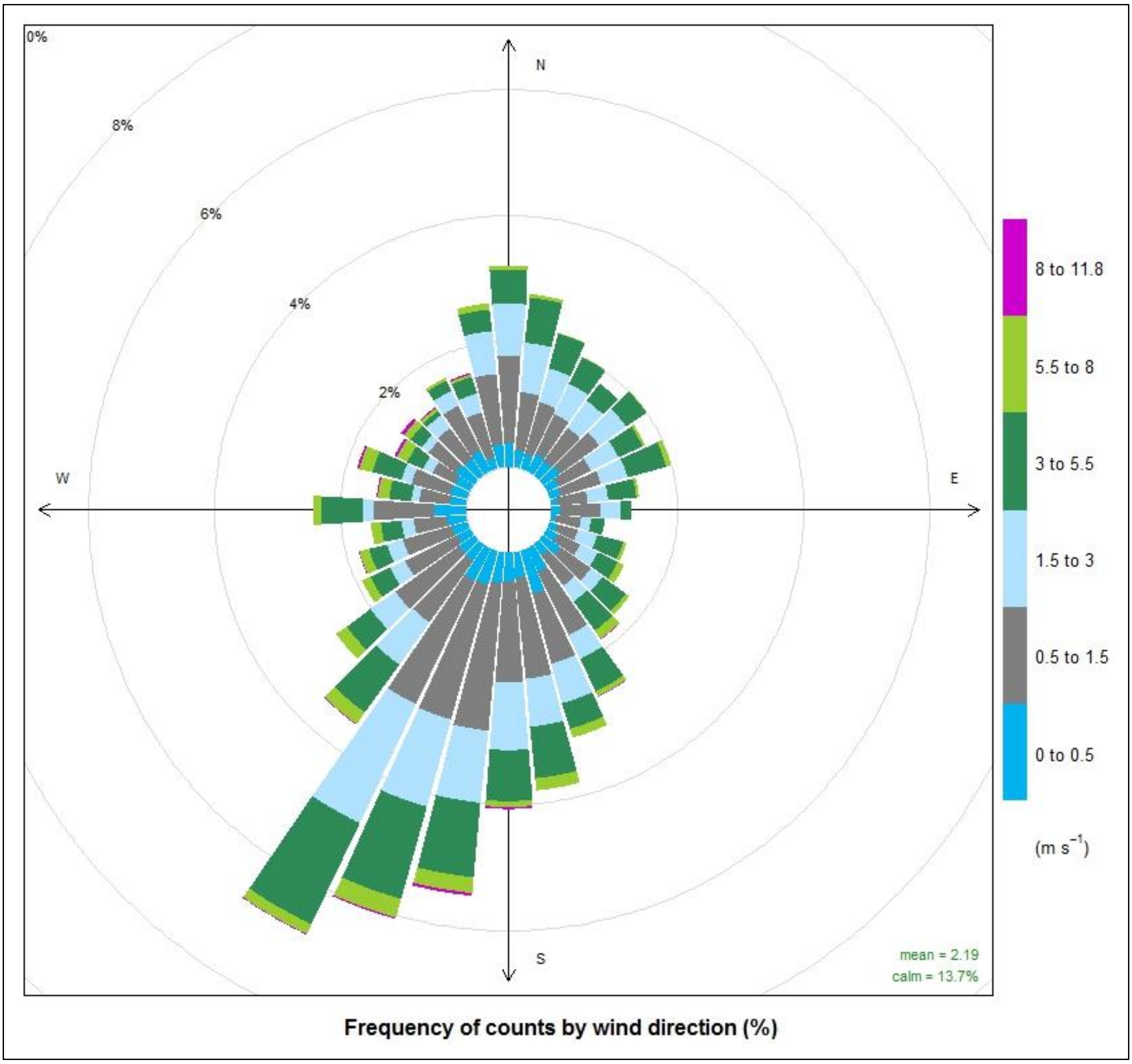


Figure 4-1: Annual Average Wind Rose – Penrith Lakes BoM AWS – 2015

Seasonal and diurnal (dividing the day into night and day) wind roses for the meteorological dataset are presented within **Appendix 1**.

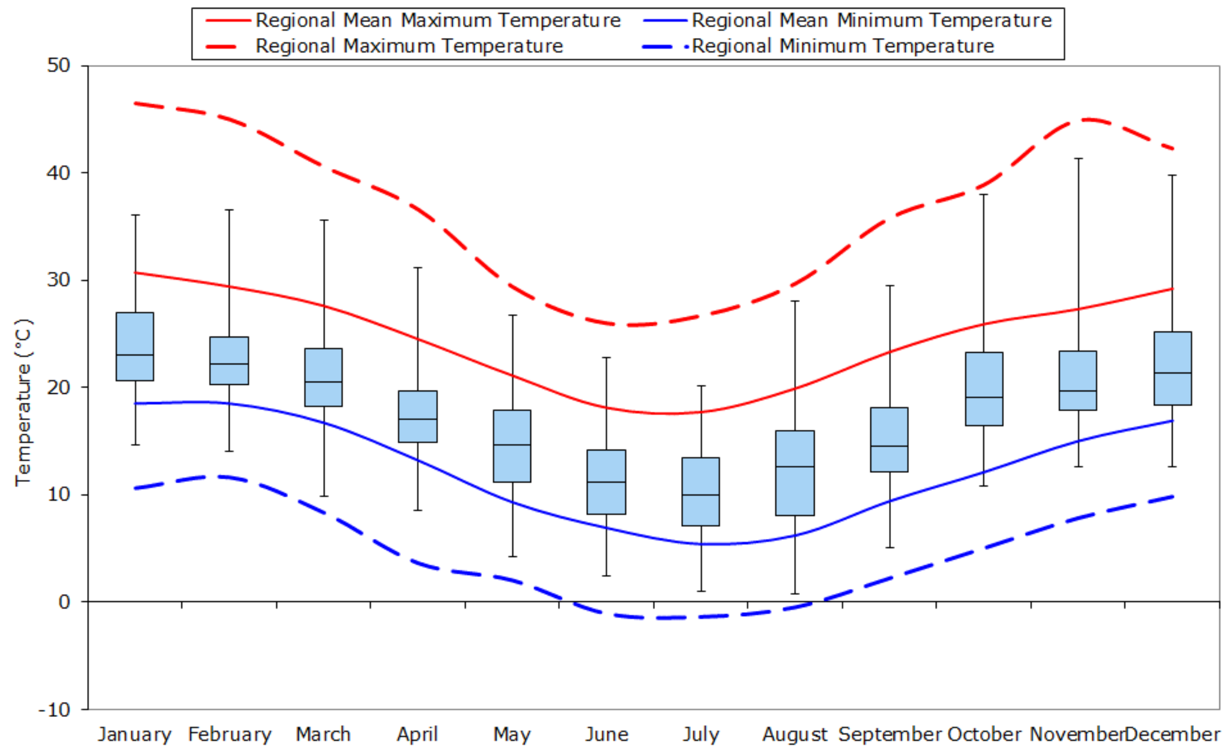
Seasonal variation in wind speed and direction is evident in the recorded data from the Penrith Lakes BoM AWS. The southwesterly airflow is evident in all seasons, with a particular dominance in autumn, winter and spring. The northeasterly airflow is most common in spring and summer. Wind speeds are typically lowest during the autumn and winter months, with the lowest average wind speed and highest occurrence of calm conditions at this time. Wind speeds are highest during the spring and summer months.

Diurnal variation is notable in both recorded wind speed and direction. Wind speeds are higher during the daylight hours than at night. Daylight hours are experience a mixture of north to northeast and southwest aligned airflow. Night time hours experience a dominance of southwesterly air flow.

4.3 Ambient Temperature

Monthly mean minimum temperatures are in the range of 5°C to 19°C, with mean maxima of 18°C to 31°C, based on the long-term average record from the BoM Penrith Lakes climate station. Peaks occur during summer months with the highest temperatures typically being recorded between November and February. The lowest temperatures are usually experienced between June and August.

The 2015 Penrith Lakes BoM temperature dataset has been compared with long-term trends recorded at the Penrith Lakes climate station to determine the representativeness of the dataset. **Figure 4-2** presents the monthly variation in recorded temperature during 2015 compared with the recorded station mean, minimum and maximum temperatures. There is good agreement between temperatures recorded during 2015 and the recorded historical trends, indicating that the dataset is representative of conditions likely to be experienced in the region.



Note: 2015 data from Penrith Lakes 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 Penrith Lakes are depicted as line graphs.

Figure 4-2: Temperature Comparison between Penrith Lakes AWS 2015 dataset and Historical Averages (1995-2016) – Penrith Lakes

4.4 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 at Penrith Lakes, the area is characterised by moderate rainfall, with a mean annual rainfall of approximately 730mm, and an annual rainfall range between 500mm and 1,010mm. Rainfall is most pronounced in between November and February, with lower rainfall during mid-winter to early spring. According to the long term records, an average of 133 rain days occur per year.

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

4.5 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 Monin-Obukhov length (L) provides a measure of the stability of the surface layer (i.e. the layer above the ground in which vertical variation of heat and momentum flux is negligible; typically about 10% of the mixing height). Negative L values correspond to unstable atmospheric conditions, while positive L values correspond to stable atmospheric conditions. Very large positive or negative L values correspond to neutral atmospheric conditions.

Figure 4-3 illustrates the seasonal variation of atmospheric stability derived from the Monin-Obukhov length calculated by AERMET for the facility. The diurnal profile presented illustrates that atmospheric instability increases during daylight hours as convective energy increases, whereas stable atmospheric conditions prevail during the night-time. This profile indicates that the potential for atmospheric dispersion of emissions would be greatest during day time hours and lowest during evening through to early morning hours.

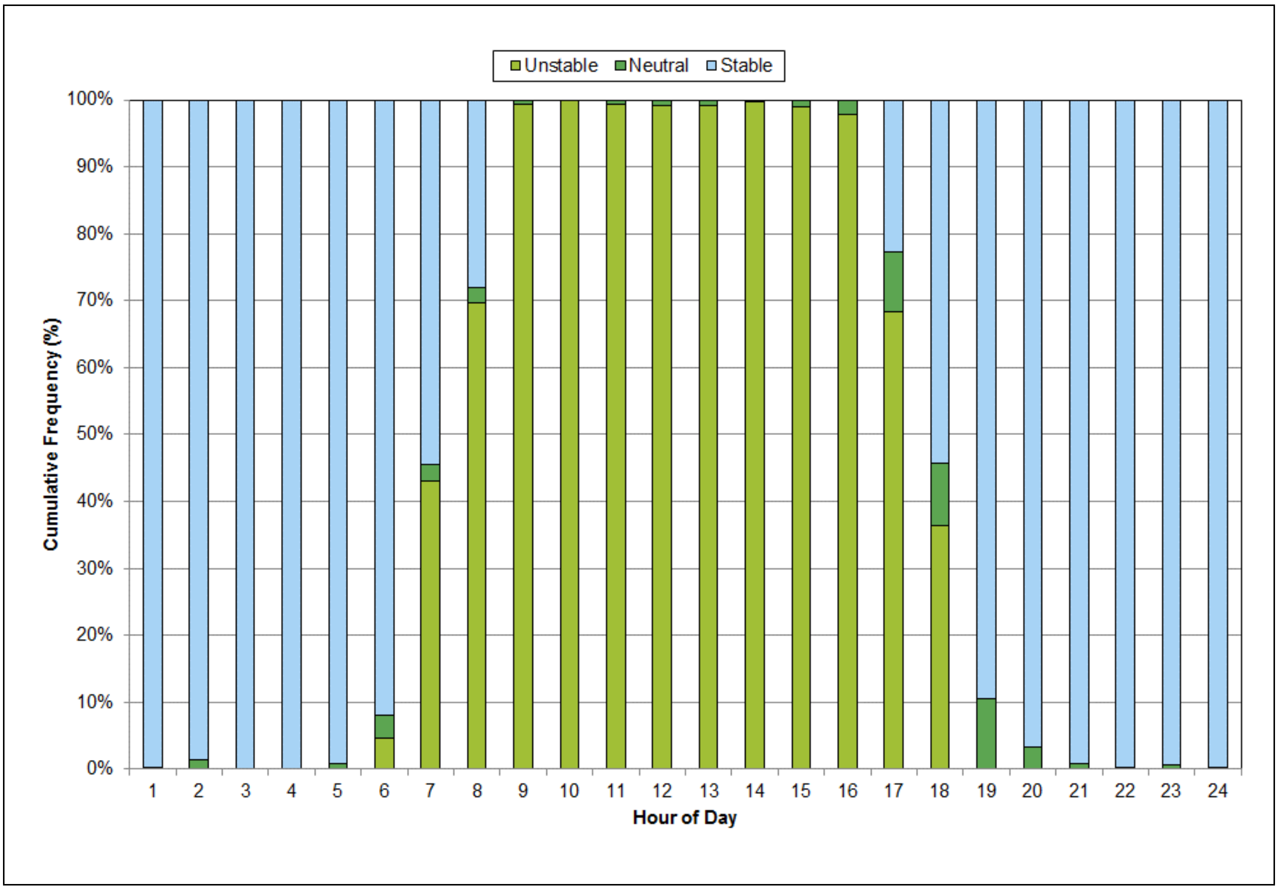
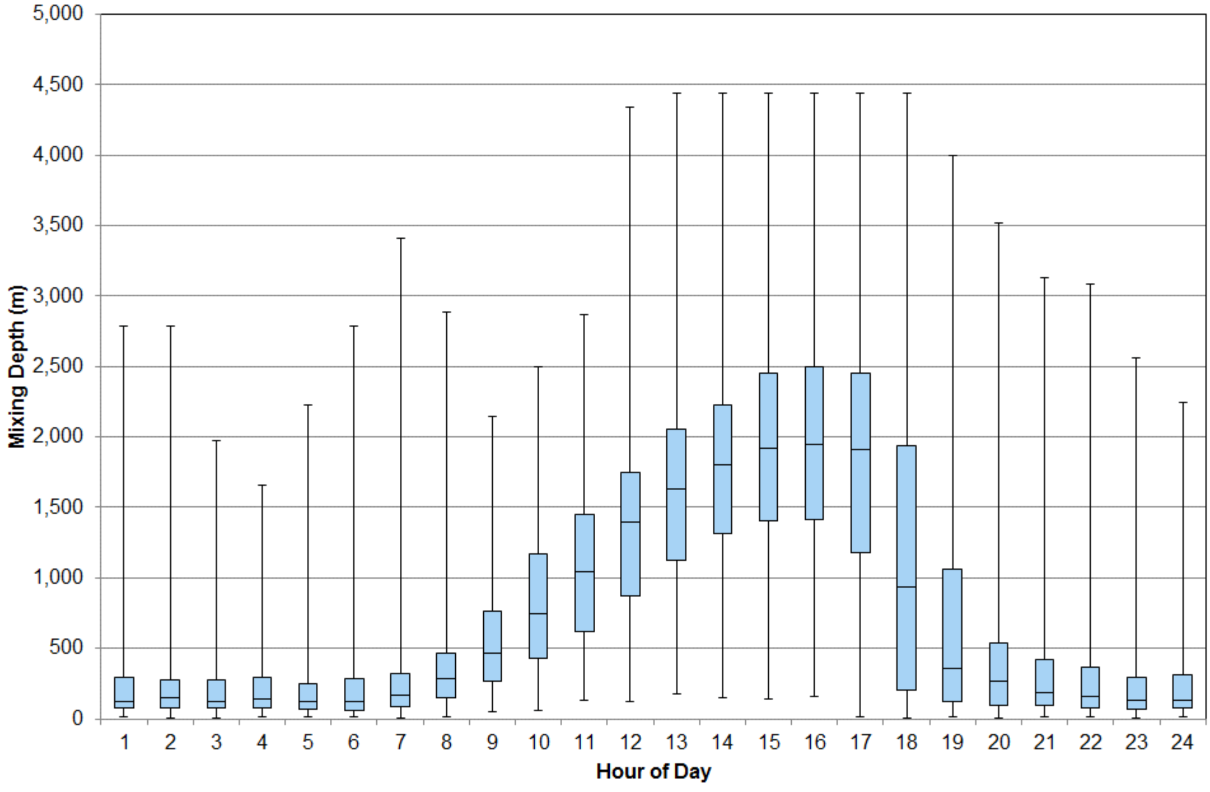


Figure 4-3: AERMET-Calculated Diurnal Variation in Atmospheric Stability– Facility 2015

4.6 Mixing Depth

Hourly-varying atmospheric boundary layer depths were generated for the facility by AERMET, the meteorological processor for the AERMOD dispersion model (see **Section 7.1** for further information), using a combination of surface observations from the Penrith Lakes BoM AWS, sunrise and sunset times and adjusted TAPM-predicted upper air temperature profile.

The variation in average boundary layer depth by hour of the day for the facility is illustrated in **Figure 4-4**. It can be seen that greater boundary layer depths are experienced during the day time hours, peaking in the mid to late afternoon. Higher day-time wind velocities and the onset of incoming solar radiation increases the amount of mechanical and convective turbulence in the atmosphere. As turbulence increases so too does the depth of the boundary layer, generally contributing to higher mixing depths and greater potential for atmospheric dispersion of pollutants.



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

Figure 4-4: AERMET-Calculated Diurnal Variation in Atmospheric Mixing Depth – Facility

5. EXISTING AIR QUALITY ENVIRONMENT

The quantification of cumulative air pollution concentrations and the assessment of compliance with ambient air quality limits necessitate the characterisation of baseline air quality. Given that particulate matter emissions represent the primary pollutant of concern generated by the proposed facility, it is pertinent that existing sources and ambient air pollutant concentrations of these pollutants are considered.

5.1 Existing sources of atmospheric emissions

The National Pollutant Inventory (NPI) database identifies 11 reporting sources of air pollution emissions in the surrounding 10km from the site. Of those, the industrial activities listed in **Table 5-1** are reported to contribute emissions of particulate matter to the local environment.

Table 5-1 Neighbouring air pollution emission sources – NPI database

Industry Name	Location	Activities	Distance / direction from the facility
Boral Emu Plains Quarry	Emu Plains	Crushing, grinding and separating works.	1km west-northwest
Capral Limited	Penrith	Aluminium Rolling, Drawing, Extruding	1km northeast
National Foods Milk Penrith	Penrith	Receival, processing, packaging and distribution of liquid whole and modified milk products.	0.5km southeast
O-I Sydney Plant (Owens Illinois)	Penrith	Manufacture and supply of glass containers for beverages and food. Technologies include furnaces, forming, annealing, surface treatment, automatic product inspection and packaging.	1.8km northeast
Rocla Emu Plains	Emu Plains	Concrete products manufacture	2km west

In addition to the above operations, the surrounding local industrial zones contain smaller particulate matter emission sources such as concrete batching plants and scrap metal recycling facilities. Finally, it is considered that the following sources also contribute to particulate matter emissions in the vicinity of the proposed facility:

- Dust entrainment and tyre and break wear due to vehicle movements along public roads;
- Petrol and diesel emission from vehicle movements along public roads;
- Wind generated dust from exposed areas within the surrounding region;
- Seasonal emissions from household wood burning fires;
- Sea salts contained in sea breezes.

More remote sources which contribute episodically to suspended particulates in the region include dust storms and bushfires. Whereas dust storms predominately contribute primary particulates from mechanical attrition, bushfires are a source of fine particulates including both primary particulates and secondary particulates formed by atmospheric gas to particle conversion processes.

5.1.1 Neighbouring NPI-reporting facilities

Emissions from annual NPI-reporting facilities has been updated from the 2017 AQIA to account for more recent emissions reporting data and changes in emissions from individual neighbouring sources. Annual particulate matter emissions for the 2016-2017 reporting period each of the NPI-reporting facilities are presented in **Table 5-1**. The NPI database only presents emissions of PM_{10} and $PM_{2.5}$.

It is noted that for the 2016-2017 reporting period, the Boral Emu Plains Quarry did not report emissions as activities were below the reporting threshold. However, Ramboll completed an air quality impact assessment for a proposed modification to existing operations at the Boral Emu Plains Quarry in 2018. Calculated emissions from that assessment have been adopted in this study.

To estimate TSP emissions, a simple assumption that PM_{10} equates to 50% of TSP emissions has been made for the O-I Sydney Plant and Rocla Emu Plains operations. Due to the fact that PM_{10} and $PM_{2.5}$ emissions are equal for the Capral Limited and National Foods facilities, it is assumed that TSP emissions are also equal, however given the low relative magnitude of reported particulate emissions from these two facilities, this assumption is not considered critical.

Table 5-2: Annual particulate matter emissions – neighbouring NPI-reporting facilities

facility	Annual emissions (kg/year)		
	TSP	**PM_{10}**	**$PM_{2.5}$**
Boral Emu Plains Quarry	95,069	26,916	3,244
Capral Limited Penrith	72	72	71
National Foods Milk Penrith	200	200	200
O-I Sydney Plant (Owens Illinois)	118,000	59,000	6,100
Rocla Emu Plains	42,000	21,000	190

Ground level concentrations and deposition rates arising from these NPI-reporting facilities were predicted through the dispersion model established to assess emissions from the site (see **Section 7**). In the absence of source characteristics, source locations or operational details, emissions were evenly distributed across each site through the use of volume sources in the dispersion model. Emissions were released on a continuous basis. On this basis, the results of the modelling should be viewed as conservatively high, in particular for 24-hour average predictions. Model predictions of TSP, PM_{10} and $PM_{2.5}$ at each of the selected sensitive receptors are presented in **Table 5-3**.

Table 5-3 Predicted incremental particulate matter concentration results – neighbouring NPI-reporting facilities

Receptor ID	Incremental concentrations due to neighbouring NPI-reporting facilities				
	TSP Annual Average µg/m³	PM_{10} Maximum 24-hr µg/m³	PM_{10} Annual Average µg/m³	$PM_{2.5}$ Maximum 24-hr µg/m³	$PM_{2.5}$ Annual Average µg/m³
R1*	3.2	3.1	1.3	0.3	0.1
R2*	3.2	3.0	1.3	0.3	0.1
R3*	3.1	3.0	1.3	0.3	0.1
R4*	3.1	3.0	1.3	0.3	0.1
R5*	3.2	3.1	1.3	0.3	0.1
R6*	3.3	3.2	1.3	0.3	0.1
R7*	3.4	3.2	1.3	0.3	0.1
R8*	3.3	3.2	1.3	0.3	0.1
R9*	3.2	3.1	1.3	0.3	0.1
R10*	3.3	3.2	1.3	0.3	0.1
R11	2.9	3.5	1.3	0.2	0.1
R12	2.6	3.0	1.2	0.2	0.1
R13	2.5	2.3	1.0	0.2	0.1
R14	2.9	2.7	1.1	0.2	0.1
R15	7.0	5.7	2.3	0.6	0.2
R16	4.6	4.4	1.6	0.4	0.1
R17	2.6	2.4	1.1	0.3	0.1
R18	3.1	4.1	1.4	0.2	0.1

Note: * denotes industrial/commercial receptor

The particulate matter predictions from these NPI-reporting sources are combined with the ambient monitoring data (see subsequent sections) and site-only increment model predictions (**Section 8**) to assess cumulative impacts at surrounding receptor locations.

5.2 Background PM_{10} and $PM_{2.5}$

At the time of the original air quality impact assessment for the facility (late-2016), dispersion modelling was conducted using the BoM Penrith Lakes 2015 calendar year dataset, which was then the most recent and data complete period.

In order to account for ambient air quality conditions and assess cumulative impacts from the facility, concurrent daily-varying concentrations of particulate matter for 2015 were collated from nearby NSW OEH air quality monitoring stations. Concentrations of PM_{10} were sourced from the NSW OEH St Marys monitoring station, located approximately 9km to the southwest of the facility.

However, as the St Marys station only commenced the measurement of ambient $PM_{2.5}$ in 2016, the original air quality impact assessment referenced $PM_{2.5}$ concentrations recorded by the next closest NSW OEH monitoring station at Richmond, approximately 15km to the north-northeast of the facility.

In the absence of site specific monitoring data, daily-varying concentrations for of PM_{10} (St Marys) and $PM_{2.5}$ (Richmond) have been collated for the period between 2010 and 2015, with recorded concentrations illustrated in **Figure 5-1** and **Figure 5-2** respectively.

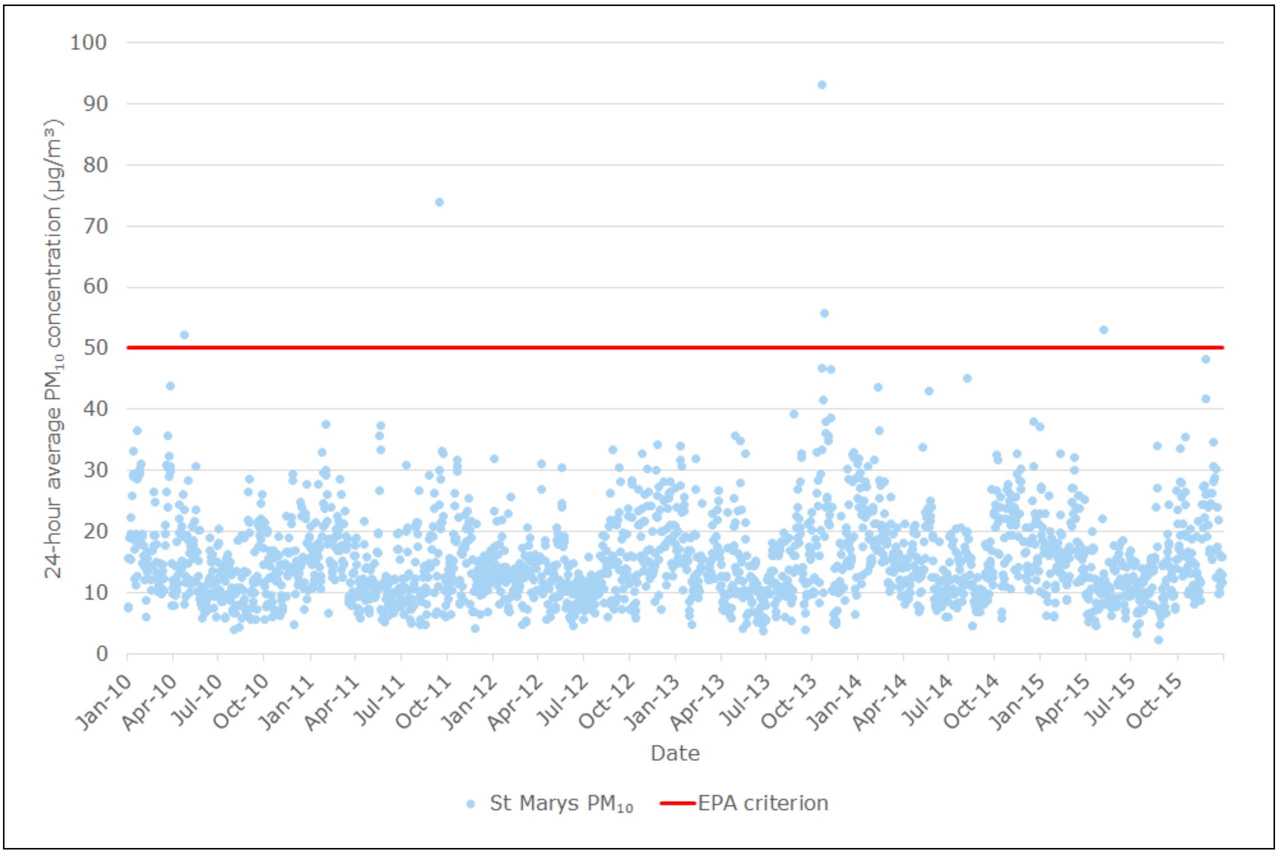


Figure 5-1: Time-series of 24-hour Average PM_{10} Concentrations recorded at NSW OEH St Marys station – 2010 to 2015

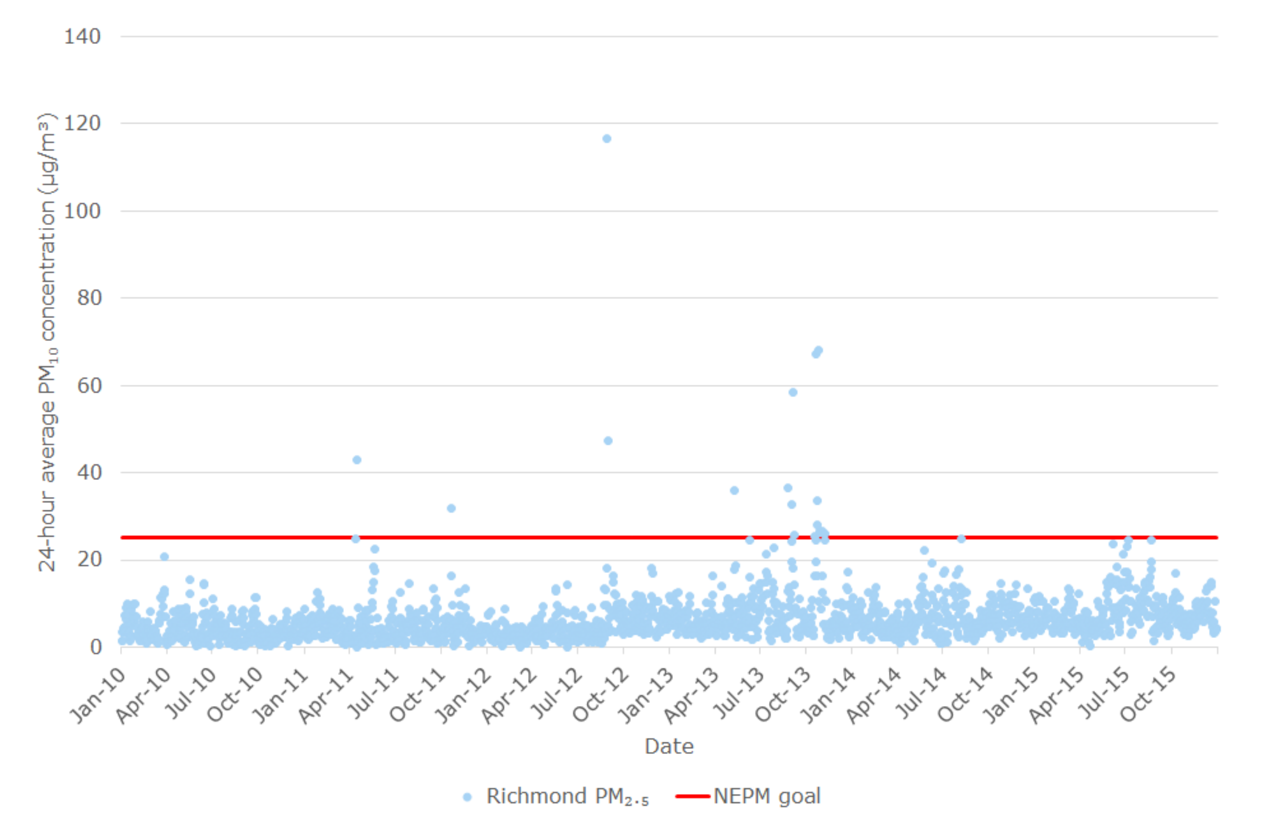


Figure 5-2: Time-series of 24-hour Average $PM_{2.5}$ Concentrations recorded at NSW OEH Richmond – 2010 to 2015

It can be seen from the **Figure 5-1** and **Figure 5-2** that both PM_{10} and $PM_{2.5}$ concentrations fluctuate on a daily basis throughout the presented period. Occasional exceedances of the NSW EPA criterion (PM_{10}) and NEPM goal ($PM_{2.5}$) occur, attributable to regional-scale events such as bushfires, hazard reduction burns and dust storms. The number of days per year where the recorded concentration exceeded the applicable criteria at each station is listed in **Table 5-4**. It can be seen that the greatest number of exceedance days occurred in 2013, which was notable for widespread bushfire activity across NSW.

Table 5-4: Number of criteria exceedance days for St Marys (PM_{10}) and Richmond ($PM_{2.5}$) NSW OEH monitoring stations - 2010 to 2015

Year	PM_{10} (St Marys)	$PM_{2.5}$ (Richmond)
2010	1	0
2011	1	2
2012	0	2
2013	2	14
2014	0	0
2015	1	0

Percentile statistics of the data recorded between 2010 to 2015 at the NSW OEH St Marys (PM_{10}) and Richmond ($PM_{2.5}$) monitoring stations are presented in **Table 5-5**.

Table 5-5: PM_{10} and $PM_{2.5}$ monitoring data statistics – NSW OEH St Marys (PM_{10}) and Richmond ($PM_{2.5}$) monitoring stations - 2010 to 2015		
Statistic	**PM_{10} (St Marys)**	**$PM_{2.5}$ (Richmond)**
Maximum	93.0	116.7
99.9th percentile	55.4	66.4
99.5th percentile	43.2	30.0
99th percentile	36.5	24.6
90th percentile	24.5	10.8
75th percentile	18.8	7.7
50th percentile	13.9	5.1
Period Average	15.3	6.1

The frequency distribution of recorded PM_{10} and $PM_{2.5}$ concentrations between 2010 and 2015 are illustrated in **Figure 5-3** and **Figure 5-4** respectively. These figures show that PM_{10} concentrations in the region were below 30µg/m^3 approximately 96% of the time, while $PM_{2.5}$ concentrations were below 15µg/m^3 approximately 97% of the time between 2010 and 2015.

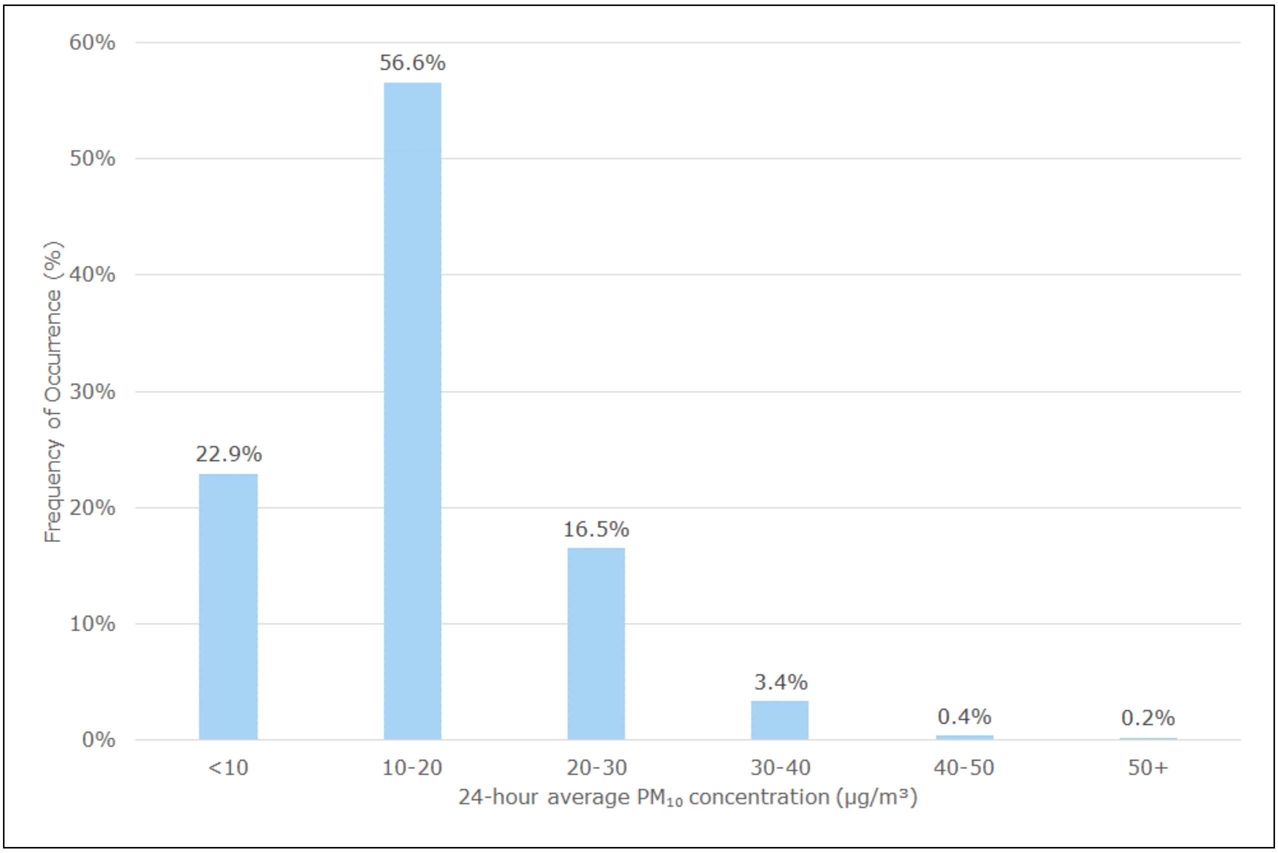


Figure 5-3: Frequency distribution of 24-hour Average PM_{10} Concentrations recorded at NSW OEH St Marys station – 2010 to 2015

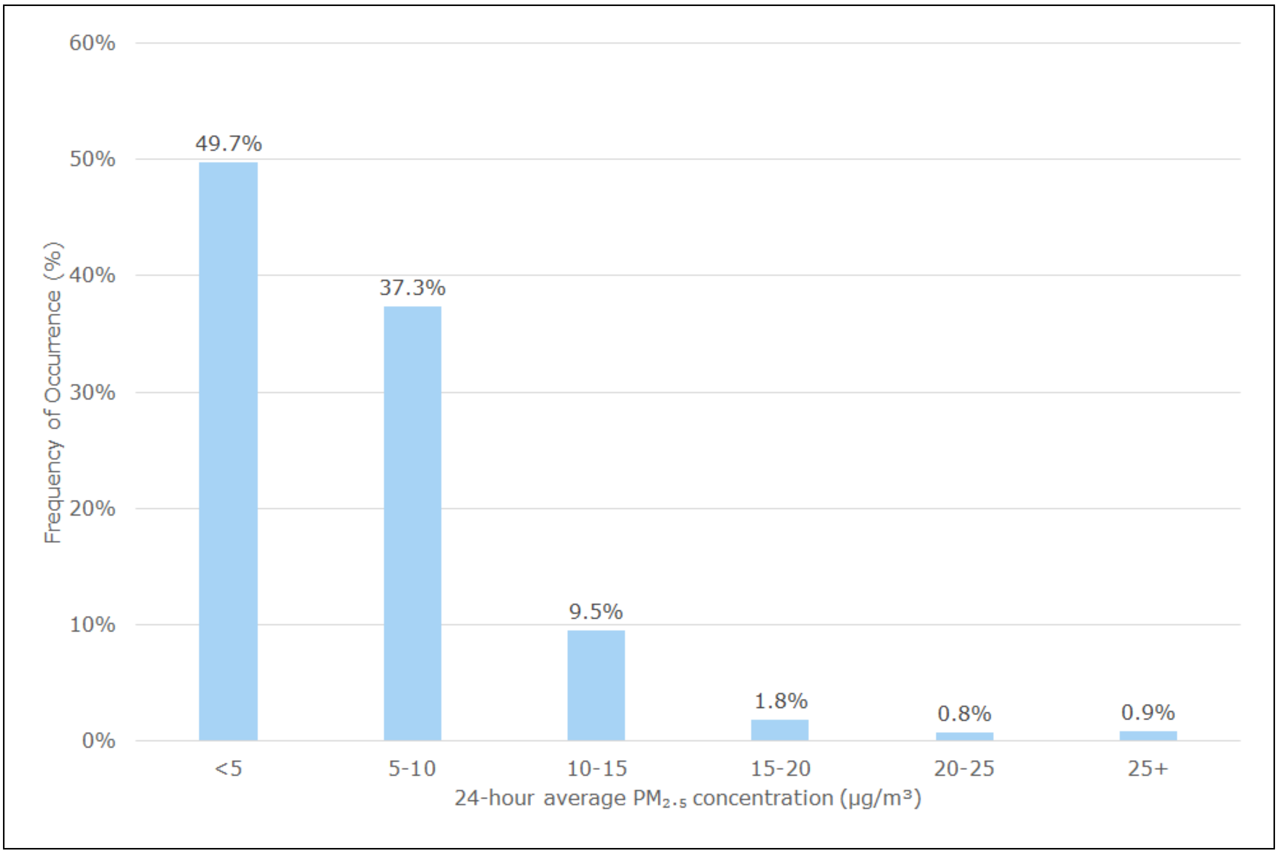


Figure 5-4: Frequency distribution of 24-hour Average $PM_{2.5}$ Concentrations recorded at NSW OEH Richmond – 2010 to 2015

To assess cumulative impacts, the daily-varying PM_{10} and $PM_{2.5}$ measurements from the NSW OEH St Marys and Richmond during 2015, concurrent with the 2015 meteorological dataset have been adopted as background.

The maximum 24-hour PM_{10} concentration recorded by the St Marys monitoring station during 2015 was 53.0µg/m³ on 6 May 2015, which is above the NSW EPA impact assessment criterion of 50µg/m³. The NSW OEH (2017) document that the criteria exceedance was a result of a statewide dust storm that originated from the Victorian Mallee and Southern NSW regions and travelled throughout NSW during the 5 & 6 May. The exceedance was classed as an exceptional event[3].

The second highest concentration recorded during 2015 was 48.3µg/m³ on 27 November 2015, which is slightly below the NSW EPA impact assessment criterion of 50µg/m³. The NSW OEH (2017) identify that bushfires in the Illawarra and Hunter Valley regions resulted in elevated particulate matter concentrations. For the purpose of cumulative impact assessment, the second highest concentration is also considered an exceptional event.

Due to these two elevated concentrations attributable to the influences of dust storm and bushfire events, the third highest cumulative 24-hour average PM_{10} concentration will be used to assess compliance with the NSW EPA impact assessment criterion.

The maximum 24-hour $PM_{2.5}$ concentration recorded by the Richmond monitoring station during 2015 was 24.5µg/m³ on 5 July 2015, which is slightly below the NSW

[3] According to the NSW OEH, exceptional events that can be clearly identified as influencing pollution levels and are not included when assessing against PM_{10}/$PM_{2.5}$ standards and goals. An Exceptional event means a fire or dust occurrence that adversely affects air quality at a particular location, and causes an exceedance of 1 day average standards in excess of normal historical fluctuations and background levels, and is directly related to: bushfire; jurisdiction authorised hazard reduction burning; or continental scale windblown dust.

EPA impact assessment criterion of 25µg/m³. The 2nd and 3rd highest 24-hour $PM_{2.5}$ concentrations recorded at Richmond in 2015 were 24.4µg/m³ (21 August) and 23.8µg/m³ (7 June). All three of these elevated concentrations recorded by the Richmond station coincided with a period of hazard reduction burns in the Greater Metropolitan Region of Sydney, with elevated $PM_{2.5}$ concentrations recorded across the NSW OEH Sydney air quality monitoring network. All three are therefore classed as exceptional events. Consequently, the fourth highest cumulative 24-hour average $PM_{2.5}$ concentration will be used to assess compliance with the NSW EPA impact assessment criterion.

The annual average PM_{10} and $PM_{2.5}$ concentrations for the 2015 St Marys and Richmond monitoring datasets were 15.1µg/m^3 and 7.7µg/m^3 respectively. The annual average $PM_{2.5}$ concentration for 2015 is just below the NSW EPA impact assessment criterion of 8µg/m³.

5.3 Background TSP

Historically, the NSW OEH recorded concurrent 24-hour average TSP and PM_{10} concentrations on a one-in-six day sampling regime in the Sydney Metropolitan Region, with this monitoring discontinuing in 2004. NSW OEH quarterly air quality monitoring reports for 2003 and 2004 were reviewed for concurrent PM_{10} and TSP concentrations. This data highlighted that on average, the ratio of PM_{10} to TSP concentrations was approximately 0.48. In the absence of local TSP monitoring data, the PM_{10}/TSP relationship from the 2003-2004 NSW OEH monitoring reports has been applied to the St Marys PM_{10} monitoring data (**Section 5.2**). The annual average TSP concentration adopted as background is therefore 31.5µg/m³.

5.4 Background Dust Deposition

There is no dust deposition monitoring data available suitable to quantify baseline levels in the local area surrounding the site. Modelling has therefore focussed on the incremental contribution from proposed operational emissions only. This is suitable for assessment against the NSW EPA incremental criterion of 2g/m^2/month, expressed as an annual average.

6. OPERATIONAL EMISSIONS ESTIMATION

Fugitive dust sources associated with the operation of the facility were principally quantified through the application of emission estimation techniques (specifically the United States Environmental Protection Agency (US-EPA) AP-42 Chapter 13.2.4 – Aggregate Handling and Storage Piles (US-EPA 2006). Particulate matter emissions were quantified for each particle size fraction, with the TSP size fraction also used to provide an indication of dust deposition rates. Fine and course particulate matter (PM_{10} and $PM_{2.5}$) were estimated using ratios for the different particle size fractions available within the literature (principally the US-EPA AP-42).

6.1 Sources of Operational Emissions

Air emissions associated with the facility would primarily comprise fugitive particulate matter releases. Potential sources of emission were identified as follows:

- Vehicle entrainment of particulate matter due to the movement of trucks and mobile equipment on paved surfaces;
- Unloading of material to the raw material storage areas inside the shed;
- Handling, sorting and transfer of raw material inside the shed;
- Loading and transfer of material to stockpiles;
- Loading of material to truck for dispatch;
- Odour emissions from the storage of certain materials (assumed to be 100% green waste for this assessment - see **Section 6.5**); and
- Diesel fuel combustion by on-site plant and equipment.

6.2 Emission Scenario

A single emissions scenario, focusing on maximum throughput facility operations, has been assessed in this report to quantify potential impacts in the surrounding environment. Two operational profiles are assessed:

- Peak day emissions based on a throughput 1,500tpd. Emissions from this profile are used to predict maximum 24—hour average PM_{10} and PM2.5 concentrations; and
- Average day emissions based on a throughput of 600tpd. Emissions from this profile are used to predict annual average TSP, PM_{10} and $PM_{2.5}$ concentrations and dust deposition levels.

Construction emissions would be negligible for the site and have not been considered further in this assessment.

Details on the assumptions made for the operational scenario are listed within **Appendix 2**.

6.3 Emission Reduction Factors

With the exception of incoming and outgoing truck movements, all emission sources will be contained within the proposed shed structure. The shed is enclosed on all sides and has a roller door facing the yard that will be open all day. Therefore, only a partial enclosure control factor has been applied. Additionally, Benedict Recycling propose to install misters inside the shed to supress dust emission generation.

All outgoing trucks will pass through a wheel-wash prior to entry to public roads.

On the basis of the above information, the following emission reduction factors were applied to all emissions occurring within the shed to account for proposed controls at the facility:

- 70% reduction for enclosure (NPI, 2012); and
- 50% reduction for water sprays (NPI, 2012).

6.4 Particulate Matter Emissions

A summary of annual average facility-related emissions by source type is presented in **Table 6-1** and illustrated in **Figure 6-1**. Control measures proposed for implementation, as documented in **Section 6.3**, have been taken into account in the emission estimates.

Table 6-1 and **Figure 6-1** highlight that, for proposed operations, the most significant source of emissions are associated with material handling activities. The significance of diesel combustion emissions increases with decreasing particle size. Further details regarding emission estimation factors and assumptions are provided in **Appendix 2**.

Table 6-1 Calculated annual TSP, PM_{10} and $PM_{2.5}$ emissions

Emissions source	Calculated emissions (kg/annum) by Source		
	TSP	**PM_{10}**	**$PM_{2.5}$**
Material Delivery - truck	20.4	3.9	0.9
Material Delivery - cars	6.1	1.2	0.3
Material Delivery inside shed - truck	56.8	10.9	2.6
Material Delivery inside shed - cars	16.9	3.2	0.8
Truck Unloading inside shed	24.6	11.6	1.8
Raw Material Handling - Excavator	24.6	11.6	1.8
Material transfer within shed - FEL	53.8	10.3	2.5
Material Handling inside shed - excavator	24.6	11.6	1.8
Stockpile loading inside shed	24.6	11.6	1.8
Dispatch Truck Loading	24.6	11.6	1.8
Material Transportation from site - inside shed	27.7	5.3	1.3
Material Transportation from site	11.4	2.2	0.5
Diesel Combustion	26.6	26.6	24.3
Total	**342.6**	**121.7**	**42.1**

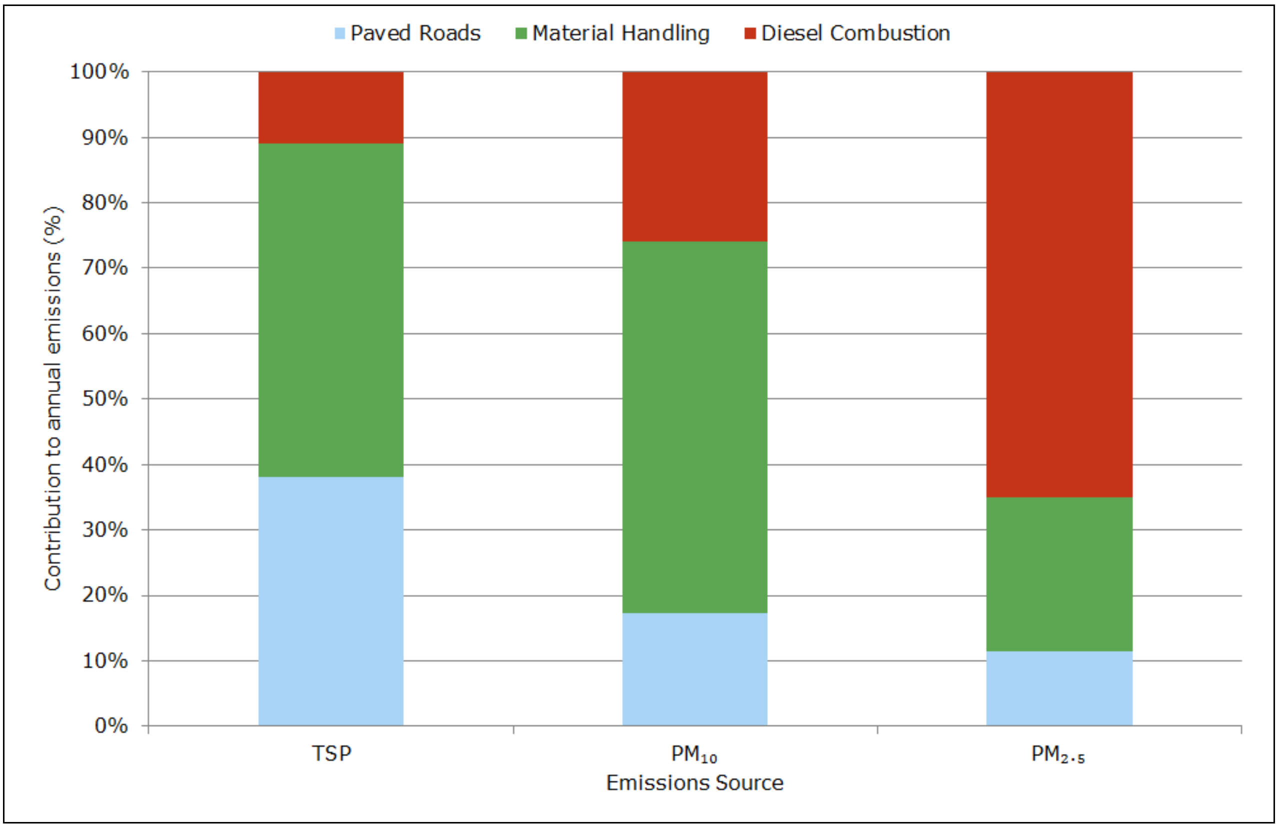


Figure 6-1: Significance of emission source categories to annual TSP, PM_{10} and $PM_{2.5}$ emissions

6.5 Odour Emissions

The majority of material received by the facility will be inert construction, demolition, commercial and industrial wastes. The proposed facility will not accept odour generating materials, such as putrescible wastes, and will not generate odours onsite, such as through the composting of green waste. Only small amounts of green waste will be stockpiled and measures will be implemented to prevent vegetation waste (including green waste) composting. Therefore, very little or no odour will be emitted from the facility.

Nevertheless, odour emissions have been quantified for this assessment for the waste streams with the highest odour potential, being green waste, although only small quantities will be delivered to the site and 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 6-2**.

Table 6-2 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 6-2** that a range of variability exists for green waste storage. The maximum odour emission rate presented in **Table 6-2**, 1.279$OU.m^3/m^2$/second, will be adopted in this assessment as a conservative assumption.

In order to quantify odour emissions, an assumed total green waste stockpile area 450m^3 (three 150m^3 stockpiles) has been assumed. This assumption is highly conservative, as the site will only stockpile a maximum of one 150m^3 of green waste at any given time.

7. OPERATIONS ASSESSMENT METHODOLOGY

7.1 Dispersion Model Selection and Application

The atmospheric dispersion modelling completed within this assessment used the AMS/US-EPA regulatory model (AERMOD) (US-EPA, 2004). AERMOD is designed to handle a variety of pollutant source types, including surface and buoyant elevated sources, in a wide variety of settings such as rural and urban as well as flat and complex terrain.

Predicted concentrations were calculated for a regular Cartesian receptor grid covering a 2 km by 2 km computational domain centred over the proposed facility, with a grid resolution of 50 m applied. Additionally, concentrations were predicted at the sensitive receptor locations listed in **Table 2-1**.

Simulations were undertaken for the 12 month period of 2015 using the AERMET-generated file based largely on the Penrith Lakes AWS meteorological monitoring dataset as input (see **Section 4** for description of input meteorology).

7.2 Modelling Scenarios

As identified in **Section 6**, a single emission scenario has been developed to estimate maximum annual throughput operational emissions of TSP, PM_{10}, $PM_{2.5}$ and odour from the proposed facility. Emission profiles for peak day and average day have been modelled. The air dispersion modelling has predicted ground-level concentrations and deposition rates for this scenario.

7.3 Source and Emissions Data

The methodology and results of the emissions inventory developed for this study are presented in **Section 6** and **Appendix 2**.

The shed structure will feature two roller doors, one each at entry and exit, and a ridge line vent opening. To account for releases of emissions generated within the shed, single volume sources have been configured for each roller door to account for door dimensions and the building structure height, while a line volume source has been allocated at the proposed roof ridgeline vent.

7.4 Presentation of Model Results

Dispersion simulations were undertaken to predict the concentrations of TSP, PM_{10} $PM_{2.5}$, odour and dust deposition. Incremental facility-related concentrations and deposition rates occurring due to the proposed operations were modelled. Model results are expressed as the maximum predicted concentration for each averaging period at the selected assessment locations over the 2015 modelling period.

The results are presented in the following formats:

- Tabulated results of particulate matter concentrations and dust deposition rates at the selected assessment locations are presented and discussed in **Section 8**.
- Isopleth plots, illustrating spatial variations in facility-related incremental TSP, PM_{10} and $PM_{2.5}$ concentrations and dust deposition rates are provided in **Appendix 3**. Isopleth plots of the maximum 24-hour average concentrations presented in **Appendix 3** 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 2015 modelling period.

Odour impacts are expressed as a 99th percentile 1-second average (nose response) concentration for comparison with the EPA odour performance criterion of 2 OU. Predicted 1-hour average concentrations were converted to nose response averages using the peak-to-mean ratio of 2.3, as per Table 6.1 of the NSW EPA Approved Methods for Modelling.

7.5 Cumulative impacts assessment

Cumulative impacts in the environment surrounding the facility have been assessed in the following way:

- For each hour of the modelling period, predicted incremental concentrations from the facility and neighbouring NPI-reporting emission sources (facility plus NPI) have been paired in time at each sensitive receptor location;
- For 24-hour average PM_{10} and $PM_{2.5}$, each facility plus NPI predicted concentration has been paired with the corresponding recorded 24-hour average recorded PM_{10} and $PM_{2.5}$ concentration in the NSW OEH St Marys and Richmond 2015 monitoring datasets (**Section 5.2**).
- For annual average pollutants, the annual average facility plus NPI predicted concentration is paired with the corresponding ambient annual average background concentration (**Section 5.2** and **Section 5.3**).

8. DISPERSION MODELLING RESULTS

8.1 Incremental (site-only) results

Predicted incremental TSP, PM_{10}, $PM_{2.5}$ and odour concentrations and dust deposition rates from facility operations are presented in **Table 8-1** for each of the selected receptor locations.

It can be seen from the results presented in **Table 8-1**, all pollutants and averaging periods are below the applicable NSW EPA assessment criterion at all neighbouring receptors. Predicted concentrations are negligible at all surrounding residential and recreational receptors (receptors 11 to 18). It is reiterated that predicted 24-hour average concentrations relate to peak day operations (1,500tpd) while annual average concentrations relate to average day operations (600tpd).

It is noted however that, with the exception of dust deposition and odour, the applicable assessment criteria are applicable to cumulative concentrations. Analysis of cumulative impact compliance is presented in **Section 8.2**.

8.2 Cumulative (site + neighbouring sources + ambient background) results

Results tables of cumulative (Project plus ambient background) model predictions of particulate matter (TSP, PM_{10} and $PM_{2.5}$) concentrations are presented in **Table 8-2**.

For 24-hour average concentrations, the daily-varying model predicted concentrations at each receptor for facility operations and NPI-reporting sources have been paired with the corresponding measured concentration from the NSW OEH St Marys (PM_{10}) and Richmond ($PM_{2.5}$). The third-highest cumulative 24-hour average PM_{10} and fourth-highest cumulative 24-hour average $PM_{2.5}$ concentrations are presented due to the occurrence of exceptional events (dust storms and vegetation burning emissions) during 2015 influencing the St Marys and Richmond monitoring datasets (as per **Section 5.2**).

It can be seen from the results in **Table 8-2** that the predicted cumulative concentrations for all pollutants and averaging periods are below applicable impact assessment criteria at all neighbouring residential receptors.

For all surrounding industrial receptors, the predicted cumulative concentrations for all pollutants and averaging periods are at or below applicable impact assessment criteria. For industrial receptor 6, the predicted cumulative annual average $PM_{2.5}$ concentration is 8µg/m^3, equal to the applicable NSW EPA impact assessment criteria. For this concentration, the ambient background concentration and modelled contribution from neighbouring NPI sources account for 97% of the cumulative concentration.

The daily-varying pairing of predicted concentrations from the facility, predicted concentrations from neighbouring NPI sources and the corresponding background concentration from the NSW OEH St Marys and Richmond monitoring stations are illustrated in **Figure 8-1** for PM_{10} and **Figure 8-2** for $PM_{2.5}$ for the most impacted receptor (industrial receptor 6). Predicted cumulative annual average PM_{10} and $PM_{2.5}$ concentrations for all receptors are presented in Figure 8-3 and Figure 8-4 respectively.

All of these figures highlight that the key contributor to cumulative concentrations at the receptors surrounding the facility is the ambient background levels. Specifically, the occurrence of exceptional events, such as dust storms or vegetation burning, is the most critical influence for air quality compliance. Predicted facility-only incremental concentrations are by comparison minor. Consequently, it is considered that the potential for adverse cumulative impacts from the operation of the facility is low.

Table 8-1 Incremental (facility-only) concentration and deposition results

Receptor ID	TSP Annual Average µg/m³	PM_{10} Maximum 24-hr µg/m³	PM_{10} Annual Average µg/m³	$PM_{2.5}$ Maximum 24-hr µg/m³	$PM_{2.5}$ Annual Average µg/m³	Deposition - Annual Average g/m²/month	Odour - 99th Percentile 1-second (OU)
Criteria+	**90**	**50**	**25**	**25**	**8**	**2**	**2**
R1*	0.6	1.7	0.2	0.5	0.1	0.1	1
R2*	0.5	1.6	0.2	0.5	0.1	0.1	1
R3*	0.2	1.0	0.1	0.3	<0.1	0.0	<1
R4*	0.3	1.6	0.1	0.5	<0.1	0.0	<1
R5*	1.1	2.9	0.4	0.9	0.1	0.2	1
R6*	1.4	3.3	0.5	1.0	0.2	0.3	1
R7*	0.4	1.2	0.1	0.3	<0.1	0.1	1
R8*	0.4	1.3	0.1	0.4	<0.1	0.1	1
R9*	0.4	1.2	0.1	0.4	<0.1	0.1	1
R10*	0.7	1.8	0.3	0.6	0.1	0.1	1
R11	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<1
R12	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<1
R13	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<1
R14	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<1
R15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1
R16	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<1
R17	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<1
R18	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<1

+ – Criteria for TSP, PM_{10} and $PM_{2.5}$ are applicable to cumulative concentrations.

* - Commercial/industrial receptor location

Table 8-2 Cumulative (facility + NPI-reporting + ambient) concentrations

Receptor ID	TSP Annual Average µg/m³	PM_{10} 3rd Highest 24-hr µg/m³	PM_{10} Annual Average µg/m³	$PM_{2.5}$ 4th Highest 24-hr µg/m³	$PM_{2.5}$ Annual Average µg/m³
Criteria	**90**	**50**	**25**	**25**	**8**
R1*	35.3	42.8	16.6	23.6	7.9
R2*	35.2	42.7	16.6	23.6	7.9
R3*	34.8	42.6	16.5	23.5	7.8
R4*	34.9	42.8	16.5	23.5	7.8
R5*	35.8	43.0	16.8	23.8	7.9
R6*	36.2	43.0	16.9	23.9	8.0
R7*	35.3	42.7	16.5	23.6	7.8
R8*	35.2	42.7	16.5	23.5	7.8
R9*	35.1	42.7	16.5	23.5	7.8
R10*	35.5	42.7	16.7	23.7	7.9
R11	34.4	42.6	16.4	23.3	7.8
R12	34.1	42.5	16.3	23.3	7.8
R13	34.0	42.3	16.1	23.3	7.8
R14	34.4	42.4	16.2	23.3	7.8
R15	38.5	43.3	17.4	23.5	7.9
R16	36.1	42.8	16.7	23.4	7.8
R17	34.1	42.4	16.2	23.4	7.8
R18	34.6	42.4	16.5	23.4	7.8

* - Commercial/industrial receptor location

Note: The 3rd highest cumulative 24-hour PM_{10} and 4th highest cumulative $PM_{2.5}$ concentrations are presented due to the occurrence of exceptional events (e.g. dust storms and hazard reduction burn emissions)

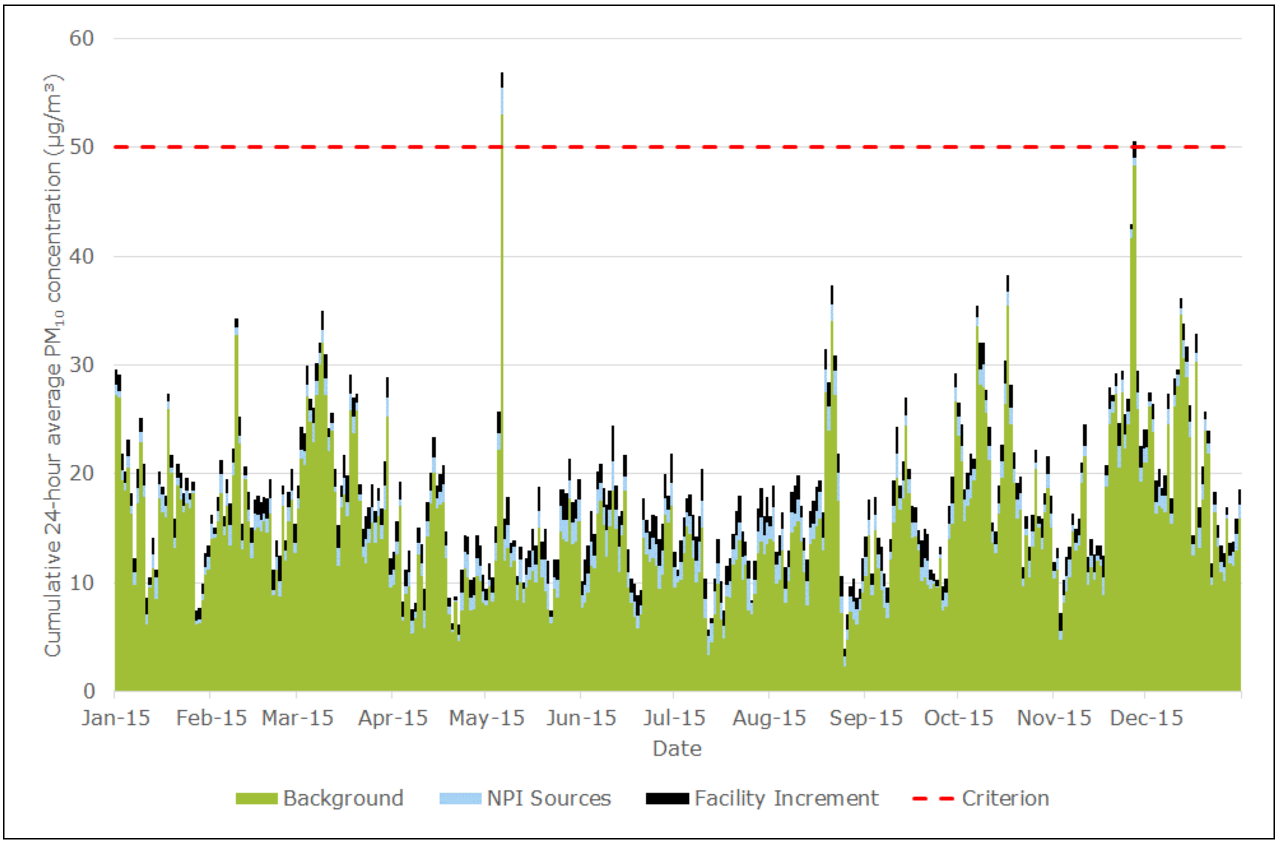


Figure 8-1: Daily-varying cumulative 24-hour average PM_{10} concentrations – Receptor 6 – ambient (OEH St Marys) + NPI sources + facility increment

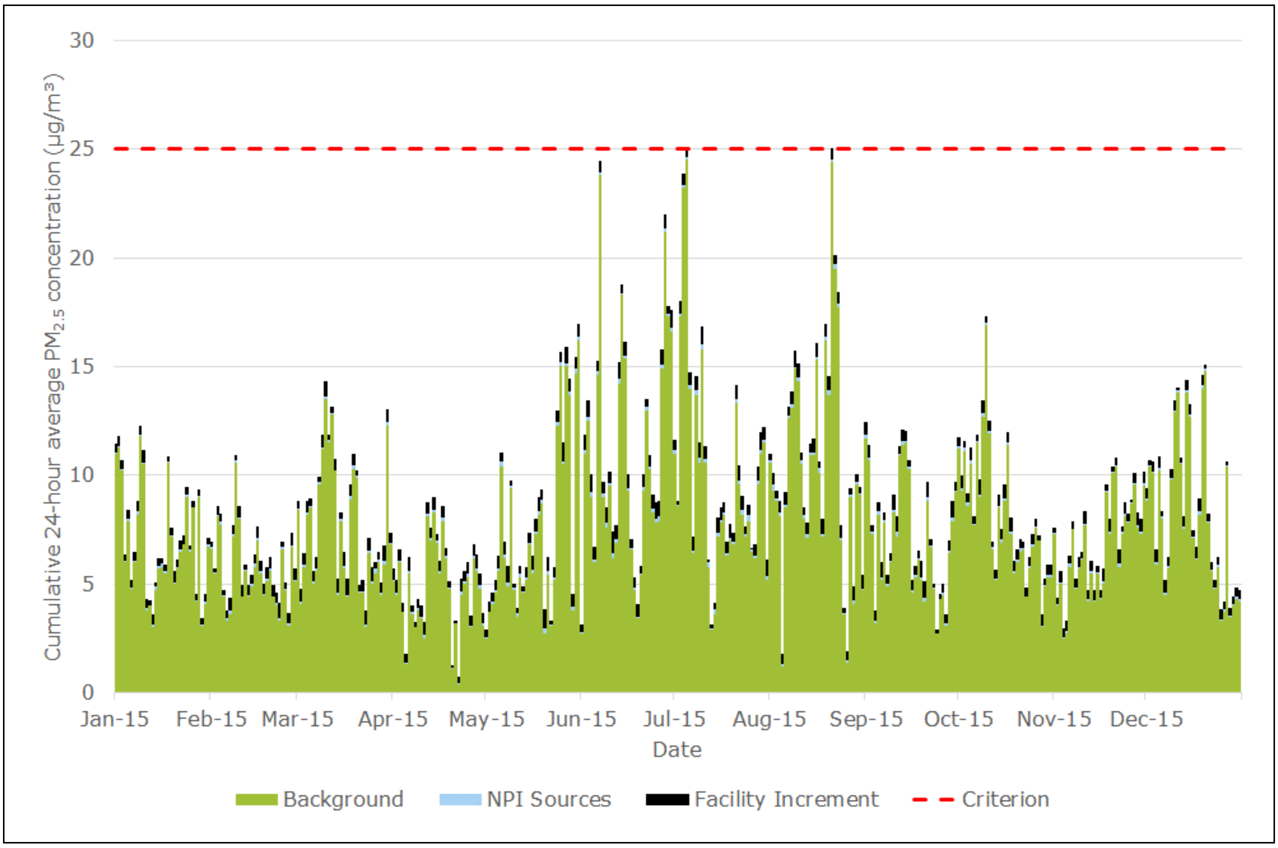


Figure 8-2: Daily-varying cumulative 24-hour average $PM_{2.5}$ concentrations – Receptor 6 - ambient (OEH Richmond) + NPI sources + facility increment

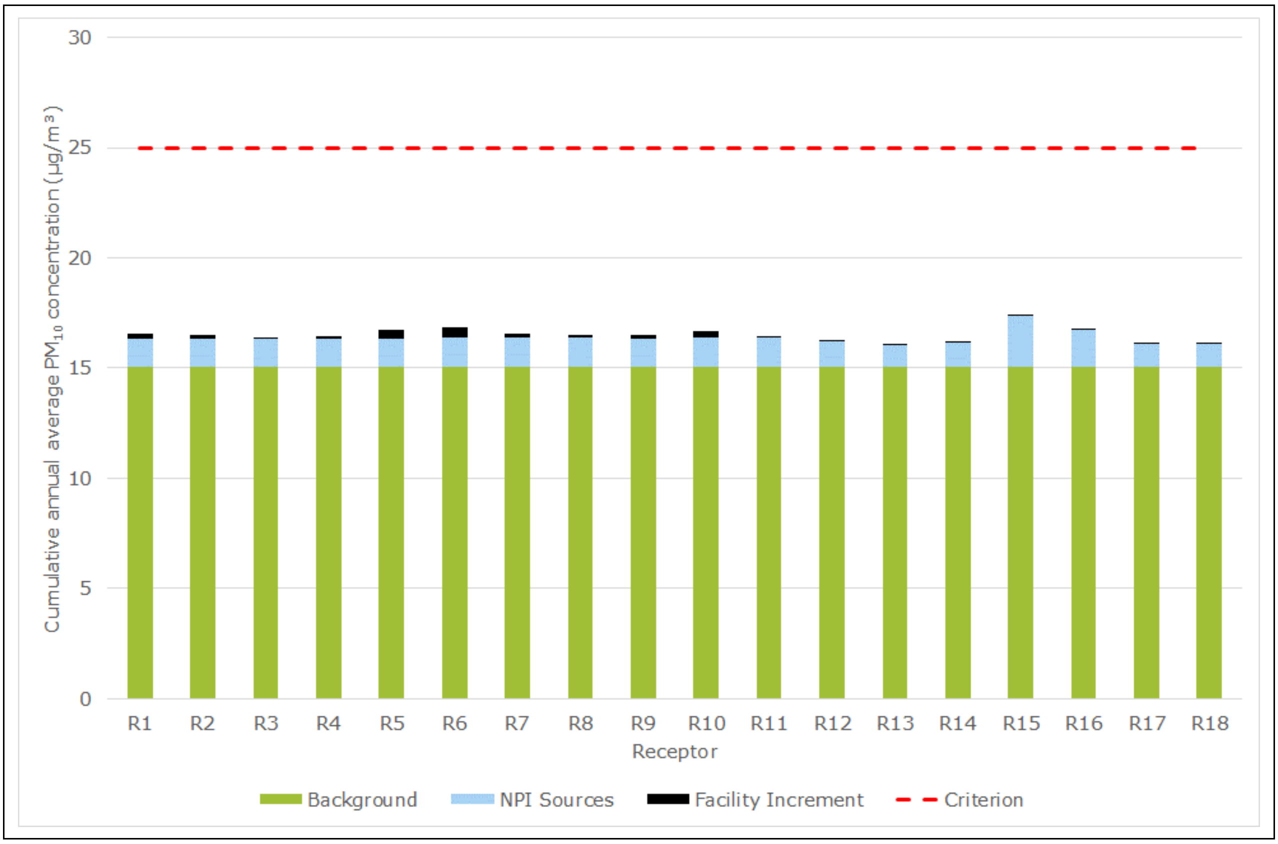


Figure 8-3: Cumulative annual average PM_{10} concentrations – all receptors – ambient (OEH St Marys) + NPI sources + facility increment

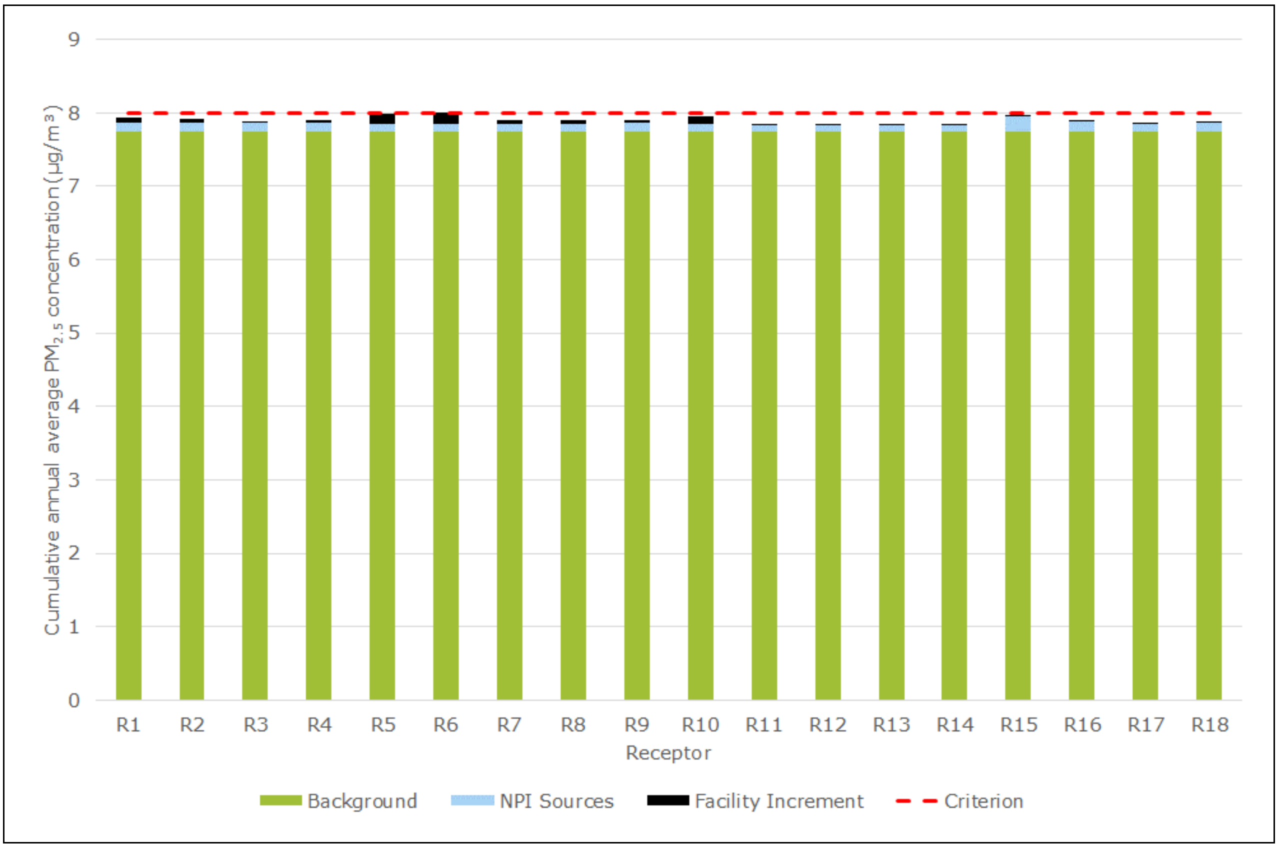


Figure 8-4: Cumulative annual average $PM_{2.5}$ concentrations – all receptors - ambient (OEH Richmond) + NPI sources + facility increment

9. EMISSIONS MITIGATION

9.1 Particulate matter emission control

Section 6.3 lists the mitigation measures proposed to manage particulate matter emissions during operations at the site. These controls were incorporated into the modelling wherever an appropriate emission reduction factor was available.

Predicted concentrations of PM_{10} and $PM_{2.5}$ arising from operations at the site are low at all surrounding receptors, suggesting that the control of these particle size fractions is effective at managing potential particulate matter-related health impacts. \

9.2 Odour generation control

The following management measures will be applied so that vegetation waste will not start to compost or produce odours within the facility:

- no odorous waste will be accepted;
- the minor amounts of vegetation waste (including green waste) that will be accepted at the facility as part of mixed loads will be segregated and stored in the shed;
- vegetation waste will not be stored on site for extended periods;
- vegetation waste will be dispatched to another facility licensed to accept vegetation, as soon as there is enough to fill a truck;
- vegetation waste will be monitored daily for any signs that composting is occurring (odour or increased temperature) and if this occurs, the stockpile will be broken apart and arrangements will be made immediately for the material to be dispatched from site in a smaller truck.

10. GREENHOUSE GAS ASSESSMENT

10.1 Introduction

The estimation of greenhouse gas (GHG) emissions for the proposed facility is based on the National Greenhouse Accounts Factors (NGAF) workbook (DoE, 2015). The methodologies in the NGAF workbook follow a simplified approach, equivalent to the "Method 1" approach outlined in the National Greenhouse and Energy Reporting (Measurement) Technical Guidelines (DoE 2014). The Technical Guidelines are used for the purpose of reporting under the National Greenhouse and Energy Reporting Act 2007 (the NGER Act).

For accounting and reporting purposes, GHG emissions are defined as 'direct' and 'indirect' emissions. Direct emissions (also referred to as Scope 1 emissions) occur within the boundary of an organisation and as a result of that organisation's activities. Indirect emissions are generated as a consequence of an organisation's activities but are physically produced by the activities of another organisation (DoE, 2015). Indirect emissions are further defined as Scope 2 and Scope 3 emissions. Scope 2 emissions occur from the generation of the electricity purchased and consumed by an organisation. Scope 3 emissions occur from all other upstream and downstream activities, for example the downstream extraction and production of raw materials or the upstream use of products and services.

Scope 3 is an optional reporting category and should not be used to make comparisons between organisations (WBCSD, 2004), for example in benchmarking GHG intensity of products or services. Typically, only major sources of Scope 3 emissions are accounted and reported by organisations. Specific Scope 3 emission factors are provided in the NGAF workbook for the consumption of fossil fuels and purchased electricity, making it straightforward for these sources to be included in a GHG inventory, even though they are a relatively minor source.

10.2 Estimated emissions

The GHG emissions sources included in this assessment are presented in **Table 10-1**. representing the most significant sources associated with the Project. Emission are estimated using the methodologies outlined in the NGAF workbook, using fuel energy contents and scope 1, 2 and 3 emission factors for diesel, gasoline and electricity generation in NSW.

Table 10-1: GHG emission sources

Scope 1	Scope 2	Scope 3
Direct emissions from fuel combustion (diesel) by onsite plant and equipment	Indirect emissions associated with the consumption of purchased electricity	Indirect upstream emissions from the extraction, production and transport of diesel fuel.
		Indirect upstream emissions from electricity lost in delivery in the transmission and distribution network.
		Indirect downstream emissions generated from off-site transportation of product
		Indirect emissions generated from employee travel

The adopted activity data for the emission estimates is presented in **Table 10-2**.

An estimate of diesel consumption from product transportation has been made based on the NSW average fuel consumption rate for articulated trucks of 56.9 L/ 100 km

(ABS, 2015[4]). An upper estimate of annual vehicle kilometres travelled (VKT) is based on a nominal return trip distance to market (50 km) and the number of trips per day (22 movements incoming and outgoing).

An estimate of diesel consumption from employee travel is based on the NSW average fuel consumption rate for passenger vehicles of 10.7 L/ 100 km (ABS, 2015). An upper estimate of annual vehicle kilometres travelled (VKT) is based on a nominal commute distance of 20 km, 306 workdays per annum and 8 on-site employees.

Table 10-2: Estimated activity data for GHG emissions

Production (tonnes/annum)	On-site Diesel (kL/annum)	Electricity (kWh/annum)	Product Transport Diesel (kL/annum)	Employee Travel Fuel (kL/annum)
180,000	270	288,000	192	37

The estimated annual GHG emissions for each source is presented in **Table 10-3**. The annual Scope 1 and Scope 3 emissions at full production represent approximately 0.0006% of total GHG emissions for NSW and 0.0001% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2014[5].

Table 10-3: Summary of estimated annual GHG emissions (tonnes CO_2-e / annum)

Scope 1 emissions	Scope 2 emissions	Scope 3 emissions			
On-site Diesel	Electricity	On-site Diesel	Electricity	Product Transport (Diesel)	Employee Travel
724	248	55	37	556	125

Note: GHG emissions are reported in tonnes of carbon dioxide equivalents (t CO2-e). Non-CO_2 gases are converted to CO_2-e by multiplying the quantity of the gas by its Global Warming Potential (GWP) – see Table 26 of the NGAF workbook.

4 http://www.abs.gov.au/ausstats/abs@.nsf/mf/9208.0

5 http://ageis.climatechange.gov.au/

11. CONCLUSIONS

Ramboll was commissioned by EMM to undertake an Air Quality Impact Assessment for the proposed facility at Penrith on behalf of Benedict Recycling.

Emissions of TSP, PM_{10}, $PM_{2.5}$ and odour were estimated for peak proposed operations associated with the facility. Atmospheric dispersion modelling predictions of air pollution emissions for proposed operations were undertaken using the AERMOD dispersion model.

The results of the dispersion modelling conducted indicated that the operation of the proposed facility was unlikely to result in exceedances of the applicable NSW EPA assessment criteria for TSP, PM_{10}, $PM_{2.5}$ and dust deposition at any of the surrounding residential or industrial receptors.

Potential odour impacts from the facility were conservatively assessed, with resultant predicted odour concentrations well below applicable impact assessment criterion.

A greenhouse gas quantification assessment was undertaken for the facility. The annual Scope 1 and Scope 3 emissions at full production represent approximately 0.0005% of total GHG emissions for NSW and 0.0001% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2014.

12. REFERENCES

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13. GLOSSARY OF ACRONYMS AND SYMBOLS

Approved Methods	Approved Methods for the Modelling and Assessment of Air Pollutants in NSW
AHD	Australian Height Datum
AWS	Automatic Weather Station
BoM	Bureau of Meteorology
Benedict Recycling	Benedict Recycling Pty Ltd
CO_2-e	Carbon dioxide equivalent
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DoE	Department of Environment
EIS	Environmental impact statement
EPA	Environmental Protection Authority
EMM	EMM Consulting Pty Limited
GADDC	Guidance on the Assessment of Dust from Demolition and Construction
IAQM	Institute of Air Quality Management
µg	Microgram (g x 10-6)
µm	Micrometre or micron (metre x 10-6)
m^3	Cubic metre
NGAF	National Greenhouse Accounts Factors
NPI	National Pollutant Inventory
OEH	NSW Office of Environment and Heritage
OU	Odour unit
PM_{10}	Particulate matter less than 10 microns in aerodynamic diameter
$PM_{2.5}$	Particulate matter less than 2.5 microns in aerodynamic diameter
Ramboll	Ramboll Australia Pty Ltd
SEARs	Secretary's Environmental Assessment Requirements
SSDA	State Significant Development Application
TAPM	"The Air Pollution Model"
TSP	Total Suspended Particulates
The facility	Proposed Penrith Recycling Facility
US-EPA	United States Environmental Protection Agency
VKT	Vehicle Kilometres Travelled

APPENDIX 1
WIND ROSES

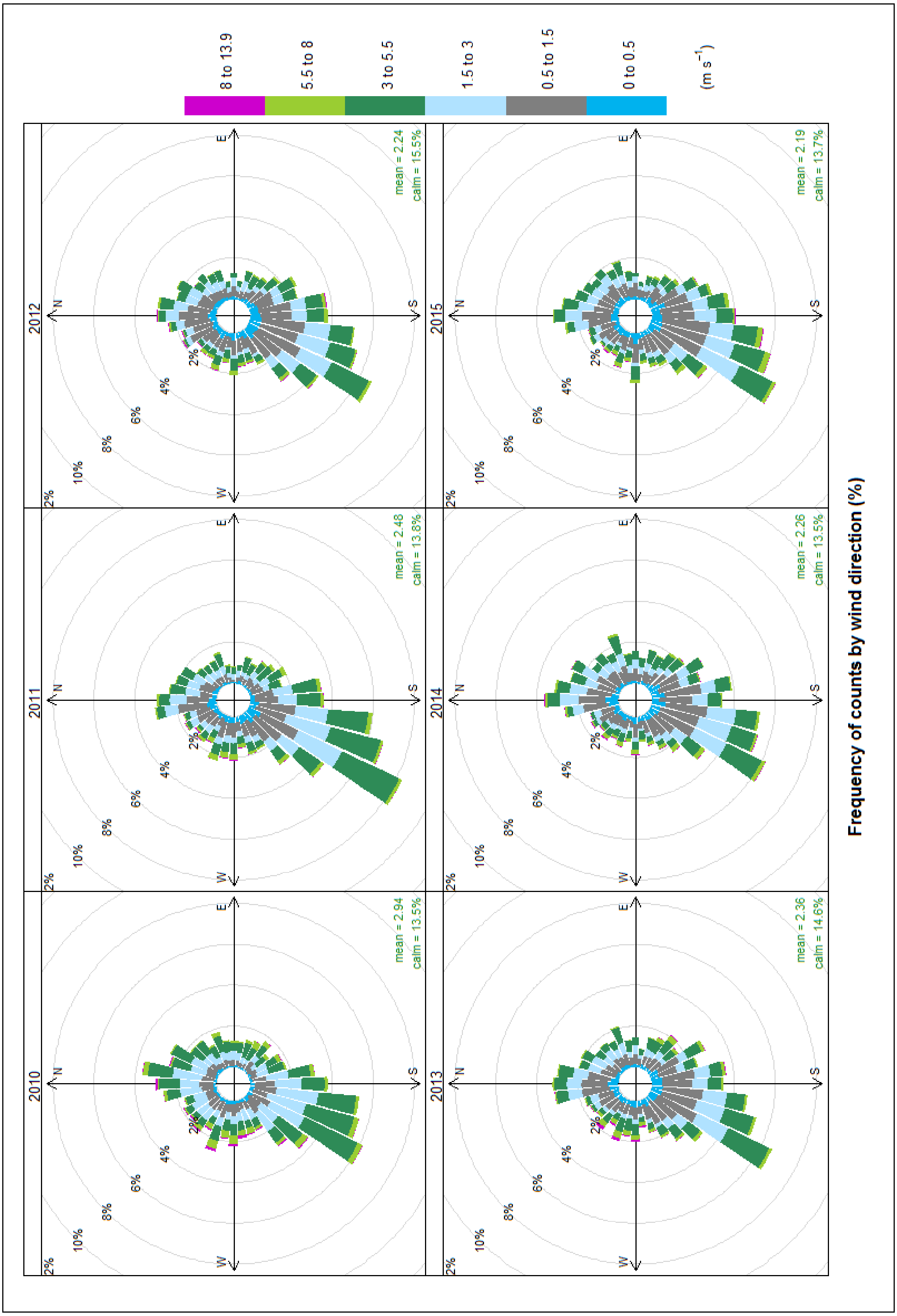

Figure A1.1 Annual Wind Roses – Penrith Lakes BoM AWS – 2010 - 2015

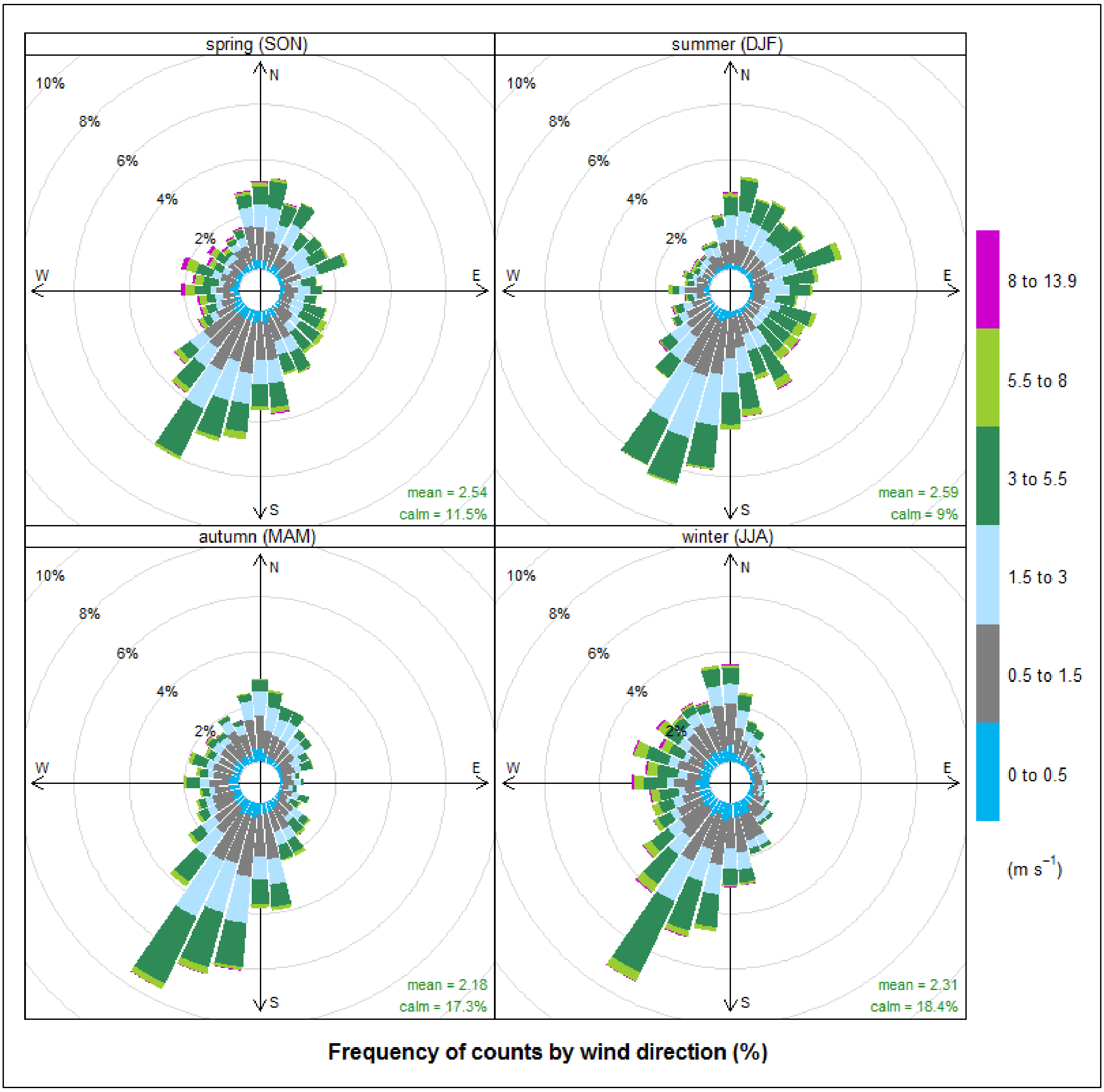

Figure A1.2 Seasonal Wind Roses – Penrith Lakes BoM AWS – 2010 - 2015

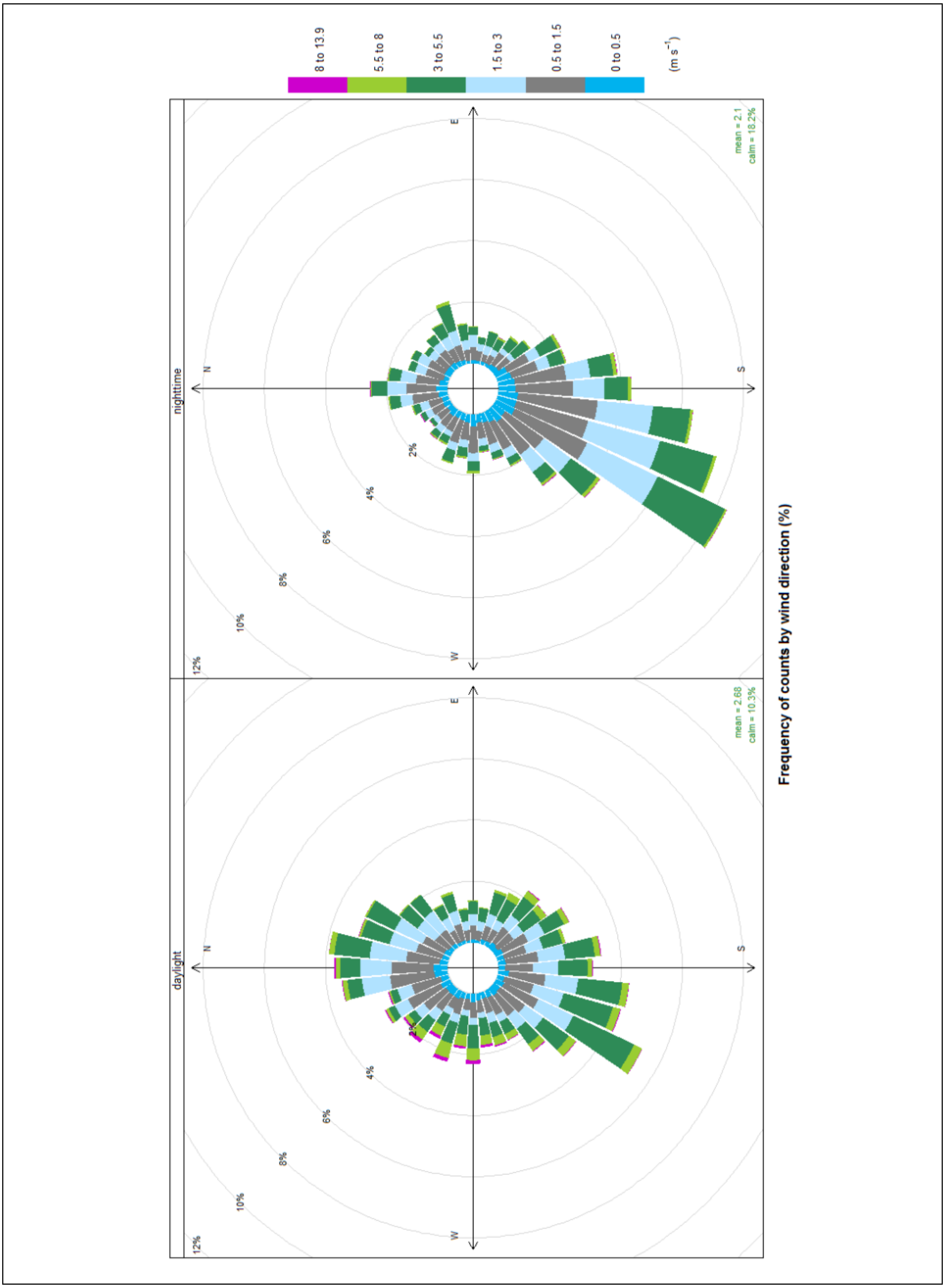

Figure A1.3 Diurnal Wind Roses – Penrith Lakes BoM AWS – 2010 - 2015

APPENDIX 2
EMISSIONS INVENTORY

Introduction

Air emission sources associated with the facility 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 13.2.4 – Aggregate Handling and Storage Piles (US-EPA 2006);
- AP-42 Chapter 11.19.2 – Crushed Stone Processing and Pulverized Mineral Processing (US-EPA 2006b); and
- AP-42 Chapter 13.2.1 – Paved Roads (US-EPA 2011).

Particulate matter releases were quantified for TSP, PM_{10} and $PM_{2.5}$ using ratios for that particle size fraction available within the literature (principally the US-EPA AP-42), as documented in subsequent sections.

Sources of Particulate Matter Emissions

Air emissions associated with the facility would primarily comprise fugitive particulate matter releases. Potential sources of particulate matter emission were identified as follows:

- Vehicle entrainment of particulate matter due to the movement of trucks and mobile equipment on paved surfaces;
- Unloading of material to the raw material storage areas inside the shed;
- Handling, sorting and transfer of raw material inside the shed;
- Loading and transfer of material to stockpiles;
- Loading of material to truck for dispatch;
- Diesel fuel combustion by on-site plant and equipment.

Operational Assumptions

To compile an emissions inventory for proposed facility operations, the following general assumptions were made:

- Material deliveries/dispatch activities occur between 6am and 4pm for average day operations (600tpd) and 6am and 10pm for average day operations (1,500tpd). 51 operational weeks per year;
- Wind erosion area for stockpiled materials of 0.13 ha
- Assumed average truck weights (average of loaded and unloaded weights) of 30 t and car deliveries of 3 t.
- Annual vehicle movements;
  - Delivery trucks – 13,770;
  - Cars – 33,354;
  - Product dispatch trucks – 6,732.

Particulate Matter Emission Factors Applied

The emission factor equations applied within the assessment are documented in this subsection. **Table A2.1** lists the uncontrolled emission factors that were applied for the emissions scenario, references the source of the listed factors and whether the factor is derived from a specific equation or a published default emission factor.

Table A2.1 Emission Estimation Factors Applied

Emission Source	TSP Emission Factor	PM_{10} Emission Factor	$PM_{2.5}$ Emission Factor	Emission Factor Unit	Source of Factor
Material Delivery - truck	0.04237	0.00813	0.00197	kg/Vehicle KM Travelled	AP-42 13.2.1 - Paved Road Equation
Material Delivery - cars	0.00521	0.00100	0.00024	kg/Vehicle KM Travelled	AP-42 13.2.1 - Paved Road Equation
Material Delivery inside shed - truck	0.54954	0.10548	0.02552	kg/Vehicle KM Travelled	AP-42 13.2.1 - Paved Road Equation
Material Delivery inside shed - cars	0.06761	0.01298	0.00314	kg/Vehicle KM Travelled	AP-42 13.2.1 - Paved Road Equation
Truck Unloading inside shed	0.0009	0.0004	0.00007	kg/tonne	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10
Raw Material Handling - Excavator	0.0009	0.0004	0.00007	kg/tonne	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10
Material transfer within shed - FEL	0.31895	0.06122	0.01481	kg/Vehicle KM Travelled	AP-42 13.2.1 - Paved Road Equation
Material Handling inside shed - excavator	0.0009	0.0004	0.00007	kg/tonne	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10
Stockpile loading inside shed	0.0009	0.0004	0.00007	kg/tonne	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10
Dispatch Truck Loading	0.0009	0.0004	0.00007	kg/tonne	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10
Material Transportation from site - inside shed	0.54954	0.10548	0.02552	kg/Vehicle KM Travelled	AP-42 13.2.1 - Paved Road Equation
Material Transportation from site	0.04237	0.00813	0.00197	kg/Vehicle KM Travelled	AP-42 13.2.1 - Paved Road Equation

Details relating to the emission equations referenced in **Table A2.1** 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)

k = constant of 3.23 for TSP, 0.62 for PM_{10} and 0.15 for PM_{10}

Material parameters are listed in **Table A2.2**.

Diesel Calculations

Diesel combustion emissions of $PM_{2.5}$ are described in the tables below. It is assumed that 97% of PM_{10} emissions from diesel combustion is $PM_{2.5}$, emissions have been up-scaled accordingly.

Table A2.3 Likely Onsite Diesel Equipment and Fleet and $PM_{2.5}$ Emissions

Equipment	Number	Make (or similar)	Power Rating (kW)	Operating Hours	$PM_{2.5}$ Emission Factor (g/kWh) – USEPA Tier 2	NPI Load Factor	Annual Emissions (kg/year)
Front End Loader	1	Volvo L120	150	4,641	0.0002	0.5	69.6
Excavator	1	Komatsu PC130	72	4,641	0.0002	0.5	66.8

Emission Factor Source: NSW EPA (2014) Reducing Emissions from Non-road Diesel Engines. Prepared by ENVIRON Australia Pty Ltd.

Table A2.4 $PM_{2.5}$ Emissions – Trucks Moving Onsite

Equipment	PM Emission Factor (g/VKT) - 1996 ADR70/00	Annual VKT	Annual Emissions (kg/year)
Trucks moving on site	0.584	4,611	2.7

Emission Factor Source: NSW EPA (2012) Technical Report No. 7, Air Emissions Inventory for the Greater Metropolitan Region in New South Wales, 2008 Calendar Year,On-Road Mobile Emissions.

Table A2.5 $PM_{2.5}$ Emissions – Trucks Idling Onsite

Equipment	Trucks onsite at any hour	Emission Factor PM (g/hr) - USEPA	Hours per year	Annual Emissions (kg/year)
Trucks Idling on site	5	1.196	3,867.5	23.1

Emission Factor Source: NSW EPA (2012) Technical Report No. 7, Air Emissions Inventory for the Greater Metropolitan Region in New South Wales, 2008 Calendar Year, On-Road Mobile Emissions.

Recycling Facility Related Input Data

Material property inputs used in the emission equations presented in **Table A2.1** are detailed in **Table A2.2**. It is noted that minimal details relating to the material properties were available at the time of reporting. To compensate, values were adopted from the literature.

Table A2.2 Material Property Inputs for Emission Estimation Factors Applied

Material Properties	Units	Value	Source of Information
Moisture Content of material	%	2.1	AP42 13.2.4 default for stone quarrying and processing
Silt Loading of Paved Roads – Material Deliveries and Product Dispatch	g/m^2	0.6	Default baseline loading for roads with traffic <500 vehicles per day - US-EPA AP42 (2011)

Key operational details by process used in the emission calculations are listed in **Table A2.3**.

Table A2.3 Emission Estimation Activity Rates Applied for Emission Calculations

Process	Unit	Amount
Material delivery - truck	Annual VKT (km)	482
Material delivery - cars	Annual VKT (km)	1,167
Material delivery inside shed-truck	Annual VKT (km)	689
Material delivery inside shed - cars	Annual VKT (km)	1,668
Truck unloading inside shed	Tonnes of material	180,000
Raw material handling inside shed	Tonnes of material	180,000
Material transfer inside shed - FEL	Annual VKT (km)	1,125
Excavator activities inside shed	Tonnes of material	180,000
Stockpile loading inside shed	Tonnes of material	180,000
Dispatch truck loading	Tonnes of material	180,000
Material transportation from site – inside shed	Annual VKT (km)	337
Material transportation from site	Annual VKT (km)	269

APPENDIX 3
INCREMENTAL ISOPLETH PLOTS

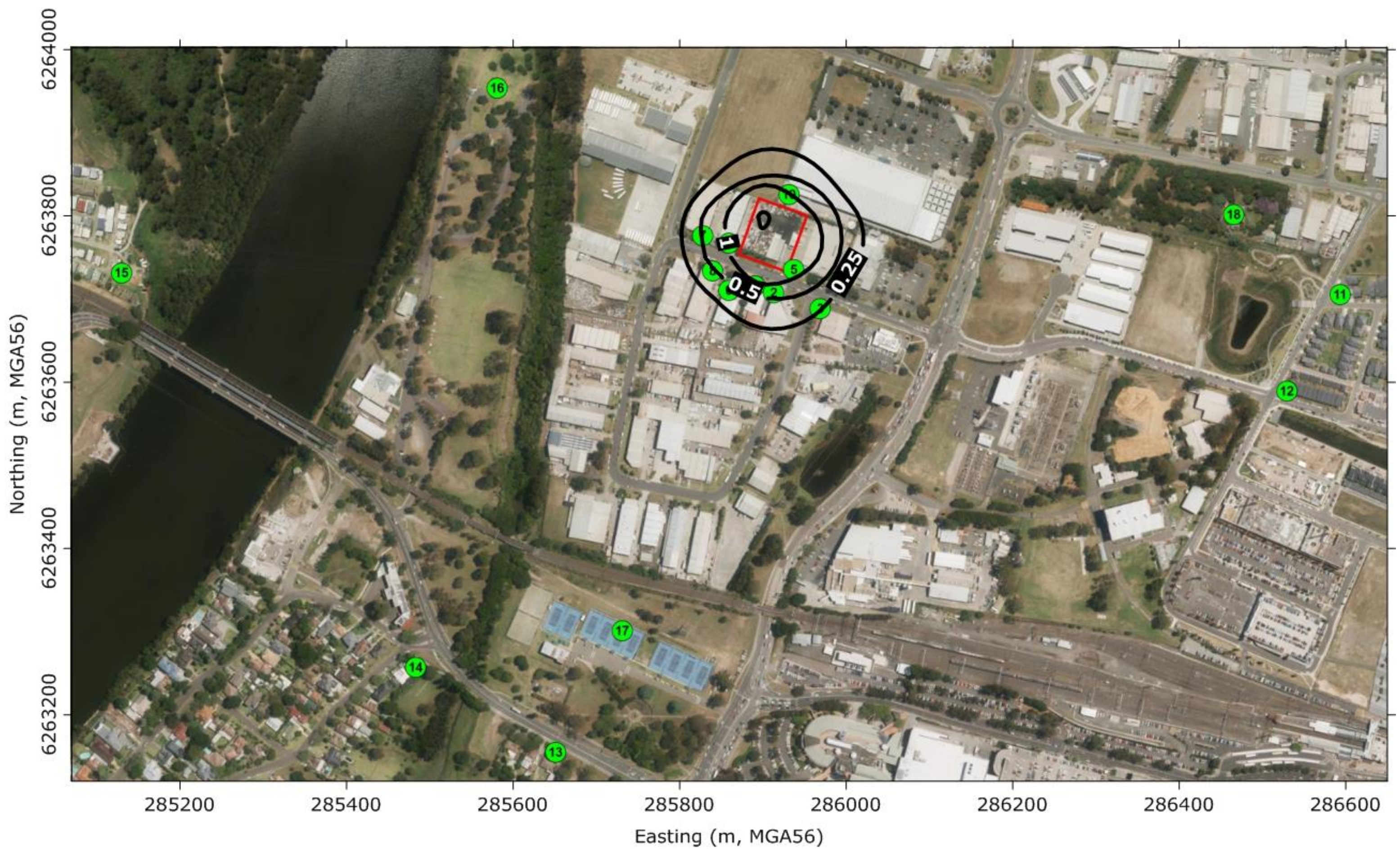

Figure A3.1 Predicted Incremental Annual Average TSP Concentrations (µg/m³)

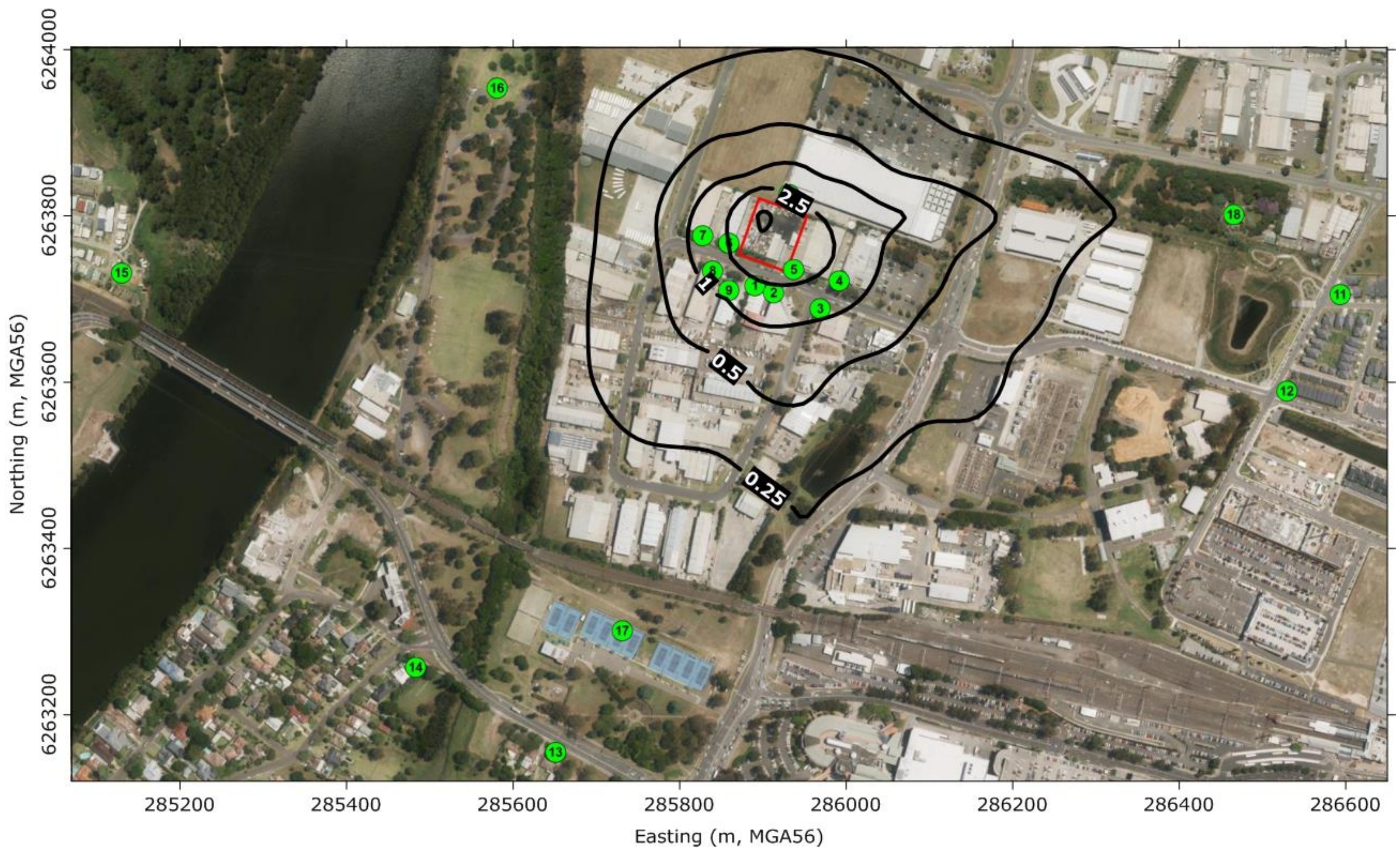

Figure A3.2 Predicted Incremental Maximum (Peak Day) 24-hour Average PM_{10} Concentrations (µg/m³)

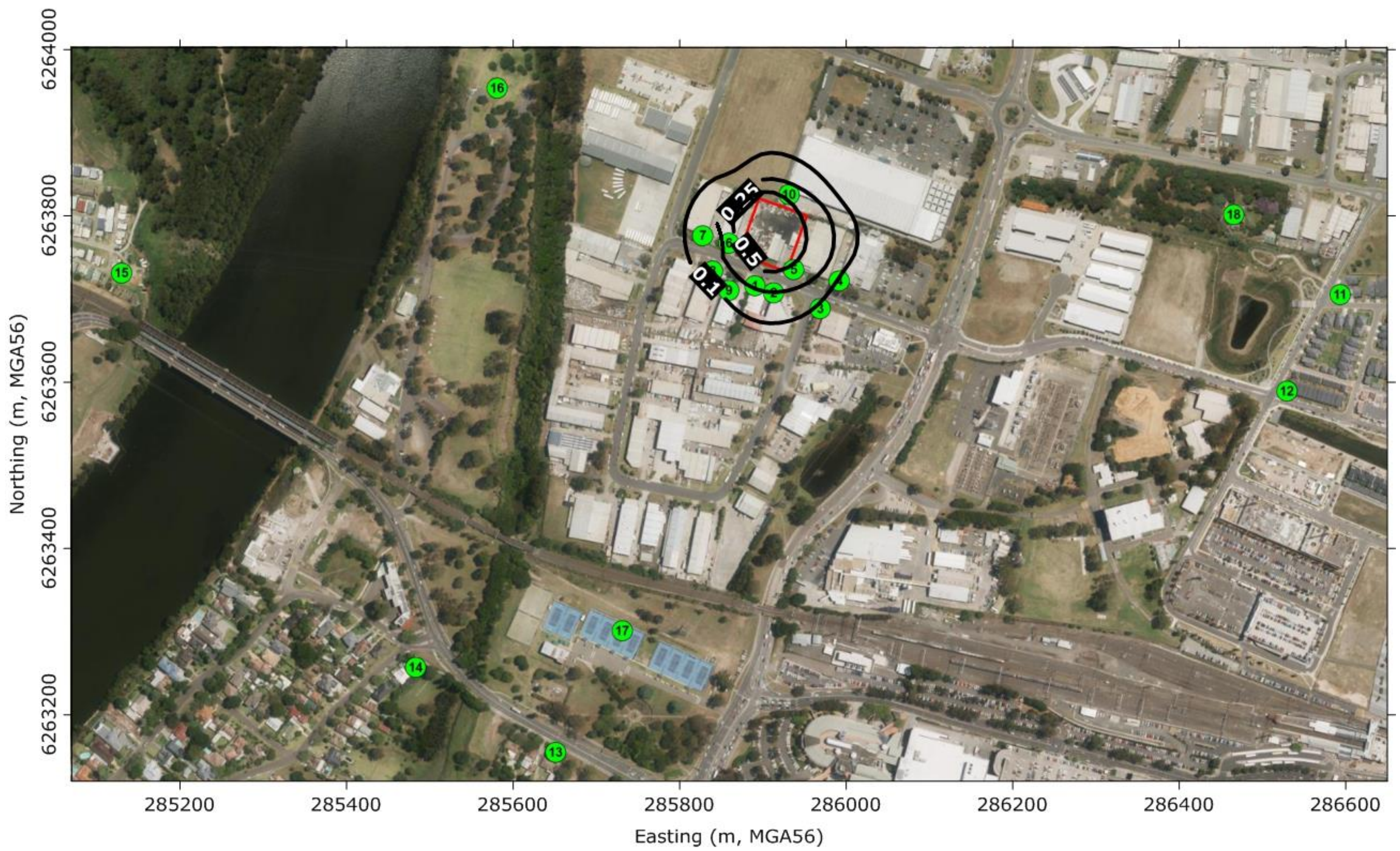

Figure A3.3 Predicted Incremental Annual Average PM_{10} Concentrations (µg/m³)

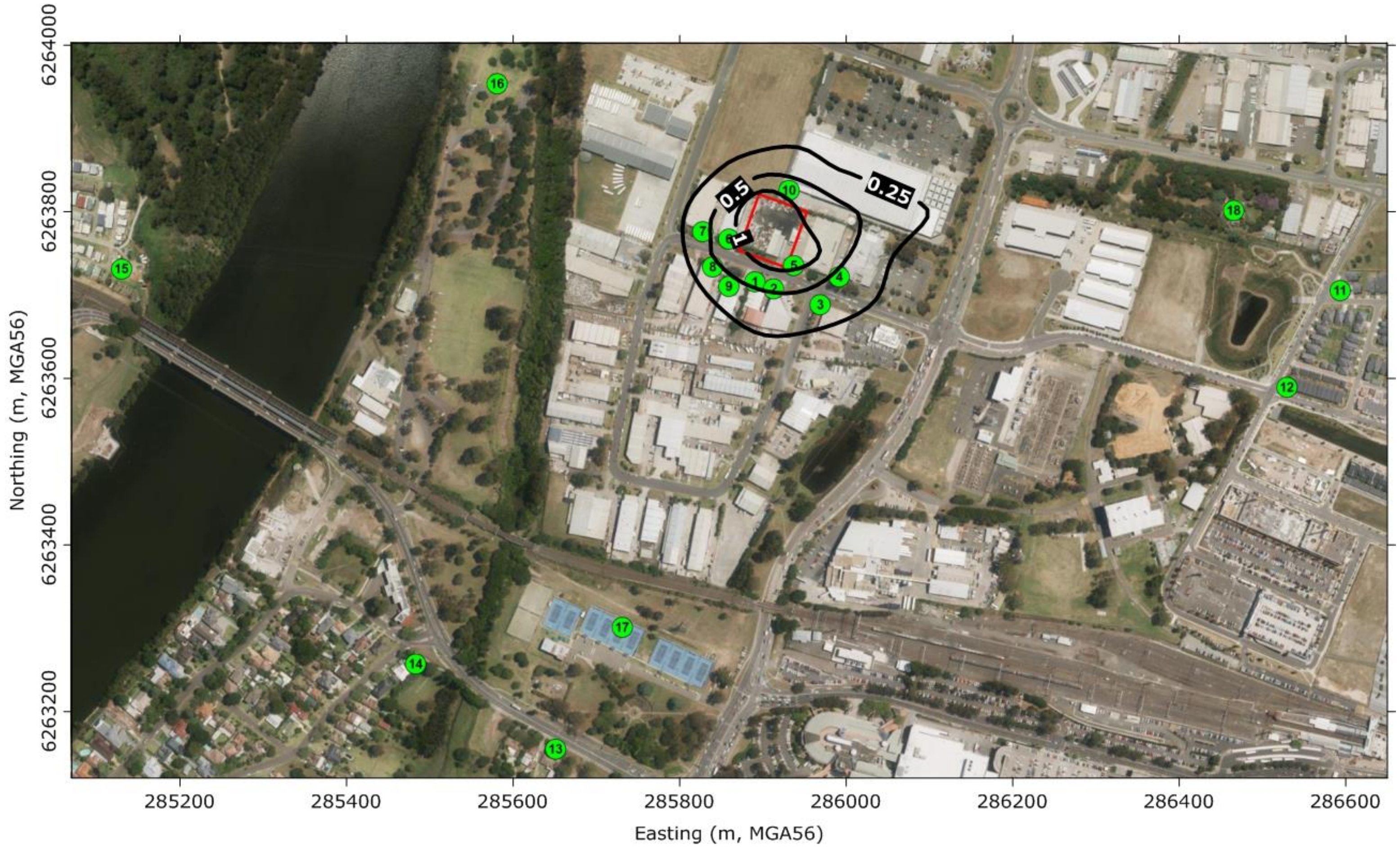

Figure A3.4 Predicted Incremental Maximum (Peak Day) 24-hour Average $PM_{2.5}$ Concentrations ($\mu g/m^3$)

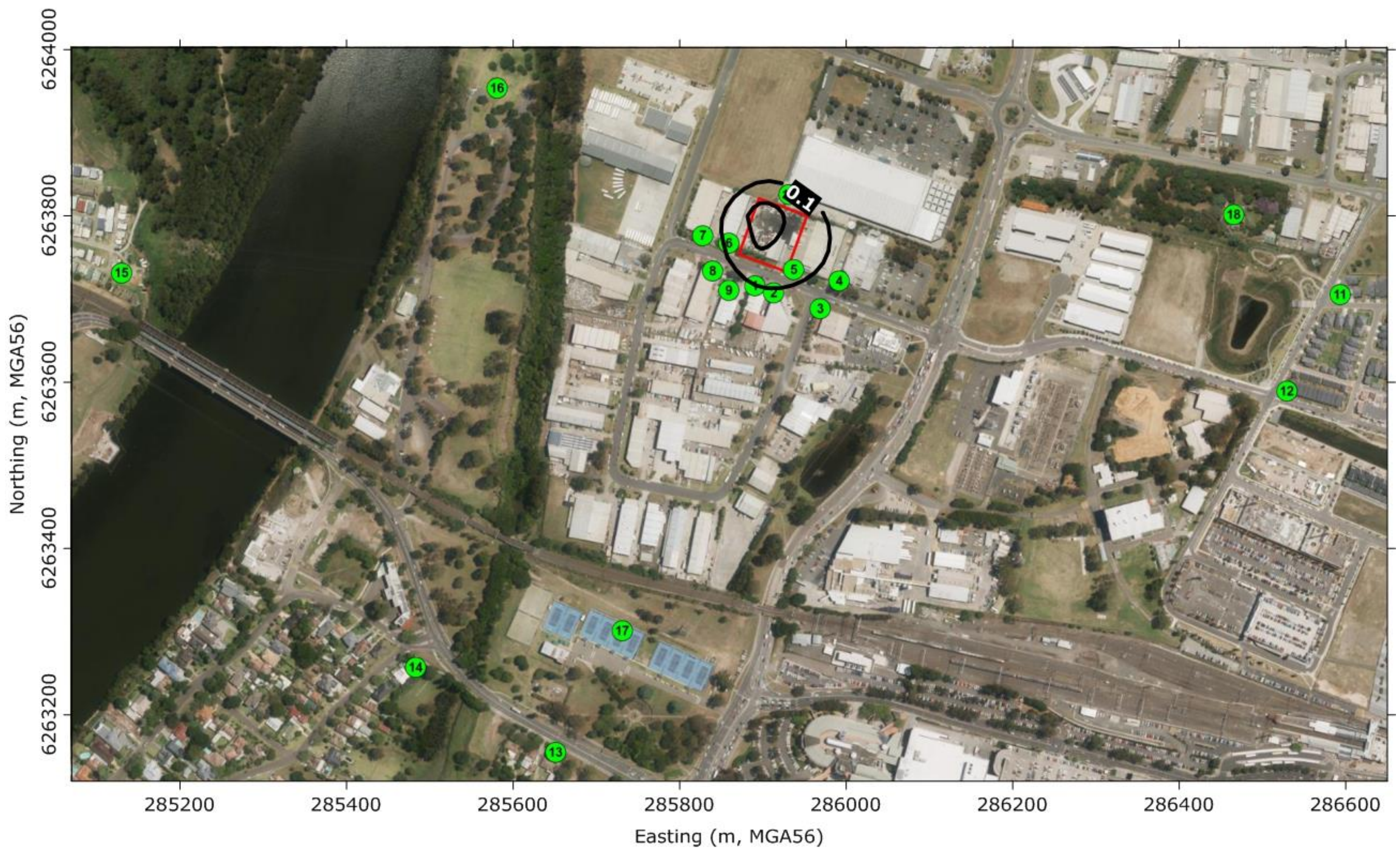

Figure A3.5 Predicted Incremental Annual Average $PM_{2.5}$ Concentrations (µg/m³)

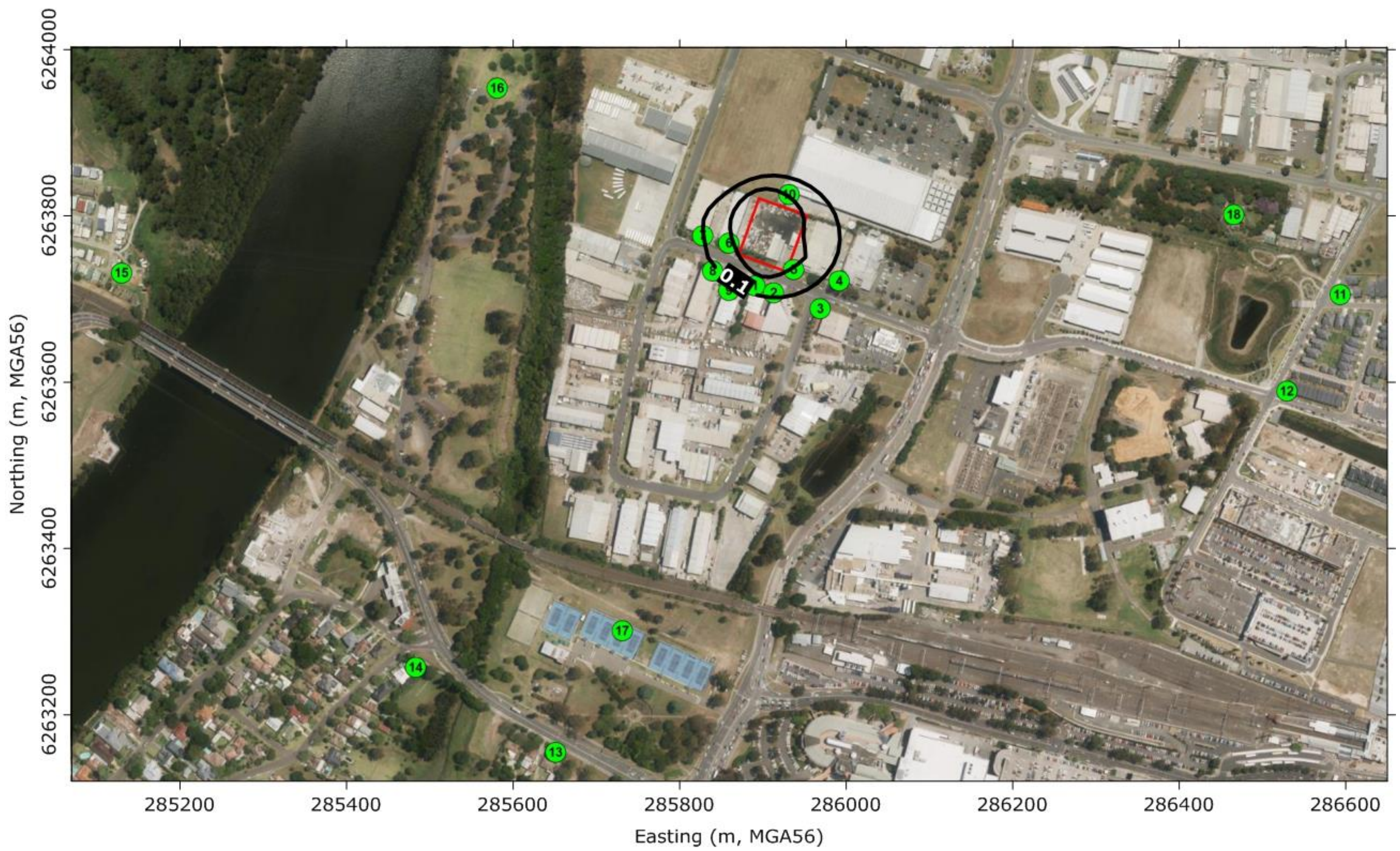

Figure A3.6 Predicted Incremental Annual Average Dust Deposition Levels (g/m²/month)

Figure A3.7 Predicted Incremental 99th Percentile 1-second Average Odour Concentrations (OU)

Appendix D

Revised traffic impact assessment

Penrith Waste Recycling and Transfer Facility

Revised Traffic Report

Prepared for Benedict Recycling Pty Ltd | 25 October 2018

Penrith Waste Recycling and Transfer Facility

Revised Traffic Report

Prepared for Benedict Recycling Pty Ltd | 25 October 2018

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Penrith Waste Recycling and Transfer Facility

Final

Report J16099RP7 | Prepared for Benedict Recycling Pty Ltd | 25 October 2018

Prepared by	**Tim Brooker**	Approved by	**Taylor Richardson**
Position	Associate	Position	Senior Planner
Signature		Signature	
Date	25 October 2018	Date	25 October 2018

Document Control

Version	Date	Prepared by	Reviewed by
V1	16/9/2018	Tim Brooker	Janet Krick
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Appendices

Tables

1 Introduction

This revised traffic impact assessment (revised TIA) has been prepared for Benedict's Penrith Waste Recycling and Transfer facility to inform the Response to Submissions (RTS) report. The revised TIA incorporates:

- revised traffic distribution routes; and
- revised heavy vehicle operational traffic.

The revised traffic distribution routes for the project allow two alternative traffic routes for light vehicle traffic to access the site from Castlereagh Road, via either Peachtree Road or Mullins Road. This will reduce the previously assessed extent of the project intersection capacity impacts at the Castlereagh Road/Peachtree Road intersection, reflecting the proportion of the site light vehicle traffic movements that will travel via Mullins Road to and from Castlereagh Road.

The Peachtree Road route will remain the only feasible route for all site heavy vehicle traffic movements to and from Castlereagh Road, as the site access driveway designs at the Peachtree Road frontage have been angled to and from the east to facilitate trucks entering and leaving the site from this direction (Peachtree Road via Castlereagh Road).

The project intersection traffic capacity impacts at both the Castlereagh Road/Peachtree Road and Castlereagh Road/Mullins Road intersections are reassessed in this revised TIA, informed by weighbridge records provided for the Benedict Recycling Chipping Norton site. Three traffic periods assessed, reflecting the of a typical weekday peak times for the site and surrounding road network:

- the morning peak traffic period for the surrounding road network, which is typically from 8.00 to 9.00 am;
- the peak period for the site generated traffic movements, which is typically from 1.00 to 2.00 pm; and
- the afternoon peak traffic period for the surrounding road network, which is typically from 4.00 to 5.00 pm.

The summary of the Benedict Recycling Chipping Norton site, a waste material processing facility with a throughput of 185,000 tonnes per annum records, is included in Appendix A. The summary includes the average weekday vehicle movements per hour for the month of May 2018 and is directly comparable to the proposed 180,000 tonnes per annum throughput for the Penrith facility. A similar number and proportion of light and heavy vehicle movements are anticipated at the Penrith facility for the incoming waste material supply and subsequent despatch of sorted recycled waste and product material deliveries.

2 Average daily and peak hourly traffic movements

2.1 Daily traffic movements

A revised estimate of 50,250 incoming waste deliveries is expected annually when the Penrith facility is operating at a maximum capacity of 180,000 tonnes of material processed annually. Variations may occur in the amounts of waste received on any given day. However, there will be a weekday average of 75 light vehicle loads and 95 heavy vehicle loads (170 vehicle loads in total) bringing waste material to the site, representing 340 daily vehicle movements for this activity.

Waste transfer and sorted products from the site will be transported to customers or sent to other Benedict Recycling sites for processing throughout the Western Sydney region. The dispatch of the site products and residue materials will generate up to 6,000 truck loads annually by 33 tonne capacity truck and dog trailer vehicles. This will require approximately 22 truck loads daily (44 daily vehicle movements) when the facility is operating at maximum capacity.

The facility will include off-street parking for trucks, employee cars and the occasional commercial visitor light vehicle. During standard hours of operation (6.00 am to 4.00 pm), the facility will normally be operated by seven employees on site. On the days when extended hours of operation are required (eg deliveries may be received until 10.00 pm in the evening) the site would be operated by approximately five employees during the extended hours.

During the standard hours of operation, the site employee and commercial visitor car traffic will generate approximately 15 light vehicle visits (30 vehicle movements) daily. During extended hour of operations, the site employee and commercial visitor car traffic will generate approximately 22 light vehicle visits (44 vehicle movements) daily. There would be no contractors generally working onsite except for maintenance and repair works.

For all waste receival, products/rejects dispatch, site employees, site visitors and maintenance vehicle traffic, there will be an overall total of 428 daily vehicle movements generated, comprising 194 light vehicle movements and 234 heavy vehicle movements.

The total daily generated by the maximum site activity during extended hours of operation are summarised in Table 2.1.

Table 2.1 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	44	44	0
Waste receivals	340	150	190
Recycled product and rejects	44	0	44
All site traffic	**428**	**194**	**234**

2.2 Peak hourly traffic

During standard hours of operations, site employee car traffic movements would occur during the afternoon traffic peak hour. During extended operations (ie there would be no site employee car traffic movements during either the morning or afternoon traffic peak hours in the locality as the site employee car traffic movements would generally travel in to the site at either 6.00 am or 3.00 pm and out from the site at either 3.00 pm or 10.00 pm.

Based on analysis of the Chipping Norton facility, site incoming site transfer traffic movements will generally ramp up from 6.00 am to a peak hour of 1.00 pm to 2.00 pm. After that point, movements will steadily decrease until the site closes. Outgoing product transfer traffic movements will be controlled by Benedict Recycling, allowing for dispatching trucks to be prioritised after the peak hour until the site closes.

The peak hourly traffic movements generated by the site during standard and extended horus are summarised in Table 2.2.

Table 2.2 Summary of site generated peak hourly traffic movements

Peak Hour	Inbound site hourly traffic movements		Outbound site hourly traffic movements		All site hourly traffic movements	
(time of day)	Cars/other light vehicles	Heavy vehicles	Cars/other light vehicles	Heavy vehicles	Cars/other light vehicles	Heavy vehicles
Morning peak hour (8.00 to 9.00 am)	2 site visitors +4 waste receivals	12 waste and product	2 site visitors +4 waste receivals	12 waste and product	12	24
Midday peak hour (1.00 to 2.00 pm)	2 site visitors +9 waste receivals	12 waste and product	2 site visitors +9 waste receivals	12 waste and product	22	24
Afternoon peak hour (4.00 to 5.00 pm) with standard hours	2 site visitors +6 waste receivals	7 waste and product	10 employees and site visitors +6 waste receivals	7 waste and product	24	14
Afternoon peak hour (4.00 to 5.00 pm) with extended hours	2 site visitors +4 waste receivals	12 waste and product	2 site visitors +4 waste receivals	12 waste and product	12	24

Approximately 8% of all the daily inbound and outbound waste receival and recycled product traffic (12 light vehicle and 24 heavy vehicle traffic movements) are expected to occur during the morning peak hour (8.00 am to 9.00 am).

Approximately 11% (22 light vehicle and 24 heavy vehicle traffic movements) occurring during the midday peak hour (1.00 pm to 2.00 pm). The midday peak hour is expected as the daily demand for site waste receival and delivery traffic on weekdays normally gets busier throughout the morning to early afternoon as building and construction sites generally generate more waste during morning hours. Activity will normally decline towards the end of each working day, reflecting construction sites ramping down for the day.

During standard hours, approximately 9% (24 light vehicle and 14 heavy vehicle traffic movements) occurring during the afternoon peak hour (4.00 pm to 5.00 pm). While the facility is generally expected to close at 4.00 pm, these movements reflect final deliveries, dispatches and employees leaving the site.

During extended hours, traffic movement associated with the site during the afternoon peak would be reduced as employee traffic movements would occur earlier. Deliveries are assumed to remain the same, as extended hours would be used to service customers that are unlikely to schedule deliveries in the peak hour.

A 'worst case' scenario has also been considered for the site, representing the maximum amount of materials that may be delivered during a single day. This scenario assumes materials are delivered and dispatched solely by 19 m articulated vehicles, which are capable of hauling the most tonnage-per-vehicle, as opposed to a variety of heavy vehicles that may not be at maximum capacity, as reflected in the model above.

In this 'worst case' scenario, a maximum of seven 19 m articulated vehicles would be visiting with the site in any given hour (14 vehicle movements). This is less than the modelled peak hour movements considered in Table2.2. Therefore, the 'worst case' scenario would not have a worse impact on the traffic network than standard site operations.

2.3 Proposed hours of operation

The facility would normally operate from 6.00 am to 4.00 pm Monday to Friday, 7.00 am to 5.00 pm on Saturday and 8.00 am to 4.00 pm on Sunday.

Benedict Recycling is applying for longer opening hours to allow it to accept waste from civil construction and maintenance projects in the evening (Monday to Friday, 4.00 pm to 10.00 pm) on occasions and more rarely between 10.00 pm to 6.00 am (see Table 2.3) for up to six two-week 24-hour campaigns per year. Penrith City Council would be notified prior to occasions when it is accepting waste between 10.00 pm to 6.00 am. The process of informing will be finalised as part of an OEMP in consultation with Council.

Operation of the site will rely on the rapid turn-over of waste, with short on-site residence times for most waste types. Dispatching materials between 4.00 pm and 10.00 pm will assist to minimise stockpile sizes, maximising facility capacity at the start of each day or when material is to be accepted. There will be a maximum of four truck movements per hour associated with dispatch of materials between 4.00 pm and 10.00 pm.

Materials would be dispatched to sites that are licensed to accept waste during the evening/night period.

These trucks will not pass local houses and will utilise the regional road network during times of decreased traffic volumes. Dispatch of waste at this time will decrease the number of required daytime movements.

Table 2.3 Operating hours

Accept waste deliveries and dispatch materials	6.00 am and 10.00 pm Monday to Friday; 6.00 am and 5.00 pm Saturday; and 8.00 am to 4.00 pm on Sunday. Closed on public holidays.
Accept waste deliveries from night works	10.00 pm to 6.00 am on limited occasions through the year.

2.4 Haulage routes

All heavy vehicle site traffic will leave the area via the traffic signal controlled Castlereagh Road/Peachtree Road intersection approximately 230 m east of the site.

The local road network includes a roundabout at the Castlereagh Road/Mullins Road intersection, approximately 250 m north of the Castlereagh Road/Peachtree Road intersection. The Castlereagh Road/Mullins Road intersection can also be used by light vehicles to access/leave the area, with half of light vehicles assumed to use this route. Heavy vehicles will not be able to access the intersection due to the design of the site driveways.

For the combined waste received and products dispatched traffic movements, the distribution to and from the site would normally be using the following routes:

- to and from Castlereagh Road, south of the Peachtree Road intersection; and
- to and from Castlereagh Road, north of the Peachtree Road intersection.

For those vehicles travelling to and from Castlereagh Road, north of Peachtree Road intersection, the distribution to and from the site would normally be using the following routes:

- through traffic at Castlereagh Road/Mullins Road intersection;
- to and from Castlereagh Road, north of Mullins Road intersection; and
- once vehicle turn onto Mullins Road from Castlereagh Road/Mullins Road intersection, vehicle will continue onto Mullins Road, then turn left onto Peachtree Road and enter the site.

Waste material will not normally be brought to the site or products dispatched via Thornton Drive which connects to local areas to the east of Castlereagh Road from the Peachtree Road intersection.

Beyond the immediate locality of North Penrith, the future site traffic will be further distributed onto other major roads such as The Great Western Highway and Western Motorway, such that the future project generated daily or peak hourly traffic volumes would be relatively minor on any traffic routes other than Peachtree Road and Castlereagh Road.

3 Assessment of traffic impacts

The predicted daily traffic increases due to site operations' traffic movements (which are 428 daily vehicle movements including 234 heavy vehicle movements) when this traffic is distributed onto the surrounding road network is summarised in Table 3.1.

Table 3.1 Summary of daily traffic volumes and increases with the 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 (%)
Castlereagh Road (north of Mullins Road)	34,000	214	0.6%	1,220*	117	9.6%
Castlereagh Road (south of Peachtree Road)	37,000	214	0.6%	1,700*	117	6.9%
Peachtree Road west of Castlereagh Road	4,500	331	7.4%	360*	234	65%
Mullins Road west of Castlereagh Road	4,400	97	2.2%	280*	0	0%

Notes: **Existing daily traffic is eleven times the average am and pm peak hourly traffic. Daily heavy vehicle traffic movements are calculated using the upper limit of the range of surveyed am or pm peak hour proportions of heavy vehicle traffic*

The project-generated traffic increases on Castlereagh Road for all vehicles will be of the order of 0.6%. These traffic increases will not generally be noticeable to existing road users.

On the local industrial area access route via Peachtree Road, the project-generated increases in daily and heavy vehicle traffic movements will be more noticeable, being approximately 7.4% for all traffic and 65% for heavy vehicle traffic.

On the local industrial area access route via Mullins Road, the project-generated increases in daily traffic movements will be lower, being approximately 2.2% for all traffic. No heavy vehicles will leave access or leave the site via Mullins Road.

The traffic increases using Peachtree Road will probably be noticeable to other road users but would not generally affect the future road capacity or general maintenance requirements for the road which has been designed to carry industrial traffic, including heavy vehicle traffic.

3.1 Traffic impacts at intersections

3.1.1 Site construction traffic

During construction, the proposal will potentially generate up to 10 daily car/other light vehicle visits and 10 daily truck deliveries on a typical weekday, resulting in up to 40 daily traffic movements in total.

The additional construction-generated peak hourly construction traffic movements at the Castlereagh Road access intersection has not been assessed in detail as the potential traffic impacts would be for a short time and would be significantly lower than during the subsequent facility operations.

3.1.2 Site operations traffic

The additional operations-generated peak hour traffic at the Castlereagh Road/Peachtree Road and Castlereagh Road/Mullins Road intersections have been assessed using SIDRA based on traffic volumes surveyed in July 2016 (with the Castlereagh Road through traffic movements adjusted to July 2018 levels) and July 2018 respectively. The Midday peak hour traffic is also identified to be relevant to this study and was surveyed in August 2018. The year 2016 and year 2018 traffic survey results for the two intersections are included as Appendix B.

The impacts of the additional site traffic when distributed onto the relevant traffic movements at the intersections are summarised in Table 3.2 and Table 3.3. Detailed results are provided in Appendix C.

Table 3.2 Summary of existing and proposed intersection operation – Castlereagh Road / Peachtree Road

Intersection	Peak hour	Adjusted 2018 base traffic			With project operations traffic		
		LoS	DOS	AVD	LoS	DOS	AVD
Castlereagh Road / Peachtree Road	Morning peak hour (8.00 to 9.00 am)	B	0.858	26.8	C	0.881	30.4
	Midday peak hour (1.00 to 2.00 pm)	B	0.853	28.1	C	0.850	30.2
	Afternoon peak hour (3.30 to 4.30 pm) during standard hours	C	0.922	29.7	C	0.939	30.0
	Afternoon peak hour (3.30 to 4.30 pm) during extended hours	C	0.922	29.7	C	0.939	30.2

Notes: LoS – Level of Service, DOS – Degree of Saturation, AVD – Average Vehicle Delay.

Table 3.3 Summary of existing and proposed intersection operation – Castlereagh Road / Mullins Road

Intersection	Peak hour	Existing 2018 base traffic			With project operations traffic		
		LoS	DOS	AVD	LoS	DOS	AVD
Castlereagh Road / Mullins Road	Morning peak hour (8.00 to 9.00 am)	A	0.845	11.0	A	0.851	11.2
	Midday peak hour (11.45 to 12.45 pm)	A	0.593	7.3	A	0.600	7.5
	Afternoon peak hour (4.15 to 5.15 pm) during standard hours	B	0.959	17.1	B	0.965	17.9
	Afternoon peak hour (4.15 to 5.15 pm) during extended hours	B	0.959	17.1	B	0.966	18.1

Notes: LoS – Level of Service, DOS – Degree of Saturation, AVD – Average Vehicle Delay.

The SIDRA intersection results show that during the morning, midday and afternoon peak hours, there will be only minor changes to both intersections' operations.

The average vehicle delays for all traffic at the Castlereagh Road/Peachtree Road intersection will increase from 26.8 seconds currently to 30.4 seconds in the morning peak, and increase slightly from 28.1 seconds to 30.2 seconds during the midday peak. Afternoon peak for both standard and extended hours of operations will increase from 29.7 seconds to 30 seconds and 30.2 seconds respectively. The intersection levels of service will change from 'B' to 'C' for both morning and midday peak hours, but remain the same (level of service 'C') for the afternoon peak hours.

Likewise, the average vehicle delays for all traffic at the Castlereagh Road/Mullins Road intersection will increase slightly from 11.0 seconds to 11.2 seconds in the morning peak, from 7.3 seconds to 7.5 seconds during the midday peak. The afternoon peak for both standard and extended hours of operations will change from 17.1 seconds to 17.9 seconds and 18.1 seconds respectively. The intersection levels of service will remain the same as existing operation at 'A' during morning and midday peak hours, and 'B' during afternoon peak hours.

This assessment conservatively assumes that all site heavy vehicle traffic will enter and leave the area via the traffic signal controlled Castlereagh Road/Peachtree Road intersection 230 m east of the site.

Given the results show minor impacts to the Castlereagh Road/Peachtree Road and Castlereagh Road/Mullins Road intersections, the projected future traffic operations at both intersections will have minimal impacts and retain some capacity for future traffic growth.

The future traffic impact of the proposed development to both Peachtree Road and Mullins Road is considered to be minimal.

4 Summary and conclusion

The revised TIA provides a revised assessment of the transport impacts of the proposed facility at 46–48 Peachtree Road, Penrith. The assessment has been revised to account for updated waste input and recycling truck generation estimates for the project and revised traffic distribution routes.

Facility operations will generate approximately 234 additional daily truck movements and 194 additional daily car/other light vehicle movements on Peachtree Road and Castlereagh Road (428 additional daily traffic movements in total).

During construction, the proposal will potentially generate up to 10 daily car/other light vehicle visits and 10 daily truck deliveries on a typical weekday, resulting in up to 40 daily traffic movements in total.

The operational traffic impacts have been assessed for the maximum hourly traffic which will potentially occur during the morning (8.00 am to 9.00 am) and afternoon (3.30 pm to 4.30 pm) peak traffic periods on the surrounding road network. During these times the peak site traffic will potentially be:

- +36 vehicle movements per hour (12 by cars and 24 by trucks) during the morning peak hour;
- +46 vehicle movements per hour (22 by cars and 24 by trucks) during the midday peak hour; and
- +38 additional vehicle movements (24 by cars and 14 by trucks) during the afternoon peak hour.

Generally the additional site traffic movements will be distributed, approximately 50% and 50% to and from the north or the south via Castlereagh Road from either the Peachtree Road or the Mullins Road intersections. The site operations traffic movements would not generally use Thornton Drive which connects to other local areas on the eastern side of Castlereagh Road from the Peachtree Road intersection.

Beyond the immediate locality of North Penrith, the future site traffic will be further distributed onto other major roads such as The Great Western Highway and Western Motorway, east of west of Penrith, such that the future project generated daily or peak hourly traffic volumes would be relatively minor on any traffic routes other than Peachtree Road and Castlereagh Road.

The key findings of the revised TIA for the predicted additional daily and peak hour traffic movements are as follows:

- The additional traffic movements from the facility will generate minimal percentage daily traffic increases of approximately 0.6% for Castlereagh Road to and from the north or the south. On the main local area access road, Peachtree Road, the additional traffic volumes will be more noticeable but will be accommodated with minimal changes to the existing traffic flows, traffic delays or road safety. The facility-generated traffic increases will not generate any additional road widening or reconstruction requirements for either Peachtree Road, Mullins Road or the Castlereagh Road intersections.
- The Peachtree Road/Castlereagh Road/Thornton Drive intersection is the main intersection providing access from the Peachtree Road industrial area to the major road network. It is operating at peak hour traffic conditions ‘level of service B’ during the morning and midday peak hours and ‘level of service C’ the afternoon peak hour. These intersection levels of service will change to ‘level of service C’ during all the morning, midday and afternoon peak hours with the site generated traffic during the facility’s operations stages.

- However, for the future project operations traffic under current (July 2018) traffic conditions, the maximum increases in the Peachtree Road/Castlereagh Road/Thornton Drive intersection average traffic delays will be relatively minor at +3.6, +2.1 and +0.5 seconds per vehicle for the three peak hourly traffic periods considered.

- The Castlereagh Road/Mullins Street intersection is currently operating at peak hour traffic conditions 'level of service A' during the morning and midday peak hours and 'level of service B' in the afternoon peak hour. These intersection levels of service will not change with the site generated traffic during the facility's operations stages.

Based on the results of this revised TIA report, there will be no significant traffic impacts anticipated from proposal on either traffic capacity, traffic delays or road safety on either Peachtree Road or Mullins Road or any other routes on the surrounding major road network.

Appendix A

Site Traffic Generation Summary

Benedict Recycling - Chipping Norton Facility
Average vehicles per hour (Monday to Friday)
May 2018

Hour	Vehicle type			Total
	Light	Rigid	Articulated	
6:00:00 AM	3.2	2.0	2.9	8.1
7:00:00 AM	3.6	2.0	4.7	10.3
8:00:00 AM	4.3	4.7	5.2	14.2
9:00:00 AM	6.4	5.1	4.4	15.9
10:00:00 AM	7.4	6.1	5.0	18.6
11:00:00 AM	7.3	5.6	4.8	17.7
12:00:00 PM	8.9	5.1	5.5	19.5
1:00:00 PM	8.3	5.5	5.9	19.8
2:00:00 PM	8.8	4.1	3.3	16.2
3:00:00 PM	8.0	4.2	2.2	14.3
4:00:00 PM	5.8	2.5	1.2	9.4
5:00:00 PM	3.0	2.0	0.7	5.6
6:00:00 PM	0.0	0.0	0.0	0.0
7:00:00 PM	0.0	0.0	0.0	0.0
8:00:00 PM	0.0	0.0	0.0	0.0
9:00:00 PM	0.0	0.0	0.0	0.0
10:00:00 PM	0.0	0.0	0.0	0.0
11:00:00 PM	0.0	0.0	0.0	0.0
12:00:00 AM	0.0	0.0	0.0	0.0
Total	74.9	48.9	45.8	169.6

Appendix B

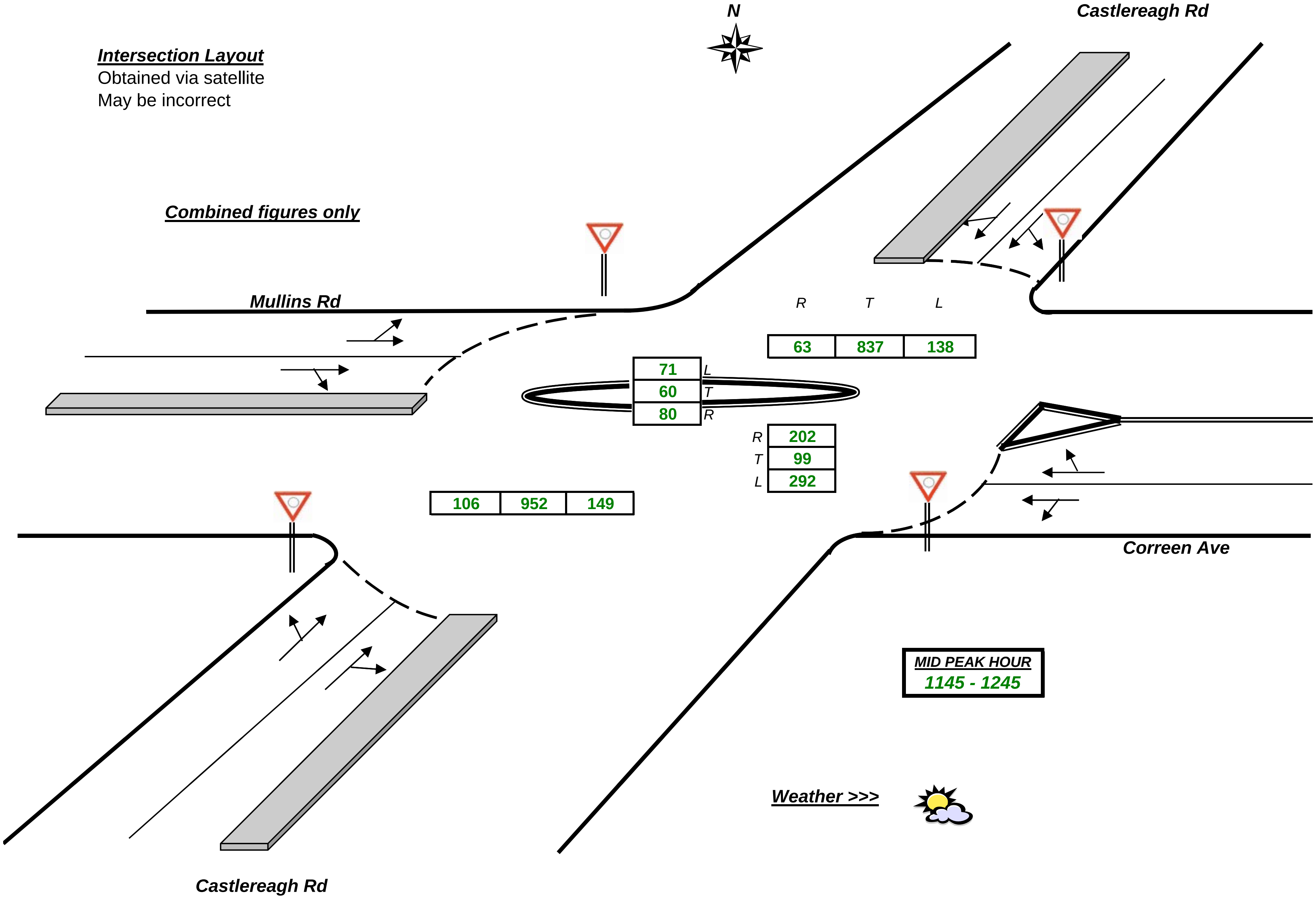
Intersection Traffic Counts

R.O.A.R. DATA
Reliable, Original & Authentic Results
Ph.88196847, Mob.0418-239019

Client	: EMM
Job No/Name	: 6874 PENRITH Castlereagh Rd 2
Day/Date	: Tuesday 7th August 2018

Intersection Layout
Obtained via satellite
May be incorrect

Combined figures only



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client : EMM
Job No/Name : 6874 PENRITH Castlereagh Rd 2
Day/Date : Tuesday 7th August 2018

Lights

	NORTH *Castlereagh Rd*			WEST *Mullins Rd*			SOUTH *Castlereagh Rd*			EAST *Coreen Ave*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	**TOT**
1100 - 1115	33	210	25	14	5	11	31	174	21	53	18	27	**622**
1115 - 1130	30	174	19	22	6	10	18	198	40	62	21	44	**644**
1130 - 1145	38	221	13	26	13	25	31	209	38	43	17	25	**699**
1145 - 1200	33	197	13	23	14	21	19	229	28	61	21	35	**694**
1200 - 1215	33	196	12	14	17	18	27	232	25	64	22	43	**703**
1215 - 1230	26	203	19	14	10	15	18	228	30	66	35	62	**726**
1230 - 1245	33	198	15	16	19	12	28	217	37	71	21	50	**717**
1245 - 1300	21	167	18	13	17	15	17	249	25	49	24	34	**649**
1300 - 1315	31	163	10	20	12	15	14	228	59	56	20	43	**671**
1315 - 1330	35	156	14	18	14	16	27	278	56	58	19	37	**728**
1330 - 1345	34	208	10	22	17	14	19	272	40	91	20	42	**789**
1345 - 1400	14	110	4	11	8	8	19	216	30	88	23	40	**571**
Period End	**361**	**2203**	**172**	**213**	**152**	**180**	**268**	**2730**	**429**	**762**	**261**	**482**	**8213**

Lights

	NORTH *Castlereagh Rd*			WEST *Mullins Rd*			SOUTH *Castlereagh Rd*			EAST *Coreen Ave*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	**TOT**
1100 - 1200	134	802	70	85	38	67	99	810	127	219	77	131	**2659**
1115 - 1215	134	788	57	85	50	74	95	868	131	230	81	147	**2740**
1130 - 1230	130	817	57	77	54	79	95	898	121	234	95	165	**2822**
1145 - 1245	125	794	59	67	60	66	92	906	120	262	99	190	**2840**
1200 - 1300	113	764	64	57	63	60	90	926	117	250	102	189	**2795**
1215 - 1315	111	731	62	63	58	57	77	922	151	242	100	189	**2763**
1230 - 1330	120	684	57	67	62	58	86	972	177	234	84	164	**2765**
1245 - 1345	121	694	52	73	60	60	77	1027	180	254	83	156	**2837**
1300 - 1400	114	637	38	71	51	53	79	994	185	293	82	162	**2759**
PEAK HOUR	**125**	**794**	**59**	**67**	**60**	**66**	**92**	**906**	**120**	**262**	**99**	**190**	**2840**

Heavies

	NORTH *Castlereagh Rd*			WEST *Mullins Rd*			SOUTH *Castlereagh Rd*			EAST *Coreen Ave*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	**TOT**
1100 - 1115	2	5	3	0	0	0	4	11	9	9	0	2	**45**
1115 - 1130	3	10	0	2	0	1	2	7	5	6	0	4	**40**
1130 - 1145	4	16	3	1	0	2	2	9	8	7	0	5	**57**
1145 - 1200	1	7	1	0	0	2	2	11	8	6	0	2	**40**
1200 - 1215	7	8	0	1	0	3	2	15	9	4	0	2	**51**
1215 - 1230	2	12	2	1	0	3	4	12	8	9	0	4	**57**
1230 - 1245	3	16	1	2	0	6	6	8	4	11	0	4	**61**
1245 - 1300	2	9	2	1	0	4	5	7	10	4	0	6	**50**
1300 - 1315	2	10	0	3	0	3	3	5	7	6	1	3	**43**
1315 - 1330	1	8	0	1	0	7	3	9	6	6	0	2	**43**
1330 - 1345	1	3	1	0	0	9	6	10	10	11	0	3	**54**
1345 - 1400	2	7	0	2	0	7	2	7	5	4	0	7	**43**
Period End	**30**	**111**	**13**	**14**	**0**	**47**	**41**	**111**	**89**	**83**	**1**	**44**	**584**

Heavies

	NORTH *Castlereagh Rd*			WEST *Mullins Rd*			SOUTH *Castlereagh Rd*			EAST *Coreen Ave*			
Peak Per	L	T	R	L	T	R	L	T	R	L	T	R	**TOT**
1100 - 1200	10	38	7	3	0	5	10	38	30	28	0	13	**182**
1115 - 1215	15	41	4	4	0	8	8	42	30	23	0	13	**188**
1130 - 1230	14	43	6	3	0	10	10	47	33	26	0	13	**205**
1145 - 1245	13	43	4	4	0	14	14	46	29	30	0	12	**209**
1200 - 1300	14	45	5	5	0	16	17	42	31	28	0	16	**219**
1215 - 1315	9	47	5	7	0	16	18	32	29	30	1	17	**211**
1230 - 1330	8	43	3	7	0	20	17	29	27	27	1	15	**197**
1245 - 1345	6	30	3	5	0	23	17	31	33	27	1	14	**190**
1300 - 1400	6	28	1	6	0	26	14	31	28	27	1	15	**183**
PEAK HOUR	**13**	**43**	**4**	**4**	**0**	**14**	**14**	**46**	**29**	**30**	**0**	**12**	**209**

Combined

	NORTH *Castlereagh Rd*			WEST *Mullins Rd*			SOUTH *Castlereagh Rd*			EAST *Coreen Ave*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	**TOT**
1100 - 1115	35	215	28	14	5	11	35	185	30	62	18	29	**667**
1115 - 1130	33	184	19	24	6	11	20	205	45	68	21	48	**684**
1130 - 1145	42	237	16	27	13	27	33	218	46	50	17	30	**756**
1145 - 1200	34	204	14	23	14	23	21	240	36	67	21	37	**734**
1200 - 1215	40	204	12	15	17	21	29	247	34	68	22	45	**754**
1215 - 1230	28	215	21	15	10	18	22	240	38	75	35	66	**783**
1230 - 1245	36	214	16	18	19	18	34	225	41	82	21	54	**778**
1245 - 1300	23	176	20	14	17	19	22	256	35	53	24	40	**699**
1300 - 1315	33	173	10	23	12	18	17	233	66	62	21	46	**714**
1315 - 1330	36	164	14	19	14	23	30	287	62	64	19	39	**771**
1330 - 1345	35	211	11	22	17	23	25	282	50	102	20	45	**843**
1345 - 1400	16	117	4	13	8	15	21	223	35	92	23	47	**614**
Period End	**391**	**2314**	**185**	**227**	**152**	**227**	**309**	**2841**	**518**	**845**	**262**	**526**	**8797**

Combined

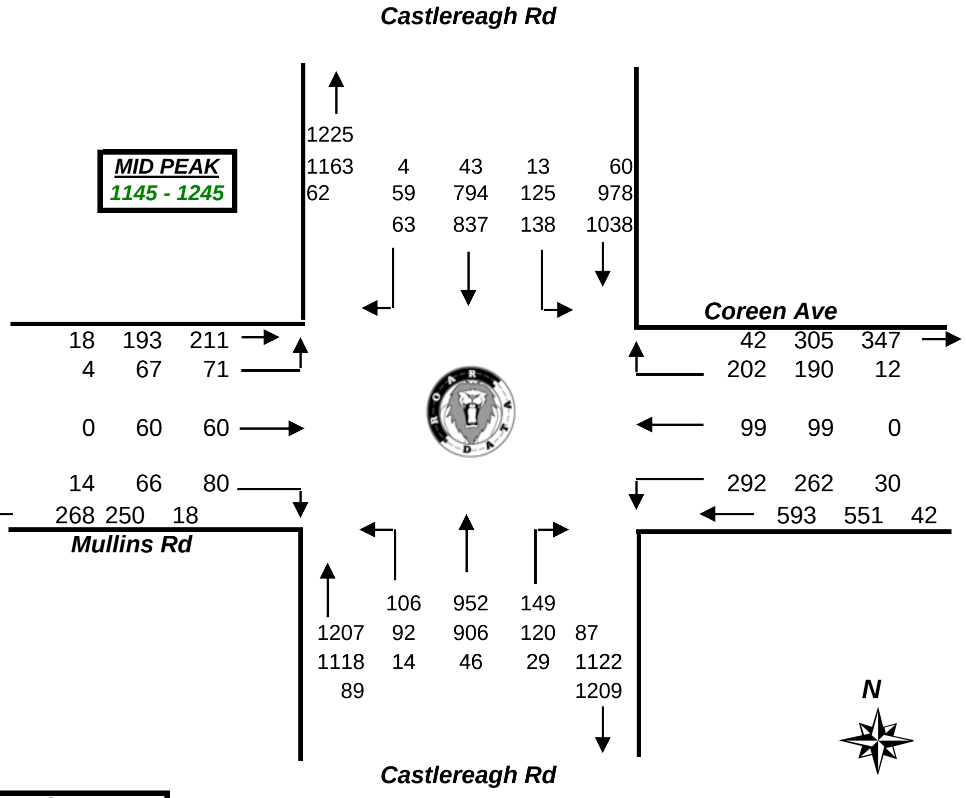
	NORTH *Castlereagh Rd*			WEST *Mullins Rd*			SOUTH *Castlereagh Rd*			EAST *Coreen Ave*			
Peak Per	L	T	R	L	T	R	L	T	R	L	T	R	**TOT**
1100 - 1200	144	840	77	88	38	72	109	848	157	247	77	144	**2841**
1115 - 1215	149	829	61	89	50	82	103	910	161	253	81	160	**2928**
1130 - 1230	144	860	63	80	54	89	105	945	154	260	95	178	**3027**
1145 - 1245	138	837	63	71	60	80	106	952	149	292	99	202	**3049**
1200 - 1300	127	809	69	62	63	76	107	968	148	278	102	205	**3014**
1215 - 1315	120	778	67	70	58	73	95	954	180	272	101	206	**2974**
1230 - 1330	128	727	60	74	62	78	103	1001	204	261	85	179	**2962**
1245 - 1345	127	724	55	78	60	83	94	1058	213	281	84	170	**3027**
1300 - 1400	120	665	39	77	51	79	93	1025	213	320	83	177	**2942**
PEAK HOUR	**138**	**837**	**63**	**71**	**60**	**80**	**106**	**952**	**149**	**292**	**99**	**202**	**3049**

R.O.A.R DATA

Reliable, Original & Authentic Results

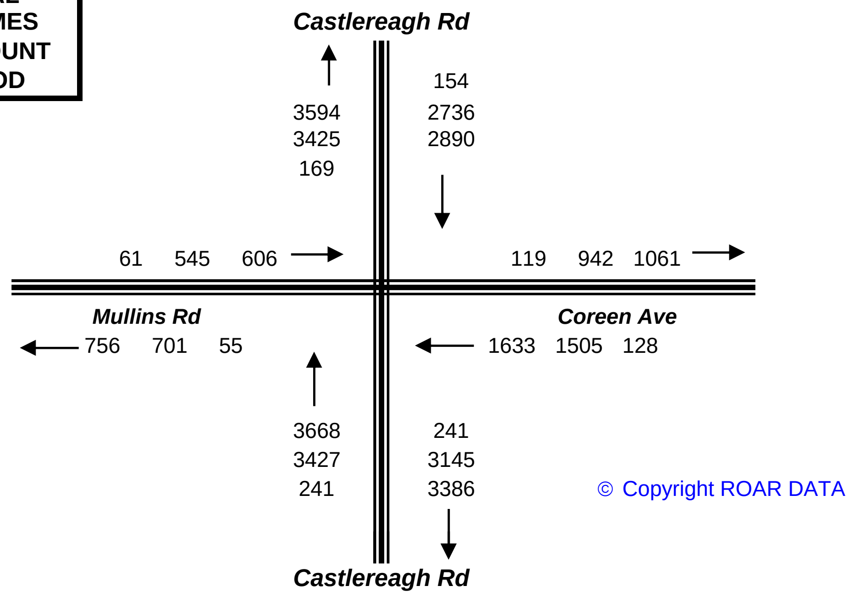
Ph.88196847, Mob.0418-239019

Client : EMM
Job No/Name : 6874 PENRITH Castlereagh Rd 2
Day/Date : Tuesday 7th August 2018



Peds	NORTH	WEST	SOUTH	EAST	
	Castlereagh Rd	*Mullins Rd*	*Castlereagh Rd*	*Coreen Ave*	
Time Per	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**TOT**
1100 - 1115					**0**
1115 - 1130	*NOT*	*NOT*	*NOT*	*NOT*	**0**
1130 - 1145	*REQUIRED*	*REQUIRED*	*REQUIRED*	*REQUIRED*	**0**
1145 - 1200					**0**
1200 - 1215					**0**
1215 - 1230					**0**
1230 - 1245					**0**
1245 - 1300					**0**
1300 - 1315					**0**
1315 - 1330					**0**
1330 - 1345					**0**
1345 - 1400					**0**
Period End	**0**	**0**	**0**	**0**	**0**

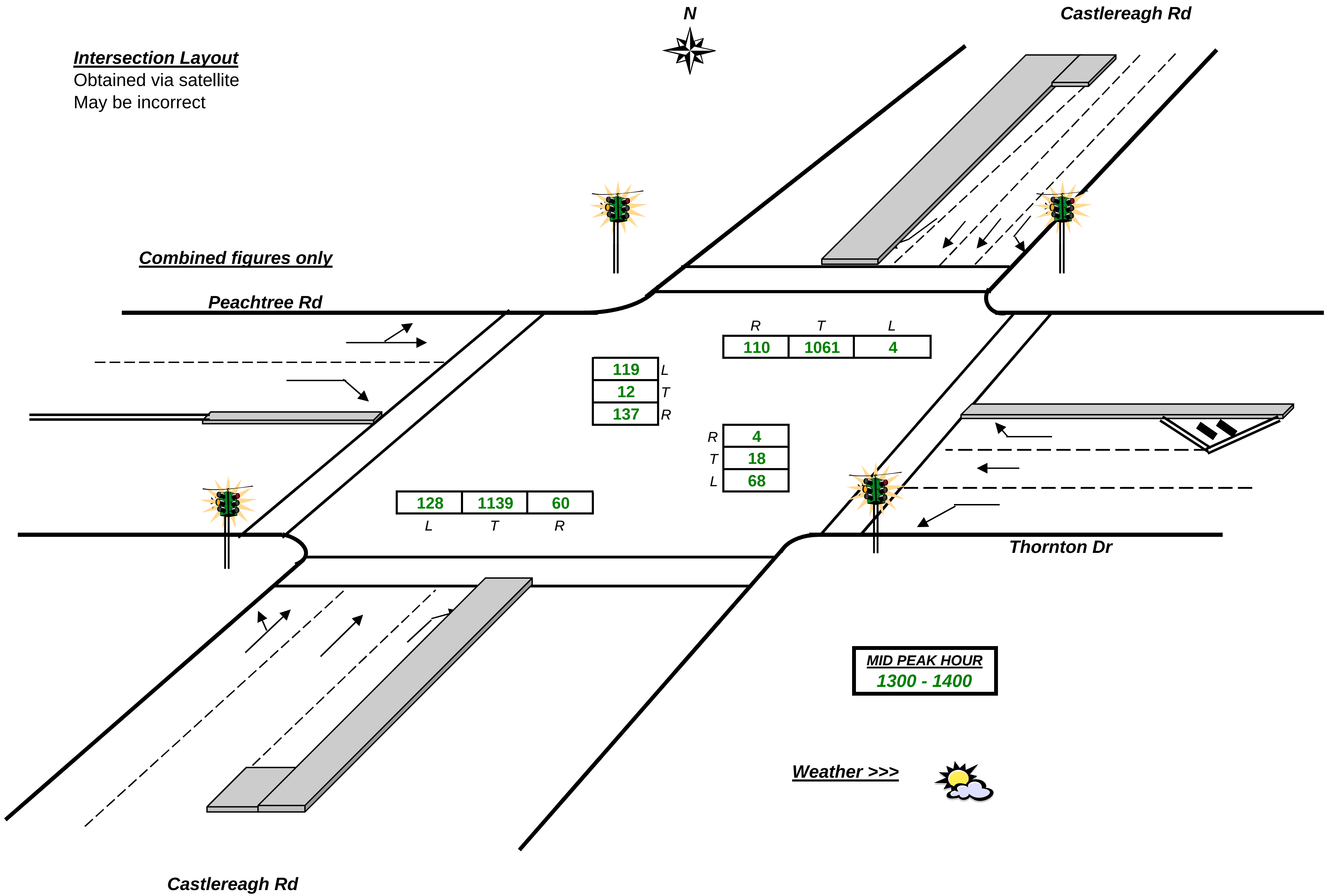
TOTAL VOLUMES FOR COUNT PERIOD



Peds	NORTH	WEST	SOUTH	EAST	
	Castlereagh Rd	*Mullins Rd*	*Castlereagh Rd*	*Coreen Ave*	
Peak Per	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**TOT**
1100 - 1200	0	0	0	0	**0**
1115 - 1215	0	0	0	0	**0**
1130 - 1230	0	0	0	0	**0**
1145 - 1245	0	0	0	0	**0**
1200 - 1300	0	0	0	0	**0**
1215 - 1315	0	0	0	0	**0**
1230 - 1330	0	0	0	0	**0**
1245 - 1345	0	0	0	0	**0**
1300 - 1400	0	0	0	0	**0**
PEAK HR	**0**	**0**	**0**	**0**	**0**

R.O.A.R. DATA
Reliable, Original & Authentic Results
Ph.88196847, Mob.0418-239019

Client : EMM
Job No/Name : 6874 PENRITH Castlereagh Rd 2
Day/Date : Tuesday 7th August 2018



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client : EMM
Job No/Name : 6874 PENRITH Castlereagh Rd 2
Day/Date : Tuesday 7th August 2018

Lights

	NORTH			WEST			SOUTH			EAST			
	Castlereagh Rd			*Peachtree Rd*			*Castlereagh Rd*			*Thornton Dr*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1100 - 1115	3	296	15	17	6	20	19	215	14	14	4	4	**627**
1115 - 1130	3	253	15	16	2	28	27	214	9	26	2	1	**596**
1130 - 1145	1	238	14	21	4	32	41	235	17	13	3	0	**619**
1145 - 1200	2	248	40	27	4	20	38	264	10	14	3	0	**670**
1200 - 1215	4	257	32	26	5	32	40	227	13	16	8	4	**664**
1215 - 1230	2	244	17	42	2	31	30	230	19	21	7	0	**645**
1230 - 1245	1	259	32	23	6	30	41	228	13	12	3	2	**650**
1245 - 1300	2	221	21	33	6	44	41	241	11	15	4	0	**639**
1300 - 1315	1	224	34	30	8	44	38	225	10	12	3	1	**630**
1315 - 1330	1	227	23	36	2	32	29	291	15	20	6	2	**684**
1330 - 1345	0	288	29	26	1	22	30	281	15	16	4	0	**712**
1345 - 1400	1	246	20	26	1	33	28	270	20	19	4	1	**669**
Period End	**21**	**3001**	**292**	**323**	**47**	**368**	**402**	**2921**	**166**	**198**	**51**	**15**	**7805**

Lights

	NORTH			WEST			SOUTH			EAST			
	Castlereagh Rd			*Peachtree Rd*			*Castlereagh Rd*			*Thornton Dr*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1100 - 1200	9	1035	84	81	16	100	125	928	50	67	12	5	**2512**
1115 - 1215	10	996	101	90	15	112	146	940	49	69	16	5	**2549**
1130 - 1230	9	987	103	116	15	115	149	956	59	64	21	4	**2598**
1145 - 1245	9	1008	121	118	17	113	149	949	55	63	21	6	**2629**
1200 - 1300	9	981	102	124	19	137	152	926	56	64	22	6	**2598**
1215 - 1315	6	948	104	128	22	149	150	924	53	60	17	3	**2564**
1230 - 1330	5	931	110	122	22	150	149	985	49	59	16	5	**2603**
1245 - 1345	4	960	107	125	17	142	138	1038	51	63	17	3	**2665**
1300 - 1400	3	985	106	118	12	131	125	1067	60	67	17	4	**2695**
PEAK HOUR	**3**	**985**	**106**	**118**	**12**	**131**	**125**	**1067**	**60**	**67**	**17**	**4**	**2695**

Heavies

	NORTH			WEST			SOUTH			EAST			
	Castlereagh Rd			*Peachtree Rd*			*Castlereagh Rd*			*Thornton Dr*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1100 - 1115	0	13	0	1	0	0	2	23	0	0	0	0	**39**
1115 - 1130	0	18	0	0	0	3	1	12	1	0	0	0	**35**
1130 - 1145	0	23	2	0	0	1	3	17	0	1	0	0	**47**
1145 - 1200	0	14	0	1	0	2	4	20	0	0	0	0	**41**
1200 - 1215	0	17	0	1	0	0	0	27	0	0	0	0	**45**
1215 - 1230	0	22	0	2	0	2	2	20	1	0	1	0	**50**
1230 - 1245	0	26	0	0	0	1	1	18	1	0	1	0	**48**
1245 - 1300	0	17	1	0	0	0	1	22	1	0	0	0	**42**
1300 - 1315	0	21	3	0	0	1	1	13	0	0	0	0	**39**
1315 - 1330	0	18	0	0	0	4	2	18	0	1	1	0	**44**
1330 - 1345	0	15	0	0	0	0	0	25	0	0	0	0	**40**
1345 - 1400	1	22	1	1	0	1	0	16	0	0	0	0	**42**
Period End	**1**	**226**	**7**	**6**	**0**	**15**	**17**	**231**	**4**	**2**	**3**	**0**	**512**

Heavies

	NORTH			WEST			SOUTH			EAST			
	Castlereagh Rd			*Peachtree Rd*			*Castlereagh Rd*			*Thornton Dr*			
Peak Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1100 - 1200	0	68	2	2	0	6	10	72	1	1	0	0	**162**
1115 - 1215	0	72	2	2	0	6	8	76	1	1	0	0	**168**
1130 - 1230	0	76	2	4	0	5	9	84	1	1	1	0	**183**
1145 - 1245	0	79	0	4	0	5	7	85	2	0	2	0	**184**
1200 - 1300	0	82	1	3	0	3	4	87	3	0	2	0	**185**
1215 - 1315	0	86	4	2	0	4	5	73	3	0	2	0	**179**
1230 - 1330	0	82	4	0	0	6	5	71	2	1	2	0	**173**
1245 - 1345	0	71	4	0	0	5	4	78	1	1	1	0	**165**
1300 - 1400	1	76	4	1	0	6	3	72	0	1	1	0	**165**
PEAK HOUR	**1**	**76**	**1**	**0**	**0**	**6**	**3**	**72**	**0**	**1**	**1**	**0**	**165**

Combined

	NORTH			WEST			SOUTH			EAST			
	Castlereagh Rd			*Peachtree Rd*			*Castlereagh Rd*			*Thornton Dr*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1100 - 1115	3	309	15	18	6	20	21	238	14	14	4	4	**666**
1115 - 1130	3	271	15	16	2	31	28	226	10	26	2	1	**631**
1130 - 1145	1	261	16	21	4	33	44	252	17	14	3	0	**666**
1145 - 1200	2	262	40	28	4	22	42	284	10	14	3	0	**711**
1200 - 1215	4	274	32	27	5	32	40	254	13	16	8	4	**709**
1215 - 1230	2	266	17	44	2	33	32	250	20	21	8	0	**695**
1230 - 1245	1	285	32	23	6	31	42	246	14	12	4	2	**698**
1245 - 1300	2	238	22	33	6	44	42	263	12	15	4	0	**681**
1300 - 1315	1	245	37	30	8	45	39	238	10	12	3	1	**669**
1315 - 1330	1	245	23	36	2	36	31	309	15	21	7	2	**728**
1330 - 1345	0	303	29	26	1	22	30	306	15	16	4	0	**752**
1345 - 1400	2	268	21	27	1	34	28	286	20	19	4	1	**711**
Period End	**22**	**3227**	**299**	**329**	**47**	**383**	**419**	**3152**	**170**	**200**	**54**	**15**	**8317**

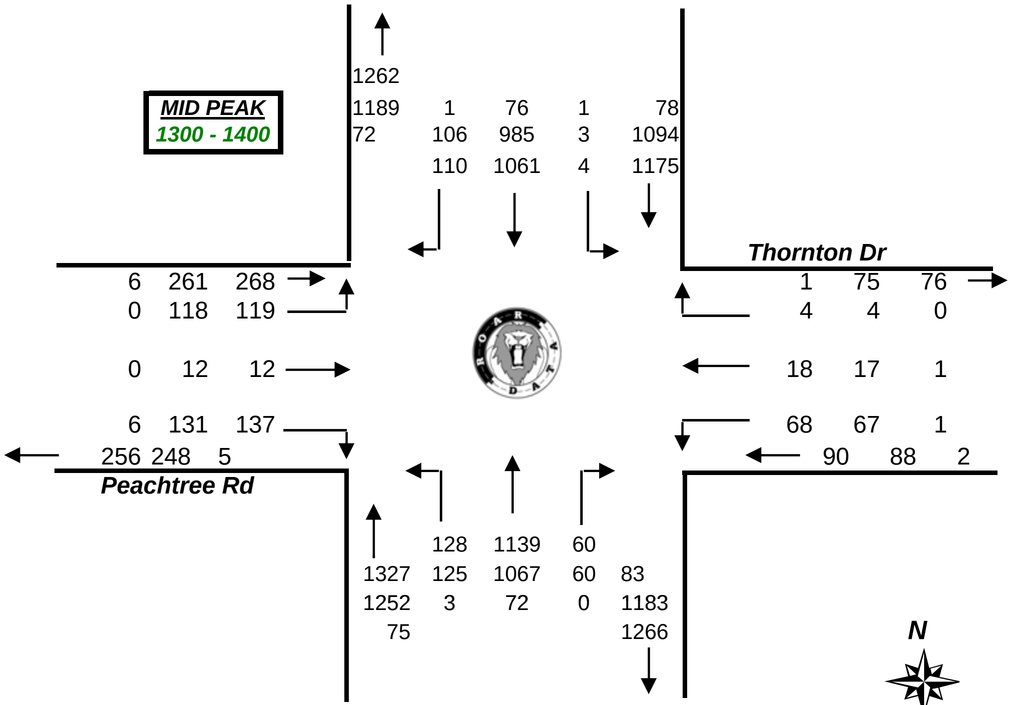
Combined

	NORTH			WEST			SOUTH			EAST			
	Castlereagh Rd			*Peachtree Rd*			*Castlereagh Rd*			*Thornton Dr*			
Peak Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1100 - 1200	9	1103	86	83	16	106	135	1000	51	68	12	5	**2674**
1115 - 1215	10	1068	103	92	15	118	154	1016	50	70	16	5	**2717**
1130 - 1230	9	1063	105	120	15	120	158	1040	60	65	22	4	**2781**
1145 - 1245	9	1087	121	122	17	118	156	1034	57	63	23	6	**2813**
1200 - 1300	9	1063	103	127	19	140	156	1013	59	64	24	6	**2783**
1215 - 1315	6	1034	108	130	22	153	155	997	56	60	19	3	**2743**
1230 - 1330	5	1013	114	122	22	156	154	1056	51	60	18	5	**2776**
1245 - 1345	4	1031	111	125	17	147	142	1116	52	64	18	3	**2830**
1300 - 1400	4	1061	110	119	12	137	128	1139	60	68	18	4	**2860**
PEAK HOUR	**4**	**1061**	**110**	**119**	**12**	**137**	**128**	**1139**	**60**	**68**	**18**	**4**	**2860**

R.O.A.R DATA
Reliable, Original & Authentic Results
Ph.88196847, Mob.0418-239019

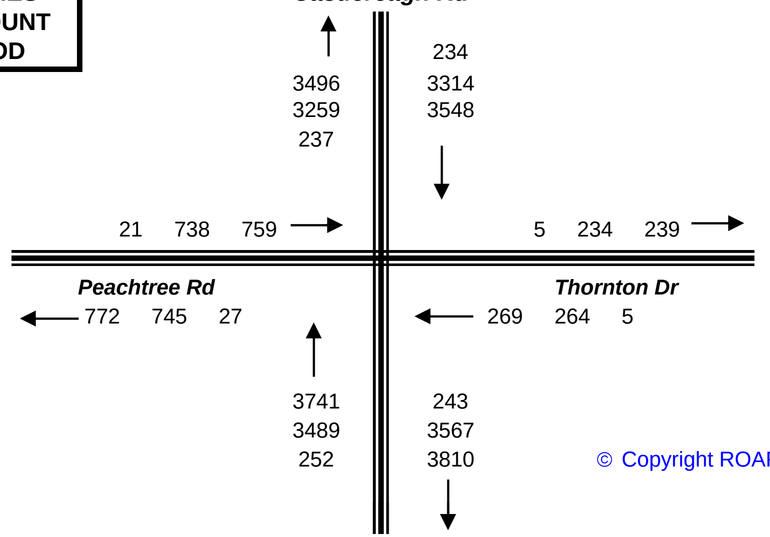
Client : EMM
Job No/Name : 6874 PENRITH Castlereagh Rd 2
Day/Date : Tuesday 7th August 2018

MID PEAK
1300 - 1400



Peds	NORTH	WEST	SOUTH	EAST	
	Castlereagh Rd	*Mullins Rd*	*Castlereagh Rd*	*Coreen Ave*	
Time Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	**TOT**
1100 - 1115	5	2	0	0	**7**
1115 - 1130	*1*	*0*	*0*	*1*	**2**
1130 - 1145	*2*	*0*	*0*	*0*	**2**
1145 - 1200	2	0	1	0	**3**
1200 - 1215	1	0	0	1	**2**
1215 - 1230	4	1	0	0	**5**
1230 - 1245	0	1	0	1	**2**
1245 - 1300	0	1	0	0	**1**
1300 - 1315	0	1	0	1	**2**
1315 - 1330	0	0	1	1	**2**
1330 - 1345	0	0	1	0	**1**
1345 - 1400	0	3	0	0	**3**
Period End	**15**	**9**	**3**	**5**	**32**

TOTAL VOLUMES FOR COUNT PERIOD



Peds	NORTH	WEST	SOUTH	EAST	
	Castlereagh Rd	*Mullins Rd*	*Castlereagh Rd*	*Coreen Ave*	
Peak Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	**TOT**
1100 - 1200	10	2	1	1	**14**
1115 - 1215	6	0	1	2	**9**
1130 - 1230	9	1	1	1	**12**
1145 - 1245	7	2	1	2	**12**
1200 - 1300	5	3	0	2	**10**
1215 - 1315	4	4	0	2	**10**
1230 - 1330	0	3	1	3	**7**
1245 - 1345	0	2	2	2	**6**
1300 - 1400	0	4	2	2	**8**
PEAK HR	**0**	**4**	**2**	**2**	**8**

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client : EMM

Job No/Name : 6864 PENRITH Castlereagh Rd

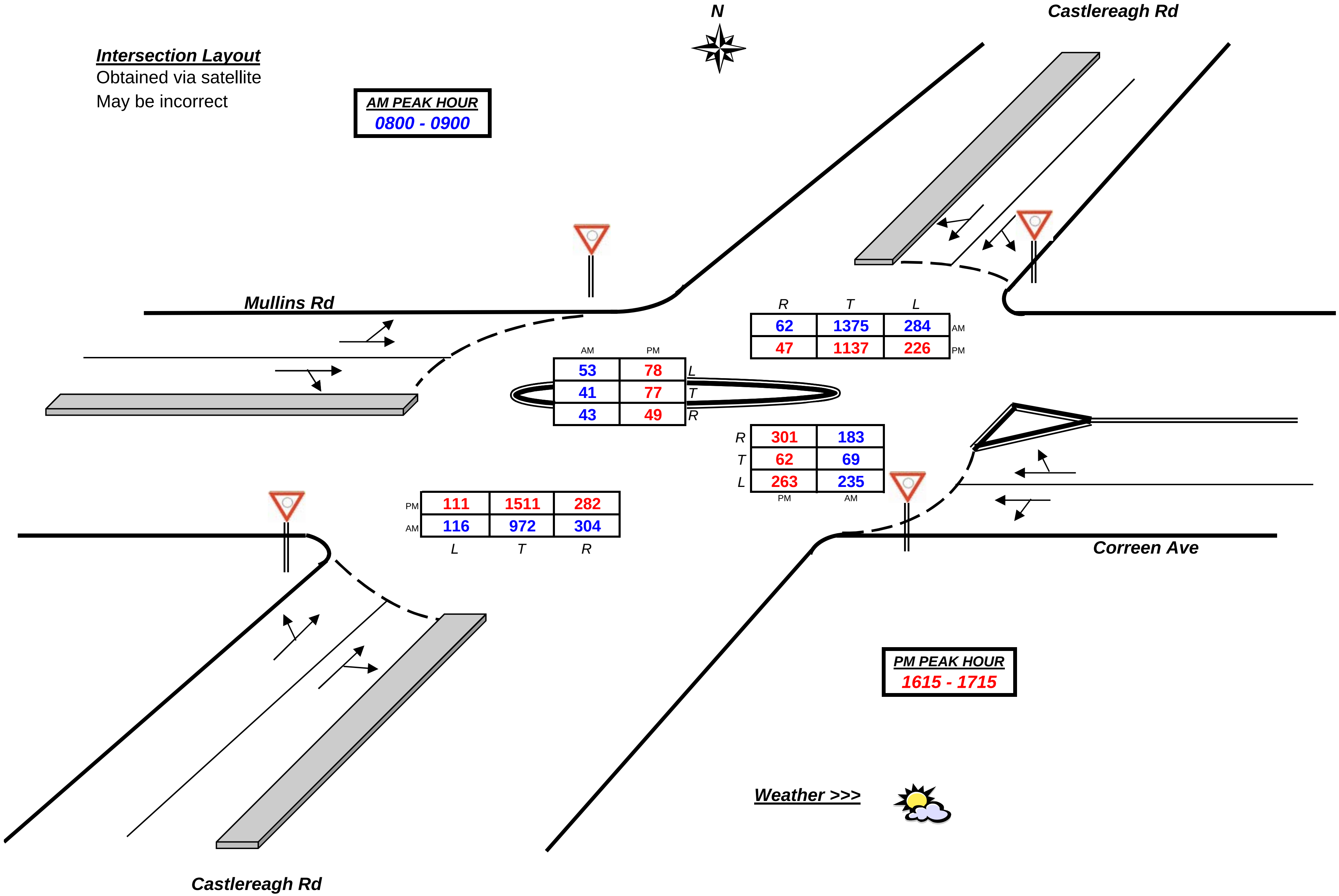
Day/Date : Thursday 26th July 2018

Intersection Layout

Obtained via satellite

May be incorrect

AM PEAK HOUR
0800 - 0900



Castlereagh Rd (north approach)

	R	T	L
AM	62	1375	284
PM	47	1137	226

Mullins Rd (west approach)

	AM	PM
L	53	78
T	41	77
R	43	49

Correen Ave (east approach)

	PM	AM
R	301	183
T	62	69
L	263	235

Castlereagh Rd (south approach)

	L	T	R
PM	111	1511	282
AM	116	972	304

PM PEAK HOUR
1615 - 1715

Weather >>>

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client : EMM

Job No/Name : 6864 PENRITH Castlereagh Rd

Day/Date : Thursday 26th July 2018

Lights

Time Per	NORTH *Castlereagh Rd* L	T	R	WEST *Mullins Rd* L	T	R	SOUTH *Castlereagh Rd* L	T	R	EAST *Coreen Ave* L	T	R	TOT
0600 - 0615	31	108	7	3	0	1	9	151	27	24	3	24	**388**
0615 - 0630	25	160	7	7	3	2	8	205	32	28	12	25	**514**
0630 - 0645	31	229	11	0	2	1	5	178	52	59	10	36	**614**
0645 - 0700	47	279	14	2	3	3	15	207	55	50	15	40	**730**
0700 - 0715	52	287	8	5	6	5	23	203	42	61	21	58	**771**
0715 - 0730	93	241	10	1	8	7	32	238	61	44	20	54	**809**
0730 - 0745	69	242	11	1	5	3	12	222	48	56	18	51	**738**
0745 - 0800	110	259	8	5	9	14	21	265	57	52	10	50	**860**
0800 - 0815	72	268	16	13	5	8	28	261	62	54	20	49	**856**
0815 - 0830	68	346	15	18	9	7	25	237	61	49	19	42	**896**
0830 - 0845	61	319	12	10	12	12	14	205	80	50	16	39	**830**
0845 - 0900	75	394	14	11	14	14	34	236	70	54	14	43	**973**
Period End	**734**	**3132**	**133**	**76**	**76**	**77**	**226**	**2608**	**647**	**581**	**178**	**511**	**8979**

Lights

Peak Time	NORTH *Castlereagh Rd* L	T	R	WEST *Mullins Rd* L	T	R	SOUTH *Castlereagh Rd* L	T	R	EAST *Coreen Ave* L	T	R	TOT
0600 - 0700	134	776	39	12	8	7	37	741	166	161	40	125	**2246**
0615 - 0715	155	955	40	14	14	11	51	793	181	198	58	159	**2629**
0630 - 0730	223	1036	43	8	19	16	75	826	210	214	66	188	**2924**
0645 - 0745	261	1049	43	9	22	18	82	870	206	211	74	203	**3048**
0700 - 0800	324	1029	37	12	28	29	88	928	208	213	69	213	**3178**
0715 - 0815	344	1010	45	20	27	32	93	986	228	206	68	204	**3263**
0730 - 0830	319	1115	50	37	28	32	86	985	228	211	67	192	**3350**
0745 - 0845	311	1192	51	46	35	41	88	968	260	205	65	180	**3442**
0800 - 0900	276	1327	57	52	40	41	101	939	273	207	69	173	**3555**
PEAK HOUR	**276**	**1327**	**57**	**52**	**40**	**41**	**101**	**939**	**273**	**207**	**69**	**173**	**3555**

Heavies

Time Per	NORTH *Castlereagh Rd* L	T	R	WEST *Mullins Rd* L	T	R	SOUTH *Castlereagh Rd* L	T	R	EAST *Coreen Ave* L	T	R	TOT
0600 - 0615	0	10	0	1	1	5	0	7	1	7	0	2	**34**
0615 - 0630	0	15	0	5	1	6	0	6	2	6	1	5	**47**
0630 - 0645	2	11	0	4	1	6	0	6	10	4	0	2	**46**
0645 - 0700	0	12	0	1	2	7	0	5	6	8	0	5	**46**
0700 - 0715	0	11	0	3	1	8	0	8	10	7	0	1	**49**
0715 - 0730	1	9	0	2	0	12	0	6	5	8	0	5	**48**
0730 - 0745	2	10	1	2	1	4	1	11	4	15	1	7	**59**
0745 - 0800	2	10	0	0	0	1	0	8	4	6	0	3	**34**
0800 - 0815	1	11	1	0	1	0	0	9	10	8	0	3	**44**
0815 - 0830	2	11	2	0	0	0	2	11	4	5	0	5	**42**
0830 - 0845	1	11	0	1	0	2	3	3	9	8	0	0	**38**
0845 - 0900	4	15	2	0	0	0	10	10	8	7	0	2	**58**
Period End	**15**	**136**	**6**	**19**	**8**	**51**	**16**	**90**	**73**	**89**	**2**	**40**	**545**

Heavies

Peak Per	NORTH *Castlereagh Rd* L	T	R	WEST *Mullins Rd* L	T	R	SOUTH *Castlereagh Rd* L	T	R	EAST *Coreen Ave* L	T	R	TOT
0600 - 0700	2	48	0	11	5	24	0	24	19	25	1	14	**173**
0615 - 0715	2	49	0	13	5	27	0	25	28	25	1	13	**188**
0630 - 0730	3	43	0	10	4	33	0	25	31	27	0	13	**189**
0645 - 0745	3	42	1	8	4	31	1	30	25	38	1	18	**202**
0700 - 0800	5	40	1	7	2	25	1	33	23	36	1	16	**190**
0715 - 0815	6	40	2	4	2	17	1	34	23	37	1	18	**185**
0730 - 0830	7	42	4	2	2	5	3	39	22	34	1	18	**179**
0745 - 0845	6	43	3	1	1	3	5	31	27	27	0	11	**158**
0800 - 0900	8	48	5	1	1	2	15	33	31	28	0	10	**182**
PEAK HOUR	**8**	**48**	**5**	**1**	**1**	**2**	**15**	**33**	**31**	**28**	**0**	**10**	**182**

Combined

Time Per	NORTH *Castlereagh Rd* L	T	R	WEST *Mullins Rd* L	T	R	SOUTH *Castlereagh Rd* L	T	R	EAST *Coreen Ave* L	T	R	TOT
0600 - 0615	31	118	7	4	1	6	9	158	28	31	3	26	**422**
0615 - 0630	25	175	7	12	4	8	8	211	34	34	13	30	**561**
0630 - 0645	33	240	11	4	3	7	5	184	62	63	10	38	**660**
0645 - 0700	47	291	14	3	5	10	15	212	61	58	15	45	**776**
0700 - 0715	52	298	8	8	7	13	23	211	52	68	21	59	**820**
0715 - 0730	94	250	10	3	8	19	32	244	66	52	20	59	**857**
0730 - 0745	71	252	12	3	6	7	13	233	52	71	19	58	**797**
0745 - 0800	112	269	8	5	9	15	21	273	61	58	10	53	**894**
0800 - 0815	73	279	17	13	6	8	28	270	72	62	20	52	**900**
0815 - 0830	70	357	17	18	9	7	27	248	65	54	19	47	**938**
0830 - 0845	62	330	12	11	12	14	17	208	89	58	16	39	**868**
0845 - 0900	79	409	16	11	14	14	44	246	78	61	14	45	**1031**
Period End	**749**	**3268**	**139**	**95**	**84**	**128**	**242**	**2698**	**720**	**670**	**180**	**551**	**9524**

Combined

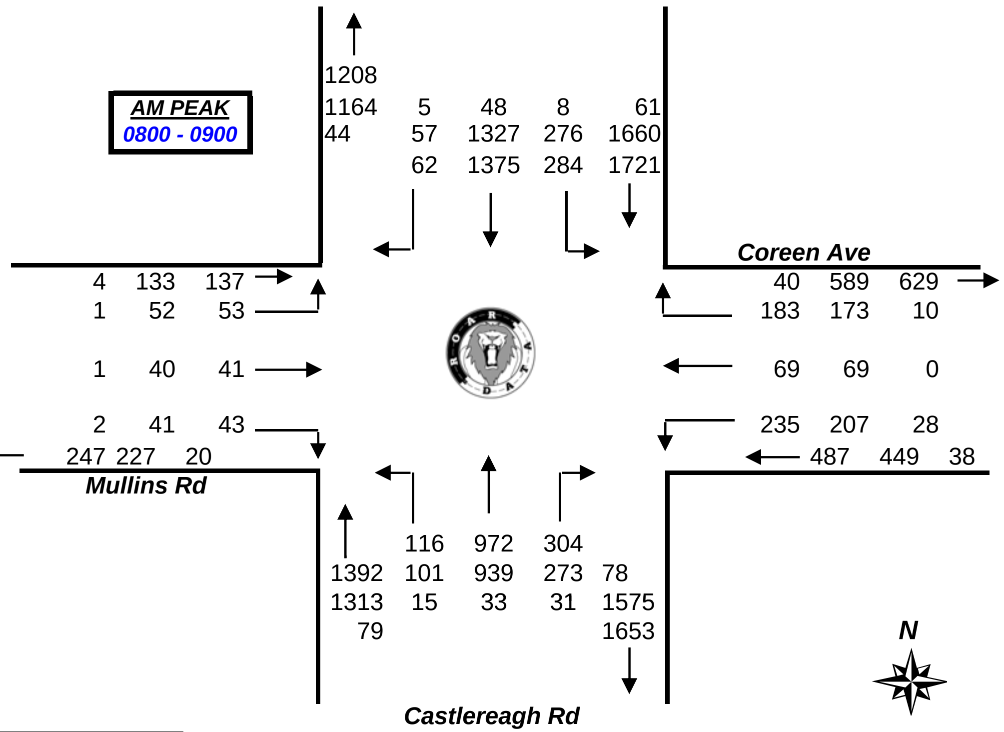
Peak Per	NORTH *Castlereagh Rd* L	T	R	WEST *Mullins Rd* L	T	R	SOUTH *Castlereagh Rd* L	T	R	EAST *Coreen Ave* L	T	R	TOT
0600 - 0700	136	824	39	23	13	31	37	765	185	186	41	139	**2419**
0615 - 0715	157	1004	40	27	19	38	51	818	209	223	59	172	**2817**
0630 - 0730	226	1079	43	18	23	49	75	851	241	241	66	201	**3113**
0645 - 0745	264	1091	44	17	26	49	83	900	231	249	75	221	**3250**
0700 - 0800	329	1069	38	19	30	54	89	961	231	249	70	229	**3368**
0715 - 0815	350	1050	47	24	29	49	94	1020	251	243	69	222	**3448**
0730 - 0830	326	1157	54	39	30	37	89	1024	250	245	68	210	**3529**
0745 - 0845	317	1235	54	47	36	44	93	999	287	232	65	191	**3600**
0800 - 0900	284	1375	62	53	41	43	116	972	304	235	69	183	**3737**
PEAK HOUR	**284**	**1375**	**62**	**53**	**41**	**43**	**116**	**972**	**304**	**235**	**69**	**183**	**3737**

R.O.A.R DATA

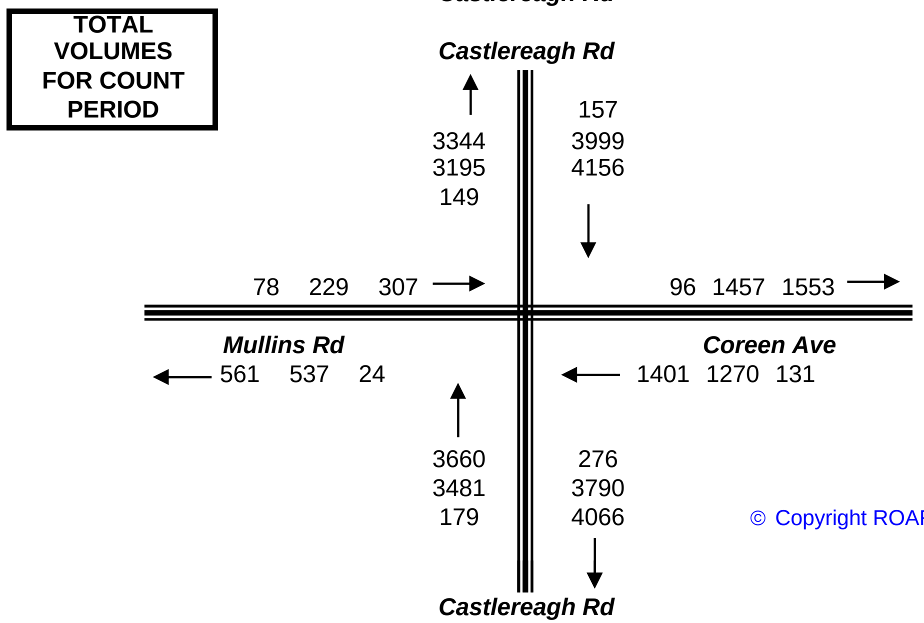
Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client : EMM
Job No/Name : 6864 PENRITH Castlereagh Rd
Day/Date : Thursday 26th July 2018



Peds	NORTH	WEST	SOUTH	EAST	
	Castlereagh Rd	*Mullins Rd*	*Castlereagh Rd*	*Coreen Ave*	
Time Per	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**TOT**
0600 - 0615					**0**
0615 - 0630	*NOT*	*NOT*	*NOT*	*NOT*	**0**
0630 - 0645	*REQUIRED*	*REQUIRED*	*REQUIRED*	*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**
Period End	**0**	**0**	**0**	**0**	**0**



Peds	NORTH	WEST	SOUTH	EAST	
	Castlereagh Rd	*Mullins Rd*	*Castlereagh Rd*	*Coreen Ave*	
Peak Per	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**TOT**
0600 - 0700	0	0	0	0	**0**
0615 - 0715	0	0	0	0	**0**
0630 - 0730	0	0	0	0	**0**
0645 - 0745	0	0	0	0	**0**
0700 - 0800	0	0	0	0	**0**
0715 - 0815	0	0	0	0	**0**
0730 - 0830	0	0	0	0	**0**
0745 - 0845	0	0	0	0	**0**
0800 - 0900	0	0	0	0	**0**

PEAK HR	**0**	**0**	**0**	**0**	**0**

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client : EMM
Job No/Name : 6864 PENRITH Castlereagh Rd
Day/Date : Thursday 26th July 2018

Lights

Time Per	NORTH Castlereagh Rd			WEST Mullins Rd			SOUTH Castlereagh Rd			EAST Coreen Ave			TOT
	L	T	R	L	T	R	L	T	R	L	T	R	
1500 - 1515	63	263	3	10	14	14	25	257	55	48	19	50	821
1515 - 1530	65	273	5	9	14	10	23	267	49	54	12	48	829
1530 - 1545	64	289	0	14	17	14	17	347	75	74	15	61	987
1545 - 1600	68	319	2	32	9	5	25	265	55	48	18	45	891
1600 - 1615	67	339	15	26	17	15	23	347	55	52	14	61	1031
1615 - 1630	58	284	9	18	21	7	28	335	71	64	10	75	980
1630 - 1645	51	274	9	23	16	9	16	387	62	65	11	70	993
1645 - 1700	58	254	15	14	23	17	28	379	63	54	24	72	1001
1700 - 1715	54	300	10	21	17	15	19	387	71	73	17	78	1062
1715 - 1730	69	241	15	19	14	10	18	408	61	47	8	71	981
1730 - 1745	54	223	10	14	21	8	12	341	38	51	9	65	846
1745 - 1800	63	219	8	12	9	3	18	370	55	63	16	80	916
Period End	**734**	**3278**	**101**	**212**	**192**	**127**	**252**	**4090**	**710**	**693**	**173**	**776**	**11338**

Lights

Peak Time	NORTH Castlereagh Rd			WEST Mullins Rd			SOUTH Castlereagh Rd			EAST Coreen Ave			TOT
	L	T	R	L	T	R	L	T	R	L	T	R	
1500 - 1600	260	1144	10	65	54	43	90	1136	234	224	64	204	3528
1515 - 1615	264	1220	22	81	57	44	88	1226	234	228	59	215	3738
1530 - 1630	257	1231	26	90	64	41	93	1294	256	238	57	242	3889
1545 - 1645	244	1216	35	99	63	36	92	1334	243	229	53	251	3895
1600 - 1700	234	1151	48	81	77	48	95	1448	251	235	59	278	4005
1615 - 1715	221	1112	43	76	77	48	91	1488	267	256	62	295	4036
1630 - 1730	232	1069	49	77	70	51	81	1561	257	239	60	291	4037
1645 - 1745	235	1018	50	68	75	50	77	1515	233	225	58	286	3890
1700 - 1800	240	983	43	66	61	36	67	1506	225	234	50	294	3805
PEAK HOUR	**221**	**1112**	**43**	**76**	**77**	**48**	**91**	**1488**	**267**	**256**	**62**	**295**	**4036**

Heavies

Time Per	NORTH Castlereagh Rd			WEST Mullins Rd			SOUTH Castlereagh Rd			EAST Coreen Ave			TOT
	L	T	R	L	T	R	L	T	R	L	T	R	
1500 - 1515	5	5	0	1	0	0	0	7	9	1	0	1	29
1515 - 1530	3	10	0	0	0	1	0	6	2	1	0	3	26
1530 - 1545	8	19	0	1	0	1	0	11	2	1	0	3	46
1545 - 1600	4	2	1	0	0	1	1	12	1	2	1	1	26
1600 - 1615	4	8	1	0	0	0	4	6	3	4	0	0	30
1615 - 1630	0	6	2	1	0	0	8	6	4	2	0	1	30
1630 - 1645	5	6	1	0	0	0	6	4	6	2	0	3	33
1645 - 1700	0	6	0	0	0	1	4	8	3	3	0	0	25
1700 - 1715	0	7	1	1	0	0	2	5	2	0	0	2	20
1715 - 1730	1	5	2	0	0	0	4	10	3	1	0	0	26
1730 - 1745	0	1	0	1	0	0	1	7	1	1	0	5	17
1745 - 1800	1	3	1	0	0	0	2	7	2	1	0	1	18
Period End	**31**	**78**	**9**	**5**	**0**	**4**	**32**	**89**	**38**	**19**	**1**	**20**	**326**

Heavies

Peak Per	NORTH Castlereagh Rd			WEST Mullins Rd			SOUTH Castlereagh Rd			EAST Coreen Ave			TOT
	L	T	R	L	T	R	L	T	R	L	T	R	
1500 - 1600	20	36	1	2	0	3	1	36	14	5	1	8	127
1515 - 1615	19	39	2	1	0	3	5	35	8	8	1	7	128
1530 - 1630	16	35	4	2	0	2	13	35	10	9	1	5	132
1545 - 1645	13	22	5	1	0	1	19	28	14	10	1	5	119
1600 - 1700	9	26	4	1	0	1	22	24	16	11	0	4	118
1615 - 1715	5	25	4	2	0	1	20	23	15	7	0	6	108
1630 - 1730	6	24	4	1	0	1	16	27	14	6	0	5	104
1645 - 1745	1	19	3	2	0	1	11	30	9	5	0	7	88
1700 - 1800	2	16	4	2	0	0	9	29	8	3	0	8	81
PEAK HOUR	**5**	**25**	**4**	**2**	**0**	**1**	**20**	**23**	**15**	**7**	**0**	**6**	**108**

Combined

Time Per	NORTH Castlereagh Rd			WEST Mullins Rd			SOUTH Castlereagh Rd			EAST Coreen Ave			TOT
	L	T	R	L	T	R	L	T	R	L	T	R	
1500 - 1515	68	268	3	11	14	14	25	264	64	49	19	51	850
1515 - 1530	68	283	5	9	14	11	23	273	51	55	12	51	855
1530 - 1545	72	308	0	15	17	15	17	358	77	75	15	64	1033
1545 - 1600	72	321	3	32	9	6	26	277	56	50	19	46	917
1600 - 1615	71	347	16	26	17	15	27	353	58	56	14	61	1061
1615 - 1630	58	290	11	19	21	7	36	341	75	66	10	76	1010
1630 - 1645	56	280	10	23	16	9	22	391	68	67	11	73	1026
1645 - 1700	58	260	15	14	23	18	32	387	66	57	24	72	1026
1700 - 1715	54	307	11	22	17	15	21	392	73	73	17	80	1082
1715 - 1730	70	246	17	19	14	10	22	418	64	48	8	71	1007
1730 - 1745	54	224	10	15	21	8	13	348	39	52	9	70	863
1745 - 1800	64	222	9	12	9	3	20	377	57	64	16	81	934
Period End	**765**	**3356**	**110**	**217**	**192**	**131**	**284**	**4179**	**748**	**712**	**174**	**796**	**11664**

Combined

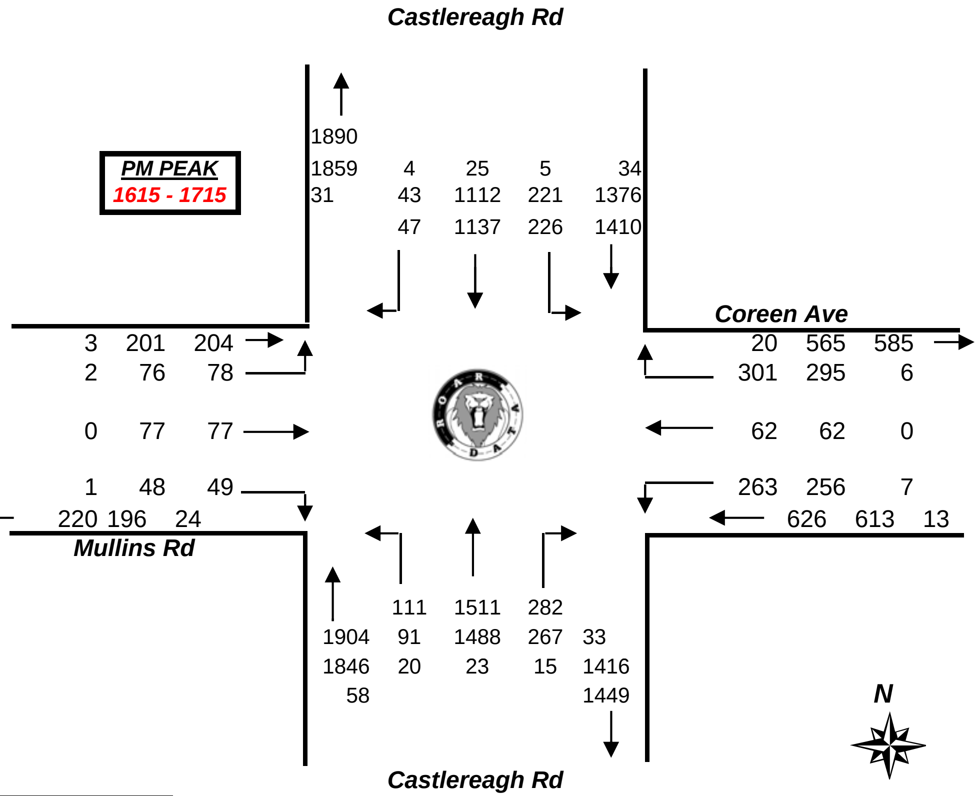
Peak Per	NORTH Castlereagh Rd			WEST Mullins Rd			SOUTH Castlereagh Rd			EAST Coreen Ave			TOT
	L	T	R	L	T	R	L	T	R	L	T	R	
1500 - 1600	280	1180	11	67	54	46	91	1172	248	229	65	212	3655
1515 - 1615	283	1259	24	82	57	47	93	1261	242	236	60	222	3866
1530 - 1630	273	1266	30	92	64	43	106	1329	266	247	58	247	4021
1545 - 1645	257	1238	40	100	63	37	111	1362	257	239	54	256	4014
1600 - 1700	243	1177	52	82	77	49	117	1472	267	246	59	282	4123
1615 - 1715	226	1137	47	78	77	49	111	1511	282	263	62	301	4144
1630 - 1730	238	1093	53	78	70	52	97	1588	271	245	60	296	4141
1645 - 1745	236	1037	53	70	75	51	88	1545	242	230	58	293	3978
1700 - 1800	242	999	47	68	61	36	76	1535	233	237	50	302	3886
PEAK HOUR	**226**	**1137**	**47**	**78**	**77**	**49**	**111**	**1511**	**282**	**263**	**62**	**301**	**4144**

R.O.A.R DATA

Reliable, Original & Authentic Results

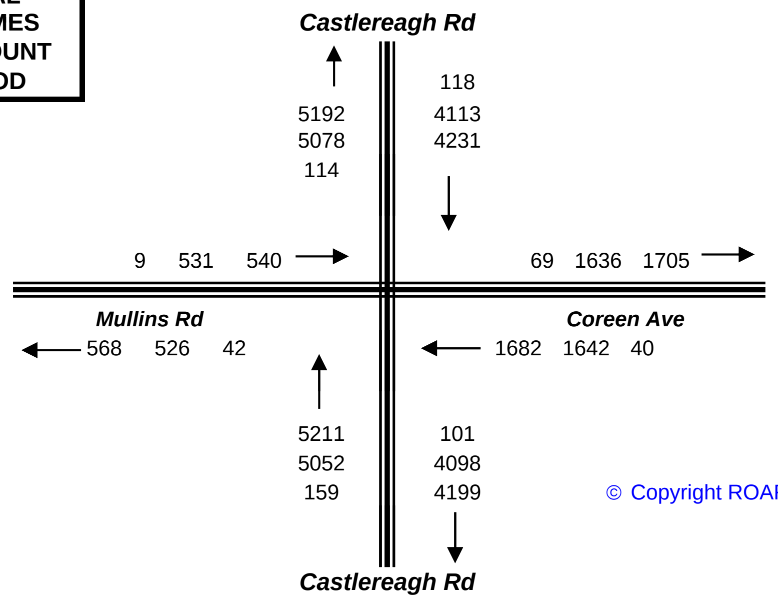
Ph.88196847, Mob.0418-239019

Client : EMM
Job No/Name : 6864 PENRITH Castlereagh Rd
Day/Date : Thursday 26th July 2018



Peds	NORTH Castleragh Rd	WEST Mullins Rd	SOUTH Castleragh Rd	EAST Coreen Ave	
Time Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
1500 - 1515					0
1515 - 1530	*NOT*	*NOT*	*NOT*	*NOT*	0
1530 - 1545	*REQUIRED*	*REQUIRED*	*REQUIRED*	*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
Period End	**0**	**0**	**0**	**0**	**0**

TOTAL VOLUMES FOR COUNT PERIOD



Peds	NORTH Castlereagh Rd	WEST Mullins Rd	SOUTH Castlereagh Rd	EAST Coreen Ave	
Peak Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
1500 - 1600	0	0	0	0	0
1515 - 1615	0	0	0	0	0
1530 - 1630	0	0	0	0	0
1545 - 1645	0	0	0	0	0
1600 - 1700	0	0	0	0	0
1615 - 1715	0	0	0	0	0
1630 - 1730	0	0	0	0	0
1645 - 1745	0	0	0	0	0
1700 - 1800	0	0	0	0	0
PEAK HR	**0**	**0**	**0**	**0**	**0**

R.O.A.R. DATA

Reliable, Original & Authentic Results

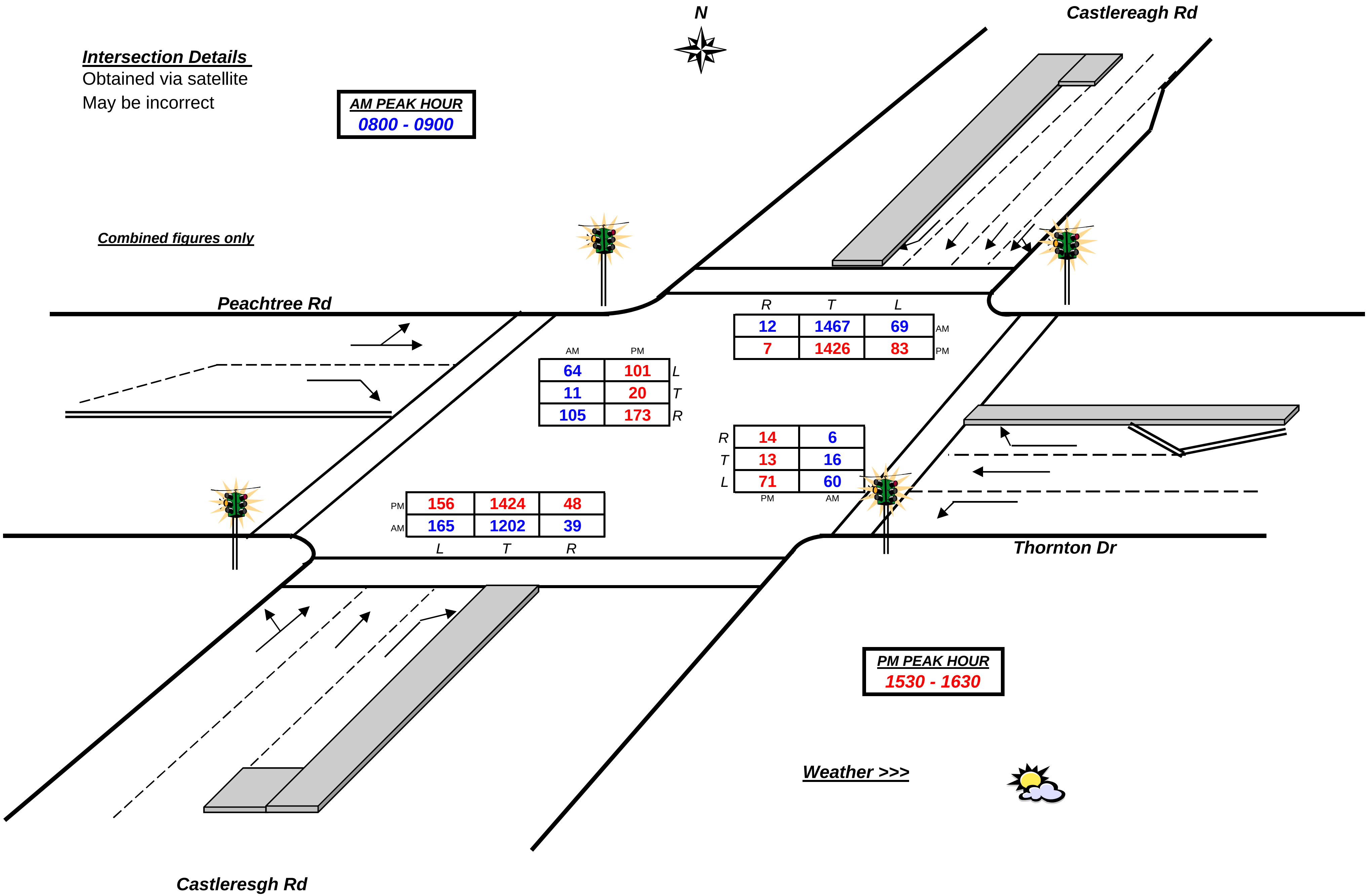
Ph.88196847, Fax 88196849, Mob.0418-239019

Client : EMM
Job No/Name : 6141 PENRITH Peachtree Rd
Day/Date : Monday 25th July 2016

Intersection Details
Obtained via satellite
May be incorrect

AM PEAK HOUR
0800 - 0900

Combined figures only



	R	T	L
AM	12	1467	69
PM	7	1426	83

	AM	PM
L	64	101
T	11	20
R	105	173

	PM	AM
R	14	6
T	13	16
L	71	60

	L	T	R
PM	156	1424	48
AM	165	1202	39

PM PEAK HOUR
1530 - 1630

Weather >>>

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : EMM

Job No/Name : 6141 PENRITH Peachtree Rd

Day/Date : Monday 25th July 2016

Lights

	NORTH			WEST			SOUTH			EAST			
	Castlereagh Rd			*Peachtree Rd*			*Castlereagh Rd*			*Thornton Dr*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0600 - 0615	6	87	4	3	1	3	23	147	7	0	0	0	**281**
0615 - 0630	22	141	2	6	1	11	26	150	13	4	1	0	**377**
0630 - 0645	18	195	1	22	4	16	32	188	24	7	1	0	**508**
0645 - 0700	7	233	5	12	3	13	36	229	32	5	1	3	**579**
0700 - 0715	13	205	3	17	4	11	29	184	28	9	0	1	**504**
0715 - 0730	15	240	3	8	1	13	33	215	39	13	3	0	**583**
0730 - 0745	18	246	1	16	3	11	32	307	31	10	1	0	**676**
0745 - 0800	10	293	2	21	0	17	42	295	17	15	2	2	**716**
0800 - 0815	10	300	4	19	4	19	30	278	19	16	6	1	**706**
0815 - 0830	22	357	3	12	1	22	46	305	6	16	1	3	**794**
0830 - 0845	18	393	4	15	3	28	25	290	9	17	4	0	**806**
0845 - 0900	17	366	1	15	3	22	52	269	4	11	5	2	**767**
Period End	**176**	**3056**	**33**	**166**	**28**	**186**	**406**	**2857**	**229**	**123**	**25**	**12**	**7297**

Lights

	NORTH			WEST			SOUTH			EAST			
	Castlereagh Rd			*Peachtree Rd*			*Castlereagh Rd*			*Thornton Dr*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0600 - 0700	53	656	12	43	9	43	117	714	76	16	3	3	**1745**
0615 - 0715	60	774	11	57	12	51	123	751	97	25	3	4	**1968**
0630 - 0730	53	873	12	59	12	53	130	816	123	34	5	4	**2174**
0645 - 0745	53	924	12	53	11	48	130	935	130	37	5	4	**2342**
0700 - 0800	56	984	9	62	8	52	136	1001	115	47	6	3	**2479**
0715 - 0815	53	1079	10	64	8	60	137	1095	106	54	12	3	**2681**
0730 - 0830	60	1196	10	68	8	69	150	1185	73	57	10	6	**2892**
0745 - 0845	60	1343	13	67	8	86	143	1168	51	64	13	6	**3022**
0800 - 0900	67	1416	12	61	11	91	153	1142	38	60	16	6	**3073**
PEAK HOUR	**67**	**1416**	**12**	**61**	**11**	**91**	**153**	**1142**	**38**	**60**	**16**	**6**	**3073**

Heavies

	NORTH			WEST			SOUTH			EAST			
	Castlereagh Rd			*Peachtree Rd*			*Castlereagh Rd*			*Thornton Dr*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0600 - 0615	0	22	0	0	0	0	0	5	0	0	0	0	**27**
0615 - 0630	1	31	0	0	0	0	1	11	0	0	0	0	**44**
0630 - 0645	0	28	0	1	0	0	0	8	0	0	0	0	**37**
0645 - 0700	0	33	0	1	0	0	3	5	0	0	0	0	**42**
0700 - 0715	1	19	0	1	0	2	1	12	0	0	0	0	**36**
0715 - 0730	0	23	0	0	0	1	1	8	0	0	0	0	**33**
0730 - 0745	0	14	0	1	0	2	3	11	0	0	0	0	**31**
0745 - 0800	0	10	0	0	0	2	0	15	0	0	0	0	**27**
0800 - 0815	0	10	0	0	0	6	2	9	1	0	0	0	**28**
0815 - 0830	0	17	0	0	0	1	2	10	0	0	0	0	**30**
0830 - 0845	2	8	0	0	0	3	4	16	0	0	0	0	**33**
0845 - 0900	0	16	0	3	0	4	4	25	0	0	0	0	**52**
Period End	**4**	**231**	**0**	**7**	**0**	**21**	**21**	**135**	**1**	**0**	**0**	**0**	**420**

Heavies

	NORTH			WEST			SOUTH			EAST			
	Castlereagh Rd			*Peachtree Rd*			*Castlereagh Rd*			*Thornton Dr*			
Peak Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0600 - 0700	1	114	0	2	0	0	4	29	0	0	0	0	**150**
0615 - 0715	2	111	0	3	0	2	5	36	0	0	0	0	**159**
0630 - 0730	1	103	0	3	0	3	5	33	0	0	0	0	**148**
0645 - 0745	1	89	0	3	0	5	8	36	0	0	0	0	**142**
0700 - 0800	1	66	0	2	0	7	5	46	0	0	0	0	**127**
0715 - 0815	0	57	0	1	0	11	6	43	1	0	0	0	**119**
0730 - 0830	0	51	0	1	0	11	7	45	1	0	0	0	**116**
0745 - 0845	2	45	0	0	0	12	8	50	1	0	0	0	**118**
0800 - 0900	2	51	0	3	0	14	12	60	1	0	0	0	**143**
PEAK HOUR	**2**	**51**	**3**	**1**	**0**	**14**	**12**	**60**	**1**	**0**	**0**	**0**	**143**

Combined

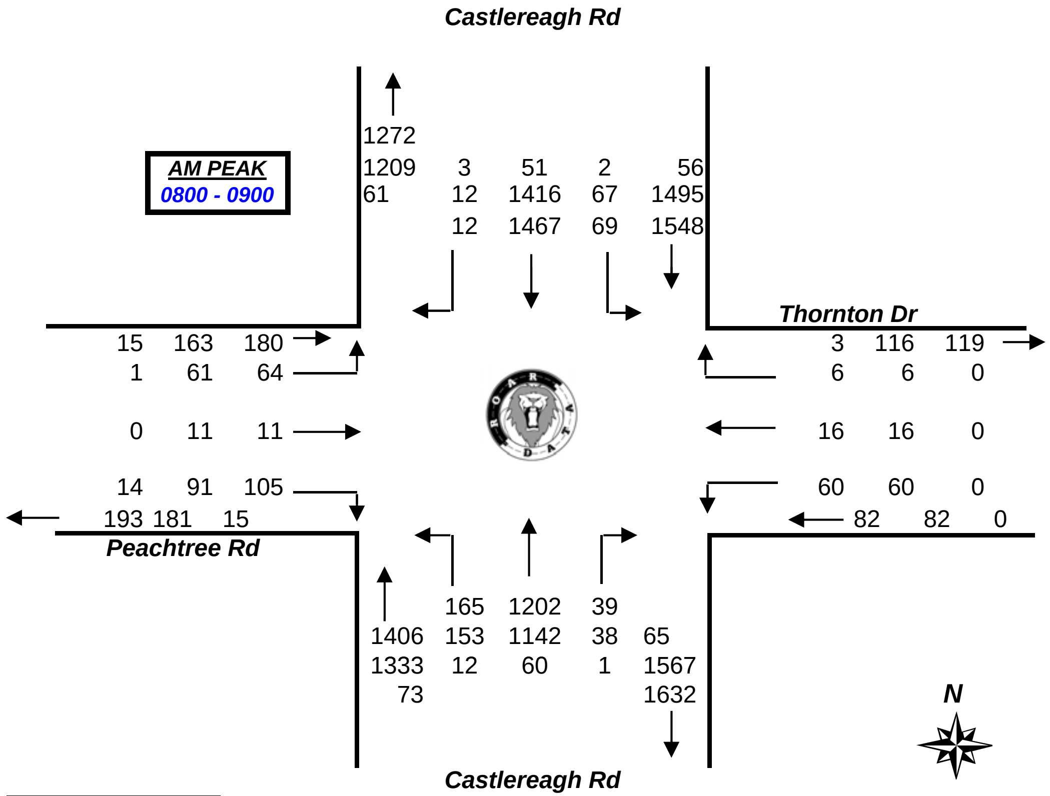
	NORTH			WEST			SOUTH			EAST			
	Castlereagh Rd			*Peachtree Rd*			*Castlereagh Rd*			*Thornton Dr*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0600 - 0615	6	109	4	3	1	3	23	152	7	0	0	0	**308**
0615 - 0630	23	172	2	6	1	11	27	161	13	4	1	0	**421**
0630 - 0645	18	223	1	23	4	16	32	196	24	7	1	0	**545**
0645 - 0700	7	266	5	13	3	13	39	234	32	5	1	3	**621**
0700 - 0715	14	224	3	18	4	13	30	196	28	9	0	1	**540**
0715 - 0730	15	263	3	8	1	14	34	223	39	13	3	0	**616**
0730 - 0745	18	260	1	17	3	13	35	318	31	10	1	0	**707**
0745 - 0800	10	303	2	21	0	19	42	310	17	15	2	2	**743**
0800 - 0815	10	310	4	19	4	25	32	287	20	16	6	1	**734**
0815 - 0830	22	374	3	12	1	23	48	315	6	16	1	3	**824**
0830 - 0845	20	401	4	15	3	31	29	306	9	17	4	0	**839**
0845 - 0900	17	382	1	18	3	26	56	294	4	11	5	2	**819**
Period End	**180**	**3287**	**33**	**173**	**28**	**207**	**427**	**2992**	**230**	**123**	**25**	**12**	**7717**

Combined

	NORTH			WEST			SOUTH			EAST			
	Castlereagh Rd			*Peachtree Rd*			*Castlereagh Rd*			*Thornton Dr*			
Peak Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0600 - 0700	54	770	12	45	9	43	121	743	76	16	3	3	**1895**
0615 - 0715	62	885	11	60	12	53	128	787	97	25	3	4	**2127**
0630 - 0730	54	976	12	62	12	56	135	849	123	34	5	4	**2322**
0645 - 0745	54	1013	12	56	11	53	138	971	130	37	5	4	**2484**
0700 - 0800	57	1050	9	64	8	59	141	1047	115	47	6	3	**2606**
0715 - 0815	53	1136	10	65	8	71	143	1138	107	54	12	3	**2800**
0730 - 0830	60	1247	10	69	8	80	157	1230	74	57	10	6	**3008**
0745 - 0845	62	1388	13	67	8	98	151	1218	52	64	13	6	**3140**
0800 - 0900	69	1467	12	64	11	105	165	1202	39	60	16	6	**3216**
PEAK HOUR	**69**	**1467**	**12**	**64**	**11**	**105**	**165**	**1202**	**39**	**60**	**16**	**6**	**3216**

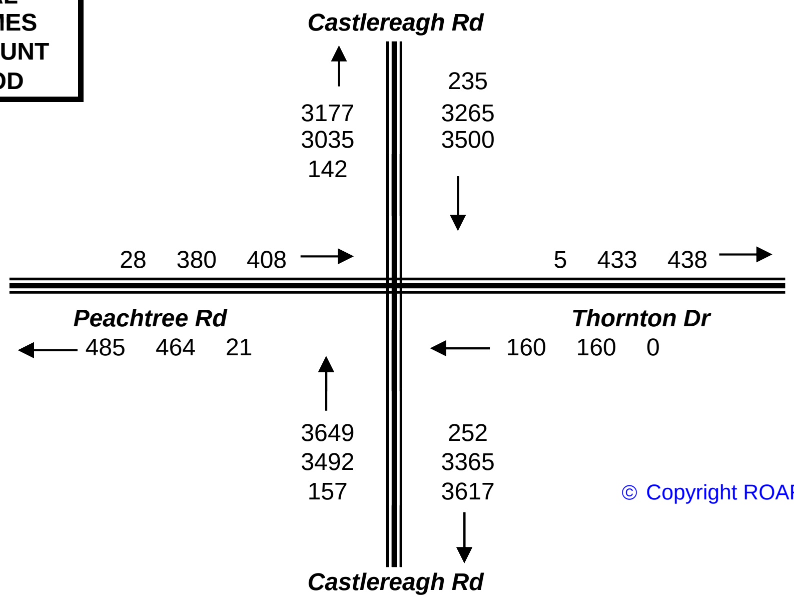
R.O.A.R DATA
Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849, Mob.0418-239019

Client : EMM
Job No/Name : 6141 PENRITH Peachtree Rd
Day/Date : Monday 25th July 2016



Peds	NORTH	WEST	SOUTH	EAST	
	Castlereagh Rd	*Peachtree Rd*	*Castlereagh Rd*	*Thornton Dr*	
Time Per	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**TOT**
0600 - 0615	1	0	1	0	**2**
0615 - 0630	1	0	0	0	**1**
0630 - 0645	0	0	1	0	**1**
0645 - 0700	0	0	0	0	**0**
0700 - 0715	0	0	1	0	**1**
0715 - 0730	1	2	0	1	**4**
0730 - 0745	0	1	0	2	**3**
0745 - 0800	1	0	0	1	**2**
0800 - 0815	0	0	1	0	**1**
0815 - 0830	0	1	1	0	**2**
0830 - 0845	0	0	0	0	**0**
0845 - 0900	0	0	1	0	**1**
Period End	**4**	**4**	**6**	**4**	**18**

TOTAL VOLUMES FOR COUNT PERIOD



Peds	NORTH	WEST	SOUTH	EAST	
	Castlereagh Rd	*Peachtree Rd*	*Castlereagh Rd*	*Thornton Dr*	
Peak Per	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**TOT**
0600 - 0700	2	0	2	0	**4**
0615 - 0715	1	0	2	0	**3**
0630 - 0730	1	2	2	1	**6**
0645 - 0745	1	3	1	3	**8**
0700 - 0800	2	3	1	4	**10**
0715 - 0815	2	3	1	4	**10**
0730 - 0830	1	2	2	3	**8**
0745 - 0845	1	1	2	1	**5**
0800 - 0900	0	1	3	0	**4**
PEAK HR	**0**	**1**	**3**	**0**	**4**

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : EMM
Job No/Name : 6141 PENRITH Peachtree Rd
Day/Date : Monday 25th July 2016

Lights

Time Per	NORTH *Castlereagh Rd* L	T	R	WEST *Peachtree Rd* L	T	R	SOUTH *Castlereagh Rd* L	T	R	EAST *Thornton Dr* L	T	R	TOT
1500 - 1515	19	308	1	30	1	28	48	359	10	18	6	0	**828**
1515 - 1530	20	318	1	27	0	43	37	353	7	28	2	0	**836**
1530 - 1545	21	379	1	30	7	44	38	322	11	15	1	0	**869**
1545 - 1600	16	317	4	21	5	42	41	363	16	25	5	2	**857**
1600 - 1615	25	336	0	21	5	48	33	333	8	13	1	2	**825**
1615 - 1630	20	344	2	29	3	36	33	357	12	18	6	9	**869**
1630 - 1645	21	300	2	25	4	33	23	324	23	20	3	3	**781**
1645 - 1700	19	281	0	15	7	48	36	342	6	17	3	4	**778**
1700 - 1715	12	307	1	29	11	38	38	381	9	32	3	5	**866**
1715 - 1730	14	231	3	20	3	43	24	372	13	27	1	11	**762**
1730 - 1745	12	259	8	17	9	39	23	309	9	19	3	10	**717**
1745 - 1800	11	217	1	21	6	22	19	322	10	34	5	9	**677**
Period End	**210**	**3597**	**24**	**285**	**61**	**464**	**393**	**4137**	**134**	**266**	**39**	**55**	**9665**

Lights

Peak Time	NORTH *Castlereagh Rd* L	T	R	WEST *Peachtree Rd* L	T	R	SOUTH *Castlereagh Rd* L	T	R	EAST *Thornton Dr* L	T	R	TOT
1500 - 1600	76	1322	7	108	13	157	164	1397	44	86	14	2	**3390**
1515 - 1615	82	1350	6	99	17	177	149	1371	42	81	9	4	**3387**
1530 - 1630	82	1376	7	101	20	170	145	1375	47	71	13	13	**3420**
1545 - 1645	82	1297	8	96	17	159	130	1377	59	76	15	16	**3332**
1600 - 1700	85	1261	4	90	19	165	125	1356	49	68	13	18	**3253**
1615 - 1715	72	1232	5	98	25	155	130	1404	50	87	15	21	**3294**
1630 - 1730	66	1119	6	89	25	162	121	1419	51	96	10	23	**3187**
1645 - 1745	57	1078	12	81	30	168	121	1404	37	95	10	30	**3123**
1700 - 1800	49	1014	13	87	29	142	104	1384	41	112	12	35	**3022**
PEAK HOUR	**82**	**1376**	**7**	**101**	**20**	**170**	**145**	**1375**	**47**	**71**	**13**	**13**	**3420**

Heavies

Time Per	NORTH *Castlereagh Rd* L	T	R	WEST *Peachtree Rd* L	T	R	SOUTH *Castlereagh Rd* L	T	R	EAST *Thornton Dr* L	T	R	TOT
1500 - 1515	1	9	0	2	0	5	4	8	0	1	0	0	**30**
1515 - 1530	1	12	0	0	1	0	3	13	0	1	1	0	**32**
1530 - 1545	0	20	0	0	0	1	4	8	0	0	0	0	**33**
1545 - 1600	0	9	0	0	0	2	0	11	0	0	0	0	**22**
1600 - 1615	0	8	0	0	0	0	5	15	0	0	0	0	**28**
1615 - 1630	1	13	0	0	0	0	2	15	1	0	0	1	**33**
1630 - 1645	0	10	0	0	0	1	1	14	0	0	0	0	**26**
1645 - 1700	0	5	0	1	0	0	0	8	0	0	0	0	**14**
1700 - 1715	0	6	0	0	0	1	1	10	0	0	0	0	**18**
1715 - 1730	1	4	0	0	0	0	0	7	0	0	0	0	**12**
1730 - 1745	0	6	0	0	0	0	2	13	0	0	0	0	**21**
1745 - 1800	0	4	0	0	0	0	2	6	0	0	0	0	**12**
Period End	**4**	**106**	**0**	**3**	**1**	**10**	**24**	**128**	**1**	**2**	**1**	**1**	**281**

Heavies

Peak Per	NORTH *Castlereagh Rd* L	T	R	WEST *Peachtree Rd* L	T	R	SOUTH *Castlereagh Rd* L	T	R	EAST *Thornton Dr* L	T	R	TOT
1500 - 1600	2	50	0	2	1	8	11	40	0	2	1	0	**117**
1515 - 1615	1	49	0	0	1	3	12	47	0	1	1	0	**115**
1530 - 1630	1	50	0	0	0	3	11	49	1	0	0	1	**116**
1545 - 1645	1	40	0	0	0	3	8	55	1	0	0	1	**109**
1600 - 1700	1	36	0	1	0	1	8	52	1	0	0	1	**101**
1615 - 1715	1	34	0	1	0	2	4	47	1	0	0	1	**91**
1630 - 1730	1	25	0	1	0	2	2	39	1	0	0	0	**70**
1645 - 1745	1	21	0	1	0	1	3	38	0	0	0	0	**65**
1700 - 1800	1	20	0	0	0	1	5	36	0	0	0	0	**63**
PEAK HOUR	**1**	**50**	**0**	**0**	**0**	**3**	**11**	**49**	**1**	**0**	**0**	**1**	**116**

Combined

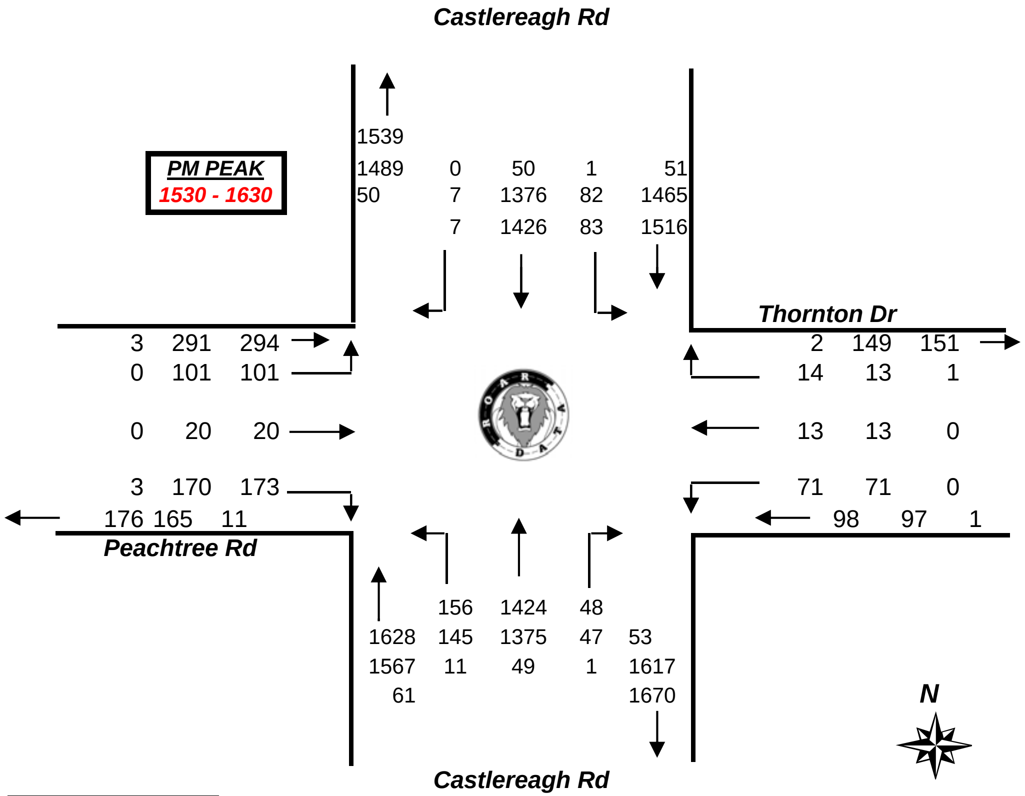
Time Per	NORTH *Castlereagh Rd* L	T	R	WEST *Peachtree Rd* L	T	R	SOUTH *Castlereagh Rd* L	T	R	EAST *Thornton Dr* L	T	R	TOT
1500 - 1515	20	317	1	32	1	33	52	367	10	19	6	0	**858**
1515 - 1530	21	330	1	27	1	43	40	366	7	29	3	0	**868**
1530 - 1545	21	399	1	30	7	45	42	330	11	15	1	0	**902**
1545 - 1600	16	326	4	21	5	44	41	374	16	25	5	2	**879**
1600 - 1615	25	344	0	21	5	48	38	348	8	13	1	2	**853**
1615 - 1630	21	357	2	29	3	36	35	372	13	18	6	10	**902**
1630 - 1645	21	310	2	25	4	34	24	338	23	20	3	3	**807**
1645 - 1700	19	286	0	16	7	48	36	350	6	17	3	4	**792**
1700 - 1715	12	313	1	29	11	39	39	391	9	32	3	5	**884**
1715 - 1730	15	235	3	20	3	43	24	379	13	27	1	11	**774**
1730 - 1745	12	265	8	17	9	39	25	322	9	19	3	10	**738**
1745 - 1800	11	221	1	21	6	22	21	328	10	34	5	9	**689**
Period End	**214**	**3703**	**24**	**288**	**62**	**474**	**417**	**4265**	**135**	**268**	**40**	**56**	**9946**

Combined

Peak Per	NORTH *Castlereagh Rd* L	T	R	WEST *Peachtree Rd* L	T	R	SOUTH *Castlereagh Rd* L	T	R	EAST *Thornton Dr* L	T	R	TOT
1500 - 1600	78	1372	7	110	14	165	175	1437	44	88	15	2	**3507**
1515 - 1615	83	1399	6	99	18	180	161	1418	42	82	10	4	**3502**
1530 - 1630	83	1426	7	101	20	173	156	1424	48	71	13	14	**3536**
1545 - 1645	83	1337	8	96	17	162	138	1432	60	76	15	17	**3441**
1600 - 1700	86	1297	4	91	19	166	133	1408	50	68	13	19	**3354**
1615 - 1715	73	1266	5	99	25	157	134	1451	51	87	15	22	**3385**
1630 - 1730	67	1144	6	90	25	164	123	1458	51	96	10	23	**3257**
1645 - 1745	58	1099	12	82	30	169	124	1442	37	95	10	30	**3188**
1700 - 1800	50	1034	13	87	29	143	109	1420	41	112	12	35	**3085**
PEAK HOUR	**83**	**1426**	**7**	**101**	**20**	**173**	**156**	**1424**	**48**	**71**	**13**	**14**	**3536**

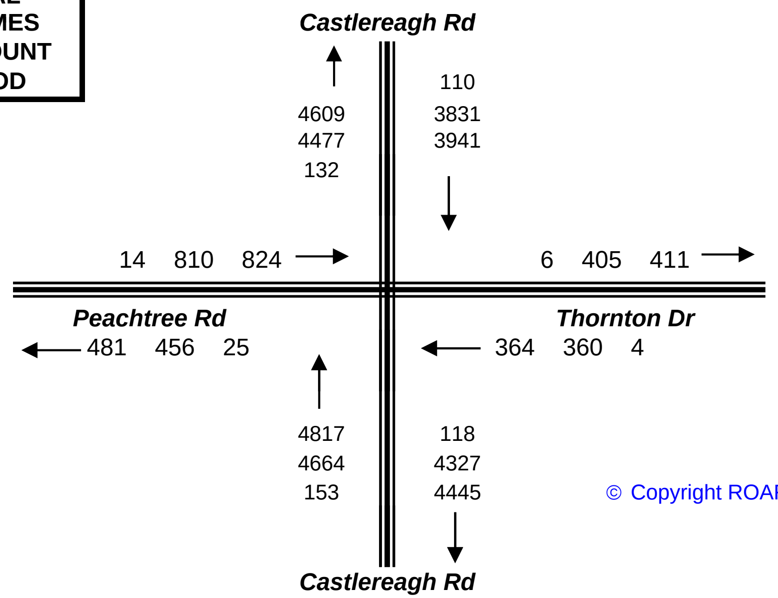
R.O.A.R DATA
Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849, Mob.0418-239019

Client : EMM
Job No/Name : 6141 PENRITH Peachtree Rd
Day/Date : Monday 25th July 2016



Peds	NORTH	WEST	SOUTH	EAST	
	Castlereagh Rd	*Peachtree Rd*	*Castlereagh Rd*	*Thornton Dr*	
Time Per	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**TOT**
1500 - 1515	0	1	1	0	**2**
1515 - 1530	2	4	0	0	**6**
1530 - 1545	1	0	0	0	**1**
1545 - 1600	0	2	1	0	**3**
1600 - 1615	1	1	1	4	**7**
1615 - 1630	0	1	0	0	**1**
1630 - 1645	0	0	0	2	**2**
1645 - 1700	0	0	0	0	**0**
1700 - 1715	1	0	0	0	**1**
1715 - 1730	0	0	0	0	**0**
1730 - 1745	1	0	0	0	**1**
1745 - 1800	0	0	0	1	**1**
Period End	**6**	**9**	**3**	**7**	**25**

TOTAL VOLUMES FOR COUNT PERIOD



Peds	NORTH	WEST	SOUTH	EAST	
	Castlereagh Rd	*Peachtree Rd*	*Castlereagh Rd*	*Thornton Dr*	
Peak Per	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**TOT**
1500 - 1600	3	7	2	0	**12**
1515 - 1615	4	7	2	4	**17**
1530 - 1630	2	4	2	4	**12**
1545 - 1645	1	4	2	6	**13**
1600 - 1700	1	2	1	6	**10**
1615 - 1715	1	1	0	2	**4**
1630 - 1730	1	0	0	2	**3**
1645 - 1745	2	0	0	0	**2**
1700 - 1800	2	0	0	1	**3**
PEAK HR	**2**	**4**	**2**	**4**	**12**

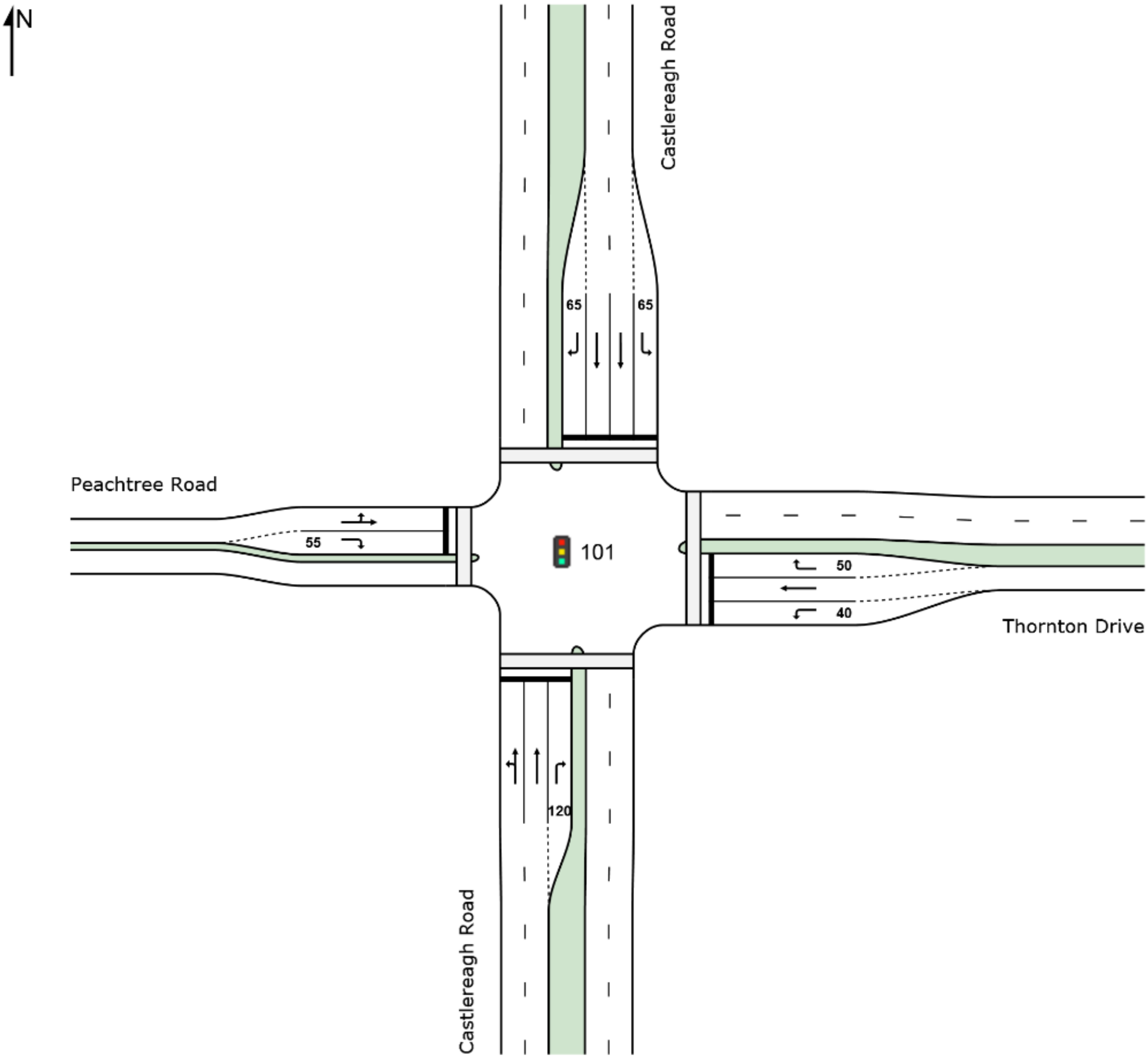
Appendix C

SIDRA Intersection Results

SITE LAYOUT

Site: 101 [Peachtree Road intersection 2018 AM peak]

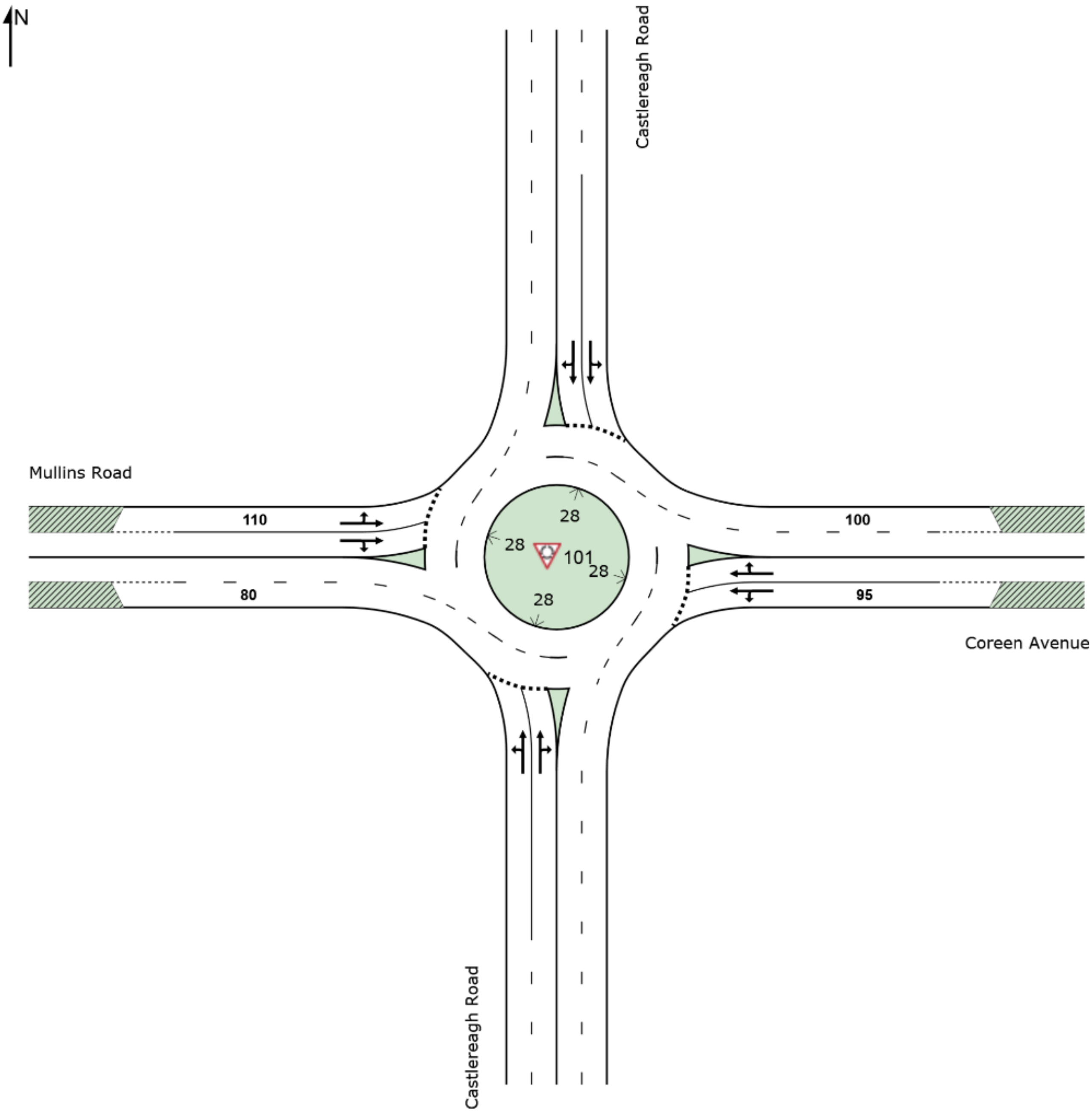
Existing Intersection
Site Category: (None)
Signals - Fixed Time Isolated



SITE LAYOUT

Site: 101 [Castlereagh Road and Mullins Road AM Peak]

Existing Roundabout
Site Category: (None)
Roundabout



MOVEMENT SUMMARY

Site: 101 [Peachtree Road intersection 2018 AM peak]

Existing Intersection
Site Category: (None)
Signals - Fixed Time Isolated   Cycle Time = 90 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
South: Castlereagh Road												
1	L2	174	7.3	0.805	27.0	LOS B	29.7	219.1	0.89	0.86	0.93	42.8
2	T1	1394	5.9	0.805	21.3	LOS B	30.1	221.0	0.89	0.85	0.93	44.2
3	R2	41	2.6	0.338	52.0	LOS D	1.9	13.2	0.99	0.73	0.99	32.0
Approach		1608	6.0	0.805	22.7	LOS B	30.1	221.0	0.89	0.85	0.93	43.6
East: Thornton Drive												
4	L2	63	0.0	0.510	52.7	LOS D	2.9	20.3	1.00	0.75	1.01	31.7
5	T1	17	0.0	0.130	45.0	LOS D	0.7	5.2	0.97	0.67	0.97	34.6
6	R2	6	0.0	0.044	48.6	LOS D	0.3	1.9	0.95	0.65	0.95	33.1
Approach		86	0.0	0.510	50.9	LOS D	2.9	20.3	0.99	0.73	1.00	32.3
North: Castlereagh Road												
7	L2	73	2.9	0.076	16.9	LOS B	1.6	11.2	0.52	0.69	0.52	45.9
8	T1	1649	4.5	0.858	26.5	LOS B	36.1	262.6	0.92	0.93	1.03	41.9
9	R2	16	20.0	0.146	51.4	LOS D	0.7	5.7	0.97	0.69	0.97	31.8
Approach		1738	4.6	0.858	26.3	LOS B	36.1	262.6	0.90	0.91	1.01	41.9
West: Peachtree Road												
10	L2	65	1.6	0.622	53.7	LOS D	3.6	25.4	1.00	0.80	1.10	31.7
11	T1	12	0.0	0.622	48.2	LOS D	3.6	25.4	1.00	0.80	1.10	32.1
12	R2	111	13.3	0.838	58.2	LOS E	5.5	43.1	1.00	0.95	1.43	30.1
Approach		187	8.4	0.838	56.0	LOS D	5.5	43.1	1.00	0.89	1.30	30.8
All Vehicles		3620	5.3	0.858	26.8	LOS B	36.1	262.6	0.90	0.88	0.99	41.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	5	39.2	LOS D	0.0	0.0	0.93	0.93
P2	East Full Crossing	5	39.2	LOS D	0.0	0.0	0.93	0.93
P3	North Full Crossing	5	39.2	LOS D	0.0	0.0	0.93	0.93
P4	West Full Crossing	5	39.2	LOS D	0.0	0.0	0.93	0.93
All Pedestrians		21	39.2	LOS D			0.93	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Peachtree Road intersection 2018 AM peak with project]

Existing Intersection
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
South: Castlereagh Road												
1	L2	183	10.3	0.836	30.6	LOS C	32.7	242.6	0.92	0.91	1.01	40.9
2	T1	1394	5.9	0.836	24.8	LOS B	32.7	242.6	0.92	0.90	1.00	42.4
3	R2	41	2.6	0.338	52.0	LOS D	1.9	13.2	0.99	0.73	0.99	32.0
Approach		1618	6.3	0.836	26.2	LOS B	32.7	242.6	0.92	0.90	1.00	41.9
East: Thornton Drive												
4	L2	63	0.0	0.510	52.7	LOS D	2.9	20.3	1.00	0.75	1.01	31.7
5	T1	17	0.0	0.130	45.0	LOS D	0.7	5.2	0.97	0.67	0.97	34.6
6	R2	6	0.0	0.038	47.3	LOS D	0.3	1.8	0.94	0.65	0.94	33.5
Approach		86	0.0	0.510	50.8	LOS D	2.9	20.3	0.99	0.73	0.99	32.4
North: Castlereagh Road												
7	L2	73	2.9	0.078	17.5	LOS B	1.6	11.5	0.53	0.69	0.53	45.6
8	T1	1649	4.5	0.881	30.6	LOS C	38.6	280.4	0.94	0.98	1.10	40.0
9	R2	22	42.9	0.233	52.7	LOS D	1.0	9.6	0.98	0.71	0.98	31.2
Approach		1744	4.9	0.881	30.3	LOS C	38.6	280.4	0.92	0.97	1.07	40.1
West: Peachtree Road												
10	L2	72	10.3	0.710	55.2	LOS D	4.0	30.0	1.00	0.84	1.21	31.2
11	T1	12	0.0	0.710	49.5	LOS D	4.0	30.0	1.00	0.84	1.21	31.8
12	R2	120	17.5	0.818	56.7	LOS E	5.9	47.7	1.00	0.94	1.36	30.5
Approach		203	14.0	0.818	55.7	LOS D	5.9	47.7	1.00	0.90	1.30	30.8
All Vehicles		3652	5.9	0.881	30.4	LOS C	38.6	280.4	0.93	0.93	1.05	39.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	5	39.2	LOS D	0.0	0.0	0.93	0.93
P2	East Full Crossing	5	39.2	LOS D	0.0	0.0	0.93	0.93
P3	North Full Crossing	5	39.2	LOS D	0.0	0.0	0.93	0.93
P4	West Full Crossing	5	39.2	LOS D	0.0	0.0	0.93	0.93
All Pedestrians		21	39.2	LOS D			0.93	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Organisation: EMM CONSULTING | Processed: Thursday, 16 August 2018 4:40:04 PM
Project: P:\SIDRA RESULTS\Benedict Penrith\Peachtree Road intersection.sip8

MOVEMENT SUMMARY

Site: 101 [Peachtree Road intersection 2018 MD peak]

Existing Intersection
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
South: Castlereagh Road												
1	L2	135	2.3	0.816	31.0	LOS C	25.2	184.8	0.94	0.92	1.04	40.9
2	T1	1199	6.3	0.816	25.4	LOS B	25.3	186.8	0.94	0.92	1.04	42.1
3	R2	63	0.0	0.453	46.7	LOS D	2.5	17.8	1.00	0.75	1.00	33.6
Approach		1397	5.7	0.816	26.9	LOS B	25.3	186.8	0.94	0.92	1.04	41.5
East: Thornton Drive												
4	L2	72	1.5	0.445	45.5	LOS D	2.8	20.1	0.99	0.76	0.99	33.8
5	T1	19	5.6	0.115	38.1	LOS C	0.7	5.3	0.95	0.67	0.95	37.0
6	R2	4	0.0	0.023	41.5	LOS C	0.2	1.1	0.92	0.64	0.92	35.4
Approach		95	2.2	0.445	43.9	LOS D	2.8	20.1	0.98	0.73	0.98	34.5
North: Castlereagh Road												
7	L2	4	25.0	0.006	19.2	LOS B	0.1	0.8	0.58	0.63	0.58	44.1
8	T1	1117	7.2	0.720	19.9	LOS B	19.0	140.9	0.86	0.77	0.87	45.3
9	R2	116	3.6	0.853	53.5	LOS D	5.2	37.8	1.00	0.97	1.50	31.4
Approach		1237	6.9	0.853	23.1	LOS B	19.0	140.9	0.88	0.79	0.93	43.5
West: Peachtree Road												
10	L2	125	0.8	0.849	52.4	LOS D	6.2	43.5	1.00	0.97	1.45	31.9
11	T1	13	0.0	0.849	46.9	LOS D	6.2	43.5	1.00	0.97	1.45	32.4
12	R2	144	4.4	0.801	49.6	LOS D	6.2	45.4	1.00	0.93	1.32	32.5
Approach		282	2.6	0.849	50.8	LOS D	6.2	45.4	1.00	0.95	1.38	32.3
All Vehicles		3011	5.8	0.853	28.1	LOS B	25.3	186.8	0.92	0.86	1.02	40.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	5	34.2	LOS D	0.0	0.0	0.93	0.93
P2	East Full Crossing	5	34.2	LOS D	0.0	0.0	0.93	0.93
P3	North Full Crossing	5	34.2	LOS D	0.0	0.0	0.93	0.93
P4	West Full Crossing	5	34.2	LOS D	0.0	0.0	0.93	0.93
All Pedestrians		21	34.2	LOS D			0.93	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Organisation: EMM CONSULTING | Processed: Friday, 10 August 2018 4:56:57 PM
Project: P:\SIDRA RESULTS\Benedict Penrith\Peachtree Road intersection.sip8

MOVEMENT SUMMARY

Site: 101 [Peachtree Road intersection 2018 MD peak with project]

Existing Intersection
Site Category: (None)
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
South: Castlereagh Road												
1	L2	146	6.5	0.850	35.1	LOS C	27.4	202.5	0.97	0.99	1.13	39.1
2	T1	1199	6.3	0.850	29.4	LOS C	27.7	204.5	0.97	0.99	1.13	40.3
3	R2	63	0.0	0.389	45.2	LOS D	2.5	17.4	0.98	0.75	0.98	34.0
Approach		1408	6.1	0.850	30.7	LOS C	27.7	204.5	0.97	0.98	1.12	39.8
East: Thornton Drive												
4	L2	72	1.5	0.519	47.1	LOS D	2.9	20.7	1.00	0.76	1.02	33.3
5	T1	19	5.6	0.134	39.5	LOS C	0.7	5.4	0.96	0.67	0.96	36.5
6	R2	4	0.0	0.030	44.1	LOS D	0.2	1.1	0.95	0.63	0.95	34.5
Approach		95	2.2	0.519	45.5	LOS D	2.9	20.7	0.99	0.74	1.00	34.0
North: Castlereagh Road												
7	L2	4	25.0	0.006	19.9	LOS B	0.1	0.8	0.59	0.63	0.59	43.8
8	T1	1117	7.2	0.743	21.6	LOS B	19.9	147.6	0.88	0.81	0.91	44.4
9	R2	122	8.6	0.798	50.5	LOS D	5.3	40.0	1.00	0.92	1.34	32.2
Approach		1243	7.4	0.798	24.4	LOS B	19.9	147.6	0.89	0.82	0.96	42.8
West: Peachtree Road												
10	L2	132	5.6	0.713	46.3	LOS D	6.0	43.5	1.00	0.87	1.16	33.7
11	T1	13	0.0	0.713	40.7	LOS C	6.0	43.5	1.00	0.87	1.16	34.3
12	R2	157	8.1	0.794	48.7	LOS D	6.7	50.5	1.00	0.92	1.29	32.8
Approach		301	6.6	0.794	47.3	LOS D	6.7	50.5	1.00	0.90	1.23	33.2
All Vehicles		3047	6.5	0.850	30.2	LOS C	27.7	204.5	0.94	0.90	1.06	40.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	5	34.2	LOS D	0.0	0.0	0.93	0.93
P2	East Full Crossing	5	34.2	LOS D	0.0	0.0	0.93	0.93
P3	North Full Crossing	5	34.2	LOS D	0.0	0.0	0.93	0.93
P4	West Full Crossing	5	34.2	LOS D	0.0	0.0	0.93	0.93
All Pedestrians		21	34.2	LOS D			0.93	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Peachtree Road intersection 2018 PM peak]

Existing Intersection
Site Category: (None)
Signals - Fixed Time Isolated   Cycle Time = 130 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
South: Castlereagh Road												
1	L2	164	7.1	0.890	34.1	LOS C	60.0	433.9	0.93	0.91	0.98	39.6
2	T1	1883	3.2	0.890	28.2	LOS B	60.0	433.9	0.91	0.89	0.96	40.9
3	R2	51	2.1	0.598	76.5	LOS F	3.4	24.3	1.00	0.77	1.08	26.4
Approach		2098	3.5	0.890	29.9	LOS C	60.0	433.9	0.91	0.89	0.97	40.2
East: Thornton Drive												
4	L2	75	0.0	0.872	83.3	LOS F	5.4	37.6	1.00	0.93	1.46	25.1
5	T1	14	0.0	0.152	67.6	LOS E	0.9	6.2	0.99	0.68	0.99	28.6
6	R2	15	7.1	0.181	73.9	LOS F	1.0	7.1	0.99	0.69	0.99	26.9
Approach		103	1.0	0.872	79.9	LOS F	5.4	37.6	1.00	0.86	1.33	25.7
North: Castlereagh Road												
7	L2	87	1.2	0.077	16.1	LOS B	2.2	15.4	0.43	0.67	0.43	46.4
8	T1	1431	2.4	0.624	16.2	LOS B	28.3	201.9	0.66	0.61	0.66	47.5
9	R2	7	0.0	0.086	72.7	LOS F	0.5	3.3	0.98	0.66	0.98	27.0
Approach		1525	2.3	0.624	16.4	LOS B	28.3	201.9	0.65	0.61	0.65	47.2
West: Peachtree Road												
10	L2	106	0.0	0.632	67.7	LOS E	8.0	56.3	1.00	0.81	1.02	28.3
11	T1	21	0.0	0.632	62.1	LOS E	8.0	56.3	1.00	0.81	1.02	28.7
12	R2	182	1.7	0.922	84.9	LOS F	13.6	96.8	1.00	1.00	1.45	24.8
Approach		309	1.0	0.922	77.4	LOS F	13.6	96.8	1.00	0.92	1.27	26.1
All Vehicles		4036	2.8	0.922	29.7	LOS C	60.0	433.9	0.82	0.79	0.88	40.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	5	59.2	LOS E	0.0	0.0	0.95	0.95
P2	East Full Crossing	5	59.2	LOS E	0.0	0.0	0.95	0.95
P3	North Full Crossing	5	59.2	LOS E	0.0	0.0	0.95	0.95
P4	West Full Crossing	5	59.2	LOS E	0.0	0.0	0.95	0.95
All Pedestrians		21	59.2	LOS E			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Peachtree Road intersection 2018 PM peak with project]

Existing Intersection
Site Category: (None)
Signals - Fixed Time Isolated   Cycle Time = 140 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
South: Castlereagh Road												
1	L2	172	8.6	0.886	33.0	LOS C	62.0	449.0	0.92	0.89	0.95	40.1
2	T1	1883	3.2	0.886	27.1	LOS B	62.0	449.0	0.90	0.87	0.93	41.4
3	R2	51	2.1	0.644	82.7	LOS F	3.7	26.3	1.00	0.78	1.11	25.2
Approach		2105	3.6	0.886	28.9	LOS C	62.0	449.0	0.90	0.87	0.94	40.6
East: Thornton Drive												
4	L2	75	0.0	0.939	96.8	LOS F	6.1	42.5	1.00	0.99	1.62	22.9
5	T1	14	0.0	0.164	73.3	LOS F	1.0	6.7	0.99	0.68	0.99	27.3
6	R2	15	7.1	0.195	79.7	LOS F	1.0	7.7	0.99	0.69	0.99	25.8
Approach		103	1.0	0.939	91.3	LOS F	6.1	42.5	1.00	0.90	1.45	23.8
North: Castlereagh Road												
7	L2	87	1.2	0.076	16.6	LOS B	2.3	16.3	0.42	0.67	0.42	46.1
8	T1	1431	2.4	0.622	16.8	LOS B	29.8	212.9	0.65	0.60	0.65	47.0
9	R2	12	36.4	0.183	80.8	LOS F	0.8	7.5	0.99	0.68	0.99	25.2
Approach		1529	2.5	0.622	17.3	LOS B	29.8	212.9	0.64	0.60	0.64	46.7
West: Peachtree Road												
10	L2	109	2.9	0.584	69.8	LOS E	8.6	61.8	0.99	0.80	0.99	27.8
11	T1	21	0.0	0.584	64.2	LOS E	8.6	61.8	0.99	0.80	0.99	28.2
12	R2	195	3.8	0.887	83.4	LOS F	14.9	107.8	1.00	0.95	1.32	25.0
Approach		325	3.2	0.887	77.6	LOS F	14.9	107.8	1.00	0.89	1.19	26.1
All Vehicles		4063	3.1	0.939	30.0	LOS C	62.0	449.0	0.82	0.77	0.86	40.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	5	64.1	LOS F	0.0	0.0	0.96	0.96
P2	East Full Crossing	5	64.1	LOS F	0.0	0.0	0.96	0.96
P3	North Full Crossing	5	64.1	LOS F	0.0	0.0	0.96	0.96
P4	West Full Crossing	5	64.1	LOS F	0.0	0.0	0.96	0.96
All Pedestrians		21	64.1	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Peachtree Road intersection 2018 PM peak with two shifts]

Existing Intersection
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 140 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Castlereagh Road												
1	L2	174	10.3	0.888	33.5	LOS C	62.4	453.5	0.92	0.90	0.95	39.8
2	T1	1883	3.2	0.888	27.5	LOS B	62.4	453.5	0.90	0.88	0.94	41.2
3	R2	51	2.1	0.644	82.7	LOS F	3.7	26.3	1.00	0.78	1.11	25.2
Approach		2107	3.7	0.888	29.3	LOS C	62.4	453.5	0.91	0.87	0.94	40.5
East: Thornton Drive												
4	L2	75	0.0	0.939	96.8	LOS F	6.1	42.5	1.00	0.99	1.62	22.9
5	T1	14	0.0	0.164	73.3	LOS F	1.0	6.7	0.99	0.68	0.99	27.3
6	R2	15	7.1	0.195	79.7	LOS F	1.0	7.7	0.99	0.69	0.99	25.8
Approach		103	1.0	0.939	91.3	LOS F	6.1	42.5	1.00	0.90	1.45	23.8
North: Castlereagh Road												
7	L2	87	1.2	0.076	16.6	LOS B	2.3	16.3	0.42	0.67	0.42	46.1
8	T1	1431	2.4	0.623	16.8	LOS B	29.7	212.2	0.65	0.60	0.65	47.1
9	R2	14	46.2	0.228	81.5	LOS F	1.0	9.6	1.00	0.69	1.00	25.0
Approach		1532	2.7	0.623	17.4	LOS B	29.7	212.2	0.64	0.60	0.64	46.6
West: Peachtree Road												
10	L2	113	5.6	0.608	70.1	LOS E	8.9	64.8	1.00	0.80	1.00	27.7
11	T1	21	0.0	0.608	64.5	LOS E	8.9	64.8	1.00	0.80	1.00	28.1
12	R2	192	4.9	0.879	82.5	LOS F	14.6	106.3	1.00	0.95	1.30	25.2
Approach		325	4.9	0.879	77.0	LOS F	14.6	106.3	1.00	0.89	1.18	26.2
All Vehicles		4067	3.4	0.939	30.2	LOS C	62.4	453.5	0.82	0.77	0.86	40.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	5	64.1	LOS F	0.0	0.0	0.96	0.96
P2	East Full Crossing	5	64.1	LOS F	0.0	0.0	0.96	0.96
P3	North Full Crossing	5	64.1	LOS F	0.0	0.0	0.96	0.96
P4	West Full Crossing	5	64.1	LOS F	0.0	0.0	0.96	0.96
All Pedestrians		21	64.1	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Castlereagh Road and Mullins Road AM Peak]

Existing Roundabout
Site Category: (None)
Roundabout

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
Movement Performance - Vehicles												
South: Castlereagh Road												
1	L2	122	12.9	0.654	6.6	LOS A	6.5	47.2	0.73	0.66	0.79	52.4
2	T1	1023	3.4	0.654	6.5	LOS A	6.5	47.2	0.74	0.70	0.81	53.8
3	R2	320	10.2	0.654	12.7	LOS A	6.4	47.0	0.75	0.78	0.84	52.8
Approach		1465	5.7	0.654	7.9	LOS A	6.5	47.2	0.74	0.72	0.81	53.5
East: Coreen Avenue												
4	L2	247	11.9	0.677	16.6	LOS B	4.4	34.3	0.93	1.07	1.27	46.8
5	T1	73	0.0	0.486	10.2	LOS A	3.3	23.8	0.93	1.02	1.07	50.2
6	R2	193	5.5	0.486	15.9	LOS B	3.3	23.8	0.93	1.02	1.07	50.3
Approach		513	7.8	0.677	15.5	LOS B	4.4	34.3	0.93	1.04	1.17	48.6
North: Castlereagh Road												
7	L2	299	2.8	0.845	11.5	LOS A	14.3	103.3	0.96	1.02	1.34	50.4
8	T1	1447	3.5	0.845	12.2	LOS A	14.3	103.3	0.97	1.05	1.38	51.3
9	R2	65	8.1	0.845	18.5	LOS B	13.8	99.7	0.98	1.08	1.42	50.7
Approach		1812	3.5	0.845	12.3	LOS A	14.3	103.3	0.97	1.05	1.38	51.1
West: Mullins Road												
10	L2	57	1.9	0.122	8.8	LOS A	0.6	4.0	0.77	0.88	0.77	52.2
11	T1	43	2.4	0.137	7.4	LOS A	0.7	5.2	0.79	0.83	0.79	52.5
12	R2	45	4.7	0.137	12.9	LOS A	0.7	5.2	0.79	0.83	0.79	52.6
Approach		145	2.9	0.137	9.6	LOS A	0.7	5.2	0.79	0.85	0.79	52.4
All Vehicles		3935	4.9	0.845	11.0	LOS A	14.3	103.3	0.87	0.92	1.12	51.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Castlereagh Road and Mullins Road AM Peak with project]

Existing Roundabout
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
South: Castlereagh Road												
1	L2	122	12.9	0.660	6.7	LOS A	6.6	48.5	0.74	0.68	0.81	52.4
2	T1	1029	4.0	0.660	6.7	LOS A	6.6	48.5	0.75	0.72	0.82	53.7
3	R2	320	10.2	0.660	12.8	LOS A	6.5	48.2	0.76	0.79	0.85	52.7
Approach		1472	6.1	0.660	8.0	LOS A	6.6	48.5	0.75	0.73	0.83	53.4
East: Coreen Avenue												
4	L2	247	11.9	0.689	17.2	LOS B	4.6	35.2	0.93	1.08	1.29	46.4
5	T1	73	0.0	0.493	10.4	LOS A	3.4	24.3	0.93	1.02	1.08	50.1
6	R2	193	5.5	0.493	16.1	LOS B	3.4	24.3	0.93	1.02	1.08	50.1
Approach		513	7.8	0.689	15.9	LOS B	4.6	35.2	0.93	1.05	1.18	48.3
North: Castlereagh Road												
7	L2	299	2.8	0.851	11.8	LOS A	14.8	106.9	0.97	1.03	1.37	50.2
8	T1	1454	3.9	0.851	12.5	LOS A	14.8	106.9	0.98	1.07	1.41	51.0
9	R2	68	7.7	0.851	18.9	LOS B	14.2	103.3	0.99	1.10	1.45	50.5
Approach		1821	3.9	0.851	12.6	LOS A	14.8	106.9	0.98	1.06	1.40	50.9
West: Mullins Road												
10	L2	60	1.8	0.129	8.8	LOS A	0.6	4.3	0.78	0.88	0.78	52.2
11	T1	43	2.4	0.138	7.4	LOS A	0.7	5.3	0.80	0.83	0.80	52.4
12	R2	45	4.7	0.138	13.0	LOS A	0.7	5.3	0.80	0.83	0.80	52.6
Approach		148	2.8	0.138	9.7	LOS A	0.7	5.3	0.79	0.85	0.79	52.4
All Vehicles		3954	5.2	0.851	11.2	LOS A	14.8	106.9	0.88	0.93	1.14	51.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Castlereagh Road and Mullins Road MD Peak]

Existing Roundabout
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
South: Castlereagh Road												
1	L2	112	13.2	0.593	6.6	LOS A	5.1	37.7	0.71	0.66	0.76	52.6
2	T1	1002	4.8	0.593	6.6	LOS A	5.1	37.7	0.71	0.70	0.77	54.1
3	R2	157	19.5	0.593	12.9	LOS A	5.0	37.7	0.72	0.76	0.80	53.2
Approach		1271	7.4	0.593	7.4	LOS A	5.1	37.7	0.71	0.71	0.77	53.8
East: Coreen Avenue												
4	L2	307	10.3	0.452	8.5	LOS A	2.5	18.9	0.75	0.90	0.87	52.2
5	T1	104	0.0	0.351	6.3	LOS A	1.8	13.4	0.71	0.82	0.72	52.7
6	R2	213	5.9	0.351	12.0	LOS A	1.8	13.4	0.71	0.82	0.72	52.7
Approach		624	7.1	0.452	9.3	LOS A	2.5	18.9	0.73	0.86	0.79	52.5
North: Castlereagh Road												
7	L2	145	9.4	0.469	5.3	LOS A	3.0	22.4	0.55	0.53	0.55	53.5
8	T1	881	5.1	0.469	5.3	LOS A	3.0	22.4	0.55	0.55	0.55	55.0
9	R2	66	6.3	0.469	11.0	LOS A	2.9	21.5	0.56	0.57	0.56	54.9
Approach		1093	5.8	0.469	5.7	LOS A	3.0	22.4	0.55	0.55	0.55	54.8
West: Mullins Road												
10	L2	75	5.6	0.151	8.5	LOS A	0.7	5.1	0.75	0.86	0.75	52.3
11	T1	63	0.0	0.215	7.1	LOS A	1.1	8.5	0.77	0.83	0.77	52.6
12	R2	84	17.5	0.215	13.1	LOS A	1.1	8.5	0.77	0.83	0.77	52.2
Approach		222	8.5	0.215	9.8	LOS A	1.1	8.5	0.77	0.84	0.77	52.3
All Vehicles		3209	6.9	0.593	7.3	LOS A	5.1	37.7	0.67	0.69	0.70	53.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Castlereagh Road and Mullins Road MD Peak with project]

Existing Roundabout
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
South: Castlereagh Road												
1	L2	112	13.2	0.600	6.8	LOS A	5.3	39.0	0.71	0.68	0.77	52.5
2	T1	1008	5.4	0.600	6.8	LOS A	5.3	39.0	0.72	0.72	0.79	54.0
3	R2	157	19.5	0.600	13.1	LOS A	5.2	38.9	0.73	0.78	0.81	53.1
Approach		1277	7.8	0.600	7.5	LOS A	5.3	39.0	0.72	0.72	0.79	53.8
East: Coreen Avenue												
4	L2	307	10.3	0.458	8.6	LOS A	2.5	19.3	0.76	0.91	0.88	52.1
5	T1	104	0.0	0.355	6.4	LOS A	1.9	13.7	0.72	0.82	0.73	52.7
6	R2	213	5.9	0.355	12.0	LOS A	1.9	13.7	0.72	0.82	0.73	52.7
Approach		624	7.1	0.458	9.4	LOS A	2.5	19.3	0.74	0.87	0.81	52.4
North: Castlereagh Road												
7	L2	145	9.4	0.478	5.4	LOS A	3.2	23.6	0.56	0.54	0.56	53.4
8	T1	887	5.8	0.478	5.4	LOS A	3.2	23.6	0.57	0.56	0.57	54.9
9	R2	73	5.8	0.478	11.0	LOS A	3.1	22.6	0.57	0.58	0.57	54.8
Approach		1105	6.3	0.478	5.8	LOS A	3.2	23.6	0.57	0.56	0.57	54.7
West: Mullins Road												
10	L2	80	5.3	0.159	8.5	LOS A	0.7	5.4	0.75	0.86	0.75	52.3
11	T1	63	0.0	0.219	7.1	LOS A	1.1	8.7	0.78	0.83	0.78	52.5
12	R2	84	17.5	0.219	13.2	LOS A	1.1	8.7	0.78	0.83	0.78	52.2
Approach		227	8.3	0.219	9.8	LOS A	1.1	8.7	0.77	0.84	0.77	52.3
All Vehicles		3234	7.2	0.600	7.5	LOS A	5.3	39.0	0.67	0.70	0.72	53.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Castlereagh Road and Mullins Road PM Peak]

Existing Roundabout
Site Category: (None)
Roundabout

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
Movement Performance - Vehicles												
South: Castlereagh Road												
1	L2	117	18.0	0.959	23.8	LOS B	29.7	213.8	1.00	1.41	2.13	43.3
2	T1	1591	1.5	0.959	24.1	LOS B	29.7	213.8	1.00	1.43	2.17	43.9
3	R2	297	5.3	0.959	31.4	LOS C	28.1	201.1	1.00	1.47	2.23	42.7
Approach		2004	3.0	0.959	25.2	LOS B	29.7	213.8	1.00	1.44	2.18	43.7
East: Coreen Avenue												
4	L2	277	2.7	0.527	10.1	LOS A	3.2	23.0	0.85	0.98	1.04	51.2
5	T1	65	0.0	0.535	8.4	LOS A	3.7	26.3	0.88	1.00	1.04	51.0
6	R2	317	2.0	0.535	14.0	LOS A	3.7	26.3	0.88	1.00	1.04	51.2
Approach		659	2.1	0.535	11.8	LOS A	3.7	26.3	0.87	0.99	1.04	51.1
North: Castlereagh Road												
7	L2	238	2.2	0.707	8.2	LOS A	8.1	58.0	0.84	0.85	1.00	52.3
8	T1	1197	2.2	0.707	8.6	LOS A	8.1	58.0	0.84	0.87	1.02	53.6
9	R2	49	8.5	0.707	14.7	LOS B	7.8	56.1	0.85	0.90	1.04	53.4
Approach		1484	2.4	0.707	8.7	LOS A	8.1	58.0	0.84	0.87	1.02	53.4
West: Mullins Road												
10	L2	82	2.6	0.335	16.4	LOS B	1.8	12.9	0.91	0.98	0.99	47.1
11	T1	81	0.0	0.348	13.0	LOS A	2.3	16.0	0.97	1.01	1.03	49.6
12	R2	52	2.0	0.348	18.6	LOS B	2.3	16.0	0.97	1.01	1.03	49.7
Approach		215	1.5	0.348	15.7	LOS B	2.3	16.0	0.95	0.99	1.02	48.6
All Vehicles		4362	2.6	0.959	17.1	LOS B	29.7	213.8	0.92	1.15	1.55	47.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Castlereagh Road and Mullins Road PM Peak with project]

Existing Roundabout
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
South: Castlereagh Road												
1	L2	117	18.0	0.965	25.3	LOS B	31.2	224.7	1.00	1.46	2.23	42.6
2	T1	1594	1.7	0.965	25.7	LOS B	31.2	224.7	1.00	1.48	2.27	43.1
3	R2	297	5.3	0.965	33.1	LOS C	29.4	210.5	1.00	1.52	2.33	41.9
Approach		2007	3.2	0.965	26.8	LOS B	31.2	224.7	1.00	1.48	2.27	42.9
East: Coreen Avenue												
4	L2	277	2.7	0.533	10.3	LOS A	3.2	23.3	0.86	0.98	1.05	51.1
5	T1	65	0.0	0.540	8.5	LOS A	3.7	26.6	0.88	1.00	1.05	50.9
6	R2	317	2.0	0.540	14.1	LOS A	3.7	26.6	0.88	1.00	1.05	51.1
Approach		659	2.1	0.540	11.9	LOS A	3.7	26.6	0.87	0.99	1.05	51.1
North: Castlereagh Road												
7	L2	238	2.2	0.712	8.2	LOS A	8.3	59.2	0.84	0.85	1.01	52.2
8	T1	1201	2.5	0.712	8.7	LOS A	8.3	59.2	0.85	0.88	1.03	53.6
9	R2	54	7.8	0.712	14.7	LOS B	8.0	57.2	0.85	0.90	1.05	53.4
Approach		1493	2.7	0.712	8.8	LOS A	8.3	59.2	0.85	0.88	1.03	53.4
West: Mullins Road												
10	L2	91	2.3	0.375	17.5	LOS B	2.0	14.6	0.92	0.99	1.04	46.4
11	T1	81	0.0	0.349	13.1	LOS A	2.3	16.0	0.97	1.01	1.03	49.5
12	R2	52	2.0	0.349	18.6	LOS B	2.3	16.0	0.97	1.01	1.03	49.7
Approach		223	1.4	0.375	16.2	LOS B	2.3	16.0	0.95	1.00	1.03	48.3
All Vehicles		4382	2.8	0.965	17.9	LOS B	31.2	224.7	0.93	1.18	1.60	47.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Castlereagh Road and Mullins Road PM Peak two shifts]

Existing Roundabout
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
South: Castlereagh Road												
1	L2	117	18.0	0.966	25.7	LOS B	31.6	228.3	1.00	1.47	2.25	42.4
2	T1	1597	1.9	0.966	26.2	LOS B	31.6	228.3	1.00	1.49	2.29	42.9
3	R2	297	5.3	0.966	33.5	LOS C	29.8	213.7	1.00	1.53	2.35	41.7
Approach		2011	3.4	0.966	27.2	LOS B	31.6	228.3	1.00	1.50	2.30	42.7
East: Coreen Avenue												
4	L2	277	2.7	0.534	10.3	LOS A	3.3	23.3	0.86	0.98	1.05	51.1
5	T1	65	0.0	0.541	8.5	LOS A	3.8	26.7	0.88	1.00	1.05	50.9
6	R2	317	2.0	0.541	14.1	LOS A	3.8	26.7	0.88	1.00	1.05	51.1
Approach		659	2.1	0.541	11.9	LOS A	3.8	26.7	0.87	0.99	1.05	51.1
North: Castlereagh Road												
7	L2	238	2.2	0.713	8.3	LOS A	8.3	59.5	0.84	0.85	1.01	52.2
8	T1	1203	2.7	0.713	8.7	LOS A	8.3	59.5	0.85	0.88	1.03	53.6
9	R2	53	8.0	0.713	14.8	LOS B	8.0	57.5	0.85	0.90	1.06	53.4
Approach		1494	2.8	0.713	8.8	LOS A	8.3	59.5	0.85	0.88	1.03	53.3
West: Mullins Road												
10	L2	85	2.5	0.352	17.0	LOS B	1.9	13.7	0.92	0.98	1.01	46.7
11	T1	81	0.0	0.350	13.1	LOS A	2.3	16.1	0.98	1.01	1.03	49.5
12	R2	52	2.0	0.350	18.7	LOS B	2.3	16.1	0.98	1.01	1.03	49.6
Approach		218	1.4	0.352	16.0	LOS B	2.3	16.1	0.95	1.00	1.03	48.4
All Vehicles		4381	2.9	0.966	18.1	LOS B	31.6	228.3	0.93	1.18	1.62	47.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Appendix E

Revised water assessment

TOOKER+
ASSOCIATES

PROPOSED PENRITH WASTE RECYCLING AND TRANSFER FACILITY

46-48 PEACHTREE ROAD, PENRITH

ENVIRONMENTAL IMPACT STATEMENT

WATER MANAGEMENT REPORT

OCTOBER 2018

TOOKER+ ASSOCIATES

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FIGURES

APPENDIX

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1. Introduction

Benedict Recycling Pty Ltd proposes to operate the Penrith Waste Recycling and Transfer Facility from an existing industrial lot at 46-48 Peachtree Road, Penrith (refer Figure 1).

This report deals with the water management issues and has been prepared by Mark Tooker of Tooker and Associates to support a State Significant Development Application (SSDA) for the project.

2. Site Description

The site is an existing industrial property at 46-48 Peachtree Road Penrith within an IN1 General Industrial zoning (refer Figure 1). It has an area of 4,367m^2 and is currently used by an autowrecker. The site is relatively flat with a concrete hardstand covering the entire site outside the shed generally located in the south eastern area of the site (refer Figure 2).

The surface water on the site drains to the southern boundary via the stormwater drainage pipelines running along the eastern and western site boundaries (refer Figure 2). There are 450 x 450mm grated drainage inlet pits with bases lowered 150mm to incorporate sediment traps. The drainage lines run separately to the back of the kerb to discharge into the gutter in Peachtree Road. These discharges flow to a 3m long inlet pit in the Peachtree Road drainage system.

3. Proposed Development

The proposed development will only accept General Solid Waste (Non Putrescible), as defined by the NSW Environment Protection Authority, for recycling, including soils, metals and dry paper/cardboard. No special, liquid, hazardous, restricted solid waste or general solid waste (putrescible) will be accepted at the site.

The layout of the proposed development is presented on Figure 3. The material handling activities will be covered by a roof extending over 3,000m2 (69% of the overall site) of the site. The entry and exit driveway areas including the weighbridges along with five car parking spaces will be open areas without a roof. The site and drainage system will be upgraded by:

- pressure cleaning the site surface to remove the residual oil;
- capturing part of the main shed roof runoff into a rainwater tank for reuse in the amenities;
- cleaning out of existing drainage system to remove accumulated materials from previous use;
- installing grated drains across the two driveways to capture overland flows;
- updating the drainage outlet pipes to the kerb;
- including water efficient fixtures in any update of the site amenities.

The proposed new stormwater infrastructure on the site is presented on Figure 4.

These proposed roof and measures for the drainage system will improve the runoff water quality and reduce the volume of runoff from the site. There will be no increase in impervious areas on the site for the proposed development.

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4. Council Water Management Requirements

The Penrith Development Control Plan (DCP) 2014 details the requirements for surface water management and the water sensitive urban design (WSUD) approach for development. In Table C3.1 (on page C3-9), the Council requirements for an industrial development which is not increasing the impervious area by greater than 250m^2 are to incorporate water saving measures by installing water efficient labelling and standards (WELS) fixtures. These fixtures need to be 4 star dual flush toilets and taps and 3 star showerheads and urinals. There are no requirements in the DCP for runoff water quality or quantity controls for the proposed development.

The DCP requires further potable water use reductions by the incorporation of rainwater reuse to supplement the non-potable water uses.

No onsite detention is required because there will be no change in the area of impervious surfaces on the site and therefore no increase in the peak flow rate from the site. The DCP also does not require detention storage for this development.

5 Risk Assessment

5.1 Surface Water Management

5.1.1 Operation Phase - WSUD

The Penrith DCP does not require water quality treatment devices for this development. Notwithstanding this, the provision of a roof over the majority of the site will remove a significant quantity of potential pollutants in the runoff from the site. The incorporation of reuse of roof runoff in the amenities will further reduce the runoff pollutant load and also reduce the volume of runoff from the site.

The sumps in the existing drainage inlet pits in the open areas would be the first line of treatment for the site runoff. Coarse materials and sediment would be trapped in the sumps.

Runoff from the open areas on the site will be collected in the drainage inlet pits and grates across the driveways and piped to the Peachtree Road kerb drainage system (refer Figure 4).

The drainage inlet pits would be maintained regularly by the removal of accumulated materials. The sediment sumps in the drainage inlet pits would be cleared on a monthly basis (or as required).

The majority of the pollutant load in runoff is discharged in small storms up to the 3 month ARI storms. Research has indicated that over 90% of the annual pollutant load is contained in frequent runoff up to the 3 month ARI storms. The provision of a roof over 69% of the site and reuse of roof runoff would reduce the runoff pollutant load by more than 55% compared to the existing site. The drainage system will readily cater for these storms and grates across the two driveways will collect the overland surface flows. The proposed drainage system will have an in pipe capacity up to a 10 year ARI storm runoff.

No runoff detention storage is required by the Penrith DCP 2014 for this development. No onsite detention storage is required in any case because the development will not result in an increase in impervious areas and as such, there would be no increase in the site runoff flow rates.

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5.1.2 Construction Phase

The proposed works on the site will include installation of offices, weighbridges, block walls, a driveway as well as a general clean-up of the site hardstands and drainage system. A roof would be erected over the majority of the site.

The runoff control measures to be incorporated in an erosion and sediment control plan for the construction works onsite would include (refer Figure 5):-

- Geotextile cloth to cover the grate of all the drainage inlet pits onsite to remove fine sediment and debris in runoff;
- Gravel filled bags around the perimeter of all the drainage inlet pits on site to temporarily pond runoff locally and remove medium to coarse sediments from runoff;
- Gravel filled bags laid across the existing and proposed entry driveway at the site boundary to temporarily pond runoff locally and remove sediments from runoff; and
- Installation of a silt fence across the back of the kerb at the location of the new driveway construction to remove sediment from runoff prior to discharge to the gutter.

5.2 Site Water Balance

The facilty will have up to 7 personnel on site at any one time and will include toilets, wash basins, kitchen, lunchroom and two offices. These will be refurbished. Any new water fixtures installed will comply with the WELS ratings required by Council which will be 4 star dual flush toilets and taps and 3 star showerheads and urinals.

The average annual supply of roof runoff from the main shed would be stored in a 4,000L rainwater tank with a pumped supply line to the amenities. It is estimated that the roof runoff reuse could readily supply the demand for non potable water use in the amenities (refer Appendix A).

The potable water for the site will be supplied from the existing water mains in Peachtree Road and sewage from the amenities will be discharged to the existing sewer.

The site water balance has been calculated based on the proposed development and details are provided in Appendix A.

The average annual runoff volume from the site under existing conditions has been estimated at approximately 2,454m^3.

In the developed scenario, the extent of runoff from the site will be reduced by capturing runoff and reusing it for use in the amenities. The estimated average annual reuse volume would be 30m3. This reuse will reduce the average annual runoff volume from the site by 1%.

The use of 3 and 4 star WELS water fixtures in the facilty will further reduce the potable water use on the site. This provides a benefit in reducing the demand on the water supply in terms of the volume available and the water reticulation available capacity.

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5.3 Flooding

The site is nominated on Penrith Council plans as being within the "flood planning area". This indicates that the finished levels on the site are below the 100 year ARI flood level plus 0.5m freeboard. It is located within the flood fringe area.

The Penrith CBD Overland Flow Flood Study undertaken by Cardno for Council shows the flood extents for a range of flood severities. The flood extents for the 100 yr ARI and the PMF floods are presented on Figures 6 and 7.

The 100 yr ARI floodwaters do not inundate Peachtree Road at its site frontage. Even in the PMF flood, the floodwaters only pond on the road verge and on the grass area along the site frontage. This grass is not used as part of the recycling facility operation.

The Penrith LEP 2010 Clause 7.2 (4) Flood Planning requires compliance with the following requirements.

"(a) is compatible with the flood hazard of the land" – the site is elevated above the road and would have a low flood hazard given the shallow flood depths and low flow velocities;

"(b) is not located within a floodway" – the site is not located in a floodway;

"(c) is not likely to adversely effect flood behaviour" –the site is an existing industrial site and the development will retain the existing features of the site and will not create any adverse impacts on flood behaviour compared to existing conditions;

"(d) is not likely to signficantly alter flow distributions and velocities" – as mention in (c), the proposed development would retain the existing main features and hence would not signficantly change the existing flood conditions;

"(e) is not likely to adversely effect safe and effective evacuation" – the flood behaviour would be unaffacted by the development and there would not be a signficant increase in workforce capacity on the site and as such, would not affect evacuation in a flood compared to existing conditions;

"(f) is not likely to signficantly detrimentially affect the environment" – the proposed facility would maintain the same main features onsite and hence would not detrimentally affect the environment, cause erosion or affect any riparian area;

"(g) is not likely to result in unsustainable social and econonmic costs to the community as a consequence of flooding" – the proposed site use is similar to the historic and current site use and hence there would not be any unsustainable impacts due to flooding;

"(h) incorporates appropriate measures to manage risk to life from floods" – signs would be installed in the office and lunchrooms indicating the site is located on flood liable land and in case of a flood, employees are to evacuate the site as directed by SES or Council personnel;

"(i) is consistent with any relevant floodplain risk management plan" – Council does not have a floodplain risk management plan covering the subject site, however the proposed development complies with Council's flood related requirements in the DCP.

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The proposed development complies with all the Council LEP requirements for sites nominated within the flood planning area.

5.4 Acid Sulphate Soils

The site is not included in the Office of Heritage and Environment Acid Sulphate Soils Risk Maps because there is no underlying potential for this risk in the area of Penrith.

5.5 Salinity

The then Department of Infrastructure Planning and Natural Resources prepared a Salinity Potential Map for Western Sydney in 2002. This map indicates that the Recycling Facility site has a “Moderate Salinity Potential”. This classification means that salinity processes may occur on the site. There is no evidence of soil salinity on the site. This issue will have been dealt with at the sub division construction stage in order to provide a lot which complied with the salinity guidelines.

Impermeable sheeting would be placed under the driveway slab to avoid any salinity impacts.

5.6 Watercourses and Riparian Areas

The site is located within a planned industrial estate which has allocated space outside the lots for drainage and riparian corridors. The proposed development therefore will not adversely impact on watercourses or riparian corridors. The reuse of runoff for dust suppression will reduce the volume of runoff from the site.

The Council’s DCP does not require any onsite detention or water quality treatment of runoff on the site. The proposed reduction in runoff volume and treament of runoff from the site prior to discharge will contribute to the long term improvement in receiving water quality and bank stability.

5.7 Groundwater

The entire site is paved and hence will not allow any significant transport of pollutants from the site surface into the groundwater.

The proposed development, therefore, will not have any significant adverse impacts on groundwater flows or quality.

6 Summary of Mitigation Measures for the Proposed Development

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

- a runoff erosion and sediment control strategy would be implemented during the construction phase to manage runoff which conforms to State Government best practice guidelines in the Blue Book;
- use of the existing runoff sediment traps in the existing drainage inlet pits to remove sediment and debris at the source;
- installation of grated drains across the two driveways to capture surface runoff before leaving the site;

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- reuse of roof runoff for non potable uses in the amenities to reduce runoff pollutant loads and potable water use;
- installation of water efficient fixtures to conform to Council requirements;
- connection to the sewerage system for onsite personnel amenities;
- no use of groundwater; and
- no use of water in the product processing.

7. Conclusions

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

- stormwater runoff;
- groundwater;
- wastewater disposal;
- potable water demand;
- runoff volume and water quality;
- flooding;
- acid sulphate soils;
- salinity; and
- watercourses and riparian areas.

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FIGURES

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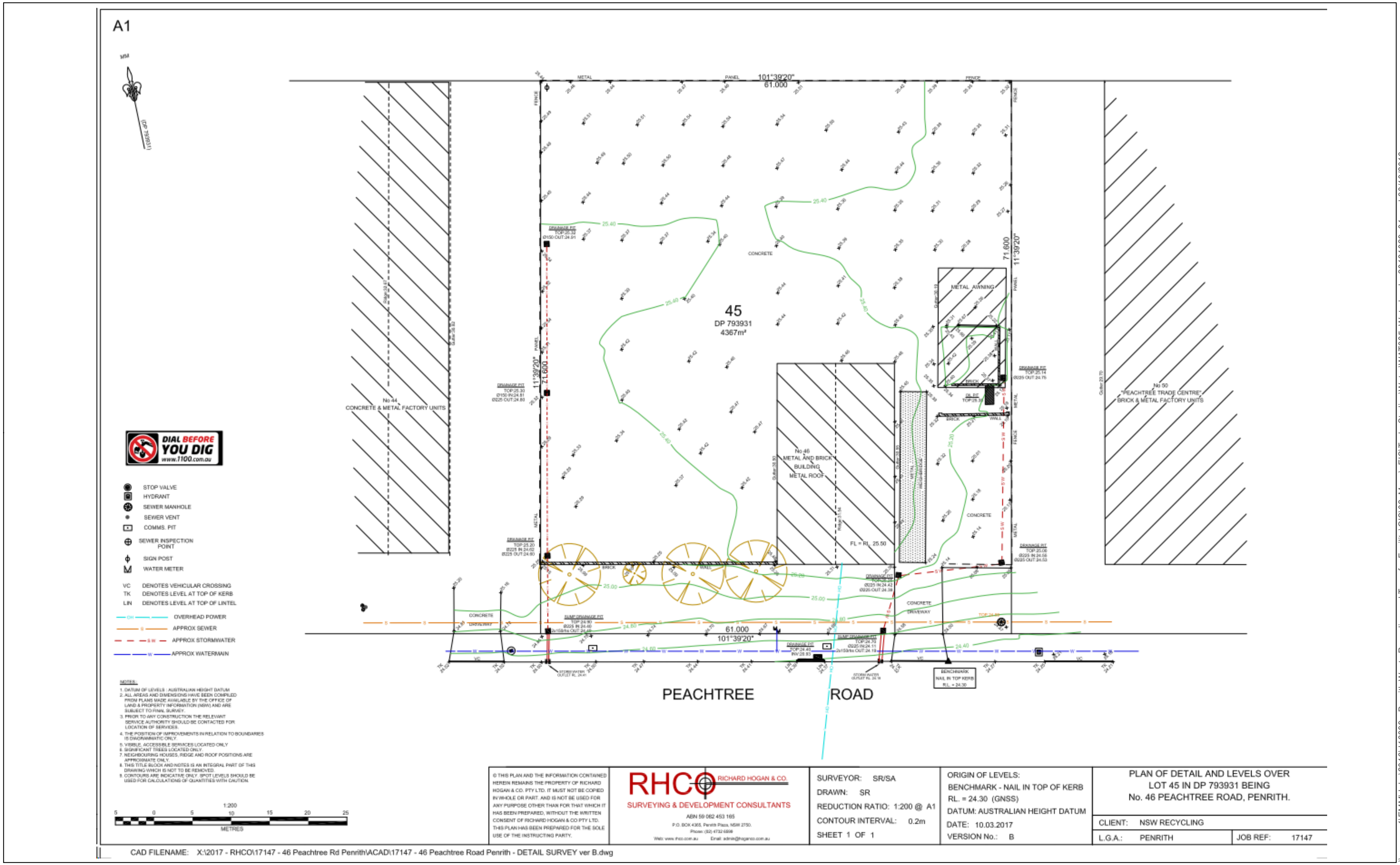
Site context

Penrith Waste Recycling and Transfer Facility

Figure 1



Source: EMM (2018); RHCO (2018)

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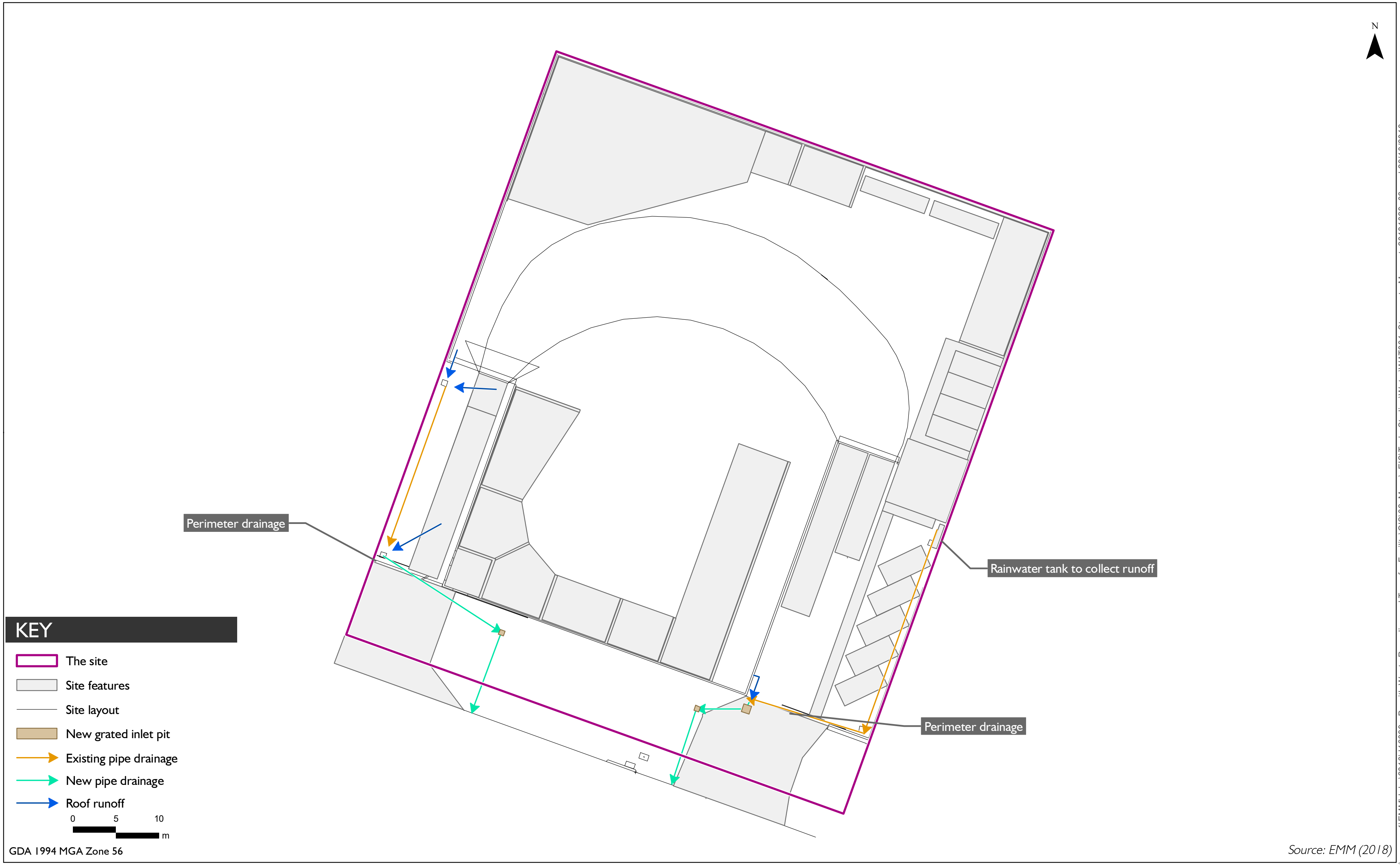
Site survey

Penrith Waste Recycling and Transfer Facility

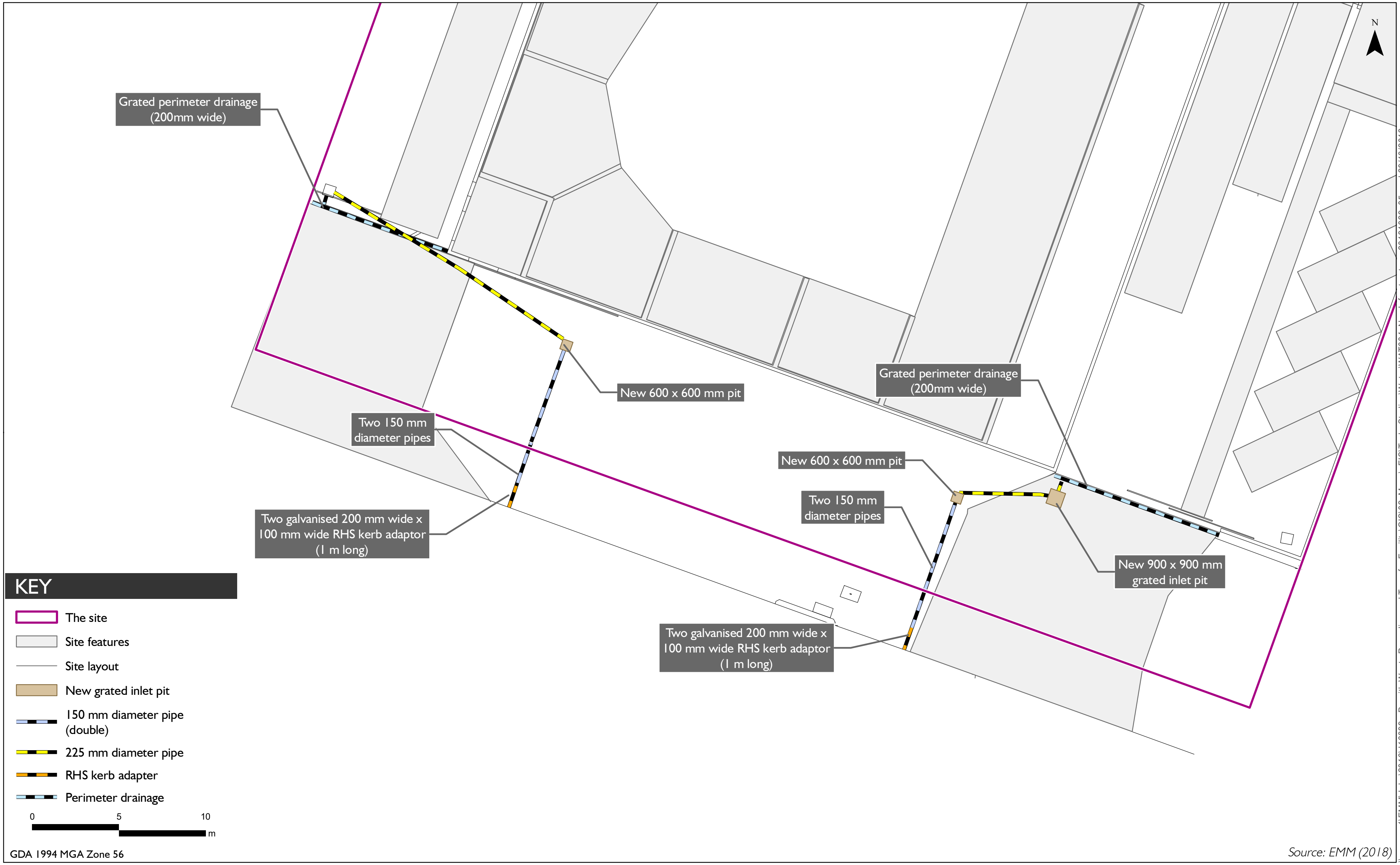
Figure 2



Stormwater management concept plan

Penrith Waste Recycling and Transfer Facility

Figure 3



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Proposed new stormwater infrastructure

Penrith Waste Recycling and Transfer Facility

Figure 4

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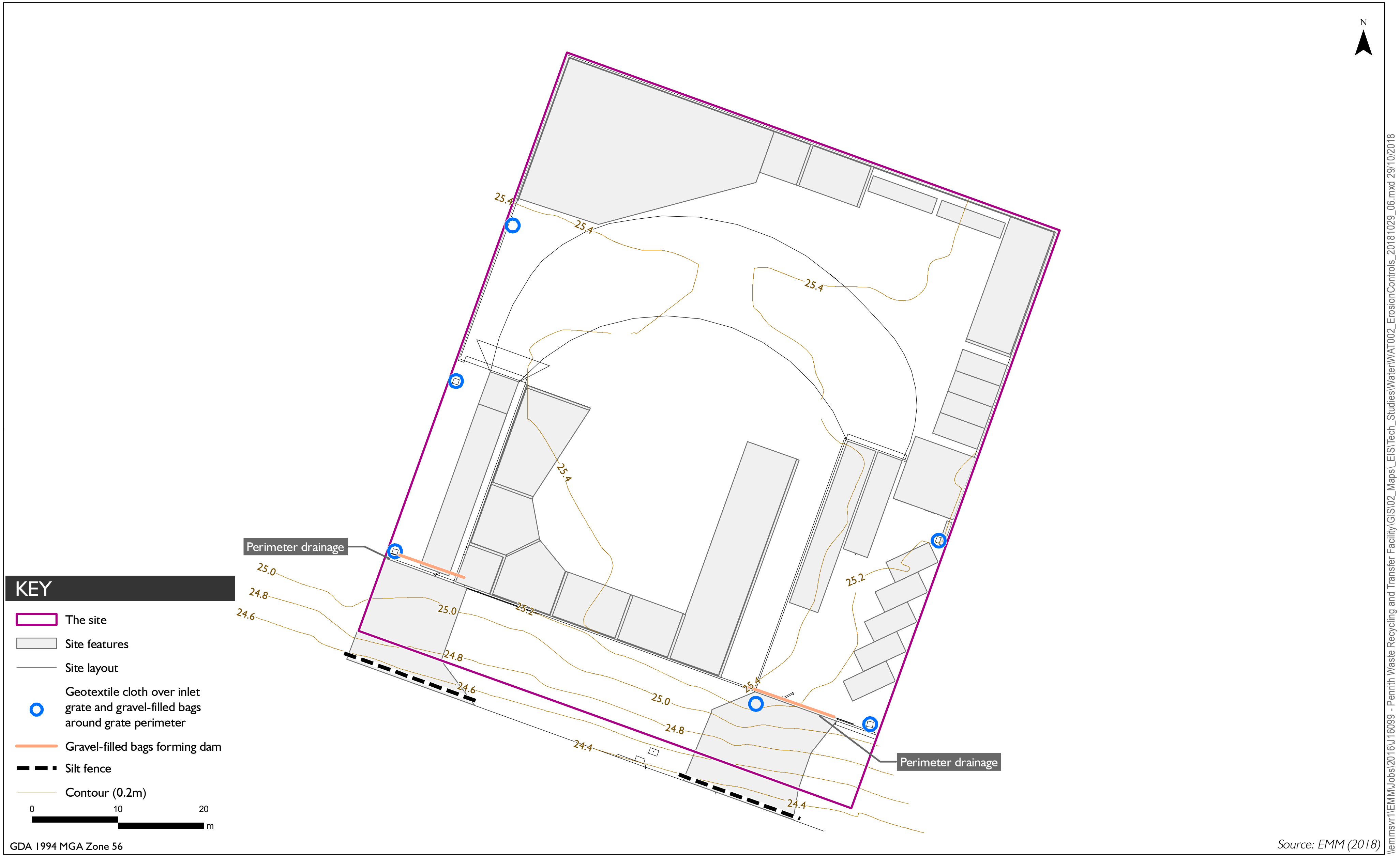
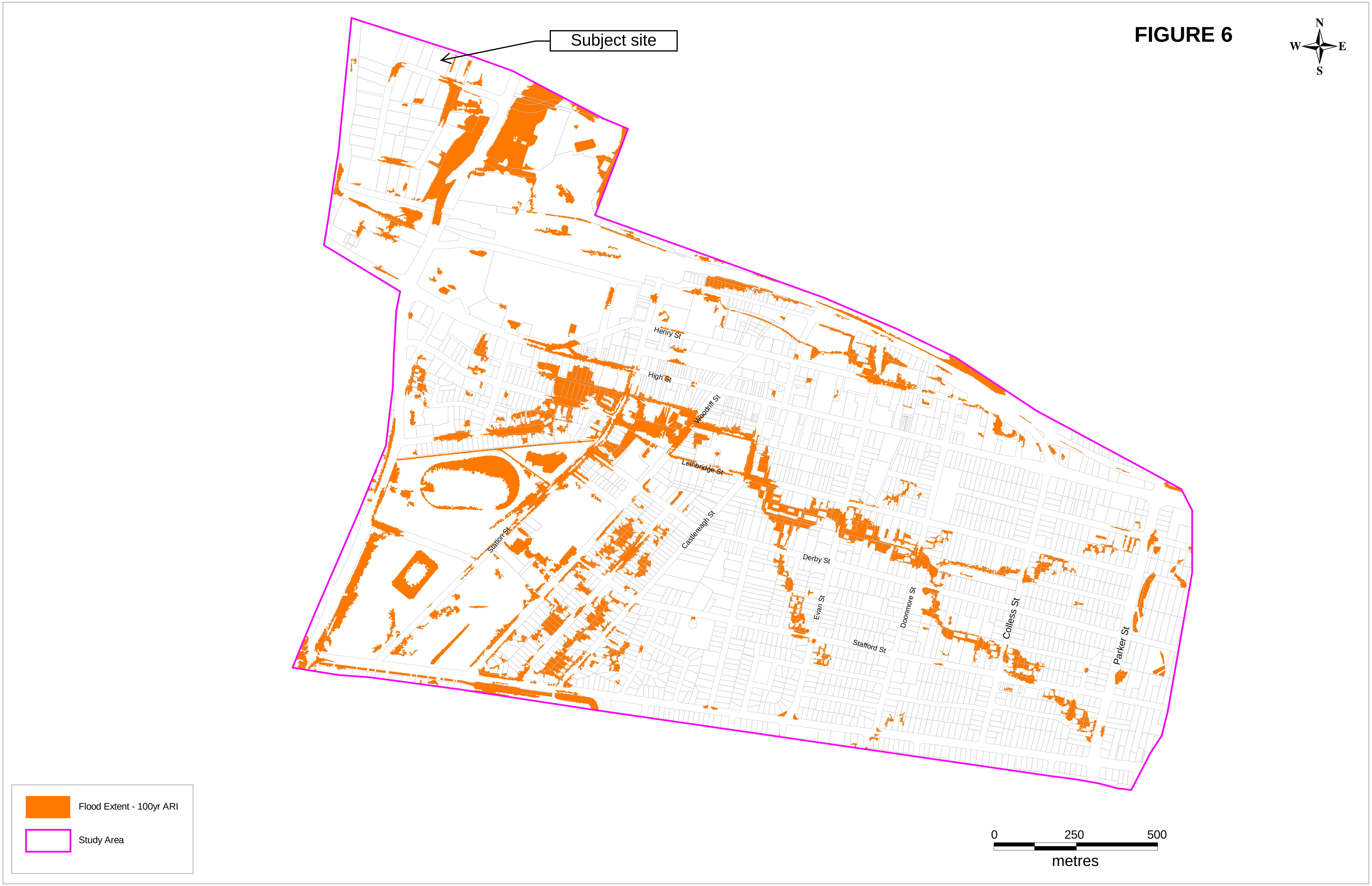


EMM

Erosion and sediment control plan

Penrith Waste Recycling and Transfer Facility

Figure 5



W4735
July 2015

Penrith CBD Detailed Overland Flow Flood Study

FLOOD EXTENT- 100 YEAR ARI

FIGURE 7


Subject site
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High St
Woodriff St
Lethbridge St
Station St
Castlereagh St
Derby St
Evan St
Doonmore St
Stafford St
Coless St
Parker St
Flood Extent - PMF
Study Area
0
250
500
metres

APPENDIX A

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Site Annual Water Balance

1. Assumptions

Mean Annual Rainfall	802.7mm
Mean Number of Rainy Days	70 days
Mean Number of Dry Days	295 days
Annual Volumetric Runoff Coefficient	0.7
Total Site Area	4367m²
Roof Area for Rainwater collection	3000m²
Non Potable water use in the amenities	30m³

Existing Conditions

Site Area	4367m²
Average Annual Volumetric Runoff Coefficient	0.7
Average Annual Rainfall	802.7mm
Average Annual Runoff Volume	4367 x 0.7 x 0.8027 = 2454m³

2. Non Potable Water Reuse

Annual Rainfall Runoff Reuse

Roof area used for reuse	3000m²
Average Annual Rainfall	802.7mm
Average Annual Runoff Coefficient	0.7
Average Annual Volume available for rainwater reuse	1686m³
Rainwater runoff reuse in amenities	30m³

3. Site Water Balance

Surface Runoff

Average Annual Site Runoff – existing conditions	2454m³
Average Annual Rainwater reuse for amenities	30m³
Average Annual Nett Site Runoff – after development	2424m³

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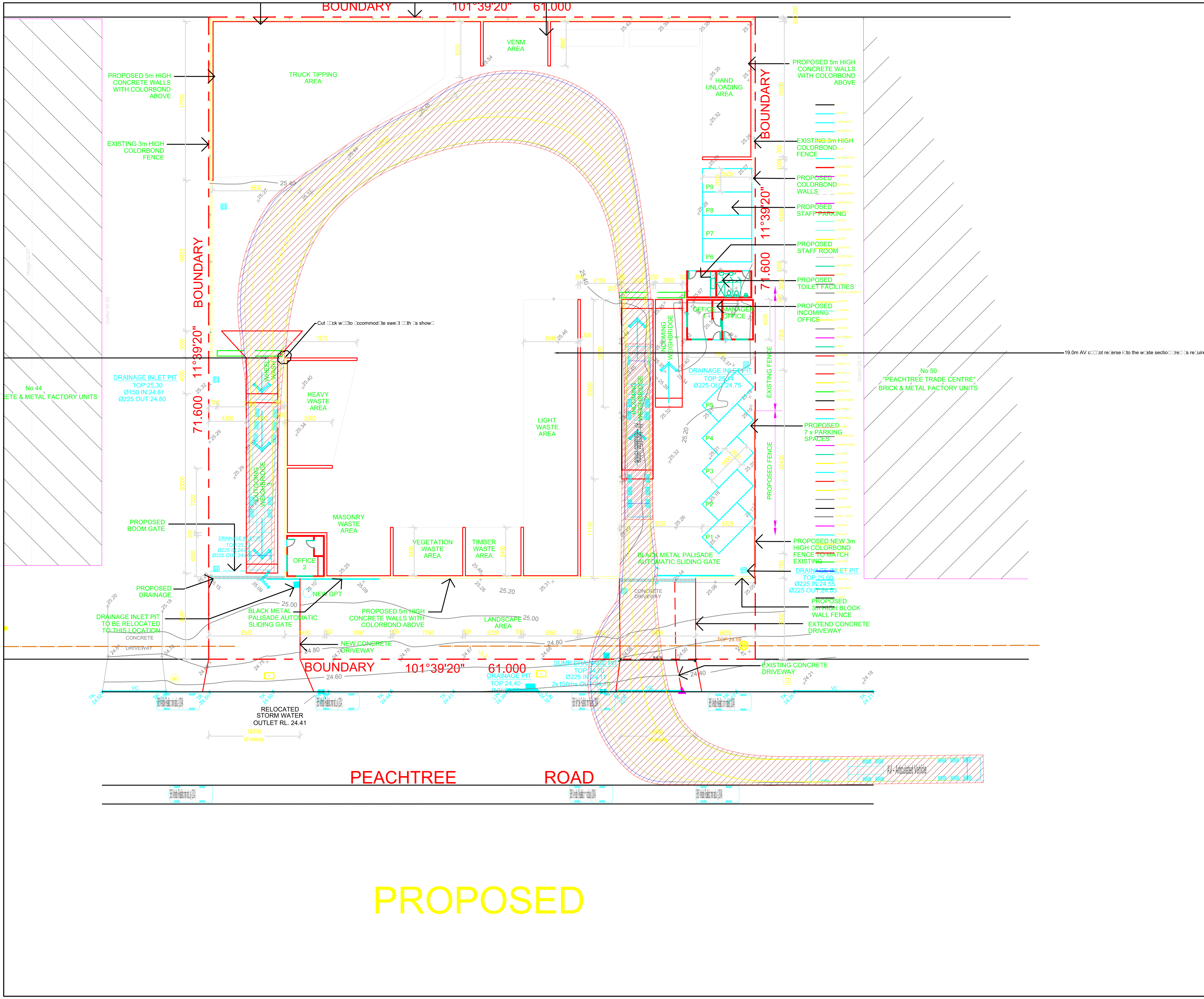
Appendix F

Swept path analysis



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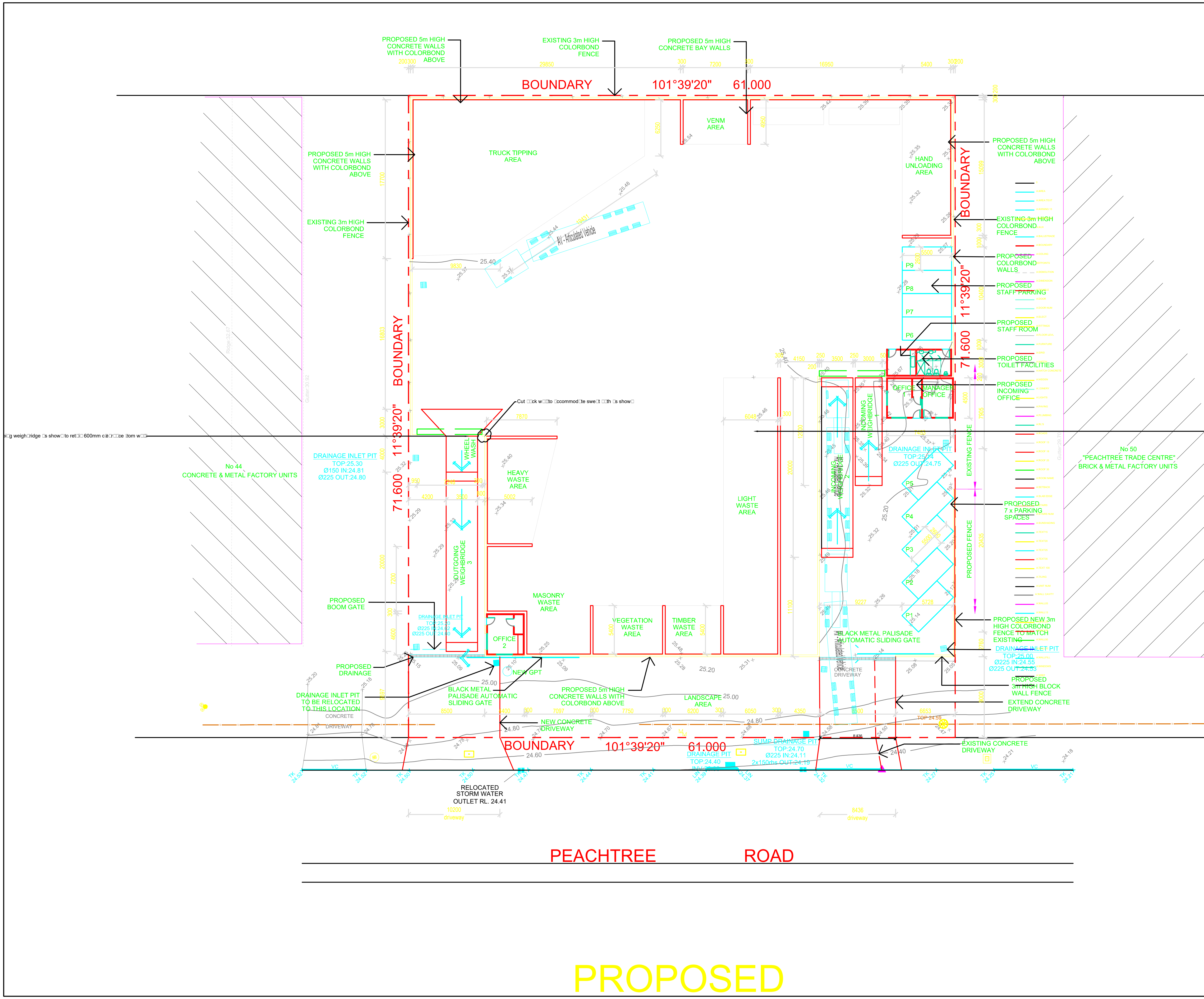

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no. revision note		date

Swept Path Legend:

Wheel Path

Vehicle Body Envelope

Clearance Envelope (300mm)

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drawing prepared by

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traffic and transport planners

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drawing title

Swept Path Analysis (19m Articulated Vehicle)
Truck Tipping Area
Queuing Analysis

drawn: DP checked: GH date: 16/10/2018

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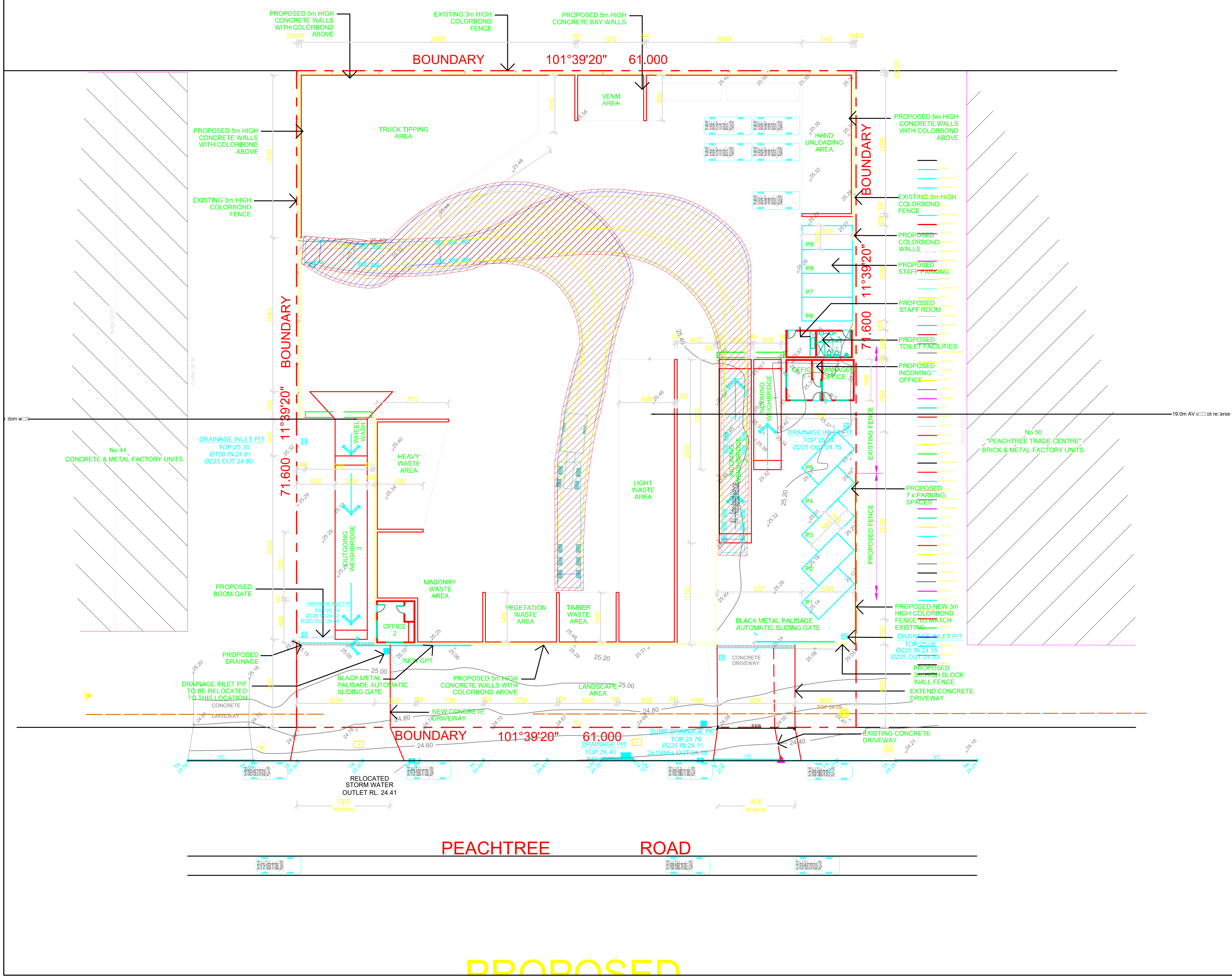

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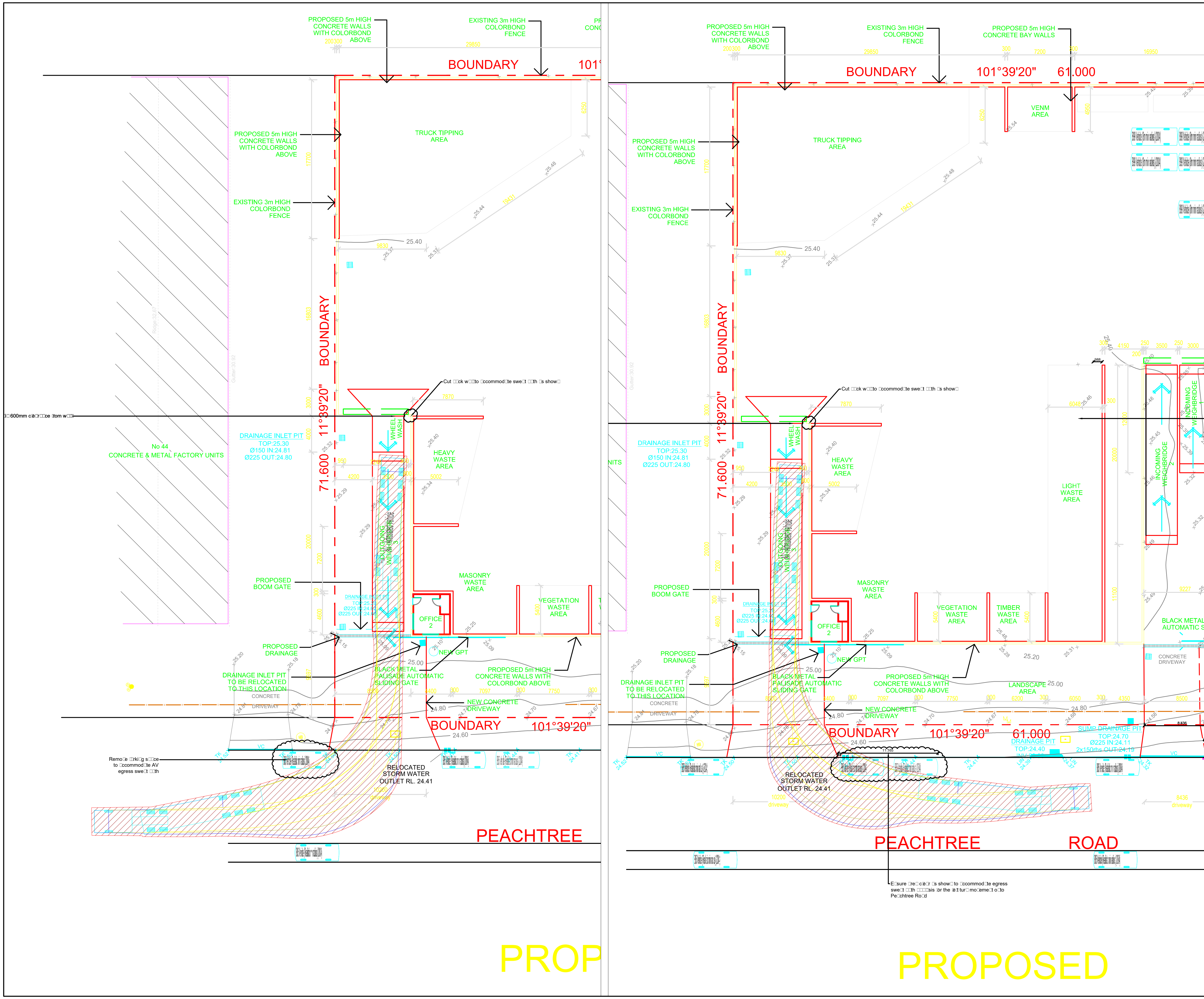

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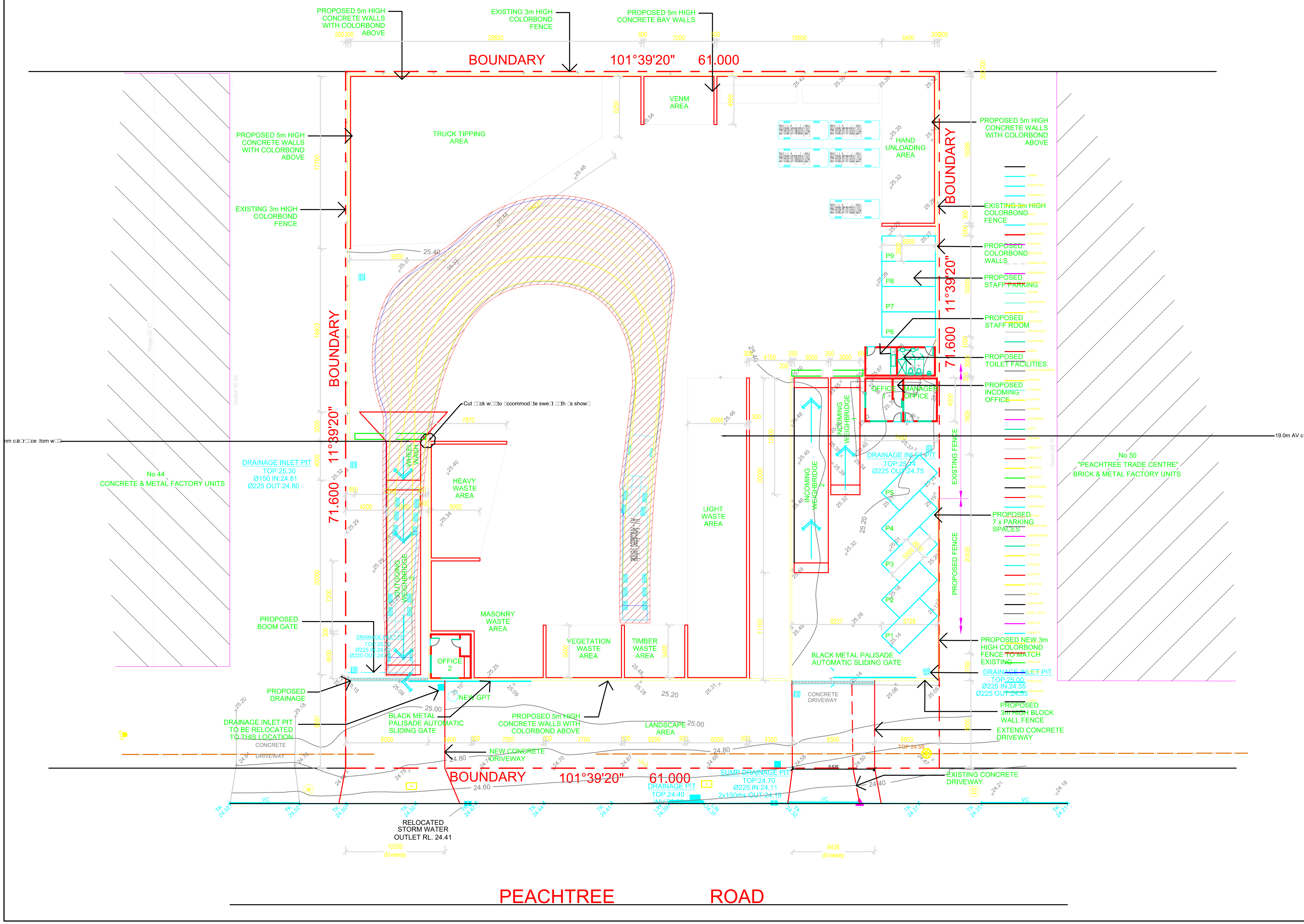

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no. revision note | app. date

Swept Path Legend:
- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

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drawing title
Swept Path Analysis (19m Articulated Vehicle)
Waste Area Analysis
Exit.

drawn: AP | checked: GH | date: 16/10/2018

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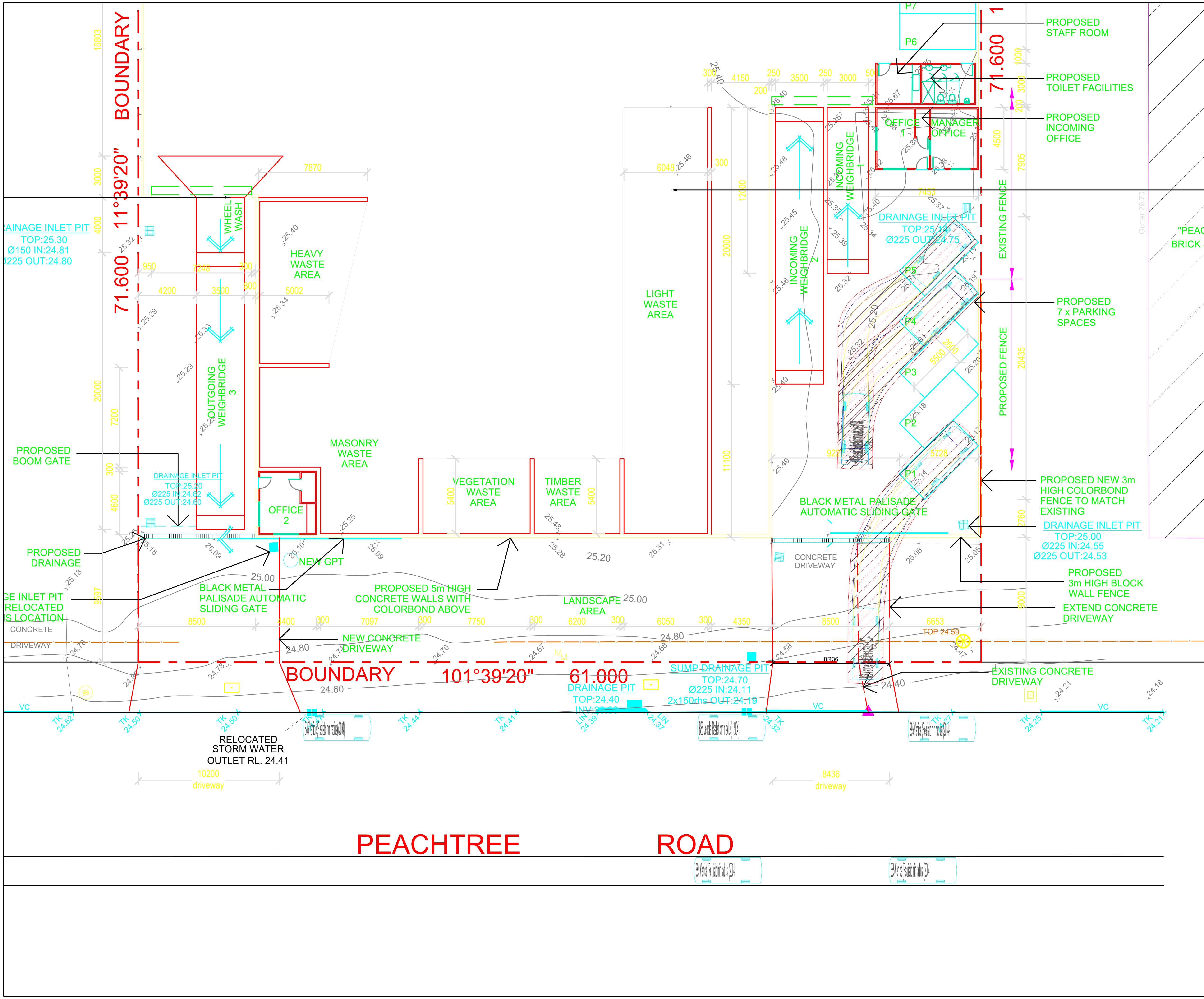

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Swept Path Legend:
- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

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scale
1:400 @ A3
0m 4 8 12 16

project
Penrith Waste Recycling and Transfer Facility
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Penrith NSW 2750

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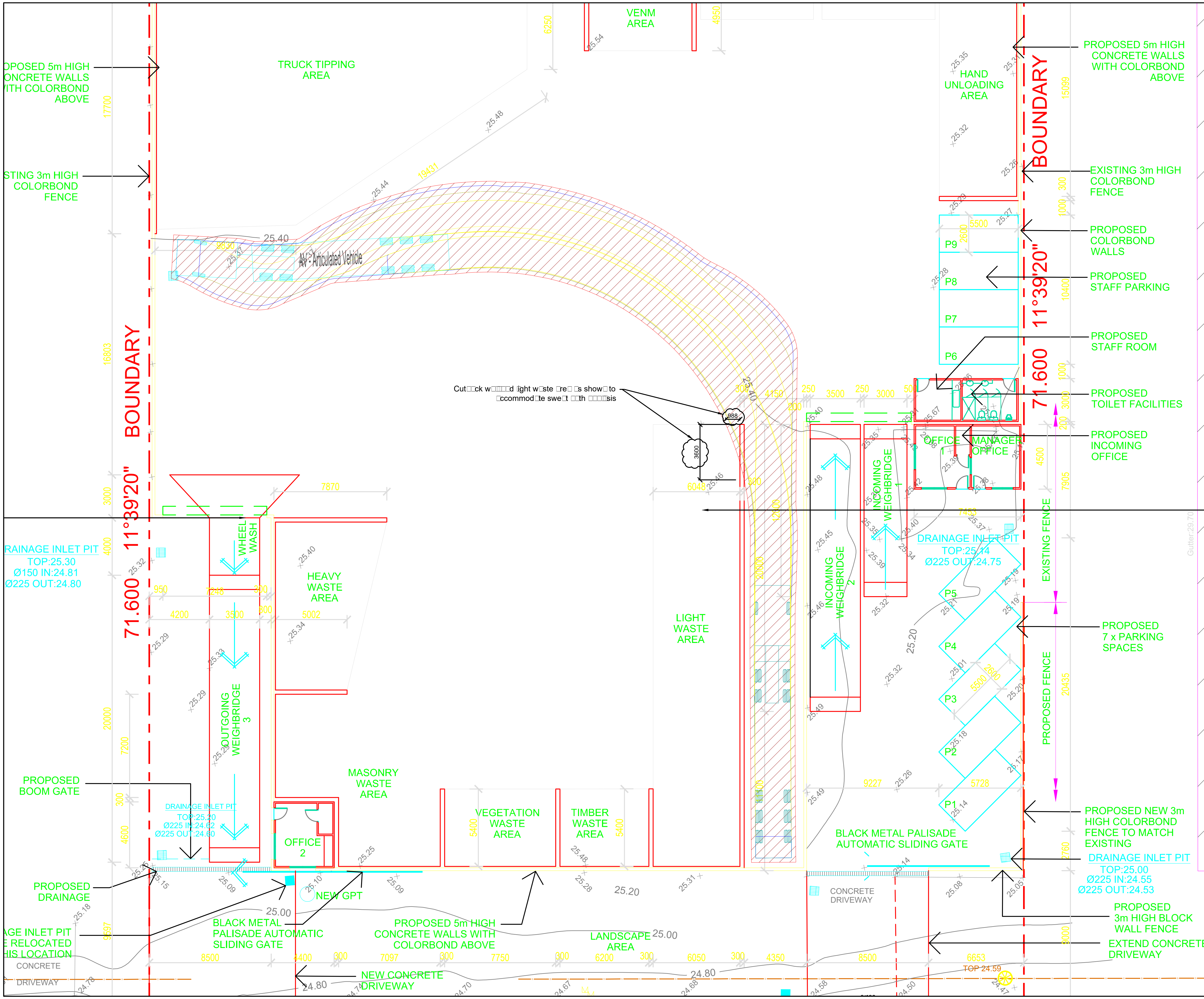
drawing title
Swept Path Analysis B99 Design Vehicle Spaces P1-P4 & P5 Entry

drawn: EP | checked: GH | date: 16/10/2018

17.012d03.03 TRAFFIX 180514 ...Swept Paths.dwg

17.012 project no. | 03 drawing chase. | TX.06 drawing no. | 03 rev



Notes

This drawing is prepared for information purposes only. It is not to be used for construction.

TRAFFIX is responsible for vehicle swept path diagrams and/or drawing markups only. Base drawing prepared by others.

Vehicle swept path diagrams prepared using computer generated turning path software and associated CAD drawing platforms. Vehicle data based upon relevant Australian Standards (AS/NZS 2890.1-2004 Parking facilities - Off-street car parking and/or AS 2890.2-2002 Parking facilities - Off-street commercial vehicle facilities). These standards embody a degree of tolerance however the vehicle characteristics in these standards represent a suitable design vehicle and do not account for all variations in vehicle dimensions, specifications and/or driver ability or behaviour.

no.	revision note	date

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drawing title
Swept Path Analysis (AV 19.0m Design Vehicle) Reverse Entry Access to Light Waste Area

drawn:	EP	checked:	GH	date:	16.10.2018

17.012d03.03 TRAFFIX 180514 ...Swept Paths.dwg

project no.	drawing phase	drawing no.	rev
17.012	03	TX.07	03

Appendix G

Enhanced preliminary contamination assessment

Penrith Waste Recycling and Transfer Facility

Enhanced Preliminary Contamination Assessment

Prepared for Benedict Recycling Pty Limited (Benedict Recycling) | 25 October 2018

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Penrith Waste Recycling and Transfer Facility

Final

Report J16099RP2 | Prepared for Benedict Recycling | 25 October 2018

Prepared by	**Kylie Drapala**	Approved by	**T Richardson**
Position	Senior Environment Scientist	Position	Senior Planner
Signature	K Drapala	Signature	Tyler Richardson
Date	25 October 2018	Date	25 October 2018

Document Control

Version	Date	Prepared by	Reviewed by
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1 Introduction

EMM Consulting Pty Ltd (EMM) was engaged by Benedict Recycling Pty Limited (Benedict Recycling) to undertake a preliminary contamination assessment for 46–48 Peachtree Road in Penrith, NSW, legally described as Lot 45 in DP 793931 (Figure 1.1) (original PCA). The original PCA was provided as part of the environmental impact statement (EIS, Appendix H) submitted with the application for state significant development (SSD) 16_7733.

As part of the response to submissions report (RTS), Benedict Recycling has engaged EMM to prepare an enhanced preliminary contamination assessment (enhanced PCA) to address areas of concerns on the site as a result of current and historical uses and activities.

This enhanced PCA improves upon the original PCA in several ways, including a more detailed walkover of the site, further photograph documentation, targeted soil sampling and laboratory testing. This enhanced PCA method tests the original PCA's assumption that the existing slab on the site has limited pathways for contamination on the site by sampling the areas most likely to be contaminated.

The objectives of this project are to:

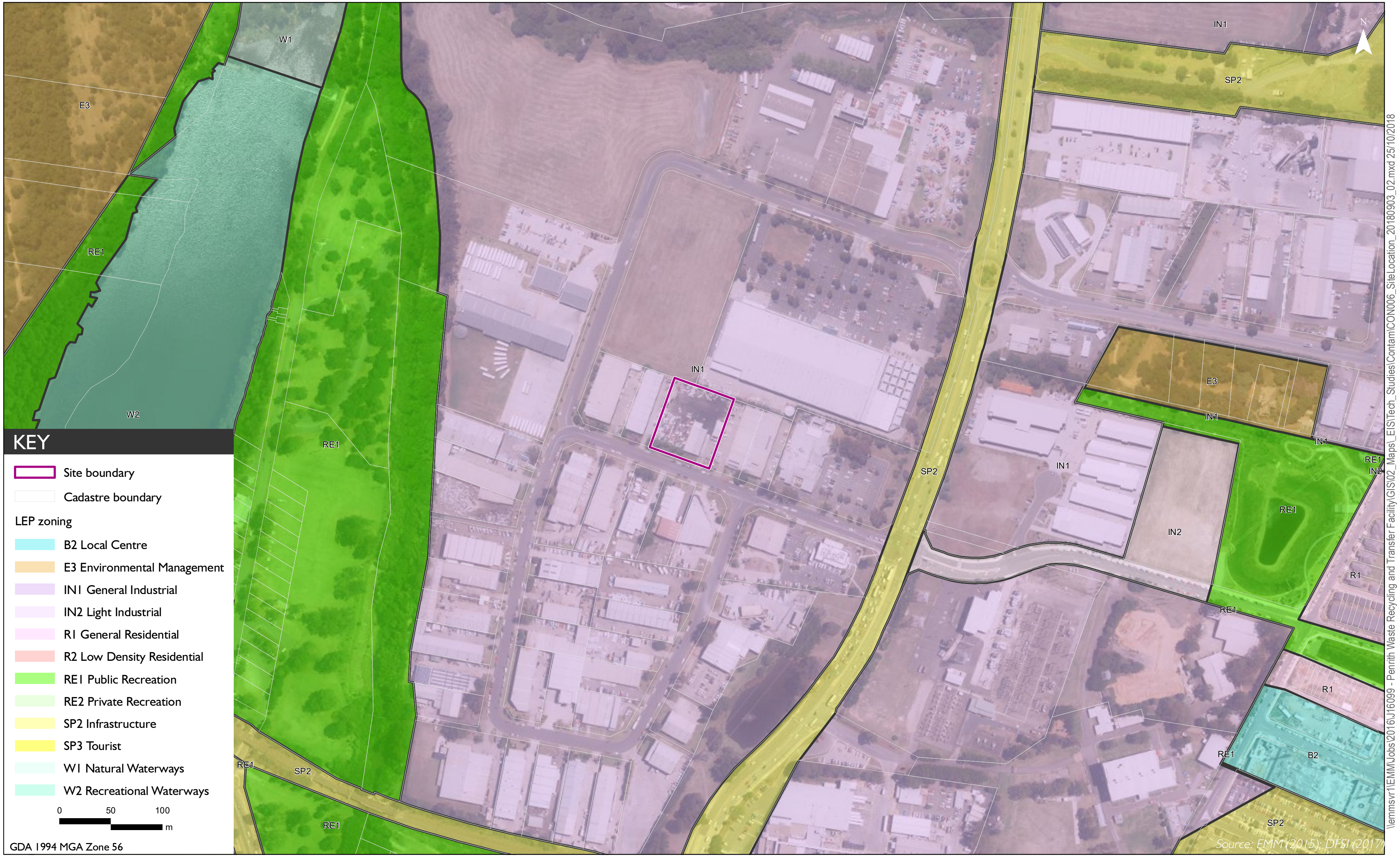
- assess the likely nature and extent of potential contamination in the identified areas of concern;
- assess whether identified contamination presents an unacceptable risk of exposure to human health and/or the environment, in the context of the proposed industrial/commercial land use scenario;
- provide advice on whether the land is suitable (from a contamination perspective) for the proposed industrial/commercial land use scenario; and
- provide preliminary recommendations on additional contamination assessment, management or remediation (if required).

1.1 Scope

The original PCA identified potential contamination issues that require management during the construction phases of the project. The regulator has requested further investigation into the potential for site contamination, highlighting concerns relating to the potential for contamination to be encountered during excavation.

EMM undertook the following scope of work to address the project objectives:

- desktop review;
- field observations;
- targeted soil and material sampling;
- laboratory analysis; and
- data assessment and reporting.



Site location

Penrith Waste Recycling and Transfer Facility

Enhanced preliminary contamination assessment

Figure 1.1

2 Existing environment

The site is a currently a sealed and levelled block industrial lot, accessed by Peachtree Road. The site identification details are included in Table 2.1.

Table 2.1 Site identification details

Site particulars	
Street number, name and suburb	46–48, Peachtree Road, Penrith, NSW, 2750
Lot and Deposited Plan (DP) number	Lot 45, DP 793931
Area	4,367 m^2
Local council	Penrith City Council
Parish, County	Cumberland, Castlereagh
Coordinates	1504120 E, 224440 S
Owner	Benedict Recycling Pty Limited
Occupier	Benedict Recycling Pty Limited
Current zoning	IN1 General Industrial
Current land use	Metal recycling

2.1 Land zoning

The site is zoned as IN1 General Industrial under the *Penrith Local Environmental Plan 2010*, this zoning extends in all directions around the site (Figure 2.1). The land use table for IN1 General Industrial is as follows:

1. Objectives of zone:

- to provide a wide range of industrial and warehouse land uses;
- to encourage employment opportunities;
- to minimise any adverse affect of industry on other land uses;
- to promote development that makes efficient use of industrial land; and
- to permit facilities that serve the daily recreation and convenience needs of persons working in industrial areas.

2. Permitted without consent:

Nil.

3. Permitted with consent:

Animal boarding or training establishments; boat building and repair facilities; car parks; depots; environmental facilities; environmental protection works; flood mitigation works; freight transport facilities; garden centres; general industries; hardware and building supplies; industrial retail outlets; industrial training facilities; industries; kiosks; landscaping material supplies; light industries; neighbourhood shops; places of public worship; plant nurseries; recreation areas; roads; rural industries; self-storage units; signage; storage premises; take away food and drink premises; timber yards; transport depots; truck depots; vehicle body repair workshops; vehicle repair stations; warehouse or distribution centres.

4. Prohibited:

Hazardous industries; offensive industries; any other development not specified in item 2 or 3.

2.2 Project description

The proposal involves the redevelopment of the site into a waste transfer and processing facility. The site is currently sealed with a large concrete slab and there is a large shed in the southern corner.

When complete, the site will comprise primarily of a 3,000 m^2 shed that will enclose the operational area of a waste recycling and transfer facility.

The removal of the existing concrete slab will not be necessary. Limited ground disturbance works, including enhancement of the stormwater system and the installation of pads/footings will be required.

Some minor cracks are evident in the existing concrete seal and these will be repaired where necessary. Stormwater management structures may require 1 to 2 m deep excavations. The site layout is shown in Figure 2.2.

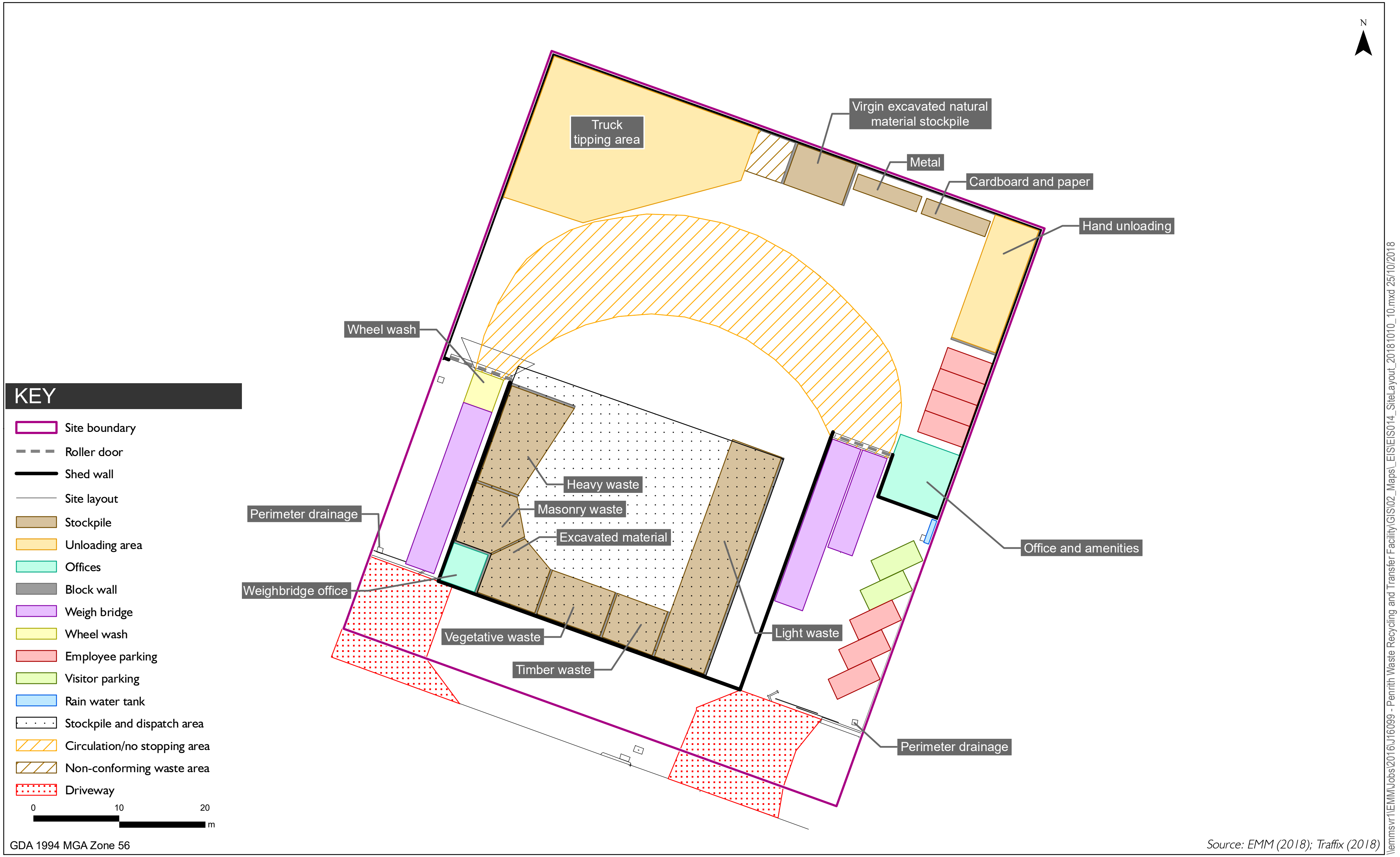
EMM

Potentially contaminated sites

Penrith Waste Recycling and Transfer Facility

Enhanced preliminary contamination assessment

Figure 2.1



[redacted]

Site layout

Penrith Waste Recycling and Transfer Facility
Enhanced preliminary contamination assessment
Figure 2.2

2.3 Environmental setting

The preliminary contamination assessment (EMM 2017) provides further detail of the local setting.

2.3.1 Topography

The site is flat and at approximately 26 m Australian Height Datum (AHD). The site is in the Hawkesbury-Nepean River catchment area and the area gently slopes towards the Nepean River. The catchment area is situated on the Cumberland Plain which comprises gently undulating plains and low hills rising gradually from the flat, low lying areas (just above sea level) in the north to an altitude of around 350 m on the rolling hills of the Razorback Range to the south.

2.3.2 Soils

The site falls into the Cranebrook soil landscape (OEH 2016). This consists of a terrace on Cranebrook Tertiary Alluvium in the Cumberland Plain. The soils likely to be encountered beneath the slab at the site include:

- Red Kandosols which are soils that lack a strong texture contrast with a massive subsoil;
- Yellow and Brown Sodosols which are soils that lack a strong texture contrast and have a sodic subsoil;
- Yellow and Brown Chromosols which are soils are lacking a strong texture contrast with a pH > 5.5 in the subsoil; and
- Stratic Rudosols which are soils that have negligible pedological organisation. The upper 0.5 m of the soil profile consists mainly of unconsolidated materials.

2.3.3 Geology

The site is within the Sydney Basin comprising Triassic and Permian sedimentary rocks. The Tertiary sedimentary rocks consist of stratified sandstone, siltstone and shale formations with interbedden coal seams at depth within the upper Permian sequences.

Locally, the site is situated on an alluvial plain adjacent to the Nepean River. Reference to the Penrith 1:100 000 Geological Map regional geology map (Clarke and Jones 1991) indicates that the site is situated on unconsolidated Quaternary gravel, sand, silt and clay which forms part of the Cranebrook formation.

Further from the river Triassic Wianamatta Group, Liverpool Sub Group (Ashfield Shale) comprises the surficial geology. The Liverpool Sub Group shales form a thin cap (ie 10 m in thickness) over the Triassic Hawkesbury Sandstone. The Hawkesbury Sandstone is a massive, flay lying sedimentary units comprised of major medium to coarse grained quartz sandstone, with interbedded siltstone, shale and claystone (Ross 2014). Shale is assumed to underlie the unconsolidated deposits and is seen in monitoring bores 500 m to the north of the site. However, this cap could have been eroded by the Nepean River meaning the Hawkesbury Sandstone unconformably underlies the alluvium.

2.3.4 Surface water

The nearest watercourse is Peach Tree Creek, approximately 240 m from the western boundary of the site. Peachtree Creek drains to the Nepean River approximately 500 m north-west of the site. Boundary creek is 380 m north of the site and runs east-west, draining into the Nepean River.

The Nepean River flows north eventually forming the Hawkesbury River before discharging into Broken Bay approximately 60 km north-east of the site. The Nepean River is a major ephemeral river and the broader Hawkesbury-Nepean River forms one of the largest coastal rivers in NSW.

2.3.5 Groundwater

The Quaternary alluvial deposits support a discontinuous and unconfined local groundwater system adjacent to the Nepean River. The alluvial groundwater system is relatively permeable and is recharged via rainfall (Ross 2014). The local groundwater flow direction is assumed to be towards the Nepean River. These systems are expected to be hydraulically connected.

A database is maintained by Department of Primary Industries - Office of Water (DPI Water) that contains information on all groundwater bores (including private landholder bores, private monitoring bores and DPI Water monitoring bores), such as location, date drilled, depth drilled, drillers logs, screen interval and type of installation. This database was reviewed and the depth to groundwater in the alluvium in the vicinity of the site was recorded between 6.6–8.1 m below ground level (BGL).

The Wianamatta Group shales generally have low permeability and yields, and act as a local aquitard (Ross 2014). The underlying Hawkesbury Sandstone forms an extensive confined to semi-confined regional aquifer within the Sydney Basin sequence (Ross 2014). Regionally groundwater flow is predominately towards the north or north-east with major discharge zones being the Georges, Parramatta or Hawkesbury Rivers, with ultimate discharge offshore to the east (Ross 2014).

There are a number of groundwater monitoring bores in the vicinity of the site. There are nine monitoring bores 500 to 600 m north to north-north-west of site. These are shallow bores (ie to 15 m deep) drilled between 2003 and 2009 into alluvium.

2.4 Surrounding land uses

The land immediately surrounding the site is dominated by industrial lots. The site is surrounded to the east, south, west and north-east by industrial buildings, and undeveloped land to the north-west (adjacent to the Nepean River), likely remnant from the previous agricultural setting. In the 250 m radius around the site are the following light industries: Boral Concrete, Thurston Signs, Norman’s Scrap Metals, Diamond Laundry Services, Peachtree Auto Electrical Service, Penrith City Exhaust, Bunnings North Penrith and Kennards Self Storage Penrith. These businesses comprise warehouses or buildings and sealed surfaces; there are no obvious unsealed surfaces where industrial works take place.

In a 2 km radius industrial and commercial users include: a former Mobil depot, Caltex service stations, Crane Enfield Metals, 7-eleven service stations, Mirvac industrial sites, Penrith sewage treatment system, LD&D Milk, Vibrac Australia, LD&D Milk processing, ACI glass packaging, Aluminium Extrusion and Distribution Pty Limited and Boral Emu Plains Quarry. Excluding the quarry and sewage treatment system, these businesses comprise warehouses or buildings and sealed surfaces; there are no obvious unsealed surfaces where industrial works take place.

The Peachtree Hotel is approximately 60 m east of the site. The shopping centre Westfield Penrith is approximately 500 m south-east of the site. The Penrith Valley Inn is about 570 m south-west of the site and a McDonald’s restaurant is located approximately 100 m to the south-east of the site.

Castlereagh Road and the Great Western Highway are approximately 200 m east and 500 m south-west of the site. The main western railway lies 420 m south of the site. This is zoned as SP3 Tourist.

Approximately 240 m to the west of the site there is a strip of undeveloped land adjacent to the Nepean River. This is zoned as RE1 Public Recreation and extends to the south. The closest residential areas are about 620 m to the south-west and east of the site. There are other minor land uses in the area.

Table 2.2 Groundwater bores

Work number	Easting	Northing	Elevation (mAHD)[1]	Distance from site boundary (m)	Bore depth (m BGL)	Standing water level (m BGL)	Reporting yield (L/s)	Salinity (mg/L)	Owner category	Date drilled
GW105511	285826	6264430	0	613	14.5	8.3	N/A	N/A	Monitoring Bore	14/05/2003
GW108081	286033	6264515	0	708	14.35	7.5	N/A	N/A	Monitoring Bore	2/05/2006
GW105510	286117	6264451	0	668	14.5	7	N/A	N/A	Monitoring Bore	15/05/2003
GW105512	285849	6264287	0	468	15	9.6	N/A	N/A	Monitoring Bore	12/05/2003
GW110648	286004	6264302	0	493	9.7	8.2	N/A	N/A	Monitoring Bore	26/11/2009
GW110649	285991	6264211	0	402	10	8.7	N/A	N/A	Monitoring Bore	25/11/2009
GW110647	286226	6264281	0	567	10	8.1	N/A	N/A	Monitoring Bore	26/11/2009
GW109667	286158	6264450	0	682	13.7	13.4	0.1	N/A	Monitoring Bore	2/10/2008
GW105509	286271	6264245	0	567	14.1	7	N/A	N/A	Monitoring Bore	27/08/2003

Source: Department of Primary Industries - Office of Water, Continuous Water Monitoring Network (allwaterdata.water.nsw.gov.au/water.stm).

Note: 1. As reported in database.

3 Site history

3.1 Site observations

The site was initially used for agricultural purposes and was rezoned and redeveloped by Investa Property Group (the previous site owners) for industrial purposes in approximately 1985. The site has been used as an auto wrecker for the entire period of industrial setting, although it has been vacant for periods over the last 30 years.

3.2 Historical imagery

Historical aerial imagery was obtained from NSW Land and Property Information and also from Penrith City Library. The historical land use findings of the review of available aerial imagery for the site and surrounds are summarised in Table 3.1.

Table 3.1 Review of historical aerial imagery

Year	Site	Surrounds
1936	The site may be present on this photo, but is not validated. The area is all agricultural use.	The local area shows significant agricultural development with clearing and fields visible along the river. Image is copy write and can be found at the following location: https://penrithcity.spydus.com/cgi-bin/spydus reference no. AS13
1965	The site is in the centre left of the photo and is cleared for grazing. No agricultural or other infrastructure is visible. it is noted by Penrith City Library that the site may have been used as a low intensity piggery and grazing site.	Some urban housing development to the south and east. The immediate surrounds are still used for agriculture. Images are copy write and can be found here: https://penrithcity.spydus.com/cgi-bin/spydus reference no. LH0012
1986	The site is originally developed to industrial use. The site of interest remains vacant until at least after this photo in 1986	The industrial area surrounding the site is developed, with each block having infrastructure installed until the industrial area if fully developed over a few years. Images are copy write and can be found here: https://penrithcity.spydus.com/cgi-bin/spydus. reference no. LH0025
1991	A large shed and a small car park are situated in the south-east of the site as well as another smaller building along the eastern boundary. The front of the site is landscaped. A concrete seal is present over the remainder of the site which is largely covered by cars (indicative of industrial land use).	Immediately north of the site are large, levelled plots, remnant of the agricultural setting in the area. Major roads are present in the vicinity of the site. Further north there are levelled plots and a small number of industrial buildings. There is also a large man-made pond. To the west of the site is the Nepean River and the Emu Plains Boral Quarry. Further west of the quarry is open pasture. Immediately south of the site are numerous industrial lots, with residential property adjacent to the Nepean River to the south-west. Further south there are residential lots and the 'Aqua Golf' golf club. Immediately east of the site are large industrial lots, undeveloped lots and the Peachtree Hotel. Further east is residential housing.
1998	As above.	As above with further development at the 'Aqua Golf' golf club.

Table 3.1 Review of historical aerial imagery

Year	Site	Surrounds
2005	As above.	As above with the plot immediately north of the site now cleared. Many of the levelled blocks further north now comprise industrial lots. Large industrial area to the east has been levelled. The water storage area to the far north has reduced in extent.
2014	As above but the site is empty.	As above with further industrial development immediately north of the site and in the far north. Industrial area to the east has been redeveloped. The water storage areas look to have further dried and been partially rehabilitated.

Notes: Images from 1991 onwards are shown in Appendix B.

From the imagery available it is considered that the possibility of contamination sources such as dips or yards does not form a high risk as the imagery does not show any significant infrastructure associated with intensive piggery, other stock or grazing activities. Stock on site are not expected to have been at intensive scales.

3.3 Current site condition

Its recent historic and current use by auto wrecking businesses means there is the potential for contamination in the site consistent with the *Managing Land Contamination Planning Guidelines* Table 1, activities that may cause contamination.

There is an 'oily sheen' in many areas on the concrete slab (Photograph 3.1) and obvious oil material sitting on the concrete surface in some areas. It is believed that grease and oil has gradually accumulated on top of the slab after being washed off of scrap during rainfall. The oil is being collected in a large oil sump (Photograph 3.2) and has also filled up a small sump located within the shed area. The oil was not observed to be leaving the site and is considered to be a residual waste from the current occupiers. While the site is sealed with concrete there is one area where the concrete slab is damaged and compromised (Photograph 3.3).

The survey of soil type material in this location indicates the slab is compromised and contamination may extend into the soil below this area and this creates a potential pathway for minor subsurface contamination of hydrocarbons. There are minor cracks obvious in the concrete slab. Chipping of the slab in some of the cracked areas indicated that they do not extend through the concrete slab although this is not verified for all the observed cracks (Photograph 3.4).

The proposed driveway area on the front verge of the property did not show any visual or odour signs of hydrocarbon contamination (Photograph 3.5). Some minor litter and plastic materials were observed scattered on the soil surface.

Photograph 3.1 Oily sheen on concrete slab

Photograph 3.2 Large oil sump

Photograph 3.3 Compromised area of concrete slab

Photograph 3.4 Cracks in concrete slab

Photograph 3.5 Proposed driveway area directly adjacent to front wall

4 Previous investigations

The following contamination assessment report has previously been prepared for the site:

- EMM, Penrith waste recycling and transfer facility: preliminary contamination assessment. Prepared for Benedict Recycling Pty Ltd 20 April 2017.

The objectives of this investigation were to:

- identify of the owner of the site and its zoning;
- review the sites history based on publicly available information sources, including historic aerial photographs;
- review the sites environment, including: topography, geology, surface water, groundwater and land use based on a review of publicly available information sources;
- identify surrounding land uses;
- identify past and present potentially contaminating activities based on a review of publicly available contaminated land registers and the site's planning certificate; and
- conduct a preliminary assessment of the contamination status of the site, including consideration of the type, source, extent and exposure pathways of any contamination.

EMM undertook the following activities to address these objectives:

- desktop review; and
- data assessment and reporting.

Based on the desktop review of available information and data, EMM concluded:

This preliminary contamination assessment identified potentially contaminating activities associated with the historic use of the site as a scrap metal recycling facility.

As contamination was not confirmed with on-site testing the following was recommended:

1. The concrete slab is steam cleaned/hot water pressure washed to remove the residual oil.
2. The concrete cutting is drained of oil and steam cleaned/hot water pressure washed to remove the residual oil. The cutting will then be backfilled with concrete.
3. A construction environmental management plan is prepared for the development phase of the site, this will include an unexpected finds protocol to ensure that if any contamination is encountered during construction it can be appropriately managed. This plan will inform contractors of the potential for subsurface soil contamination and will be required to look out for staining and odours when excavating. Contractors will also use a photoionization detector during excavations so volatile organic compounds (petroleum hydrocarbons) can be assessed.

4. If subsurface contamination is suspected excavation works in the immediate area will stop and an environmental consultant will be contracted to collect soil samples for laboratory analysis of petroleum hydrocarbons and chlorinated hydrocarbons consistent with the potentially contaminating activities in and around the site. The results of the soil testing will determine whether further action is required.

5. All excavated material will be tested for petroleum hydrocarbons at a laboratory and if results exceed the applicable guideline limits the material will be disposed of at a licensed facility.

5 Conceptual site model

5.1 Area of environmental concern and contaminants of potential concern

The EMM (2017) preliminary contamination assessment identified potentially contaminating activities associated with the historic use of the site as a scrap metal recycling facility. The area of concrete slab comprising the property is an area of environmental concern (AEC). The main contaminants of potential concern (COPC) which may be present on the site based on current and historical uses are petroleum hydrocarbons. Sampling has been limited to the soils within proposed areas of disturbance targeting potential direct and indirect contact during construction.

5.2 Receptors and pathways

It is understood that the proposed redevelopment of the site is for the purposes of a waste and resource recycling management facility that will handle up to 180,000 tonnes per year of waste.

5.2.1 Direct contact - human health

It is appropriate to assess if a direct contact source for construction workers and operational workers may be present on the site.

5.2.2 Inhalation/vapour intrusion - human health

It has been assumed that if contaminants of concern are present and direct contact occurs for constructors then vapour will also be an issue. Therefore it is assumed that a vapour source for construction workers may be present on the site due to the presence of petroleum hydrocarbons.

5.2.3 Aesthetics

There is evidence of widespread or significant staining on the hardstand surface of the site. It is considered that the proposed site hardstand materials will prevent receptor visual exposure to potentially aesthetically impacted sub–surface soils.

5.2.4 Terrestrial ecosystems

A pragmatic risk based approach has been taken in applying ecological investigation and screening levels in this commercial/industrial setting, as per the NEPC (1999) guideline. The proposal involves the replacement of one land use with another on the existing hardstand area; and improvements to the hardstand concrete slab and site drainage.

This limits the environmental values that require consideration (i.e. support of plant growth) and based on this, it is considered that further assessment of unacceptable risk to terrestrial ecosystems is not warranted.

5.2.5 Aquatic ecosystems

The nearest watercourse is Peach Tree Creek, approximately 240 m from the western boundary of the site. Peachtree Creek drains to the Nepean River approximately 500 m north-west of the site. Boundary creek is 380 m north of the site and runs east-west, draining into the Nepean River.

The Nepean River flows north eventually forming the Hawkesbury River before discharging into Broken Bay approximately 60 km north-east of the site. The local waterways are just past the area of tidal influence and are considered to be freshwater environments.

The proposal involves the replacement of one land use with another on the existing hardstand area; and improvements to the hardstand concrete slab and site drainage. It is considered that further assessment of unacceptable risk to aquatic ecosystems is not warranted.

5.2.6 Drinking water

Expected poor regional water quality (as a result of historical regional commercial and industrial land use activities and disturbance), is considered likely to prevent groundwater from being a drinking water resource of value.

There are no registered groundwater bores onsite or down gradient of the site, registered for drinking water use. Further assessment of this groundwater value is therefore considered not warranted.

5.2.7 Recreational water use

The surface water bodies nearest the site are considered to be Peach Tree creek and Boundary Creek . These creeks are located between 240m and 380m to the west and north respectively. Review of aerial imagery identifies recreational boats within Peach Tree creek. Waters in these creeks, particularly the downstream reaches, are considered to be highly disturbed as a result of historical commercial / industrial activity.

5.2.8 Agricultural (irrigation and stock water)

Expected poor regional water quality (as a result of historical regional commercial and industrial land use activities and disturbance), is considered likely to prevent groundwater from being an agricultural water resource of value in the immediate local area. No further assessment of this groundwater value is considered warranted.

6 Methodology and criteria

6.1 Field assessment

6.1.1 Site clearance

A 'dial before you dig' search was undertaken to ensure service identification. On site clearance was undertaken by visual identification of signage and the location of an above ground pipe junction on the road verge. The proposed sampling points were not significantly affected by the presence of underground services and were able to be sampled to target the areas of environmental concern.

6.1.2 Targeted site survey

In order to address the requirements of the regulator, survey site selection was targeted at the most likely areas of soil contamination on the site, as well as areas which will experience some disturbance as part of the proposal, and therefore potential areas of contact for construction workers.

These were the new driveway area at the front of the site and excavation areas associated with stormwater infrastructure installation within the site. Opportunistic sampling was used within the concrete slab area, focusing on areas where soil could potentially be accessed.

No groundwater sampling has been undertaken, as this risk to groundwater is low, based on the results of soil sampling.

Site 1 (285907, 6263796) was sampled within the site where the concrete slab had become compromised. Sampling of the surface could only take place as concrete pieces prevented any deeper sampling.

Sites 2 (285876, 6263761) and Site 3 (285883, 6263747) were sampled in the road verge within the proposed driveway area where disturbance will occur.

6.1.3 Survey method

The procedures employed are based on accepted industry practice for projects of this kind and were undertaken by a suitably experienced EMM consultant. The following method was employed in the soil survey:

- the site location and observations were recorded for each sampled location;
- soil sampling was undertaken by manual augering;
- sampling equipment (auger, large screwdriver and trowel) were cleaned with a simple bucket and brush decontamination setup between each site;
- soil samples were collected directly from the hand auger and samples were placed directly into 150 mL glass sample jars. To mitigate potential loss of volatile contaminants from samples, the following procedures were used:
  - care was taken not to homogenise soils prior to sampling;
  - soils were lightly compacted into each sample jar and sealed with a Teflon lined lid, to minimise headspace; and

- samples were stored and transported in insulated containers with ice.

- Sample sizes were the same during the sampling event.

- The following information was recorded on the COC:

  - project job number;
  - date of sampling;
  - sample identifier;
  - sample matrix and container type;
  - sampler's name;
  - analysis requirements for each sample;
  - turnaround times required for analysis; and
  - names of sender and receiving laboratory.

6.1.4 Laboratory assessment

The samples were analysed for:

- metals and metaloids (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg);
- total recoverable hydrocarbons;
- total petroleum hydrocarbons;
- polycyclic aromatic hydrocarbons; and
- benzene, toluene, ethylbenzene, and xylene (BTEX).

6.2 Criteria for assessment

Exposure risk assessment criteria will be adopted from:

- ANZECC 2000, 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality';
- National Environment Protection Council (NEPC) 1999, 'Schedule B(1) Guideline on Investigation Levels for Soil and Groundwater, National Environment Protection (Assessment of Site Contamination) Measure (NEPM), as amended in 2013'; and
- Friebel, E & Nadebaum, P 2011, 'Health screening levels for petroleum hydrocarbons in soil and groundwater, Part 2: Application document, CRC CARE Technical Report No. 10'.

The criteria selected for adoption have been based on the relevant exposure scenarios reported in Section 5.2 of this report.

6.2.1 Human health - direct contact and vapour intrusion

The criteria relevant to direct contact used for this assessment are:

- Health based investigation levels (HILs) commercial / industrial land use, listed in Table 1A(1) in NEPC (1999); and
- Health screening levels (HSL) for HSL&D (commercial / industrial) listed in Table B4 of Friebel and Nadebaum (2011), are adopted for this assessment.

6.2.2 Aesthetics

The revised NEPM 2013 requires that aesthetic quality of accessible soils be considered even if testing suggests that the concentrations of contaminants of concern are within acceptable limits.

No specific numerical guidelines have been assigned for aesthetics. However, the NEPM 2013 indicates that professional judgement with regard to quantity, type and distribution of foreign material and/or odours in relation to the specific land use and its sensitivity should be employed.

The following circumstances are considered likely to trigger further aesthetic assessment:

- highly malodorous soils (e.g. strong residual petroleum hydrocarbon odours, hydrogen sulphide in soil);
- hydrocarbon sheen on surface water;
- discoloured chemical deposits or soil staining with chemical waste other than of a very minor nature;
- large monolithic deposits of otherwise low risk material, e.g. gypsum as powder or plasterboard, cement kiln dust;
- presence of putrescibles refuse including material that may generate hazardous levels of methane; and
- soils containing residue from animal burial.

7 Assessment

7.1 Site observations

The site visit identified an area of the concrete pad within the site that was compromised, with broken concrete and soil material visible. Samples of this material were taken as site 1. No other samples could be collected from the remaining concrete covered area within the property boundary. The concrete slab has not been cleaned and a significant oily sheen was visible across some areas of the surface of the concrete pad, with obvious areas of oil sitting on the concrete surface. Some spill cleanup material was observed adjacent to the main oil sump, which was observed to be almost full.

Sites 2 and 3 were sampled from the road verge adjacent to the property where it is proposed to place a new driveway. There was no obvious visual contamination indications within this area.

7.1.1 Odour

Observed petroleum type odours were associated with the surface sample of site 1 within the degraded concrete slab area. No olfactory evidence of odours was present in the soil samples collected from site 2 and site 3 in the verge area between the slab and the road reserve.

7.1.2 Staining

No visual evidence of staining was observed in the soil samples collected from site 2 and site 3 within the road reserve. The sample taken from site 1 contained obvious darkened staining from petroleum hydrocarbons.

7.1.3 Anthropogenic material

Site 1 contained concrete pieces ranging in size. Small bits of plastic and metal litter were also observed. No anthropogenic materials were observed in site 2 and site 3 although it was obvious that site 3 was an anthropogenic soil profile with gravel at the base of the excavation depth (where auger refusal was met) associated with the construction of the adjacent road.

7.2 Laboratory analysis

A selection of soil samples was sent for analysis based on field observations targeting specific locations where it is expected that excavation works will take place and there is the greatest risk of direct contact. Table 7.1 provides the analysis results and the laboratory certificates are included in Appendix A.

Table 7.1 Soil analysis results

Analyte	Units	HIL F	Site and depth				
			S1 0-10 cm	S2 0-20 cm	S2 30-50 cm	S3 0-15 cm	S3 15-30 cm
Arsenic	mg/kg	500	<5	<5	<5	<5	5
Cadmium	mg/kg	100	1	<1	<1	<1	<1
Chromium	mg/kg	500[1]	18	12	11	14	13
Copper	mg/kg	5,000	70	23	11	34	16
Lead	mg/kg	1,500	249	33	14	58	22
Nickel	mg/kg	3,000	20	14	9	13	16
Zinc	mg/kg	35,000	338	75	32	111	45
Mercury	mg/kg	75	<0.1	<0.1	<0.1	<0.1	<0.1
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	mg/kg		250	<50	<50	<50	<50
C15 - C28 Fraction	mg/kg	28000[2]	6460	<100	<100	<100	<100
C29 - C36 Fraction	mg/kg		2110	<100	<100	<100	<100
C10 - C36 Fraction (sum)	mg/kg		8820	<50	<50	<50	<50
Total Recoverable Hydrocarbons							
C6 - C10 Fraction	mg/kg		<10	<10	<10	<10	<10
C6 - C10 Fraction minus BTEX (F1)	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	mg/kg		690	<50	<50	<50	<50
>C16 - C34 Fraction	mg/kg		7770	<100	<100	<100	<100
>C34 - C40 Fraction	mg/kg		780	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	mg/kg		9240	<50	<50	<50	<50
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg		690	<50	<50	<50	<50
Polycyclic Aromatic Hydrocarbons							

Table 7.1 Soil analysis results

Naphthalene	mg/kg	3 (100 total)	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	mg/kg		1.4	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	mg/kg	5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Sum of polycyclic aromatic hydrocarbons	mg/kg		1.4	<0.5	<0.5	<0.5	<0.5
BTEXN							
Benzene	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg		<0.5	0.6	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Sum of BTEX	mg/kg		<0.2	0.6	<0.2	<0.2	<0.2
Naphthalene	mg/kg		<1	<1	<1	<1	<1

7.3 Discussion

7.3.1 Quality control

The results of an assessment of laboratory analytical data quality indicate that:

- laboratory analysis of the samples was undertaken by NATA accredited environmental testing laboratories (ALS Environment Brisbane);
- the identified contaminants of potential concern were analysed for;
- the laboratory analytical methods and laboratory limits of reporting were appropriate for the objective of this project;
- the same analytical laboratory was used for analysing all primary samples;
- samples were extracted and analysed within applicable holding times;
- the laboratory sample surrogate recoveries were within acceptance criteria;
- the laboratory method blank analytical results were not above the laboratory limit of reporting;
- the laboratory control sample recoveries were within the laboratory's adopted acceptance criteria with the exception of:
    - chrysene, fluoranthene and anthracene, where recovery was greater than the upper control limit.

A copy of the laboratory data quality indicators is presented in Appendix A.

The quality assessment of fieldwork data and laboratory analytical data indicates that the data is adequately complete, comparable, representative, precise and accurate for the purpose of interpretation within the objective of this project.

7.3.2 Human health - direct and indirect contact

The results of the laboratory analysis indicate that the concentrations of the contaminants of potential concern, in soil in each of the relevant areas of environmental concern, were less than the adopted human health assessment criteria for direct contact.

The analytes detected in Site 1, within the working site, were elevated compared to Sites 2 and 3, which were on the road verge outside the working site, indicating this material has been impacted by the works associated with the wrecking yard.

Metals and metaloids were below the industrial setting health investigation levels for all sampled sites and BTEX was below detection limits in all samples. Pyrene was 1.4 mg/kg in the Site 1 surface sample and below detection limits in all other samples. This value is well below the selected health investigation limits. Petroleum hydrocarbons were below detection limits in Sites 2 and 3 and were detected but below the selected HILs in Site 1. No ecological health limits were exceeded.

Olfactory evidence of petroleum hydrocarbon odours were detected in the site 1 soil samples collected. Headspace screening was not undertaken, however the laboratory detected presence of pyrene at low levels. Therefore, the risk of vapour intrusion requires consideration.

7.3.3 Aesthetics

Observations made during soil sampling indicate that circumstances likely to trigger further aesthetic assessment (based on commercial/industrial land use) were not encountered. Some obvious staining of the soil material in Site 1 was observed as well as small amounts of materials such as plastics and metals. The concrete slab itself has an oily sheen and staining present.

It is expected that surface soil and upper subsoil contamination of petroleum hydrocarbons has occurred in the site area where the concrete slab has been broken, however the concentration of contaminants in the material sampled from the exposed soil is below the representative HILs.

7.3.4 Other

Visual evidence of waste oil sumps was observed on site. One sump appeared to be full and had potentially overflowed previously, as spill control material had been placed on the concrete surface surrounding the sump. A smaller sump had been emptied recently.

It is noted that the concentration of lead in the Site 1 surface sample was slightly above the expected background range reported by NEPM.

8 Conclusions and recommendations

The proposed development seeks to remove the current auto wrecker use from the site, refurbish the existing concrete slab and erect a shed, within which non-putrescible waste will sorted, stockpiled for short periods, and dispatched from the site.

Based on a review of the available desktop search data, observations made during fieldwork, results of laboratory analysis, and the proposed land use scenario (existing slab on ground to be retained and enhanced, installation of new driveway and stormwater pipes requiring shallow excavation), EMM concludes that no contamination issues have been identified that would preclude the proposed future land use as a waste recycling and transfer facility with minimal opportunities for soil access.

The site is suitable for the proposed use; however, some remediation works are recommended on site associated with potential contamination pathways.

EMM concludes that:

- the potential for significant and/or widespread chemical soil contamination arising from historical land use activities on site is considered to be low;
- the concentrations of chemical contamination detected in soil on the site would not present an unacceptable risk of exposure to human health;
- the groundwater level at the site is expected to be at 6.6–8.1 m BGL. No proposed activity is likely to intersect groundwater. Therefore, the proposal presents a low risk for contamination of groundwater;
- the risk for vapour intrusion, given the low level of potential contamination and distance to groundwater, is unlikely to present a risk for the site; and
- there is uncertainty around the contamination status of soils in the immediate vicinity of an oil sump located on the eastern boundary of the site.

Based on the conclusions EMM makes the following recommendations:

- The compromised slab (site 1) and areas where the slab is significantly cracked should be cut and removed, with the soil immediately below the removed slab excavated and tested for petroleum hydrocarbons. If relevant limits are exceeded, the material should be disposed of at a licensed facility.
- The oil sumps should be emptied, with contents disposed of at an appropriately licensed facility. The sumps should be inspected for damage. If any damage could allow for leakage, the sumps should be removed, with the soil immediately surrounding the sump tested for petroleum. If removal is required, and soil sampling outcomes exceed relevant limits, the material should be disposed of at a licensed facility. Otherwise, the sumps should be backfilled with concrete.
- Removed sections of the slab should be backfilled with VENM and resealed.
- During the initial construction stage, section of the slab should be progressively bunded, treated with a solvent/degreaser and steam cleaned. The entire slab should be cleaned in this way. Waste water should be pumped out and disposed at an appropriately managed facility.

- A construction environmental management plan should be prepared for the development phase of the site, this should include an unexpected finds protocol to ensure that if any contamination is encountered during construction it can be appropriately managed. This plan should inform contractors of the potential for subsurface soil contamination and should be required to look out for staining and odours when excavating. Contractors should also use a photoionization detector during excavations so volatile organic compounds (petroleum hydrocarbons) can be assessed.

References

ANZECC 2000, Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

Clark, N and Jones, D 1991, *Penrith 1:100 000 Geological Map*, 1st Ed., NSW Department of Industry; Resources & Energy, accessed 9 June 2016, http://www.resourcesandenergy.nsw.gov.au/geoproducts/details?editionid=123&productid=131.

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Environment Protection Authority (EPA) 2014, *Waste Classification Guidelines - Part 1: Classification of Waste*.

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NSW DEC 2006, Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition).

NSW DECC 2009, Contaminated Sites: Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997.

NSW OEH 2011, Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites, Office of Environment and Heritage.

Office of Environment and Heritage (OEH) 2016, *NSW Soil and Land Information Maps*, accessed 25 February 2016, http://www.environment.nsw.gov.au/eSpadeWebApp/.

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Appendix A

Laboratory documents

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1819023**	Page	: 1 of 6
Client	: **EMM CONSULTING PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS KYLIE DRAPALA	Contact	: Sepan Mahamad
Address	: 1/4 87 WICKHAM TERRACE SPRING HILL QLD 4000	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: 07 3839 1800	Telephone	: +61-7-3243 7222
Project	: J16099 - Penrith facility	Date Samples Received	: 06-Aug-2018 15:30
Order number	:	Date Analysis Commenced	: 07-Aug-2018
C-O-C number	: ----	Issue Date	: 10-Aug-2018 14:49
Sampler	: KYLIE DRAPALA		
Site	: ----		
Quote number	: EN/112/18		
No. of samples received	: 5		
No. of samples analysed	: 5		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Matt Frost	Senior Organic Chemist	Brisbane Inorganics, Stafford, QLD
Matt Frost	Senior Organic Chemist	Brisbane Organics, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP075(SIM): High LCS recovery deemed acceptable as all associated analyte results are less than LOR.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID			Penrith S1 0-10	Penrith S2 0-20	Penrith S2 30-50	Penrith S3 0-15	Penrith S3 15-30
	Client sampling date / time			03-Aug-2018 00:00	03-Aug-2018 00:00	03-Aug-2018 00:00	03-Aug-2018 00:00	03-Aug-2018 00:00
Compound	CAS Number	LOR	Unit	EB1819023-001	EB1819023-002	EB1819023-003	EB1819023-004	EB1819023-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	6.7	6.3	6.4	7.0	7.7
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	5
Cadmium	7440-43-9	1	mg/kg	1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	18	12	11	14	13
Copper	7440-50-8	5	mg/kg	70	23	11	34	16
Lead	7439-92-1	5	mg/kg	249	33	14	58	22
Nickel	7440-02-0	2	mg/kg	20	14	9	13	16
Zinc	7440-66-6	5	mg/kg	338	75	32	111	45
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	50	mg/kg	690	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	7770	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	780	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	9240	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	<50	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	690	----	<50	<50	<50
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup								
C10 - C14 Fraction	----	50	mg/kg	250	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	6460	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	2110	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	8820	<50	<50	<50	<50
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	1.4	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	Penrith S1 0-10	Penrith S2 0-20	Penrith S2 30-50	Penrith S3 0-15	Penrith S3 15-30
			Client sampling date / time	03-Aug-2018 00:00	03-Aug-2018 00:00	03-Aug-2018 00:00	03-Aug-2018 00:00	03-Aug-2018 00:00
Compound	CAS Number	LOR	Unit	EB1819023-001	EB1819023-002	EB1819023-003	EB1819023-004	EB1819023-005
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	**1.4**	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	**0.6**	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	**0.6**	<0.2	<0.2	<0.2
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**108**	**99.5**	**105**	**97.9**	**95.6**
2-Chlorophenol-D4	93951-73-6	0.5	%	**107**	**104**	**108**	**100**	**97.0**
2.4.6-Tribromophenol	118-79-6	0.5	%	**98.3**	**89.6**	**86.9**	**97.7**	**79.6**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**102**	**105**	**108**	**106**	**101**
Anthracene-d10	1719-06-8	0.5	%	**92.0**	**110**	**131**	**106**	**119**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	Penrith S1 0-10	Penrith S2 0-20	Penrith S2 30-50	Penrith S3 0-15	Penrith S3 15-30
			Client sampling date / time	03-Aug-2018 00:00	03-Aug-2018 00:00	03-Aug-2018 00:00	03-Aug-2018 00:00	03-Aug-2018 00:00
Compound	CAS Number	LOR	Unit	EB1819023-001	EB1819023-002	EB1819023-003	EB1819023-004	EB1819023-005
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
4-Terphenyl-d14	1718-51-0	0.5	%	101	127	142	112	128
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	77.0	118	70.9	70.4	76.2
Toluene-D8	2037-26-5	0.2	%	77.4	104	73.4	76.1	83.8
4-Bromofluorobenzene	460-00-4	0.2	%	81.6	106	76.0	78.9	84.8

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	35	155
2-Chlorophenol-D4	93951-73-6	42	153
2.4.6-Tribromophenol	118-79-6	26	157
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	34	157
Anthracene-d10	1719-06-8	37	153
4-Terphenyl-d14	1718-51-0	42	172
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	53	134
Toluene-D8	2037-26-5	60	131
4-Bromofluorobenzene	460-00-4	59	127

Appendix B

Historical images

\\emgammsvr1\EMGAMM\Jobs\2016\J16099 - Penrith Waste Recycling and Transfer Facility\GIS\02_Maps_EIS\Tech_Studies\Contam\CON004_Historical1991_20160726_02.mxd 26/07/2016

EMM

Historical Imagery - 1991

Penrith Waste Recycling and Transfer Facility
Benedict Recycling Pty Limited
Figure

EMM

Historical Imagery - 2014

Penrith Waste Recycling and Transfer Facility

Benedict Recycling Pty Limited

Figure

\\emgammsvr1\emgamm\Jobs\2016\J16099 - Penrith Waste Recycling and Transfer Facility\GIS\02_Maps_EIS\Tech_Studies\Contam\CON002_Historical2005_20160726_02.mxd 26/07/2016

EMM

Historical Imagery - 2005

Penrith Waste Recycling and Transfer Facility
Benedict Recycling Pty Limited
Figure

\\emgammsvr1\EMGAMM\Jobs\2016\J16099 - Penrith Waste Recycling and Transfer Facility\GIS\02_Maps_EIS\Tech_Studies\Contam\CON003_Historical1998_20160726_02.mxd 26/07/2016

EMM

Historical Imagery - 1998

Penrith Waste Recycling and Transfer Facility

Benedict Recycling Pty Limited

Figure

Appendix H

State of available pressure and flow

Statement of Available Pressure and Flow

Sydney WATER

Gavin Grace
56 Clarence Street
Sydney, 2000

Attention: Gavin Grace Date: 02/12/2017

Pressure & Flow Application Number: 338957
Your Pressure Inquiry Dated: 2017-10-25
Property Address: 48 Peachtree Road, Penrith 2750

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: Peachtree Road	Side of Street: North
Distance & Direction from Nearest Cross Street	88 metres East from Mullins Road
Approximate Ground Level (AHD):	26 metres
Nominal Size of Water Main (DN):	150 mm

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure Minimum Pressure	104 metre head 42 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	42
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5	43
	10	42
	15	42
	20	41
	30	40
	40	38
	50	36
	60	33
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main)	5	42
	10	42
	15	41
	20	41
	30	39
	40	37
	50	35
	60	32
Maximum Permissible Flow	67	30

(Please refer to reverse side for Notes)

For any further inquiries regarding this application please email:

swtapin@sydneywater.com.au

General Notes

This report is provided on the understanding that (i) the applicant has fully and correctly supplied the information necessary to produce and deliver the report and (ii) the following information is to be read and understood in conjunction with the results provided.

1. Under its Act and Operating Licence, Sydney Water is not required to design the water supply specifically for fire fighting. The applicant is therefore required to ensure that the actual performance of a fire fighting system, drawing water from the supply, satisfies the fire fighting requirements.

2. Due to short-term unavoidable operational incidents, such as main breaks, the regular supply and pressure may not be available all of the time.

3. To improve supply and/or water quality in the water supply system, limited areas are occasionally removed from the primary water supply zone and put onto another zone for short periods or even indefinitely. This could affect the supply pressures and flows given in this letter. This ongoing possibility of supply zone changes etc, means that the validity of this report is limited to one (1) year from the date of issue. It is the property owner's responsibility to periodically reassess the capability of the hydraulic systems of the building to determine whether they continue to meet their original design requirements.

4. Sydney Water will provide a pressure report to applicants regardless of whether there is or will be an approved connection. Apparent suitable pressures are not in any way an indication that a connection would be approved without developer funded improvements to the water supply system. These improvements are implemented under the Sydney Water 'Urban Development Process'.

5. Pumps that are to be directly connected to the water supply require approval of both the pump and the connection. Applications are to be lodged online via Sydney Water Tap in™ system -
Sydney Water Website – www.sydneywater.com.au/tapin/index.htm. Where possible, on-site recycling tanks are recommended for pump testing to reduce water waste and allow higher pump test rates.

6. Periodic testing of boosted fire fighting installations is a requirement of the Australian Standards. To avoid the risk of a possible 'breach' of the Operating Licence, flows generated during testing of fire fighting installations are to be limited so that the pressure in Sydney Water's System is not reduced below 15 metres. Pumps that can cause a breach of the Operating Licence anywhere in the supply zone during testing will not be approved. This requirement should be carefully considered for installed pumps that can be tested to 150% of rated flow.

Notes on Models

1. Calibrated computer models are used to simulate maximum demand conditions experienced in each supply zone. Results have not been determined by customised field measurement and testing at the particular location of the application.

2. Regular updates of the models are conducted to account for issues such a urban consolidation, demand management or zone change.

3. Demand factors are selected to suit the type of fire-fighting installation. Factor 1 indicates pressures due to system demands as required under Australian Standards for fire hydrant installations. Factor 2 indicates pressures due to peak system demands.

4. When fire-fighting flows are included in the report, they are added to the applicable demand factor at the nominated location during a customised model run for a single fire. If adjacent properties become involved with a coincident fire, the pressures quoted may be substantially reduced.

5. Modelling of the requested fire fighting flows may indicate that local system capacity is exceeded and that negative pressures may occur in the supply system. Due to the risk of water contamination and the endangering of public health, Sydney Water reserves the right to refuse or limit the amount of flow requested in the report and, as a consequence, limit the size of connection and/or pump.

6. The pressures indicated by the modelling, at the specified location, are provided without consideration of pressure losses due to the connection method to Sydney Water's mains.

Appendix I

Fire safety strategy

STEPHEN GRUBITS & ASSOCIATES

Stephen Grubits & Associates Pty Ltd
ABN 24 075 049 688
PO Box N522, Grosvenor Place NSW 1220
T: +61 2 9247 1444 **E**: sydney@grubits.com.au **W**: www.grubits.com.au

46-49 Peachtree Road, Penrith

PENRITH RECYCLING AND TRANSFER FACILITY

FIRE SAFETY STRATEGY TO SUPPORT APPLICATION FOR DEVELOPMENT CONSENT

REPORT 2018/137 R1.0

· FIRE SAFETY ENGINEERS ·

REVISION CONTROL

Repot No.	Issue Date	Report Details		
2018/137 R1.0	05/04/2018	Description:	Original Report	
		Prepared by:	Christina Knorr (Senior Fire Safety Engineer)	
		Approved by:	Rose Pengilly (Director)	
		Verified and Issued by:	Carlos Quaglia (Managing Director, C10 - BPB0334)	
2018/137 R1.0 DRAFT	05/04/2018	Description:	Draft	

TABLE OF CONTENTS

1. INTRODUCTION

This statement has been prepared to confirm that

- Stephen Grubits & Associates have been appointed by the Building Owner to undertake a Fire Safety Engineering Assessment of the subject development;
- Measures will be recommended to be introduced in order to ensure that relevant Performance Requirements of the National Construction Code, Volume 1 (also referred to as Building Code of Australia) are met; and
- The proposed design is capable to achieve compliance with the Performance Requirements of the Building Code of Australia (BCA).

The assessment is to be undertaken as part of the fire engineering analysis prior to the issue of a Construction Certificate, using fire safety engineering methodologies in accordance with the *International Fire Engineering Guidelines* [(1)].

The fire safety assessment and recommendations will be presented in the form of a report issued by a C10 accredited Fire Safety Engineer.

2. SPECIFICS OF THE PROJECT

2.1. BUILDING DIMENSIONS

The following are the dimensions of the subject building:

Dimension	Measurement
Length	61 m
Width	51 m
Height	Up to 10 m
Area	3,127 m^2
Volume	31,290 m^2

Table 1 – Building measurements

2.2. BUILDING OPENINGS

The following are the measurements of the subject building's openings:

Openings	Width	Height	Area
Gate 1	8 m	5 m	40 m^2
Gate 2	8 m	5 m	40 m^2
Smoke Vent	TBD	TBD	Min. 50 m^2
		TOTAL	140 m^2

Table 2 – Building openings

(1) *International Fire Engineering Guidelines,* Edition 2005, Australian Building Codes Board

3. CLIENT OBJECTIVES

A cost-effective solution for a safe building that achieves compliance with the BCA.

4. DOUCMENTS REVIEWED

The following document has been reviewed for preparation of this report:

- Proposed Site Shed Version 3, by EMM Consulting Pty Ltd (Refer to Appendix A for the drawing).

5. PRELIMINARY CALCULATIONS

The following preliminary calculations have been undertaken:

a) Fire severity calculations, determining the FRL required to withstand the contents burn-out; and

b) Zone modelling, determining the size of the smoke and heat vents capable of venting the products of combustion under a worst-case credible fire scenario.

6. FIRE ENGINEERING

6.1. GENERAL

An assessment of the proposed design for compliance with the Deemed-to-Satisfy Provisions of the Building Code of Australia has identified a number of departures. Fire-engineering analysis is proposed to demonstrate the objectives of the BCA are fulfilled and recommend appropriate means to achieve it. The following items will be subject to a fire engineering assessment:

- Loss of tenability affecting egress and Fire Brigade search and rescue.
- Reduction of fire resistance level of external walls;
- Extended travel distances within the warehouse portion; and
- Height of the exit signage exceeding 2.7 m.

6.2. RELEVANT PERFORMANCE REQUIREMENTS

The following Performance Requirements are considered applicable and are proposed to be assessed:

CP1 *A building must have elements which will, to the degree necessary, maintain structural stability during a fire appropriate to-*

(a) the function or use of the building; and

(b) the fire load; and

(c) the potential fire intensity; and

(d) the fire hazard; and

(e) the height of the building; and

(f) its proximity to other property; and

(g) any active fire safety systems installed in the building; and

(h) the size of any fire compartment; and

(i) fire brigade intervention; and

(j) other elements they support; and

(k) the evacuation time.

CP2 *(a) A building must have elements which will, to the degree necessary, avoid the spread of fire-*

(i) to exits; and

(ii) to sole-occupancy units and public corridors; and

(iii) between buildings; and

(iv) in a building,

(b) Avoidance of the spread of fire referred to in (a) must be appropriate to-

(v) the function or use of the building; and

(vi) the fire load; and

(vii) the potential fire intensity; and

(viii) the fire hazard; and

(ix) the number of storeys in the building; and

(x) its proximity to other property; and

(xi) any active fire safety systems installed in the building; and

(xii) the size of any fire compartment; and

(xiii) fire brigade intervention; and

(xiv) other elements they support; and

(xv) the evacuation time.

DP4 *Exits must be provided from a building to allow occupants to evacuate safely, with their number, location and dimensions being appropriate to-*

(a) the travel distance; and

(b) the number, mobility and other characteristics of occupants; and

(c) the function or use of the building; and

(d) the height of the building; and

whether the exit is from above or below ground level.

EP2.2 *(a) In the event of a fire in a building the conditions in any evacuation route must be maintained for the period of time occupants take to evacuate the part of the building so that-*

(i) the temperature will not endanger human life; and

(ii) the level of visibility will enable the evacuation route to be determined; and

(iii) the level of toxicity will not endanger human life.

(b) The period of time occupants take to evacuate referred to in (a) must be appropriate to-

(i) the number, mobility and other characteristics of the occupants; and

(ii) the function or use of the building; and

(iii) the travel distance and other characteristics of the building; and

(iv) the fire load; and

(v) the potential fire intensity; and

(vi) the fire hazard; and

(vii) any active fire safety systems installed in the building; and

fire brigade intervention.

EP4.2 *To facilitate evacuation, suitable signs or other means of identification must, to the degree necessary-*

(a) be provided to identify the location of exits; and

(b) guide occupants to exits; and

(c) be clearly visible to occupants; and

(d) operate in the event of a power failure of the main lighting system for sufficient time for occupants to safely evacuate.

6.3. SMOKE VENT AND EXTENDED TRAVEL DISTANCES

It is proposed to use the principle of natural ventilation to ensure that tenable conditions within the subject building are present for the duration required for the building occupants to evacuate and fire brigade carrying out search and rescue. Preliminary calculations have shown that a total vent area of minimum 50 m^2 would be requied to vent hot smoke in an event of a fire so that sufficient time for the evacuation of occupants is provided. It is proposed to have the vent at the highest point of the roof with an optional roof for weatherproofing. Examples of proposed roof structure for smoke ventilation is shown in Figure 3, Figure 1 and Figure 2. For the fire-safety purposes, no ridge or vent cover is consdered necessary.

Figure 3 – Option 1: roof vent without a cover.

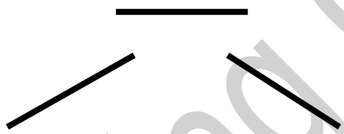


Figure 4 – Option 2: Roof vent with a cover for weather protection.

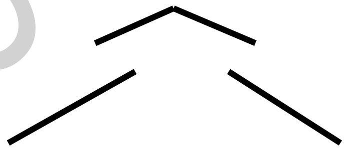


Figure 5 – Option 3: Roof vent with a ridge for weather protection.

The installation of the smoke/heat vents is considered appropriate to provide a solution for extended travel distances within the building and search and rescue. That is hot smoke layer would not descend below a height of 2 m above the floor for the duration required for evacuation and fire brigade search and rescue.

NOTE: The dimensions of the smoke/heat vent will be confirmed at the time of the preparation of the Fire Engineering Assessment following completion of fire and smoke modelling.

6.4. FIRE RESISTANCE LEVEL OF EXTERNAL WALLS

The proposed design contains metal sheet walls and concrete walls bounding the individual bays containing the recycled materials. Whist the Deemed-to-Satisfy Provisions of the BCA require that the external walls achieve an FRL of -/240/240 if non-loadbearing and 240/240/240 if loadbearing, preliminary calculations have shown that the following could be justified through fire-engineering methods:

- Concrete walls bounding bays having an FRL of at least 120/120/120 and to be at least 4 m tall; and
- External walls, where no bays are provided being constructed of non-combustible construction, such as corrugated metal without the required FRL.

6.5. HEIGHT OF THE EXIT SIGNAGE

It is considered that the height of exit signage could be justified through a fire engineering assessment. Additional measures may be recommended.

6.6. NOTES

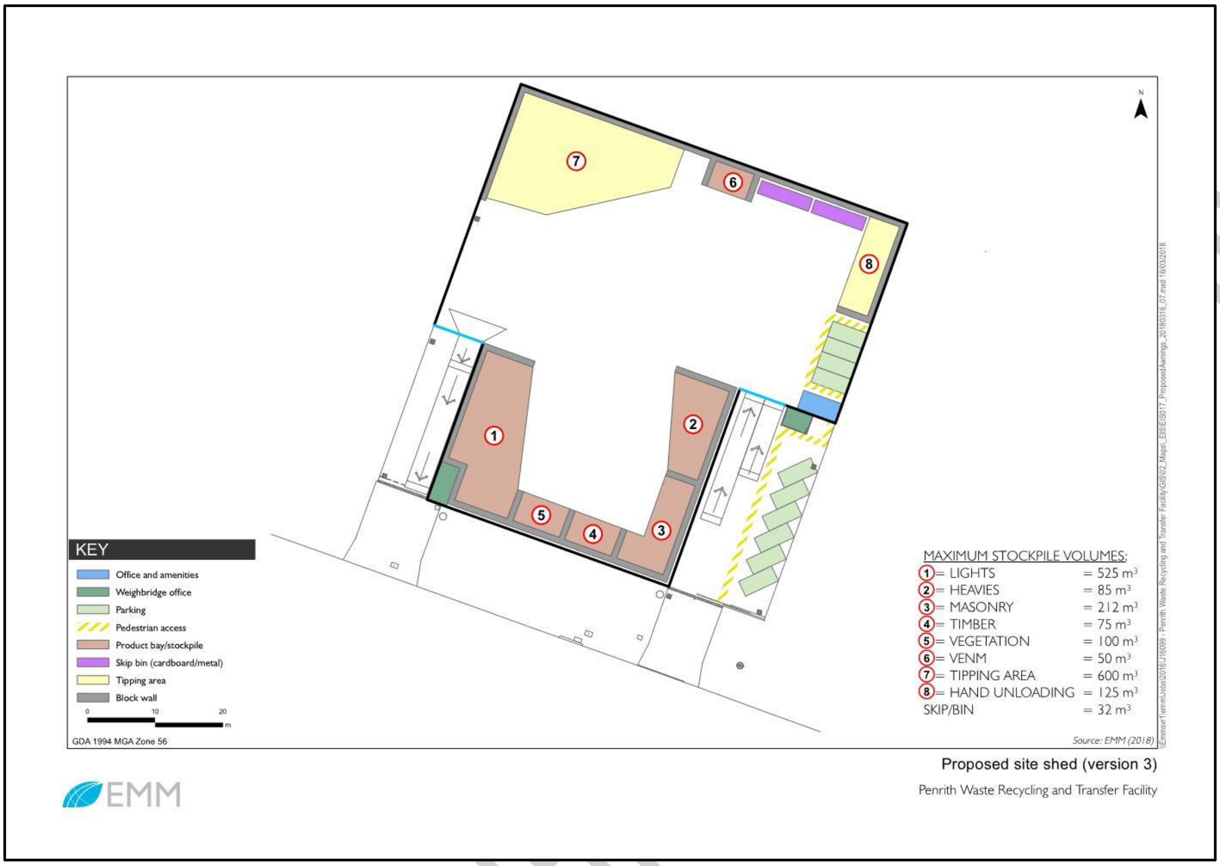
- The final dimensions of the smoke vents will be confirmed when the fire engineering assessment is undertaken.
- Roller shutter doors will be required to stay open during operation of the Recycling Plant.
- The proposed fire engineering assessment is limited to the objectives of the BCA, being safety of occupants, fire brigade intervention and protection of neighboring property. Protection of the subject property is not within the scope of the proposed fire engineering assessment. Should it be decided that more consideration should be given to protection of the subject property, additional measures, such as sprinkler protection, may be introduced.
- It is noted that Benedict Industries Pty Ltd, acting proactively, are currently designing a fire suppression system that is intended to be deployed at its Chipping Norton, Newcastle, Unanderra and Penrith sites. This system operates by using thermal imaging cameras focussed on the combustible wastes stockpiles/bays, which can monitor 5 m below the surface of a stockpile of waste and monitor any temperature rises within these stockpiles. The cameras, upon observing an appreciable rise in temperate of say 10ºC or 15ºC would simultaneously activate an alarm which is continuously monitored by a back-to-base system, and will also activate one or more pre-positioned water cannons supplying 15L/sec directly on to that stockpile for 10 minutes before switching off. If the temperature did not reduce (and remained so) the system would cycle on indefinitely. The water cannons are proposed to be connected to the water main and to be augmented with a tankage and electric booster pump system should the local water main connection be insufficient for full operation for an extended period. An isolation valve is intended to be provided to ensure the suppression system can be isolated by the fire brigade when required. The assessment and endorsement of the suppression system is not subject of the fire engineered assessment and the system certification will need to be obtained from the system designer. The preliminary assessment documented in this report has been completed without taking into account the contribution of an automatic suppression system.

7. REFERENCE

International Fire Engineering Guidelines, Edition 2005, Australian Building Codes Board.

National Construction Code Series, Volume 1, Building Code of Australia 2016 Amendment 1, Australian Building Codes Board.

APPENDIX A. DRAWINGS



Appendix J

Revised landscape plan

Planting schedule				
Species	Common name	Maximum height	Planting	Pot size
Eucalyptus tereticornis	Forest red gum	30 m	Plant three trees either side of entrance	45 L
Grevillea	Boongala spinebill	2 m	2 m spacing along shed	5 L
Lomondra longifolia	-	1.5 m	Plant at 0.5 m spacing with mulching	Growth tube

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Landscape plan

Penrith Waste Recycling and Transfer Facility
Response to Submissions
Appendix J

SYDNEY
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