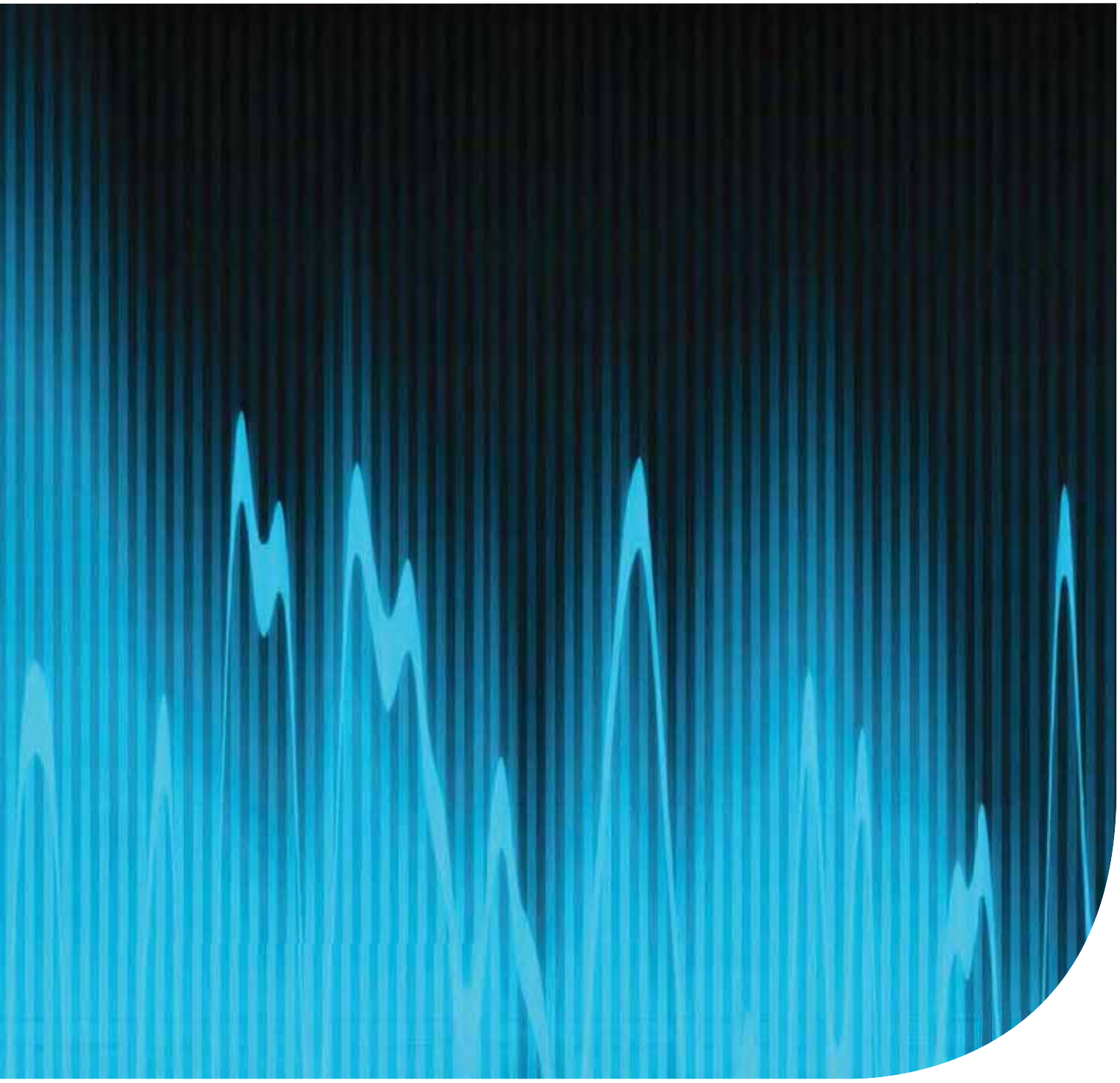
Appendix I

Noise assessment

Recycling Facility, Mayfield West

80 Tourle Street, Mayfield West | Noise impact assessment

Prepared for Benedict Recycling Pty Ltd | 15 September 2016



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Prepared for Benedict Recycling Pty Ltd | 15 September 2016

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Recycling Facility, Mayfield West

Final

Report J14152RP1 | Prepared for Benedict Recycling Pty Ltd | 15 September 2016

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1 Introduction

Benedict Recycling Pty Ltd (Benedict) proposes to increase the capacity of the Mayfield West Recycling Facility at 1a McIntosh Drive, Mayfield West (the recycling facility).

Development consent (DA 15-291) was granted for the recycling facility on 8 March 2016 by the Hunter and Central Coast Joint Regional Planning Panel (JRPP). This permits acceptance of up to 90,000 tonnes per annum (tpa) of waste, and ancillary activities.

The recycling facility imports inert pre-classified general solid waste (non-putrescible) – such as construction and demolition wastes, and selected commercial and industrial wastes – for processing (eg crushing, shredding and sorting) to produce saleable recycled materials. The site also includes ancillary activities.

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

Recycled products include aggregates, road-base, soils and mulches. Segregated recycled materials such as ferrous and non-ferrous metals, dry paper/cardboard, shredded wood and plastics, are sold to other recycling firms for further processing. All of these products meet recycled material specifications while recovering a range of materials that would otherwise be directed to lower order uses or disposed to landfill.

All of the materials brought onto the site are taken from the site as either products, or non-recyclable residues for disposal at an EPA licensed landfill. No materials are land-filled or otherwise disposed anywhere within the site. No wastes are composted on the site.

Since the commencement of operations, Benedict has identified a large additional demand for the disposal and recycling of excavated materials from large civil works (eg road projects), commercial developments (eg excavations for high rise buildings) and smaller developments (eg residential building sites). These volumes are far greater than originally expected. Benedict proposes to increase the annual volume of material received at the recycling facility from 90,000 tpa to 315,000 tpa, and proposes minor changes to the site layout to include an additional stockpile area (the proposal).

The recycling facility requires development consent under the State Significant Development (SSD) provisions within Division 4.1 of Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) to enable it to handle the volume of waste proposed.

Secretary's Environmental Assessment Requirements (SEARs) were issued by the Department of Planning and Environment (DPE) in July 2016 for the proposal. The Environment Protection Authority (EPA) has also provided details of key issues requiring assessment. Table 1.1 provides the relevant assessment requirements and the section of the NIA report relevant to the specific requirement.

Table 1.1 Noise impact assessment requirements

Relevant authority and assessment requirement	Relevant section of NIA report
DPE (SEARs)	
Noise and vibration – including - a quantitative assessment of potential construction, operational and transport noise and vibration impacts in accordance with relevant Environment Protection Authority guidelines; and - details and justification of the proposed noise mitigation and monitoring measures.	Section 3.4, Chapters 6 and 7 It is noted that no construction activity is required. Chapter 8
EPA	
The EPA's key information requirements for the proposal include an adequate assessment of: 2. Noise emissions – generated by the increase in vehicle and plant movements and higher volumes of waste being processed	Chapters 6 and 7

2 Glossary of acoustic terms

A number of technical terms are required for the discussion of noise and vibration. These are explained in Table 2.1.

Table 2.1 Glossary of acoustic terms

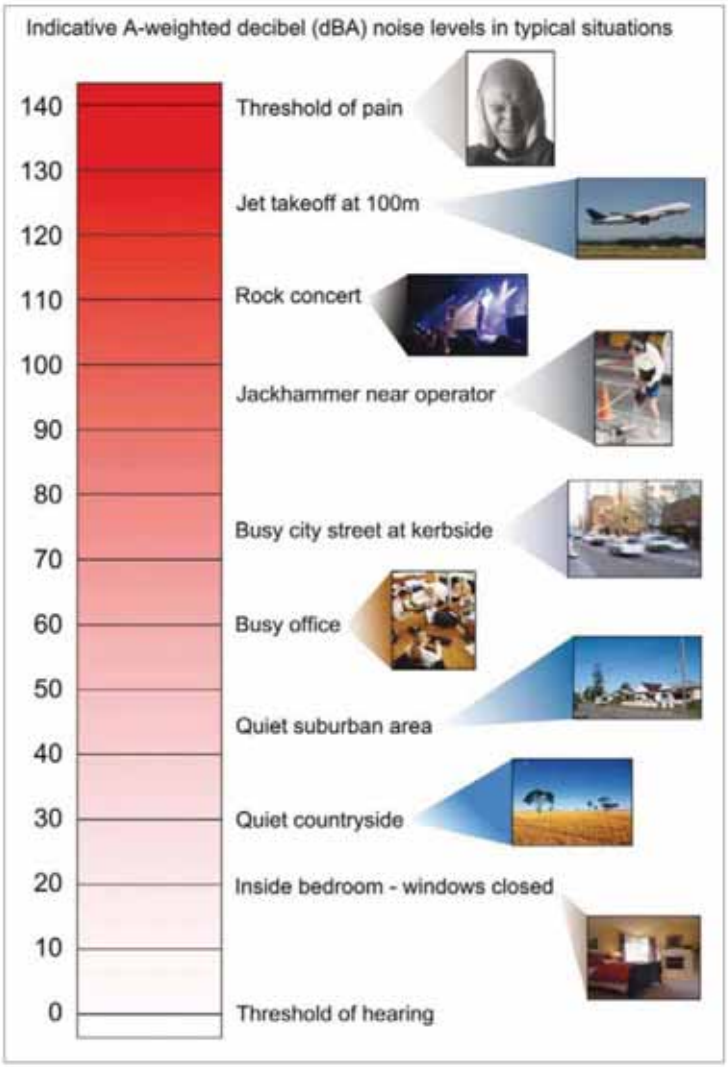
Term	Description
dB	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
L_{A1}	The noise level exceeded for 1% of a measurement period.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

It is useful to have an appreciation of decibels, the unit of noise measurement. Table 2.2 gives an indication as to what an average person perceives about changes in noise levels:

Table 2.2 Perceived change in noise

Change in sound level (dB)	Perceived change in noise
1–2	typically indiscernible
3	just perceptible
5	noticeable difference
10	twice (or half) as loud
15	large change
20	four times as loud (or quarter) as loud

Examples of common noise levels are provided in Figure 2.1.



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

Figure 2.1 Common noise levels

3 Project and site description

3.1 Approved operations

The Mayfield West Recycling Facility Environmental Impact Statement (EIS) (EMM 2015) describes the approved operations at the recycling facility. The EIS was prepared in accordance with SEARs that were issued by the Department of Planning and Environment (DP&E) in February 2015 (SEAR 889). Development consent was subsequently granted by the Hunter and Central Coast Joint Regional Planning Panel in March 2016.

The recycling facility has two main components (Figure 3.1):

- the main recycling facility on the west of the site, accepting and processing segregated and co-mingled inert waste; and
- ancillary activities on the east of the site that may include temporary storage, including for light and heavy vehicles.

The EIS considered impacts from both components, particularly the combined traffic volumes. The main recycling facility has commenced operations, while the ancillary waste activity area has not yet been developed. Accordingly, the impacts assessed in the 2015 EIS were conservative (ie over-estimated) for current operations at the site.

The recycling facility is approved to accept up to 90,000 tonnes per annum (tpa) of 'Pre-classified general solid waste (non-putrescible)' as defined by the EPA (2014). This mainly consists of the following wastes:

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

No special, hazardous restricted solid waste (including asbestos) is accepted at the site.

Approved site layout

Recycling Facility, Mayfield West
Noise Assessment

Figure 3.1

The recycled materials able produced include soils, mulches, road-base, metals and dry paper/cardboard. These products meet recycled material specifications while recovering a range of materials that may otherwise be disposed to landfill. All of the materials brought onto the site are taken from the site as products or as rejects for disposal at a licensed landfill. No materials are land-filled or otherwise disposed anywhere within the site.

The hours of operation of the recycling facility are:

- waste delivery and dispatch to and from the premises: Monday to Friday, 6 am – 6 pm Saturday 6 am – 5 pm and Sunday 7 am – 3 pm; and
- waste processing at the premises: Monday to Saturday, 7 am – 6 pm.

The recycling facility has approval to accept (but not process) waste 24 hours per day on occasion.

The approved operations are described in detail in the EIS.

3.2 Proposed operations

Additional demand to recycle the types of excavated materials approved to be received by the recycling facility (eg ENM, VNEM and the like) has been identified.

Benedict proposes to receive and process an additional 225,000 tpa of materials that meet the EPA's definition of 'Pre-classified general solid waste (non-putrescible)' to meet the identified market demand. Accordingly, development consent is sought for the operation of the recycling facility generally as described in Chapter 2, with an increase in the volume of material handled at the site up to a total of 315,000 tpa.

Minor changes to the site layout are proposed, which involves realigning the boundaries between the recycling facility and ancillary waste activities area to incorporate an additional stockpile area to cater for the additional volumes of material handled by the recycling facility (Figure 3.2).

There would be no change to:

- the classification of waste materials already approved to be received at the recycling facility;
- waste processing methods and type of equipment used; or
- hours of operation for waste receival, dispatch and processing.

The additional material will be processed using the plant and equipment listed in the previous EIS (EMM 2015) with the addition of one front-end loader. The additional processing will also generate increased truck movements to and from the site. Table 3.1 shows a comparison of indicative equipment and activities for approved and proposed operations.

No additional construction activity will be required for the project.

Table 3.1 Indicative equipment and activities

Plant (or equivalent)[1]	Quantity (Approved / Proposed)	Typical activities
Equipment used across the site		
Front end loader (eg Volvo L150)	1 / 2	Unloading and loading trucks Moving waste and products
Generator[1]	1 / 0	Power for weighbridge, offices, amenities and lighting
Trucks (customers)	4 / 8	Delivering waste and dispatching products Returning to/leaving the site
Equipment used in a processing shed		
Excavator (eg Komatsu PC120)	1 / 1	Sorting waste using a variety of excavator attachments Loading feed to processing plant Loading trucks
Flip-flow screen waste sorter (eg Finlay 883 flip flow)	1 / 1	Sorting co-mingled waste
Picking line	2 / 2	Sorting co-mingled waste from flip flow
Campaign processing in yard		
Excavator (eg Komatsu PC220)	1 / 1	Loading material to crusher
Secondary crusher/screen (eg Metso LT1213)		Crushing/screening material
Timber shredder (eg Komptech Crambo)	1 / 1	Shredding timber and vegetation

Note: 1. *It is understood that the site is re-connected to the grid and the generator is no longer required.*

3.3 Site location and surroundings

The site is located at 1a McIntosh Drive, Mayfield West and is legally described as Lot 1 in DP 874109. It is within the Steel River industrial estate and covers about 8.9 ha. The site is flat and is approximately 10 m Australian Height Datum (mAHD). The site is largely devoid of vegetation except for trees around the boundary and patches of planted vegetation near old office buildings.

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

The nearest residential properties are on the far side of a hill and Industrial Drive, about 500 m south of the site. The nearest residential properties are currently exposed to significant levels of road traffic noise from Industrial Drive.

Proposed site layout

Recycling Facility, Mayfield West
Noise Assessment

Figure 3.2

3.4 Key noise issues

The new noise sources associated with the proposal (compared to approved operations) are:

- noise associated with the main operations, particularly the operation of an additional front-end loader on the site;
- noise associated with the increased traffic to/from the site during operation; and
- cumulative noise from all existing and proposed industrial operations part of the larger development precinct.

The NVIA has focussed on these potential issues. Its preparation included review of previous noise measurements, derivation of suitable criteria in accordance with the INP and comparison of predicted noise emission levels to appropriate noise criteria.

Operation of the site is expected to generate minimal levels of vibration at nearest sensitive receptors. Vibration levels associated with operation of the project are not expected to change since there will be no change to site operations, waste processing or site boundaries.

4 Existing environment

4.1 Assessment locations

Representative assessment locations considered in the NVIA are shown in Figure 4.1. Nearest residential assessment locations are located south of the Project within the residential area of Mayfield West, approximately 500 m from the site. Other non-residential assessment locations in the vicinity are:

- Mayfield Church of Christ, 31 Gregson Avenue, approximately 600 m south of the site;
- Mayfield West Public School, Gregson Avenue located approximately 700 m south of the site;
- 3rd Mayfield Scouts Hall, Gregson Avenue, Mayfield West located approximately 560 m south of the site; and
- CSIRO research facilities located within the Steel River estate approximately 200 m south of the site.

The assessment locations represent those most likely to be affected by the recycling facility. Adherence with noise and vibration criteria at these locations would indicate that criteria will be met at other surrounding sensitive locations.

4.2 Existing noise levels

A key element in assessing environmental noise impact from industry is to quantify the existing ambient acoustic environment, including any existing industrial noise where present. The locations of ambient noise monitoring used in this assessment are provided in Figure 4.2.

Based on previous noise assessments completed in the area, historical data and EMM field observations, road traffic on Industrial Drive and Tourle Street is the dominant noise source at residential areas south of the site.

EMM

Assessment locations

Benedict Recycling Facility, Mayfield West
Noise Impact Assessment
Figure 4.1

Noise monitoring locations

Benedict Recycling Facility, Mayfield West

Noise Impact Assessment

Figure 4.2

The existing acoustic environment (ie ambient noise) was characterised by long-term unattended and short-term attended noise monitoring. This was supplemented by a review of historical unattended noise monitoring data from publically available noise assessments to quantify the existing industrial noise at assessment locations.

Attended 15-minute noise measurements were completed at four locations in January and February 2015, including at the unattended noise monitoring location (Table 4.1).

The attended noise surveys were conducted using a Brüel and Kjær Type 2250 one-third octave hand-held sound level meter (s/n 2759405). Field calibration of the instrument was undertaken before and after the survey using a Brüel and Kjær type 4230 calibrator. Attended measurements were conducted in general accordance with Australian Standard (AS) 1055-1997 *Description and Measurement of Environmental Noise,* Parts 1, 2 and 3. Meteorological conditions throughout the survey period generally consisted of winds at 2 to 4 m/s from the east to north-east with some cloud cover. There were no winds above 5 m/s or rain events during the attended surveys. A summary of the results of the attended measurements is presented in Table 4.1.

Table 4.1 Attended noise monitoring summary

Location	Date	Start time	Measurement result, dB			Comments
			L_{Aeq}	L_{A90}	L_{Amax}	
A1. 28 Groongal St	31/01/15	3 pm	53	48	72	Traffic on Industrial Dr dominant. Occasional car passby. Aeroplane. Birds occasionally audible. Whipper snipper nearby. Existing industrial noise inaudible.
A2. Cnr Groongal and Tourle St	13/02/15	10.15 am	63	57	74	Traffic on Industrial Dr dominant. Insects and birds. Frequent traffic on Groongal St. Existing industrial noise inaudible.
A3. 15 Shelley Close	13/02/15	10.45 am	45	42	61	Traffic on Industrial Dr dominant. Some industrial noise – general hum, dropping load (or similar) < 40 dB. Insects and birds occasionally audible.
A4. Gregson Avenue (opposite scout hall)	13/02/15	11.15 am	59	51	73	Traffic on Industrial Dr dominant. Insects and birds constant. Helicopter briefly audible. Nearby residential activity audible. Existing industrial noise inaudible.

The ambient noise environment is dominated by road traffic from Industrial Drive at all monitoring locations. It was noted that noise levels from existing industrial operations were generally inaudible at all attended monitoring locations with the exception of 15 Shelley Close (A3) where an existing industrial noise 'hum' was measured at less than 40 dB.

Long-term noise monitoring was completed by EMM at one location in Mayfield West from 31 January to 13 February 2015 as described in Table 4.2. The long-term monitoring was completed using an ARL EL 316 Type 1 environmental noise logger (s/n 130209).

Table 4.2 EMM noise logging details

Location	Approximate position with respect to the site
L1. 28 Groongal Street	700 m south-west

The Rating Background Levels (RBL) and ambient $L_{Aeq,period}$ noise levels derived from EMM's long-term noise monitoring are summarised in Table 4.3. The daily noise data and charts from EMM's noise logging are provided in Appendix A. The logging data was analysed in accordance with the INP, whereby data was excluded where rainfall and/or winds of greater than 5 m/s were recorded. This analysis was completed using weather data from the Bureau of Meteorology's Automatic Weather Station at Nobbys Beach in Newcastle, NSW.

Table 4.3 Summary of measured ambient noise levels (31/1/15 to 13/2/15)

Location	RBL, dB			Ambient (L_{Aeq}) noise level, dB		
	Day	Evening	Night	Day	Evening	Night
L1. 28 Groongal Street	48	46	42	59	55	50

Note: 1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; evening: 6 pm to 10 pm; night is the remaining periods.

Several industrial developments currently operate in the area surrounding the site. Based on the results of operator-attended noise measurements, ambient noise at the logger location was primarily influenced by road traffic noise on Industrial Drive and is not expected to have been significantly influenced by existing industrial noise.

Information regarding the existing noise environment surrounding the site is readily available from environmental assessments from adjacent industrial sites, most recently the Port Waratah Coal Services (PWCS) Terminal 4 (T4) Project *Environmental Assessment* (EMM 2012) (T4 EA). A review of this information has been completed to supplement EMM's background noise data. Noise monitoring for this project was conducted by SLR Consulting Australia Pty Ltd (SLR) and is considered applicable to the project site.

A summary of the results relevant to this study are presented in Table 4.4.

Table 4.4 Summary of ambient noise levels from T4 Environmental Assessment (EMM 2012)

Location	RBL, dB(A)			Estimated $L_{eq(period)}$ industrial noise only, dB(A)		
	Day	Evening	Night	Day	Evening	Night
Mayfield West[1,2] (W1, W2)	45	46	41	<54	45	43
Warabrook[1,3] (W4)	45	43	39	<54	<49	<39

Notes: 1. Noise data obtained from the PWCS T4 Environmental Assessment (EMM 2012).

2. These noise levels are considered representative of the residential assessment locations in Mayfield West (ie R1–R11).

3. These noise levels are considered representative of the residential assessment locations in the north of Mayfield West and Warabrook (ie R12–R13).

4.3 Meteorology

Noise propagation over distance can be significantly affected by the prevailing weather conditions. Of most interest are source to receiver winds, the presence of temperature inversions and drainage flow effects, as these conditions can enhance received noise levels. To account for these phenomena, the INP specifies meteorological analysis procedures to determine the prevalent weather conditions that enhance noise propagation in a particular area, with a view to determining whether they can be described as a feature of the project area.

4.3.1 Wind

Wind has the potential to increase noise impacts at a receiver when it is light and stable, and blows from the direction of the noise source. As the wind strength increases, the noise produced by the wind usually obscures noise from most industrial and transport sources.

The prevailing wind directions in the area have been determined in accordance with Section 5 of the INP. The NSW INP requires that winds of speeds up to 3 m/s with an occurrence greater than 30% of the time during any period (day, evening or night) in any season be assessed.

4.3.2 Analysis of prevailing winds for the area

Detailed analysis of winds was undertaken for the T4 EA (EMM 2012) using weather data from the PWCS automatic weather station. This weather station is the nearest available to the subject site.

The prevailing winds analysis considered weather data over a one year period (2011). The analysis determined that prevailing winds are dominant in the area during the evening and night periods from most directions. The detailed analysis of winds is provided in the wind roses provided in Appendix B.

4.3.3 Temperature inversions

The data required to determine if temperature inversions are a feature of the area were not available. The default inversion parameter of 3^{o}C/100 m has therefore been adopted for this assessment.

4.3.4 Drainage winds

The INP states that a default wind drainage value should be applied where sources are at a higher altitude than the assessment location with no intervening topography. All assessment locations are at a similar or higher elevation than the subject site. Therefore, drainage winds have not been adopted in this assessment.

4.3.5 Modelled meteorological conditions

The relevant site specific meteorological conditions adopted in the NVIA based on the meteorological data analysis are presented in Table 4.5.

Table 4.5 Weather conditions considered in noise modelling

Assessment period	Meteorological condition	Air temperature	Relative humidity	Wind speed[1]	Stability Category (Temperature inversion)
Day	Calm	20°C	70%	0 m/s	D
	Wind	20°C	70%	2.7 m/s[2]	D
Evening/Night	Calm	10°C	90%	0 m/s	D
	Wind	10°C	90%	2.4 m/s[3]	D
	Temperature inversion	10°C	90%	0 m/s	F

Note 1: Based on the 10th percentile wind speed of all winds present for 30% of the time during the day or morning shoulder period.

2: Wind directions considered include 315° and 337.5° from north.

3: Wind direction considered include 22.5° to 135° (22.5° increments), 315°, 337.5° and 360° from north.

5 Noise criteria

5.1 Strategic Impact Assessment Study, Steel River Project

The Strategic Impact Assessment Study (SIAS) (City of Newcastle 1998) for the Steel River Project provides noise limits which apply to the site. The SIAS states that the noise limits provided are based on the EPA Environmental Noise Control Manual (ENCM). The ENCM is now superseded by the EPA's Industrial Noise Policy (INP) released in 2000, which provides a more comprehensive noise assessment approach for industrial sites in terms of both intrusive and amenity noise levels. The contemporary INP assessment methodology has therefore been adopted for the site, as also required by the EPA (refer Table 1.1), and is discussed in the following sections.

5.2 Operational noise

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

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

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

Assessment criteria depend on the existing amenity of areas potentially affected by a proposed development. Noise assessment criteria for industry are based on the following objectives:

- protection of the community from excessive intrusive noise; and
- preservation of amenity for specific land uses.

To ensure these objectives are met, the EPA provides two separate criteria: intrusiveness criteria and amenity criteria. A fundamental difference between the intrusiveness and the amenity criteria is the period they relate to:

- intrusiveness criteria — apply over 15 minutes in any period (day, evening or night); and
- amenity criteria — apply to the entire assessment period (day, evening or night).

The INP (EPA, 2000) states that ”where early morning (5 am - 7 am) operations are proposed, it may be unduly stringent to expect such operations to be assessed against the night-time criteria - especially if existing background noise levels are steadily rising in these early morning hours”. For this reason, the morning shoulder period (6.00 am - 7.00 am) has been considered separately as part of this assessment.

5.2.1 Intrusiveness

The intrusiveness criteria require that $L_{Aeq,15\text{-}min}$ noise levels during the relevant operational periods (ie day, evening and night) do not exceed the RBL by more than 5 dB. The adopted RBL utilised for determination of the intrusive criteria are based on those reported within the PWCS T4 EA (EMM 2012) to provide a conservative approach for the NIA as these are marginally lower than those measured by EMM.

Table 5.1 presents the intrusive noise criteria determined for the site.

Table 5.1 Intrusive noise criteria

Location	Period[1]	Adopted RBL, dB	Intrusive criteria dB, $L_{Aeq,15\text{-}min}$
R1 to R11	Morning shoulder	43[2]	48
	Day	45	50
	Evening	45[3]	50
	Night	41	46
R12 to R13	Morning shoulder	42[2]	47
	Day	45	50
	Evening	43	48
	Night	39	44

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

2. As per guidance provided in the INP, the RBL adopted for the morning shoulder is the mid-point value between the RBL's determined for day and night.

3. In accordance with the INP Application Notes, the RBL for day has been adopted for the evening period since the measured RBL during the evening was higher than that measured for daytime.

5.2.2 Amenity

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

Residential assessment locations potentially affected by the recycling facility have been categorised in the INP (EPA 2000) urban amenity category. The corresponding recommended amenity criteria for the Project are given in Table 5.2. It is noted that no adjustment to the acceptable recommended noise amenity level was necessary during the day since the measured level of industrial noise was not significant enough to warrant adjustment as per Table 2.2 of the INP. Relevant adjustments have been made to the evening and night urban amenity criteria based on the existing levels of industrial noise (refer Table 4.4).

Table 5.2 Amenity criteria

Assessment location	Indicative area	Time period	Recommended noise level dB, $L_{Aeq,period}$	
			Acceptable	Maximum
Residential R1 to R11	Urban	Day	60	65
		Evening	48	55
		Night	41	50
Residential R12 to R13	Urban	Day	60	65
		Evening	50	55
		Night	45	50
School classrooms - internal	All	Noisiest 1 hour period when in use	35	40
Place of worship - internal	All	When in use	40	45
Active recreation	All	When in use	55	60
Commercial	All	When in use	65	70

Source: INP (EPA 2000).

5.2.3 Project specific noise levels

The project-specific noise level (PSNL) is the lower of the calculated intrusive or amenity criteria. The PSNL for the relevant operational periods are indicated in bold in Table 5.3.

Table 5.3 Project specific noise levels

Location	Period[1]	Intrusive criteria $L_{Aeq,15\text{-}min}$, dB	Amenity criteria, $L_{Aeq,period}$, dB
R1 to R11	Morning shoulder	**48**	-
	Day	**50**	60
	Evening	50	**48**
	Night	46	**41**
R12 to R13	Morning shoulder	**47**	-
	Day	**50**	60
	Evening	**48**	50
	Night	**44**	45
Mayfield West Public School	When in use	n/a	**35 (internal)**
Mayfield Church of Church	When in use	n/a	**40 (internal)**
3rd Mayfield Scouts Hall	When in use	n/a	**55**
CSIRO	When in use	n/a	**65**

Note: 1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; evening: 6 pm to 10 pm; night is the remaining periods. Morning shoulder is 6 am to 7 am.

5.3 Sleep disturbance criteria

The recycling facility will operate on occasion during the night-time period from 10 pm to 7 am. Therefore assessment of sleep disturbance is required in accordance with the INP and associated application notes.

The operational criteria described in Section 5.1, which consider the average noise emission of a source over 15 minutes, are appropriate for assessing noise from steady-state sources, such as engine noise from mobile plant and other pit equipment. However impact noise from sources such as a front end loader loading trucks is intermittent (rather than continuous) and needs to be assessed using the L_{A1} or L_{Amax} noise metrics.

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

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

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

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

The descriptors L_{Amax} and L_{A1} may be considered interchangeable which is accepted by the EPA.

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

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

Table 5.4 provides the sleep disturbance criteria for the residential assessment locations.

Table 5.4 Sleep disturbance criteria – residential assessment locations

Assessment location	Adopted RBL, dB[1]	Sleep disturbance screening criteria dB, L_{Amax} Night-time period (10 pm to 7 am)
R1 to R11	41	56
R12 to R13	39	54

Notes: 1.Night-time RBLs adopted.

5.4 Road traffic noise criteria

The principle guidance for assessing the impact of road traffic noise is the RNP (EPA 2011). Vehicles will access the site from Industrial Drive via Steel River Boulevard and McIntosh Drive. Industrial Drive is a major heavy vehicle route and is classified as an arterial road in accordance with the RNP.

Table 5.5 presents the road noise assessment criteria reproduced from Table 3 of the RNP.

Table 5.5 Road traffic noise assessment criteria for residential land uses

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

Source: EPA (2011).

The RNP states that where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2 dB.

5.4.1 Relative increase criteria

In addition to meeting the assessment criteria, any significant increase in total traffic noise at assessment locations must be considered. Assessment locations experiencing increases in total traffic noise levels above those presented in Table 5.6 should be considered for mitigation.

Table 5.6 Relative increase criteria for residential land uses

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

Road traffic generated by the recycling facility will be relatively minor compared to existing traffic volumes on the proposed transport route. The potential for the relative increase criteria to be exceeded is therefore highly unlikely and has not been considered further.

5.5 Existing noise criteria

The Development consent (DA 15-291) and Environment Protection Licence (EPL 20771) relevant to the recycling facility provide operational noise criteria that are consistent with the project specific noise levels provided in this NVIA.

6 Operational noise modelling and assessment

6.1 Noise modelling method

This section presents the methods and assumptions used to model noise emissions from the recycling facility.

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 11.0 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 Section 4.3).

Plant and equipment was modelled at locations and heights representing activities during operation using representative equipment sound power levels and quantities provided in Table 6.1. The sound power levels adopted have been taken from an EMM database of similar equipment. Noise modelling has conservatively assumed that all plant and equipment operates simultaneously. While this may occur at times, the use of individual plant generally will be intermittent during operations.

Table 6.1 Operational plant and equipment sound power levels

Plant and equipment	Typical activities	Location	Quantity	L_w, $L_{Aeq,15\text{-}min}$, dB
Main operations				
Excavator	Sorting waste using a variety of excavator attachments Loading feed to processing plant Loading trucks	Inside main building	1	104
Heavies sorter (Screen)	Sorting co-mingled waste	Inside main building	1	101
Picking line	Sorting / moving co-mingled waste	Inside main building	2	88
Front-end loader (FEL)	Loading trucks Moving waste products	Outside; north of main shed	2	108
Road truck	Delivering waste and dispatching products, returning to/leaving the site	Delivery/dispatch route	8	103 loaded 105 unloaded
Idling road trucks	Standing at weighbridge	Weighbridge	2	98

Table 6.1 Operational plant and equipment sound power levels

Plant and equipment	Typical activities	Location	Quantity	L_w, $L_{Aeq,15\text{-}min}$, dB
Campaign basis				
Excavator/secondary crusher	Loading material to crusher Crushing/screening material	Segregated heavy waste yard	1	123
Timber shredder	Shredding timber and vegetation	Segregated heavy waste yard	1	115
Transporting product only (evening and night-time)				
Road truck	Delivering waste and dispatching products, returning to/leaving the site	Delivery/dispatch route	8	103 loaded 105 unloaded
Front end loader	Loading trucks	Outside	2	108
Idling road trucks	Standing at weighbridge	Weighbridge	2	98

Activities in the ancillary waste activities area in the east of the site have not been modelled. These activities will generally be much quieter than those associated with the main operations and campaign crushing and most will be conducted inside buildings. Therefore, they are not expected to contribute significantly to the overall noise emissions from the site.

Noise modelling was completed for daytime, evening and night-time periods for the meteorological scenarios presented in Table 4.5.

6.2 Noise modelling results and discussion

Noise modelling results at all assessment locations shown in Figure 4.1 are provided in Table 6.2, Table 6.3 and Table 6.4 for day, morning shoulder and night-time periods, respectively. Results for the evening period have not been included as the night-time criteria provide the most stringent requirements for the operational scenario considered during these periods ie transporting product only.

Noise modelling predicts that the INP PSNLs will be met at all assessment locations for calm and prevailing conditions during all proposed operational periods.

Table 6.2 Operational noise modelling results - daytime

Assessment location	Predicted operational noise level, dB						PSNL, dB
	Main operations		Campaign		Main ops + campaign		
	Calm	Wind	Calm	Wind	Calm	Wind	
R1	35	38	44	47	45	48	50 $L_{Aeq,15\text{-}min}$
R2	36	39	46	49	46	49	50 $L_{Aeq,15\text{-}min}$
R3	34	37	43	46	44	47	50 $L_{Aeq,15\text{-}min}$
R4	34	37	44	46	44	47	50 $L_{Aeq,15\text{-}min}$
R5	38	41	46	49	47	50	50 $L_{Aeq,15\text{-}min}$
R6	36	39	44	47	45	48	50 $L_{Aeq,15\text{-}min}$
R7	35	38	45	48	45	48	50 $L_{Aeq,15\text{-}min}$
R8	35	38	45	47	45	48	50 $L_{Aeq,15\text{-}min}$
R9	36	39	46	49	46	49	50 $L_{Aeq,15\text{-}min}$
R10	36	39	45	48	46	49	50 $L_{Aeq,15\text{-}min}$
R11	37	39	45	48	46	49	50 $L_{Aeq,15\text{-}min}$
R12	32	32	42	42	42	42	50 $L_{Aeq,15\text{-}min}$
R13	30	<30	40	40	40	40	50 $L_{Aeq,15\text{-}min}$
MWPS[1, 2]	<30	<30	30	33	31	34	Internal 35 $L_{Aeq,period}$
Mayfield Church of Christ[2]	<30	<30	32	35	32	35	Internal 40 $L_{Aeq,period}$
3rd Mayfield Scouts Hall	34	36	42	45	43	46	55 $L_{Aeq,period}$
CSIRO	46	48	54	56	55	57	65 $L_{Aeq,period}$

Notes: *1.Mayfield West Public School.*

2. Internal noise levels have been conservatively estimated as 10 dB below predicted external levels. This is a typical facade noise reduction achieved with windows open.

Table 6.3 Operational noise modelling results – morning shoulder

Location	Predicted operational noise level, dB		PSNL, dB
	Main operations		
	Calm	Adverse (Wind/Inversion)	
R1	35	38	48 $L_{Aeq,15\text{-}min}$
R2	36	39	48 $L_{Aeq,15\text{-}min}$
R3	34	37	48 $L_{Aeq,15\text{-}min}$
R4	34	37	48 $L_{Aeq,15\text{-}min}$
R5	38	41	48 $L_{Aeq,15\text{-}min}$
R6	36	39	48 $L_{Aeq,15\text{-}min}$
R7	35	38	48 $L_{Aeq,15\text{-}min}$
R8	35	38	48 $L_{Aeq,15\text{-}min}$
R9	36	39	48 $L_{Aeq,15\text{-}min}$
R10	36	39	48 $L_{Aeq,15\text{-}min}$
R11	37	39	48 $L_{Aeq,15\text{-}min}$
R12	32	35	47 $L_{Aeq,15\text{-}min}$
R13	30	33	47 $L_{Aeq,15\text{-}min}$
MWPS[1, 2]	<30	<30	Internal 35 $L_{Aeq,period}$
Mayfield Church of Christ[2]	<30	<30	Internal 40 $L_{Aeq,period}$
3rd Mayfield Scouts Hall	34	36	55 $L_{Aeq,period}$
CSIRO	46	48	65 $L_{Aeq,period}$

Table 6.4 Operational noise modelling results – night

Location	Predicted operational noise level, dB		PSNL, dB
	Transporting product only		
	Calm	Adverse (Wind/Inversion)	
R1	33	36	41 $L_{Aeq,night}$
R2	34	37	41 $L_{Aeq,night}$
R3	32	35	41 $L_{Aeq,night}$
R4	31	34	41 $L_{Aeq,night}$
R5	35	38	41 $L_{Aeq,night}$
R6	33	36	41 $L_{Aeq,night}$
R7	33	35	41 $L_{Aeq,night}$
R8	33	36	41 $L_{Aeq,night}$
R9	34	37	41 $L_{Aeq,night}$
R10	33	36	41 $L_{Aeq,night}$
R11	34	37	41 $L_{Aeq,night}$
R12	30	32	44 $L_{Aeq,15\text{-}min}$
R13	<30	31	44 $L_{Aeq,15\text{-}min}$
MWPS[1, 2]	<30	<30	Internal 35 $L_{Aeq,period}$
Mayfield Church of Christ[2]	<30	<30	Internal 40 $L_{Aeq,period}$
3rd Mayfield Scouts Hall	34	37	55 $L_{Aeq,period}$
CSIRO	46	48	65 $L_{Aeq,period}$

Notes: *1.Mayfield West Public School.*

2. Internal noise levels have been conservatively estimated as 10 dB below predicted external levels. This is a typical facade noise reduction achieved with windows open.

3. Based on previous experience at similar sites and given the likely intermittent nature of night-time activities, the predicted $L_{eq(night)}$ noise level from the project has been conservatively estimated as 3 dB lower than the predicted $L_{eq(15\ min)}$.

6.3 Sleep disturbance assessment

The loading and/or unloading of trucks during the night-time period has been assessed. Typical maximum noise events are likely to include reversing alarms and impacts associated with loading activities. A typical L_{Amax} sound power level of 125 dB has been used to predict potential sleep disturbance impacts. Results are provided in Table 6.5.

Results of noise modelling indicate that the sleep disturbance criteria will be met during calm and prevailing meteorological conditions.

Table 6.5 Predicted maximum noise levels at residential assessment locations

Assessment location	Predicted L_{Amax} noise level, dB			L_{Amax}, noise criterion, dB
	Calm	Worst case wind	Inversion	
R1	48	51	51	56
R2	49	52	52	56
R3	48	51	51	56
R4	47	50	50	56
R5	50	53	53	56
R6	49	51	51	56
R7	49	52	52	56
R8	49	52	52	56
R9	50	52	52	56
R10	49	51	51	56
R11	49	52	52	56
R12	46	48	48	54
R13	44	47	47	54

6.4 Cumulative noise assessment

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

Based on experience with similar sites, $L_{Aeq,period}$ noise levels (used to assess amenity) from such sites are typically 3 dB below the worst case $L_{Aeq,15minute}$ intrusive noise level. On this basis, the highest predicted daytime amenity level at any residential assessment location is up to 47 dB. This is greater than 10 dB below the acceptable amenity level for an urban receiver type and thus will not increase industrial noise above the relevant criteria.

The predicted amenity level from the recycling facility is also greater than 10 dB below the measured existing ambient $L_{Aeq,day}$ of 59 dB and $L_{Aeq,night}$ of 50 dB which is primarily due to traffic on Industrial Drive. Hence, noise levels from the recycling facility are not predicted to increase existing ambient noise levels at any of the assessment locations.

On this basis, the proposal is predicted to have a negligible impact on the existing ambient acoustic environment and is not predicted to increase industrial noise levels above the relevant amenity criteria.

7 Road traffic noise assessment

The nearest residences potentially affected by an increase in road traffic volumes as a result of the Project are located adjacent to Industrial Drive in Mayfield West. The Traffic Impact Assessment for the proposal (EMM 2016) states that the predicted total number of vehicles associated with operation of the site represents less than 1% of total traffic on Industrial Drive.

This increase in traffic volume would lead to a negligible increase (<0.5 dB) in road traffic noise from Industrial Drive. Therefore, the impact of road traffic noise associated with the proposal is predicted to be negligible and within the 2 dB allowable increase for land use developments as described in the RNP (DECCW 2011).

8 Noise management and monitoring

It is noted that residual noise impacts, that is, noise emission levels above the PSNLs, are not predicted. Further, given the existing high levels of ambient noise (primarily from road traffic) it is unlikely that the Project will have any significant acoustic impact on the assessment locations. Hence, additional specific noise mitigation and management measures have not been considered for the recycling facility.

The environment management plan (EMP) prepared for the site (dated May 2016) describes the measures implemented at the site to minimise noise impacts and generally describes noise monitoring requirements. Noise management measures currently implemented at the site include the following:

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

9 Conclusion

EMM has completed a NVIA to quantify potential noise impacts associated with the recycling facility.

Operational noise levels have been assessed for the proposed operational periods during calm and prevailing weather conditions. 'Worst-case' predictions assumed that all plant is operating simultaneously for the proposed operations. In all cases, noise levels were predicted to comply with the relevant PSNLs.

Sleep disturbance from operation during the night-time has been assessed. Maximum noise level events are predicted to be below the EPA screening criteria at all residential assessment locations.

An assessment of cumulative industrial noise from the recycling facility together with other industrial noise sources in the vicinity was also conducted. The recycling facility is predicted to have a negligible impact on the existing ambient acoustic environment at residences and is not predicted to increase industrial noise levels above the relevant amenity criteria.

The proposal will result in additional traffic movements on Industrial Drive. This increase is minor in comparison to existing traffic volumes on Industrial Drive and the overall increase in road traffic noise level at residents will be negligible and in any case within appropriate criteria.

In summary, noise levels from the recycling facility are predicted to comply with current EPA noise criteria and are therefore not expected to cause adverse impacts at the assessment locations.

References

NSW Environmental Protection Authority 2000, *Industrial Noise Policy.*

NSW Department of Environment and Climate Change, 2009, *Interim Construction Noise Guideline.*

NSW Department of Environment and Conservation 2006, *Assessing Vibration: A Technical Guideline.*

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

Australian Standard AS 1055-1997, *Acoustics - Description and Measurement of Environmental Noise*.

Australian Standard AS 2436-2010, *Guide to Noise Control on Construction, Maintenance and Demolition Sites.*

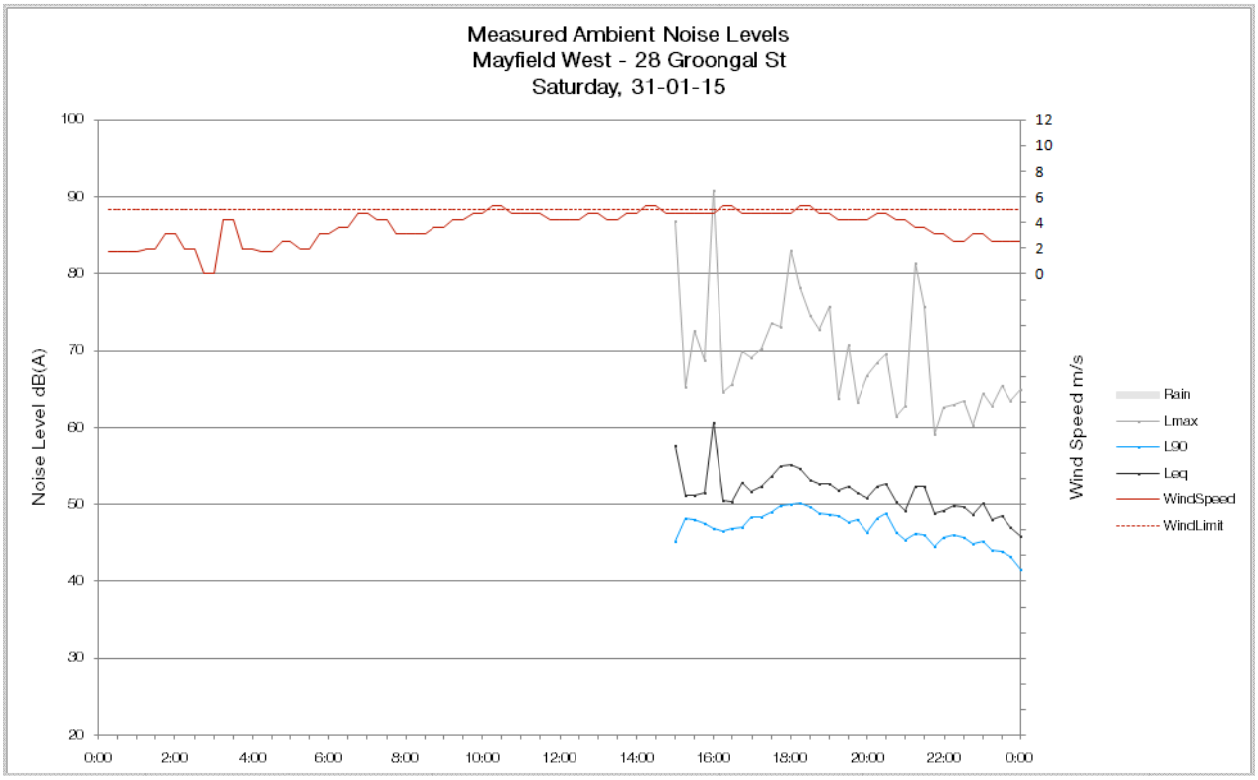
EMGA Mitchell McLennan Pty Ltd 2012, *PWCS T4 Project Environmental Assessment.*

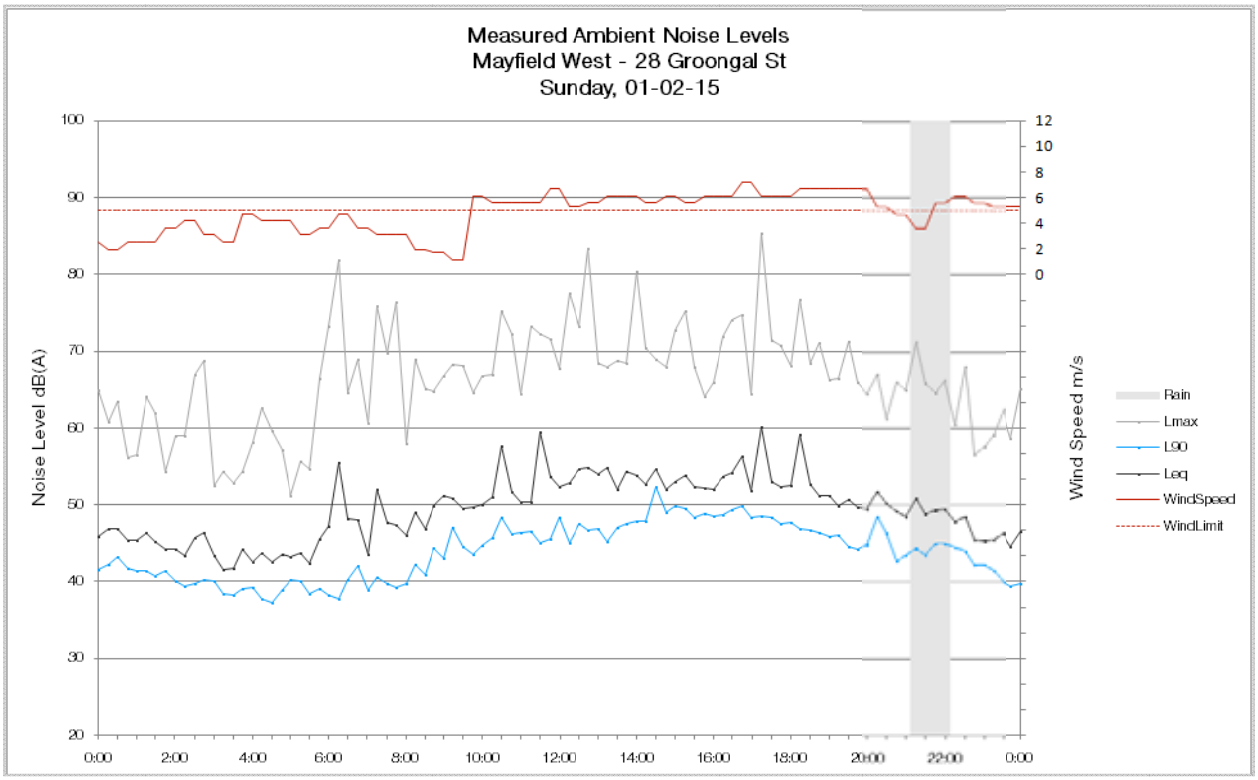
The City of Newcastle 1998, *Strategic Impact Assessment Study, "Steel River" Project.*

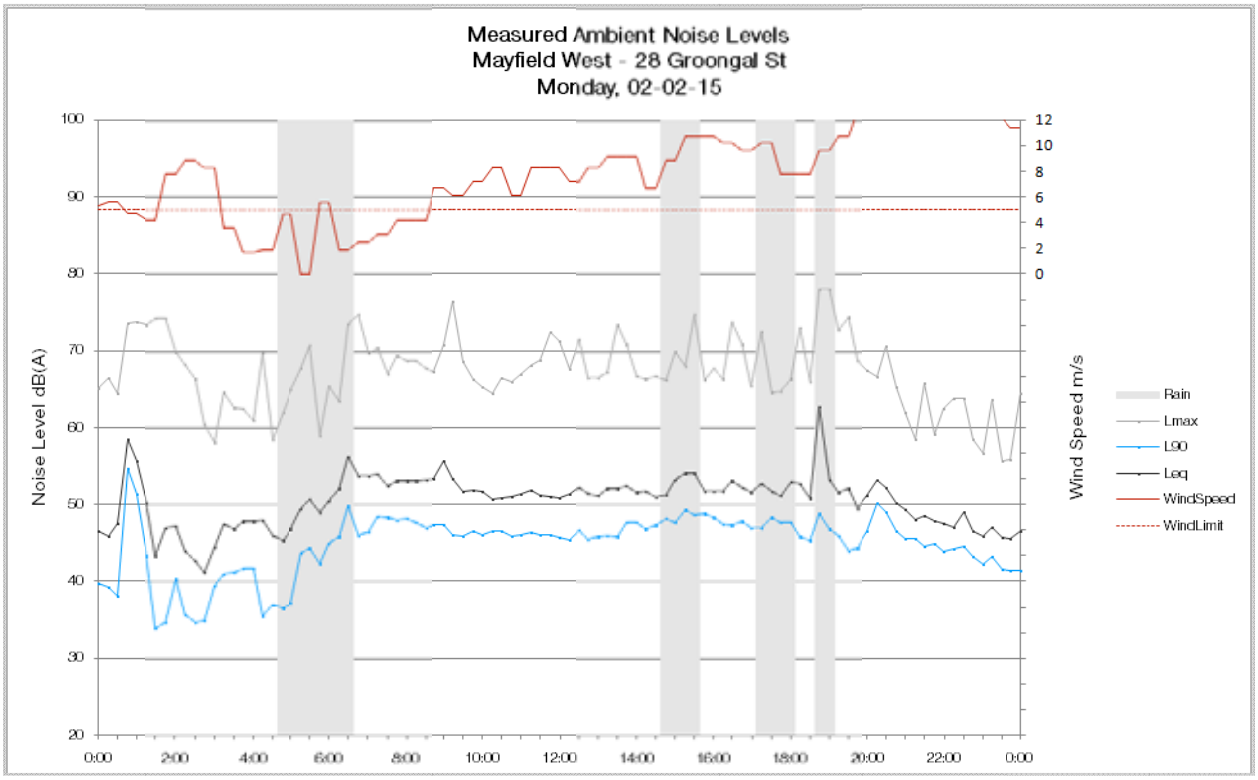
Environment Protection Authority (superseded), *Environmental Noise Control Manual.*

Appendix A

Daily unattended noise monitoring results


Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Saturday, 31-01-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Rain
Lmax
L90
Leq
WindSpeed
WindLimit


Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Sunday, 01-02-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Rain
Lmax
L90
Leq
WindSpeed
WindLimit


Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Monday, 02-02-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
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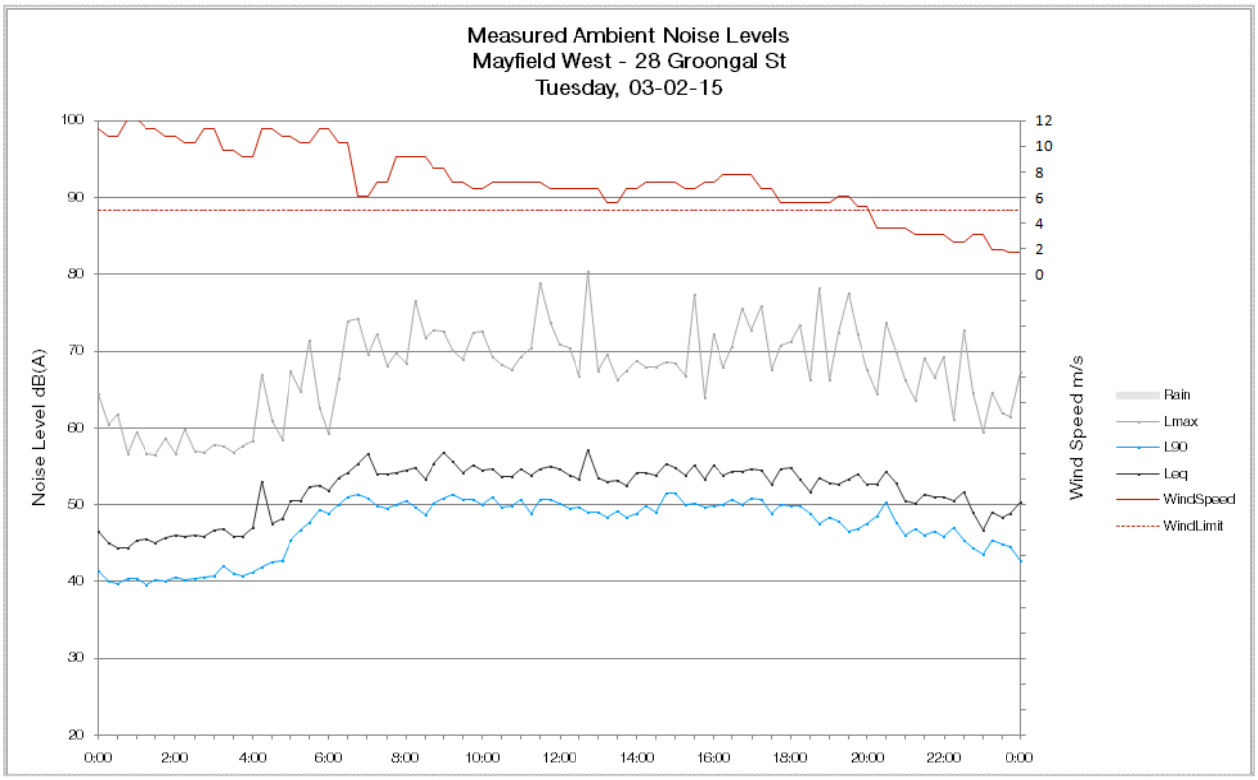
16:00
18:00
20:00
22:00
0:00
Rain
Lmax
L90
Leq
WindSpeed
WindLimit


Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Tuesday, 03-02-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
10:00
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WindSpeed
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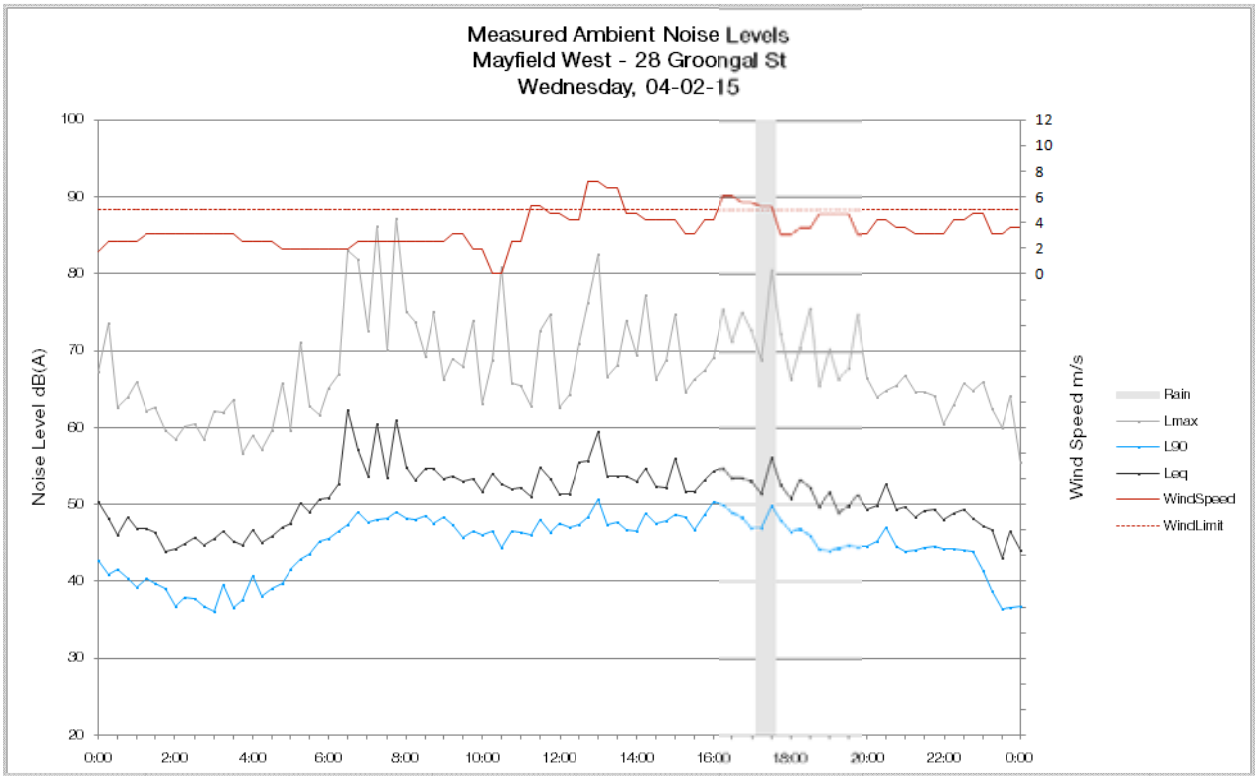
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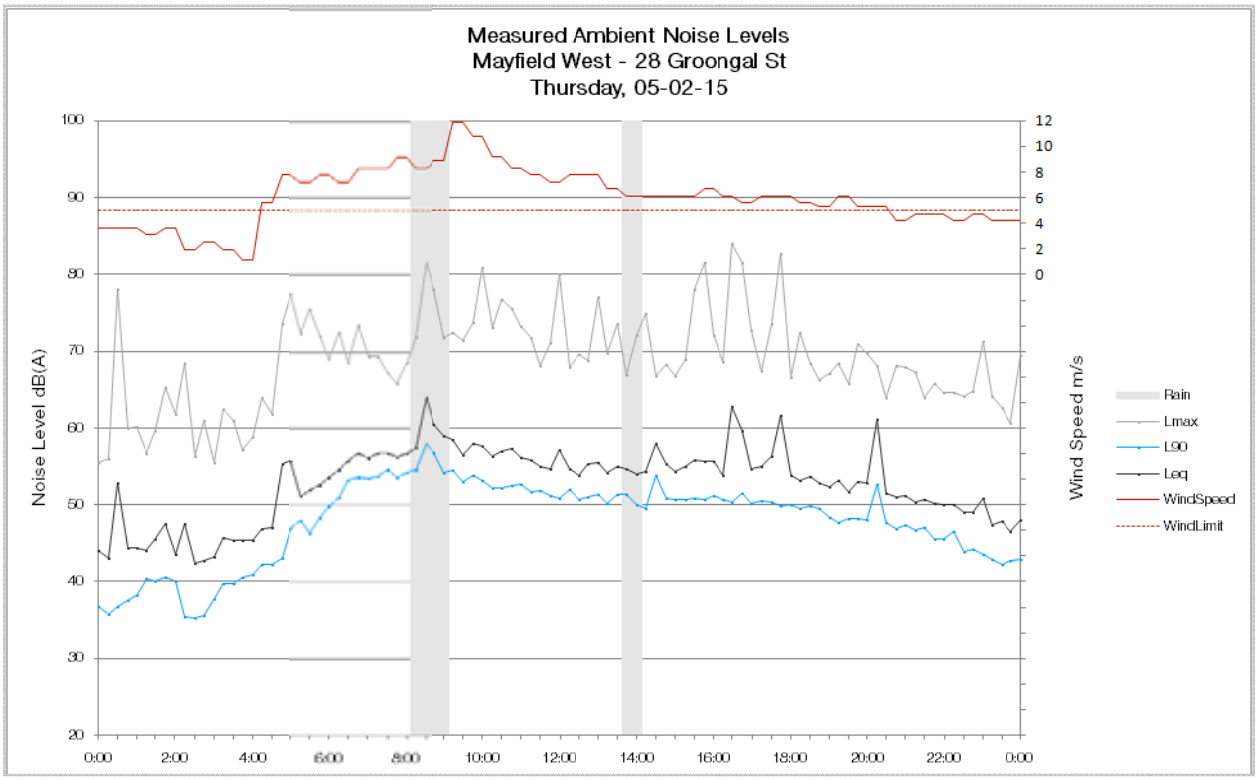
Wednesday, 04-02-15
Noise Level dB(A)
Wind Speed m/s
Rain
Lmax
L90
Leq
WindSpeed
WindLimit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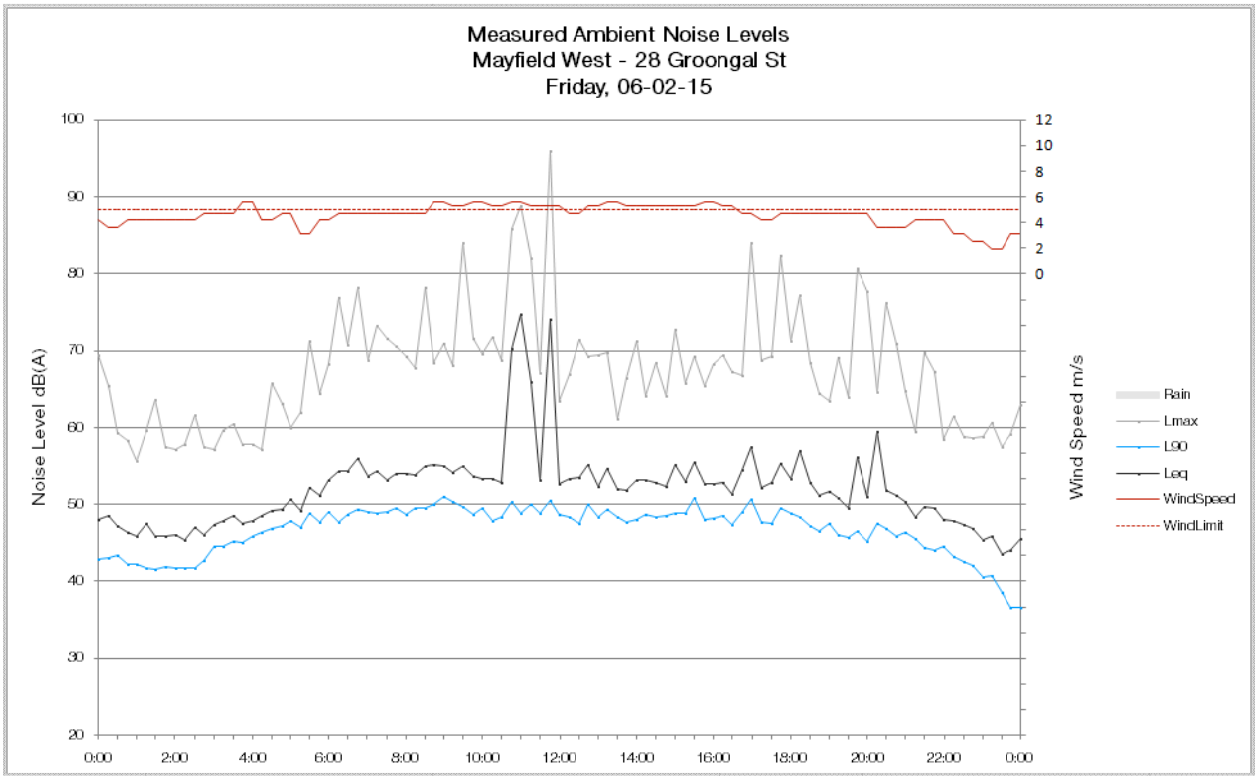
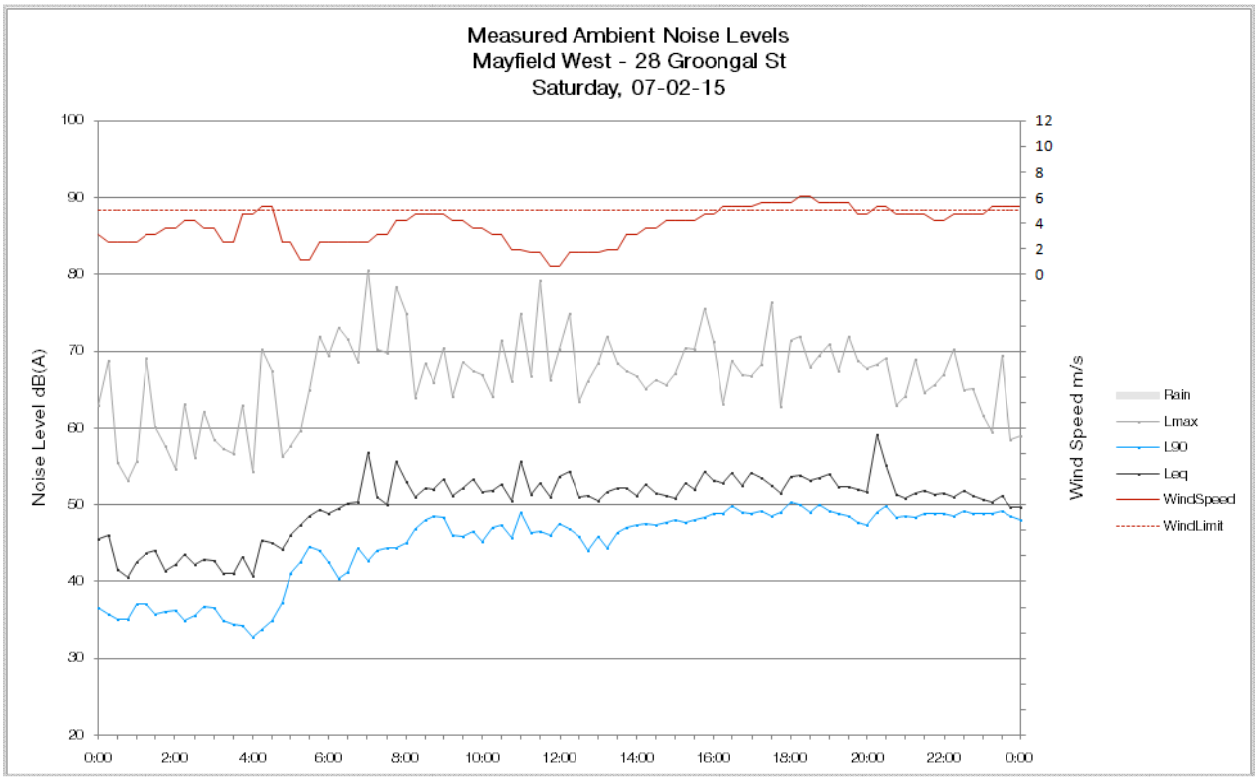
Mayfield West - 28 Groongal St
Thursday, 05-02-15
Noise Level dB(A)
Wind Speed m/s
Rain
Lmax
L90
Leq
WindSpeed
WindLimit


Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Friday, 06-02-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Rain
Lmax
L90
Leq
WindSpeed
WindLimit


Measured Ambient Noise Levels
Mayfield West - 28 Groongal St
Saturday, 07-02-15
Noise Level dB(A)
Wind Speed m/s
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
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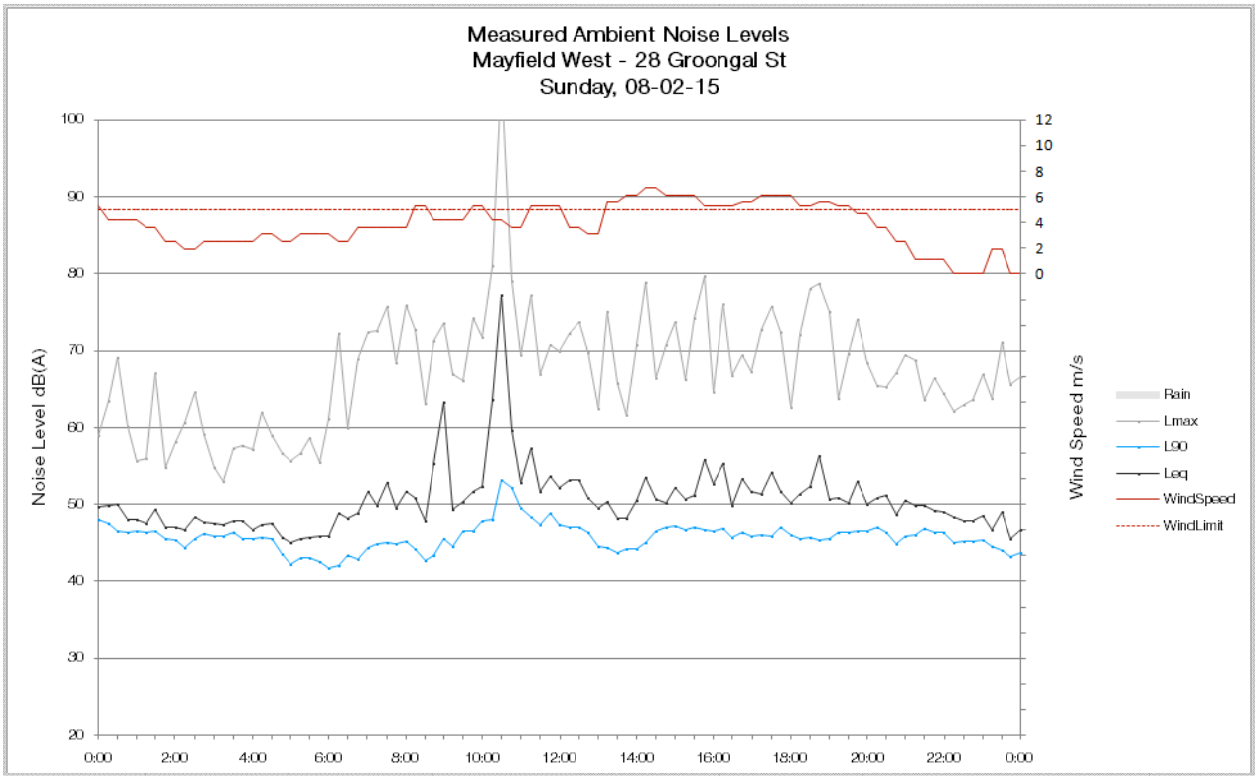
Rain
Lmax
L90
Leq
WindSpeed
WindLimit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Sunday, 08-02-15
Noise Level dB(A)
Wind Speed m/s
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80
70
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40
30
20
12
10
8
6
4
2
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Rain
Lmax
L90
Leq
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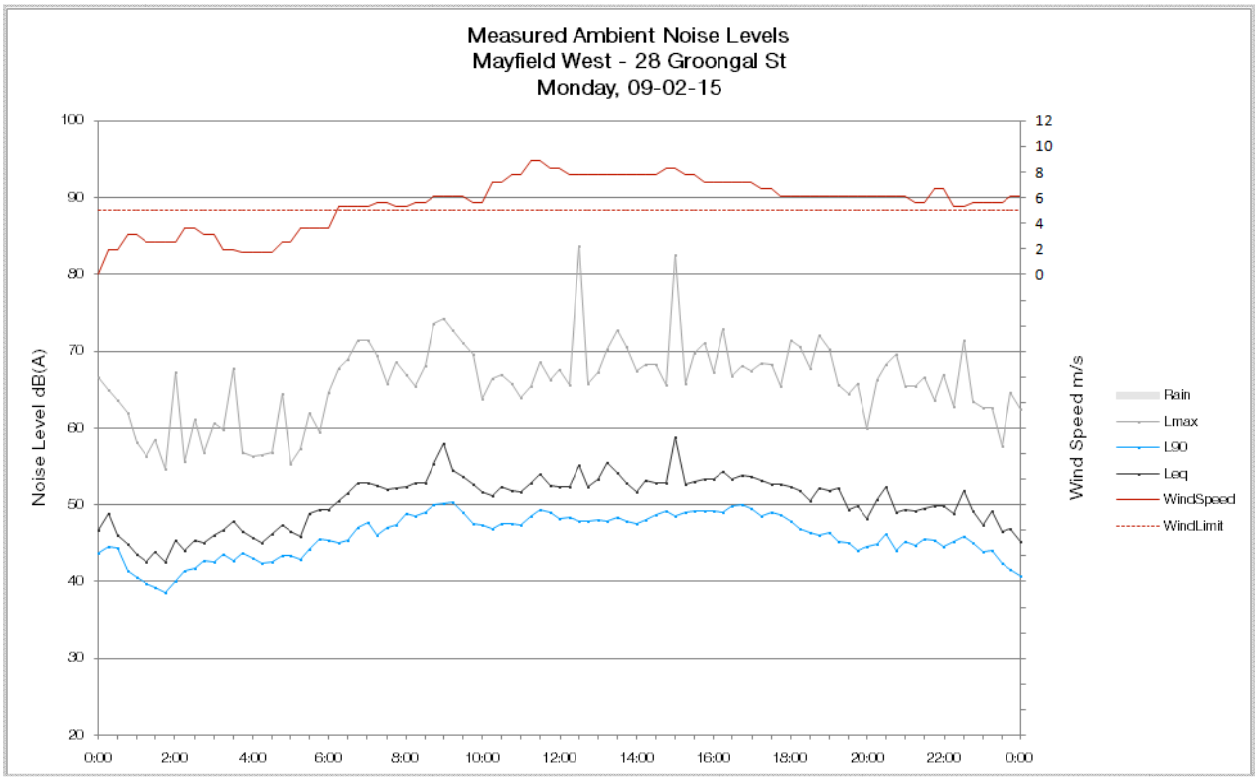
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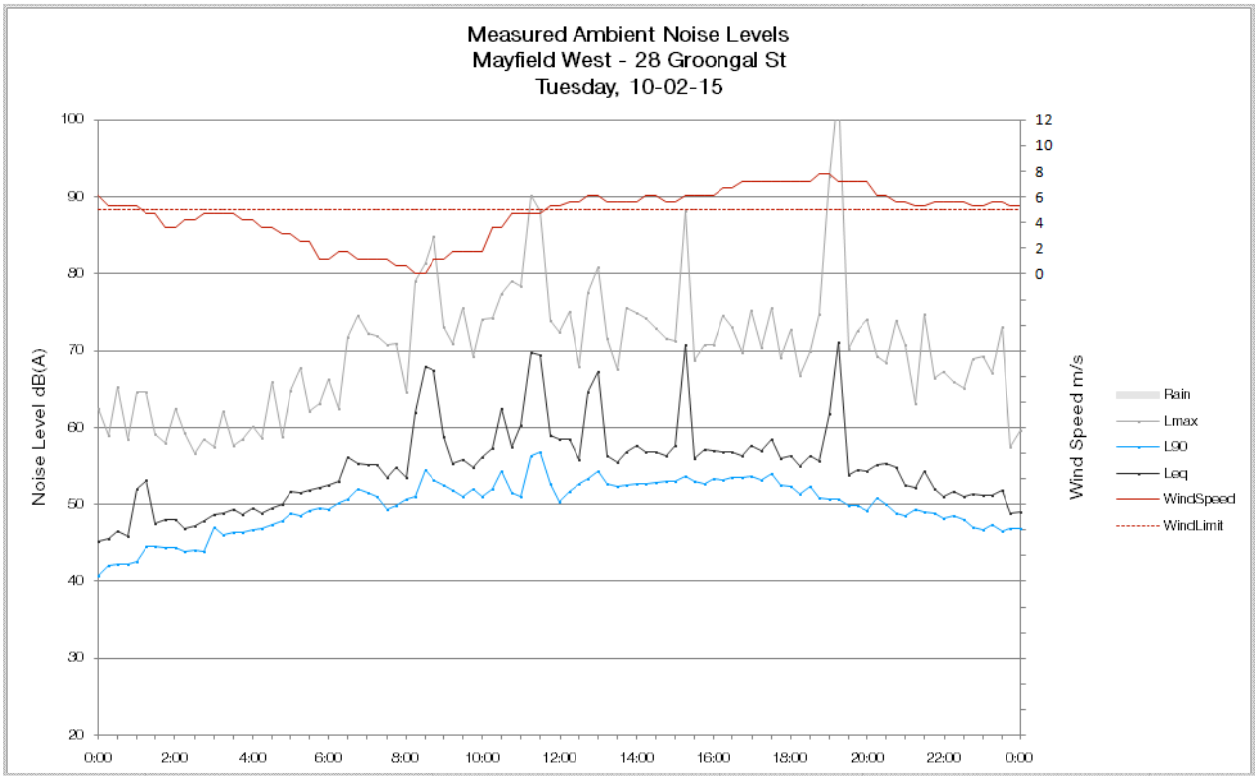
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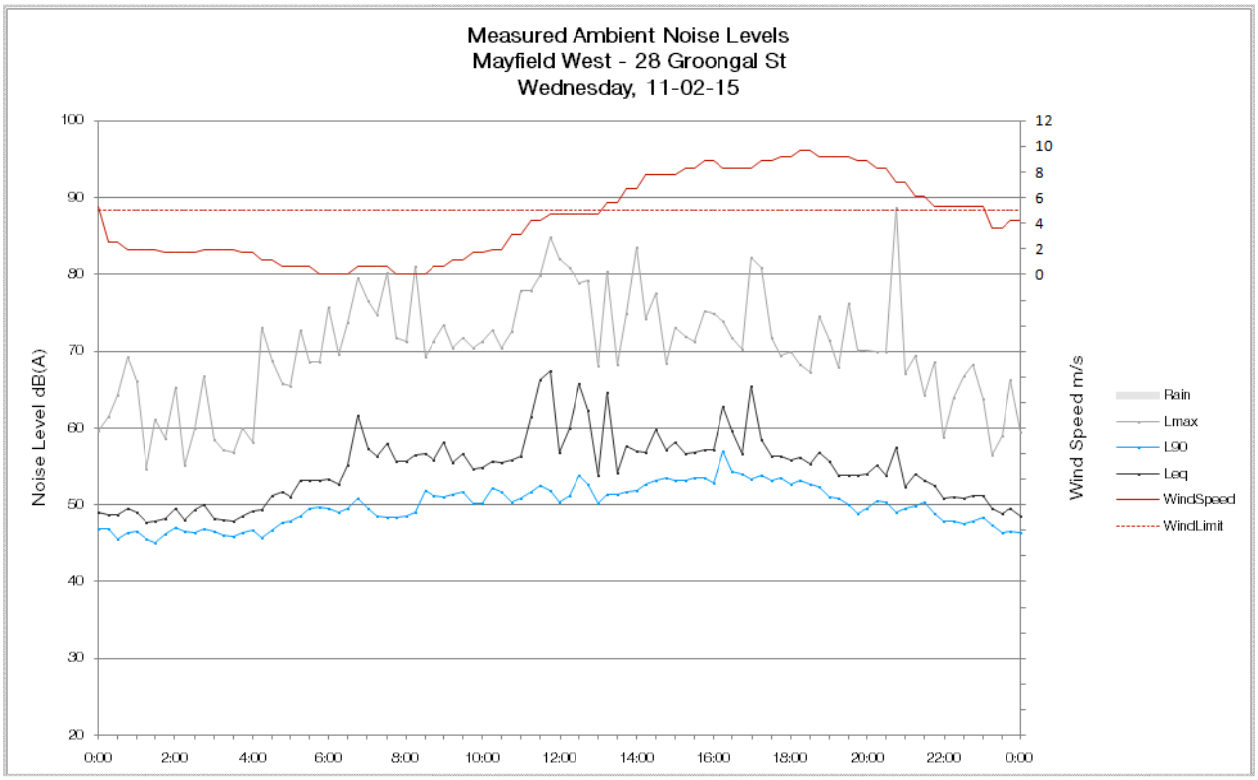
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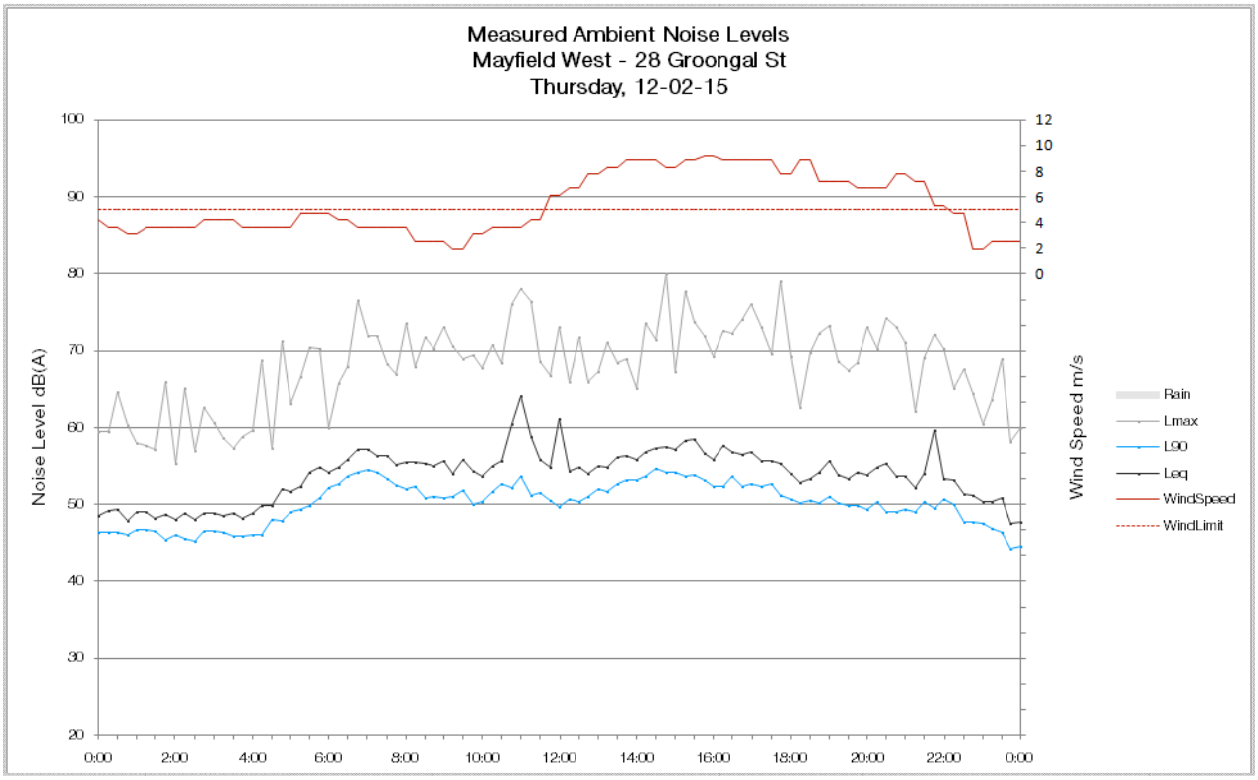
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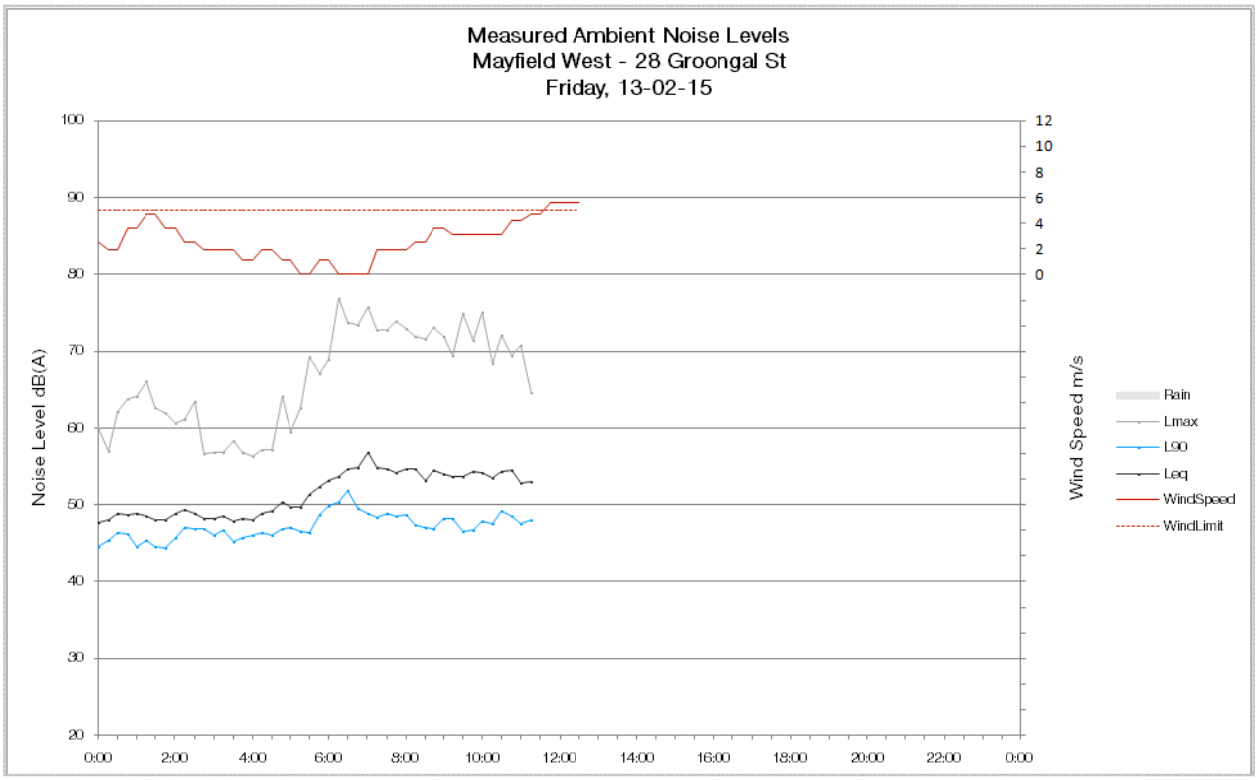
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Friday, 13-02-15
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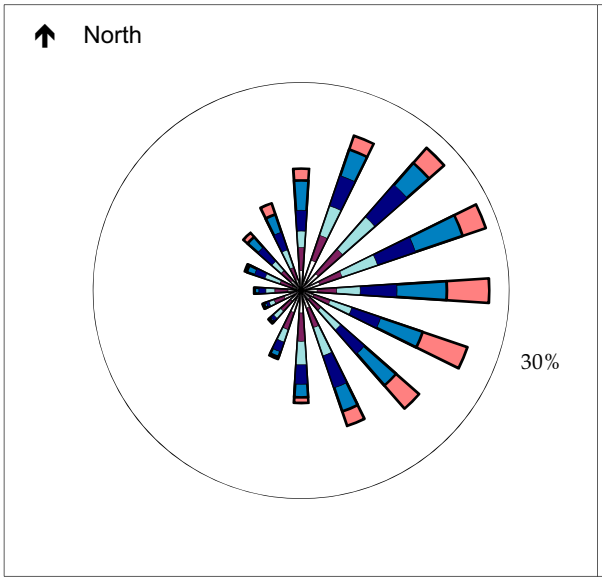
Appendix B

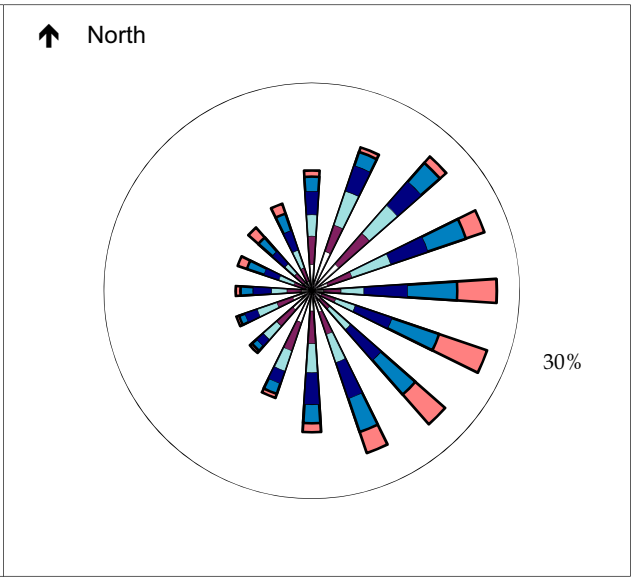
Wind roses

Day

Summer



Spring



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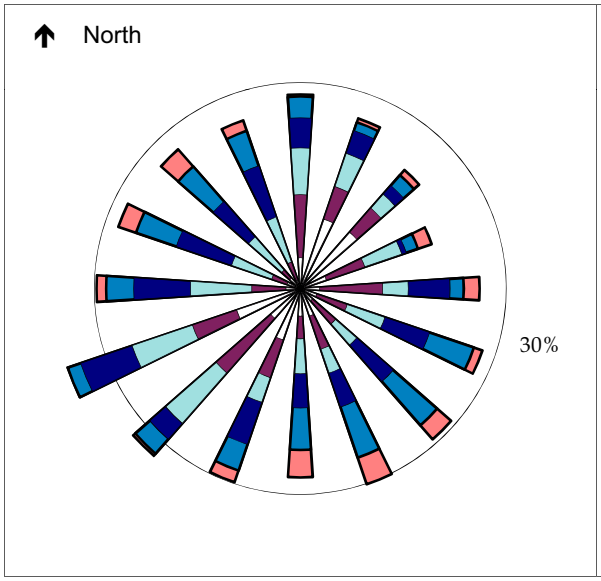
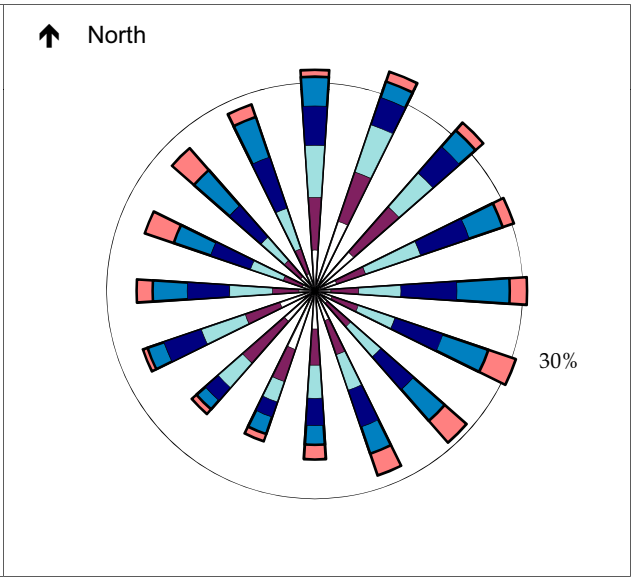


Autumn



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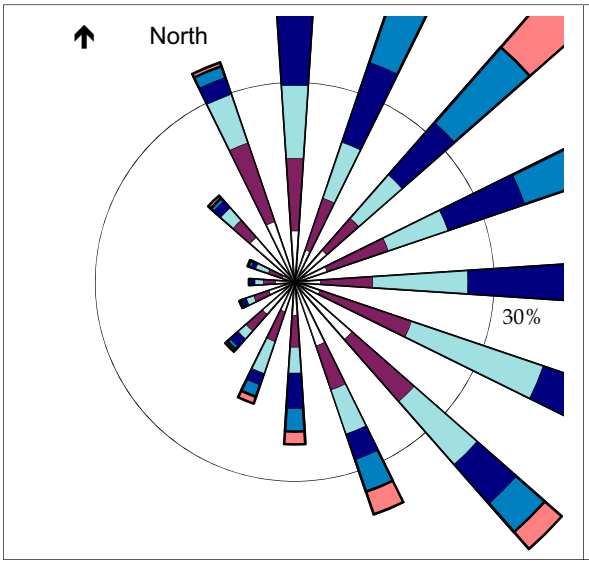
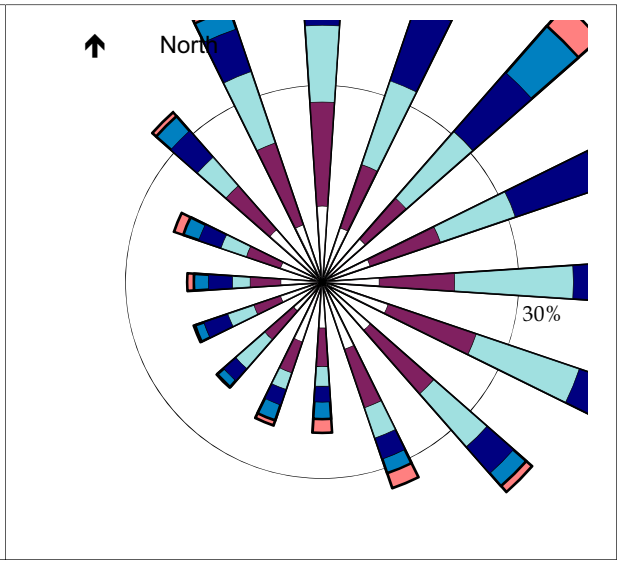
The segments of each arm represent the six valid wind speed classes, with increasing windspeed from the centre outwards. The length of each arm represents the vector components (for each direction) of wind speeds 3m/s or below as a proportion of the total time for the period . The circle represents the 30% occurrence threshold.

Evening

Summer



Spring



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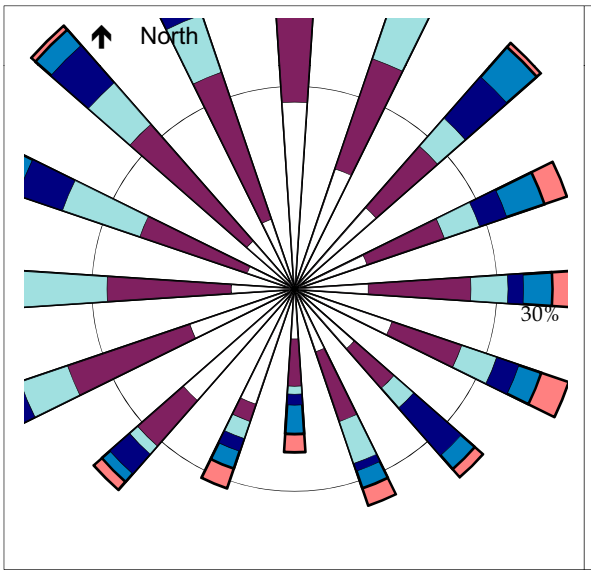

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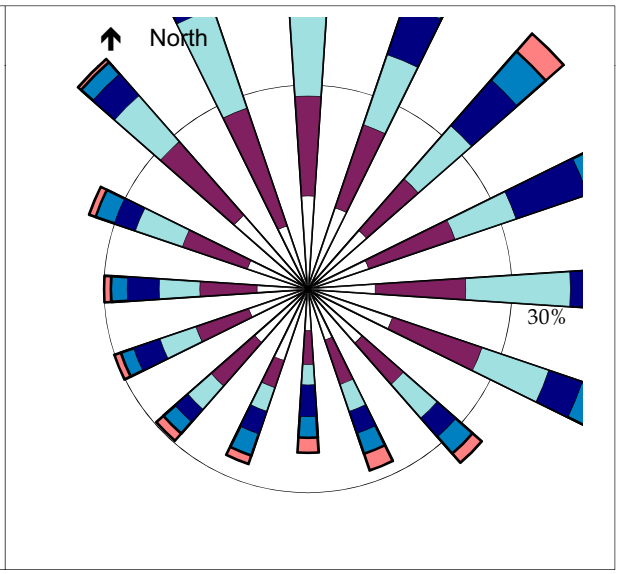

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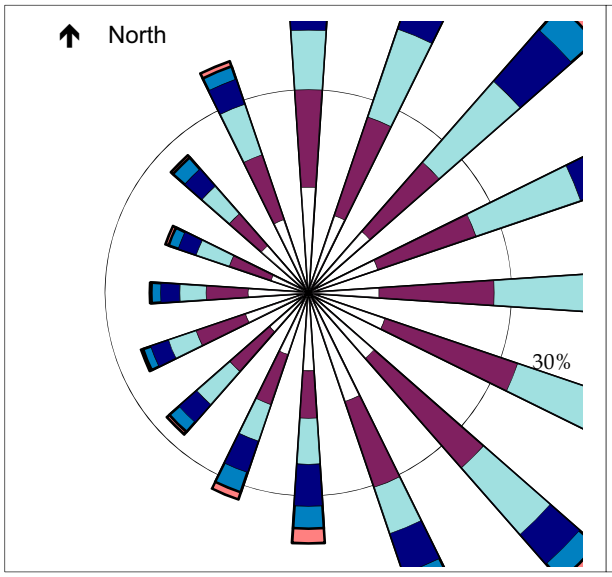
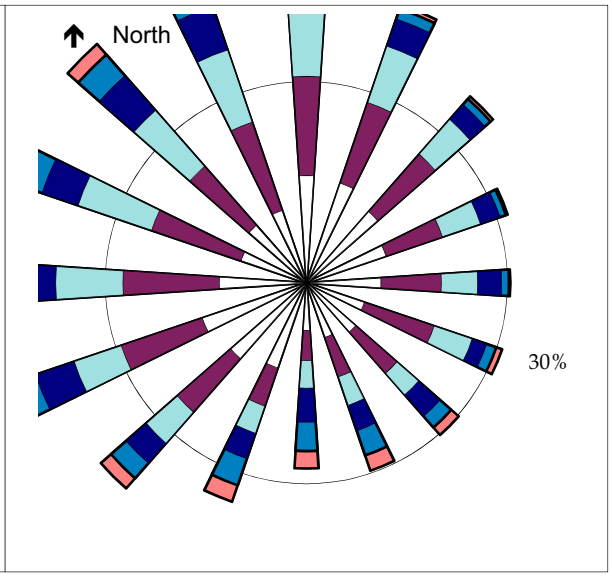
Night

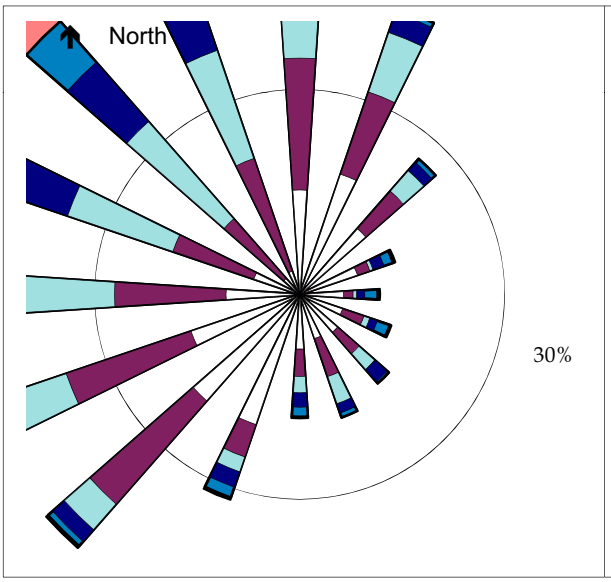
Summer



Spring



Winter



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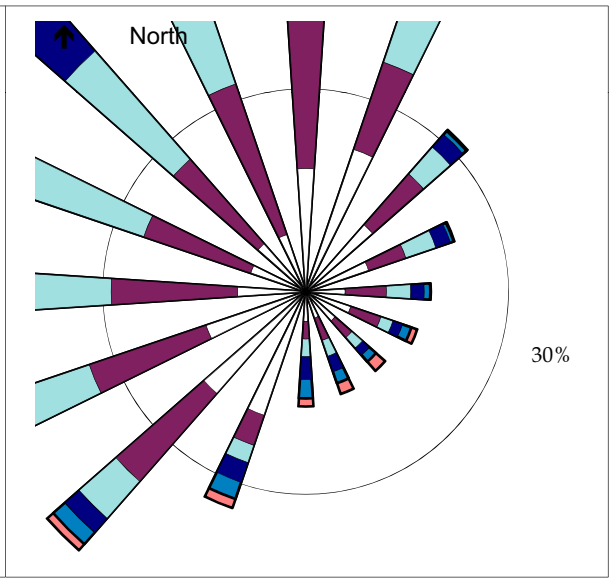

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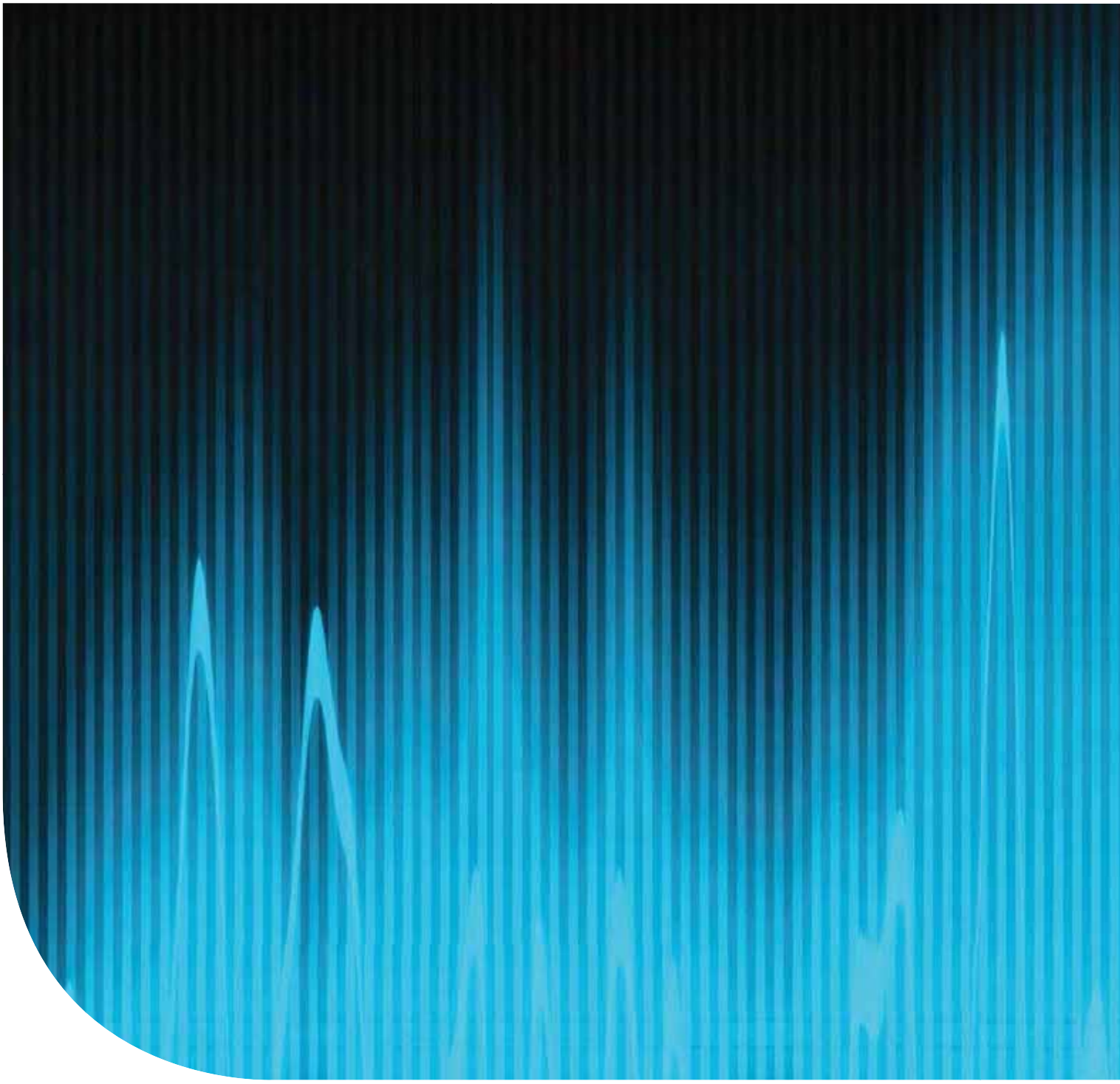

Appendix J

Traffic assessment

Traffic Impact Assessment

Mayfield West Recycling Facility
State Significant Development Application

Prepared for Benedict Recycling Pty Ltd | 11 October 2016

Traffic Impact Assessment

Mayfield West Recycling Facility

State Significant Development Application

Prepared for Benedict Recycling Pty Ltd | 11 October 2016

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Traffic Impact Assessment

Final

Report J14152RP3 | Prepared for Benedict Recycling Pty Ltd | 11 October 2016

Prepared by	**Tim Brooker**	Approved by	**Philip Towler**
Position	Senior Transport Planner	Position	Associate Director
Signature		Signature	
Date	11 October 2016	Date	11 October 2016

Document Control

Version	Date	Prepared by	Reviewed by
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1 Introduction

1.1 Background

Benedict Recycling Pty Ltd (Benedict) proposes to increase the capacity of its recycling facility at 1A McIntosh Drive, Mayfield West.

Development consent (DA 15-291) was granted for the recycling facility on 8 March 2016, including acceptance of up to 90,000 tonnes per annum (tpa) of waste and ancillary activities. The recycling facility imports inert pre-classified general solid waste (non-putrescible), such as construction and demolition wastes, and selected commercial and industrial wastes, for processing (eg crushing, shredding and sorting) to produce saleable recycled materials. The site also includes ancillary activities.

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

Ready-to-use recycled products include aggregates, road-base, soils and mulches. Segregated recycled materials such as ferrous and non-ferrous metals, dry paper/cardboard, shredded wood and plastics, are sold to other recycling firms for further processing. All of these products meet recycled material specifications while recovering a range of materials that would otherwise be disposed to landfill.

All of the materials brought onto the site are taken from the site as either products, or non-recyclable residues for disposal at an EPA licensed landfill. No materials are land-filled or otherwise disposed anywhere within the site. No wastes are composted on the site.

Since the commencement of operations, Benedict has identified additional demand for the disposal and recycling of excavated materials from large civil works (eg road projects), commercial developments (eg excavations for high rise buildings) and smaller developments (eg residential building sites). These volumes are far greater than originally expected. Benedict proposes to increase the annual volume of material received at the recycling facility from 90,000 tpa to 315,000 tpa, and proposes minor changes to the site layout to include an additional stockpile area (the proposal).

The recycling facility requires development consent under the State Significant Development (SSD) provisions within Division 4.1 of Part 4 of the EP&A Act to enable it to handle the volume of waste proposed. Accordingly, an environmental impact statement (EIS) has been prepared to support a development application for the proposal.

1.2 Description of operations

The site is at 1A McIntosh Drive, Mayfield West, legally described as Lot 1 in DP 874109. It is within the Steel River industrial estate and covers about 8.9 ha. The site is flat (approximately 10 m Australian Height Datum (AHD)) and largely devoid of vegetation except for trees around the boundary.

The recycling facility has two main components:

- the main recycling facility on the west of the site that accepts and processes segregated and co-mingled inert waste; and

- ancillary activities on the east of the site that include:
    - temporary storage of plant, equipment, machinery, commercial vehicles, bins and containers; and
    - some waste storage and processing (eg recyclable glass crushing within an existing building).

Waste material is brought to the site via Industrial Drive, Steel River Boulevard and McIntosh Drive. Industrial Drive is a major heavy vehicle route. Steel River Boulevard and McIntosh Drive are local roads, within the General Industrial IN1 zone, which are suitable for heavy vehicles.

Approximately 35,500 incoming waste deliveries are expected annually under approved operations, with approval for a throughput of 90,000 tpa. This corresponds to a daily average of about 95 light vehicle loads and 34 truck loads bringing waste material to the site. Under the proposal, approximately 49,500 incoming waste deliveries are expected annually for a future capacity of 315,000 tpa, which corresponds to a daily average of about 104 light vehicle loads and 76 truck loads. Most of the additional tonnage will be carried to the site by trucks.

Recycled products and non-recyclable residues are estimated to generate about 2,880 truck loads annually for approved operations (assuming 33 tonne truck loads, with an average of 11 truck loads per day). Under the proposal, this would increase to about 9,950 truck loads annually using a range of truck sizes (36 truck loads per day on average).

Other traffic movements generated by ancillary activities, the site workforce and general site visitor/maintenance traffic each day are:

- Ancillary activities – the traffic assessment completed in the EIS for approved operations assessed up to 160 daily vehicle movements (a vehicle movement is a one-way vehicle trip) representing up to 20 daily light vehicle visits (40 movements) and 60 daily truck visits (120 movements), with a maximum of 160 movements per day. This was conservative, and operational vehicle movements are less than assessed in the EIS. Under the proposal, traffic generated by ancillary activities would be a maximum of 70 daily vehicle movements representing up to 10 daily light vehicle visits (20 movements) and 25 daily truck visits (50 movements).
- Workforce – under approved operations, daily site workforce cars (12), visitors (three) and maintenance trucks (two) may generate up to 17 vehicle visits each day (34 vehicle movements). Under the proposal, an additional four employees may generate another four daily vehicle visits (eight vehicle movements) increasing the total site traffic generated by these operations to a total of 42 daily vehicle movements.

1.3 Scope of this report

This Traffic Impact Assessment (TIA) report has been prepared in accordance with the general requirements of the Road and Maritime Services (RMS) *Guide to Traffic Generating Developments* (RMS 2002) and addresses.

- the existing site access and traffic arrangements;
- existing traffic flows on major roads and at intersections in the locality;
- the proposed internal site traffic circulation and car parking;

- the forecast traffic generation from the proposal;
- effects of the proposal on the external road network and intersections; and
- effects of the proposal on traffic safety, public transport, pedestrian and cycling facilities.

The Department of Planning and Environment (DPE) Secretary's Environmental Assessment Requirements (SEARs) for the project specifically request the consideration and assessment of:

- details of all traffic types and volumes likely to be generated during construction and operation, including a description of haul routes;
- an assessment of the predicted impacts of this traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts at key intersections using SIDRA or similar traffic model;
- detailed plans of the proposed layout of the internal road network and parking on the site in accordance with the relevant Australian Standards; and
- plans of any proposed road upgrades, infrastructure works or new roads required for the development.

Additionally, in correspondence to the DPI, RMS requested that the traffic analysis of intersections includes the following items:

- current traffic counts and 10 year traffic growth projections;
- with and without development scenarios;
- 95th percentile back-of-queue lengths;
- delays and level of service on all legs for the relevant intersections; and
- electronic data for Roads and Maritime review.

The RMS letter also noted that in the future traffic control signals at the Industrial Drive/ Steel River Boulevard intersection will continue to give priority to the through traffic on Industrial Drive and that traffic generated by the subject development and further infill development within the Steel River Industrial Park will not be provided with additional green time for the right turn phase out of the industrial park to the detriment of the through traffic on Industrial Drive.

All SEARs and RMS requirements have been addressed in this TIA, allowing 2% annual background traffic growth on the classified road network for the future assessment of the 10 year traffic growth (year 2026) intersection traffic impacts scenarios.

2 Existing traffic conditions

2.1 Site location and land uses

The site is part of the Steel River industrial estate which is located on the northern side of Industrial Drive, between the intersections with Tourle Street and the Pacific Highway. The site is located approximately 8 kilometres (km) by road, north-west of the Newcastle city centre. The site location is shown in Figure 2.1. Access is via a two-lane site access road from McIntosh Drive.

2.2 Road network and traffic volumes

The major road network in the vicinity of the project is shown in Figure 2.1 and consists of the following roads:

- Tourle Street, Mayfield, is part of a major arterial road route (MR 108) which is two to four lanes wide. It provides access to Kooragang Island, Stockton, Williamtown, Nelson Bay, Port Stephens and surrounding areas of NSW, including heavy industrial sites on Kooragang Island. The site has no direct vehicular access to Tourle Street. This access is prevented both legally and physically, by the concrete median barriers and embankments at the Tourle Street site frontage.

- Industrial Drive (MR 316) is a four to six-lane dual carriageway arterial road which connects the Pacific Highway near Sandgate to central Newcastle near the Wickham Railway Station. It provides a traffic relief bypass route for the Pacific Highway, through the main retail and commercial districts of Mayfield. As its name suggests, the road serves a number of major industrial sites in the locality including the former BHP Billiton (now OneSteel) steelworks and the Newcastle port terminals at Carrington. The route has significant heavy vehicle traffic usage throughout most periods of the day and night.

- Werribi Street (MR 605) is also an arterial type road which intersects with Industrial Drive at Mayfield West, approximately 350 m west of Tourle Street and 350 m east of Steel River Boulevard. It has traffic signals controlling the traffic movements at the intersection with Industrial Drive. It also carries significant heavy vehicle traffic, between the MR 108 Tourle Street route, the industrial and port areas of Newcastle and other urban areas of Newcastle to the south.

- Steel River Boulevard is a local industrial area road which provides the only access to the newly developed Steel River industrial and business park precinct. It connects to all the other local roads within the precinct, including McIntosh Drive and Murray Dwyer Circuit. There are traffic signals controlling the intersection of Steel River Boulevard with Industrial Drive.

Photographs 2.1 to 2.7 show the existing road widths, cross sections and traffic lane configurations for the local roads and intersections within the Steel River precinct, including McIntosh Drive, Murray Dwyer Circuit and the intersection of Steel River Boulevard with Industrial Drive.

The traffic management plan for the approved recycling facility includes an agreement that the site generated truck traffic will not use Murray Dwyer Circuit and will only use the Steel River Boulevard and McIntosh Drive route when travelling to or from the recycling facility. The McIntosh Drive route has generous road width and low traffic volumes currently.

Site access road

Recycling Facility, Mayfield West
Traffic Assessment
Figure 2.1

Photograph 2.1 Site access driveway within the site looking south to McIntosh Drive

Photograph 2.2 McIntosh Drive west of the site looking towards Steel River Boulevard

Photograph 2.3 McIntosh Drive west of the site looking east towards the site

Photograph 2.4 Murray Dwyer Circuit at the corner 300 metres south of the site

Photograph 2.5 **Steel River Boulevard at Industrial Drive intersection**

Photograph 2.6 **Industrial Drive looking west from Steel River Boulevard**

Photograph 2.7 Industrial Drive looking east from Steel River Boulevard

To analyse the traffic impacts of the proposal on the surrounding road network, the peak hour traffic movements at the intersection of Industrial Drive/Steel River Boulevard were surveyed on Thursday 11 August 2016.

The traffic associated with approved operations (excluding the workforce car traffic) was also recorded on the day of the survey by the site weighbridge records. The raw traffic count data for the intersection is included in Appendix A and for the site traffic in Appendix B.

Historic tube traffic counts have also been undertaken by RMS (formerly the Roads and Traffic Authority (RTA)), at a number of locations on the MR 316 Industrial Drive and MR 108 Tourle Street routes. A summary of these counts, which record the historic growth in the average annual daily traffic (AADT) volumes in the Mayfield West locality, is provided in Table 2.1.

Table 2.1 Summary of AADT traffic volumes on Industrial Drive and Tourle Street

RMS Location ref	Road and nearest cross street	2010	2012	2013	2014	2015	2016* (Estimate)
05.842	MR 108 Tourle Street, Mayfield North, north of Industrial Drive	29,173	28,067	27,686	27,080	27,410	28,000
05.979	MR 316 Industrial Drive Mayfield West, west of Werribi Street	31,325		-	-		35,000

*Note: * The year 2016 traffic estimates are based on 2% annual growth from the most recent actual survey.*

The current peak hourly traffic volumes on the road network and proportions of heavy vehicle traffic have been determined from the 11 August 2016 intersection traffic survey. These are summarised in Table 2.2.

Table 2.2 Summary of August 2016 surveyed peak hour and heavy vehicle traffic

Road	Direction	Morning (7.15 to 8.15 am)			Afternoon (4.30 to 5.30 pm)		
		All traffic	Heavy vehicles	% Heavy	All traffic	Heavy vehicles	% Heavy
Steel River Boulevard (north of Industrial Drive)	N'bound	404	12	3.0%	152	5	3.3%
	S'bound	178	7	3.9%	490	8	1.6%
Industrial Drive (east of Steel River Boulevard))	E'bound	1,647	110	6.7%	1,345	63	4.7%
	W'bound	1,361	112	8.2%	1,680	67	4.0%
Industrial Drive (west of Steel River Boulevard)	E'bound	1,706	108	6.3%	1,144	64	5.6%
	W'bound	1,194	105	8.8%	1,817	71	4.0%

During the morning and afternoon peak traffic hours, the proportions of heavy vehicle traffic using Steel River Boulevard are generally 4% or less but at other times of the day, when there is less commuter traffic, the heavy vehicle percentages are higher.

On Industrial Drive the heavy vehicle traffic proportions are higher, between 6% to 9% during the morning peak hour and between 4% to 6% during the afternoon peak hour. The route has higher proportions of heavy vehicle traffic, typically about 10% of all traffic, at most other times of the day.

2.3 Existing site traffic

The existing site traffic is included in the summary of existing traffic in Table 2.2. The site has only been operating for a relative short time and is not yet generating traffic according to the currently approved production levels. On the day of the survey (11 August 2016), the site generated approximately 182 daily vehicle movements (including workforce movements). This is approximately 38% of the currently approved development traffic, as is summarised in Table 2.3 below.

Table 2.3 Summary of current site generated daily traffic movements

Activity	Existing site daily traffic movements	Approved site daily traffic movements	Proportion of currently approved usage
Site employees and visitors	10	34	29%
Waste receivals by light vehicles	122	190	64%
Waste and product trucks	50	90	56%
Ancillary activities	0*	160	0%
All site traffic	**182**	**474**	**38%**

*Note: * No Ancillary site traffic movements were recorded on the survey day (11 August 2016).*

The peak hourly proportions of the daily site traffic have also been determined from the existing site traffic survey details in Appendix B. The site employee car traffic movements normally occur during the period shortly before 6.00 am, and between 4.00 pm and 5.00 pm.

The site employee morning car traffic (50% total daily movements) is therefore travelling outside the normal morning peak hour on Industrial Drive (7.15 to 8.15 am,). However workforce movements are typically exit the site (50% total daily movements) during the afternoon peak hour on Industrial Drive (4.30 to 5.30 pm).

The other site traffic movements which were recorded in the site traffic survey on 11 August 2016 (Appendix B) show approximately 15% of all the daily inbound and outbound site waste and product traffic occurs during the morning peak hour on Industrial Drive (7.15 to 8.15 am), but a much lower proportion (0% effectively) occurs during the afternoon peak hour on Industrial Drive (4.30 to 5.30 pm).

These peak hourly traffic proportions are used for the future assessment of the proposal, which is described in further detail in Chapter 4.

2.4 Intersections

The key intersection at which the existing and proposed future changes to traffic movements have been assessed is the Industrial Drive/Steel River Boulevard intersection, which is the only access intersection to the major road network for the Steel River Industrial Estate. The intersection capacity assessment has been undertaken using the SIDRA intersection analysis model.

The RMS 'intersection level of service' standards which apply to the SIDRA intersection analysis model are based on the average intersection delay for all traffic, for a traffic signal controlled intersection, are summarised in Table 2.4.

Table 2.4 Intersection level of service standards

Level of Service	Average delay (seconds per vehicle)	Traffic signals, roundabout
A	Less than 14	Good operation
B	15 to 28	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At capacity, at signals, incidents will cause excessive delays. Roundabouts require other control mode
F	Greater than 71	Unsatisfactory with excessive queuing

Source: (RTA 2002).

The modelled intersection layout at Industrial Drive/Steel River Boulevard, including the length of the additional left and right turning traffic lanes, is shown with the detailed SIDRA analysis results in Appendix C. The SIDRA analysis results for the existing (August 2016) traffic situation at the intersection show the following intersection performance, using a 120 second peak hour intersection cycle time:

- Intersection performance (am peak);
  - degree of saturation: 0.918;
  - average delay: 32.5 seconds; and
  - level of service: C.

- Intersection performance (pm peak);
    - degree of saturation: 0.637;
    - average delay: 18.1 seconds; and
    - level of service: B.

The intersection is operating with satisfactory peak hour intersection level of service 'C' under existing traffic demands during the morning peak hour and level of service 'B' during the afternoon peak hour. The SIDRA intersection analysis has incorporated the following intersection parameters, including the 120 second peak hour cycle time following consultation with the RMS (Hunter Region, Network Operations) which is summarised in Table 2.5.

Table 2.5 Summary of RMS recommended intersection parameters for the SIDRA model

Intersection operation	RMS recommendation	SIDRA intersection model
No filter turn is permitted for the Industrial Drive right turn westbound traffic	The RMS has recommended that although the original intersection plan incorporated provision for a filter right turn phase to operate at the intersection this is no longer used.	The EMM SIDRA intersection model does not include any right turn filter phase at the intersection.
The intersection phase splits and cycle times are adaptive and respond to actual traffic conditions at the site	RMS has provided the normal maximum cycle times for the A, B and C phase at the intersection, which are 50, 20 and 20 seconds respectively. These phase times correspond to an overall intersection time of 110 seconds approximately.	The EMM modelled SIDRA intersection phase splits, which are independently determined by the SIDRA model, are 58,19 and 25 seconds respectively during the morning peak hour and 66,11 and 25 seconds respectively during the afternoon peak hour. These phase splits correspond reasonably well to the RMS recommended phase splits.
The SIDRA analysis should consider both an externally specified maximum cycle time and an optimised cycle time determined by SIDRA for the intersection	The RMS data provided notes that an overall maximum intersection cycle time of 120 seconds applies when the individual maximum phase times are stretched. Also, the optimum cycle time for the degree of saturation at the intersection is noted by RMS as approximately 90-96 seconds.	The EMM modelled SIDRA intersection analysis has used a 120 second externally specified intersection cycle time for all scenarios as this provides the most direct comparison of the actual intersection operations for the with and without development scenarios and also in future years the effects of locality traffic growth in the year 2026 traffic analysis scenarios.
The site is part of a co-ordinated network of traffic signal sites along Industrial Drive which may have some implications for the SIDRA intersection model	Due to this co-ordination requirement, in practice the intersection will normally operate with 120 second cycle times during both the morning and afternoon traffic peak hour.	EMM has not modelled the potentially lower optimum intersection cycle times of 90-96 seconds for the intersection as these are unlikely to apply in practice due to the need for peak hour traffic co-ordination with other intersections on Industrial Drive where the longer overall intersection cycle time of 120 seconds is more likely to apply.
Electronic versions of the SIDRA intersection modelling results	Electronic versions of the SIDRA intersection modelling results should be provided to RMS for their review.	Electronic versions of the EMM SIDRA intersection modelling results will be provided to RMS for their review, with the Modification DA documentation.

2.5 Road safety and accident history

The recent accident history of the Industrial Drive route over the 4 km section through Mayfield has been investigated by EMM using the Transport for NSW interactive crash statistics database, which includes all traffic accidents recorded over the five year period 2011 to 2015. The five year accident history map for the route, which includes the Industrial Drive intersection, is shown in Figure 2.2.

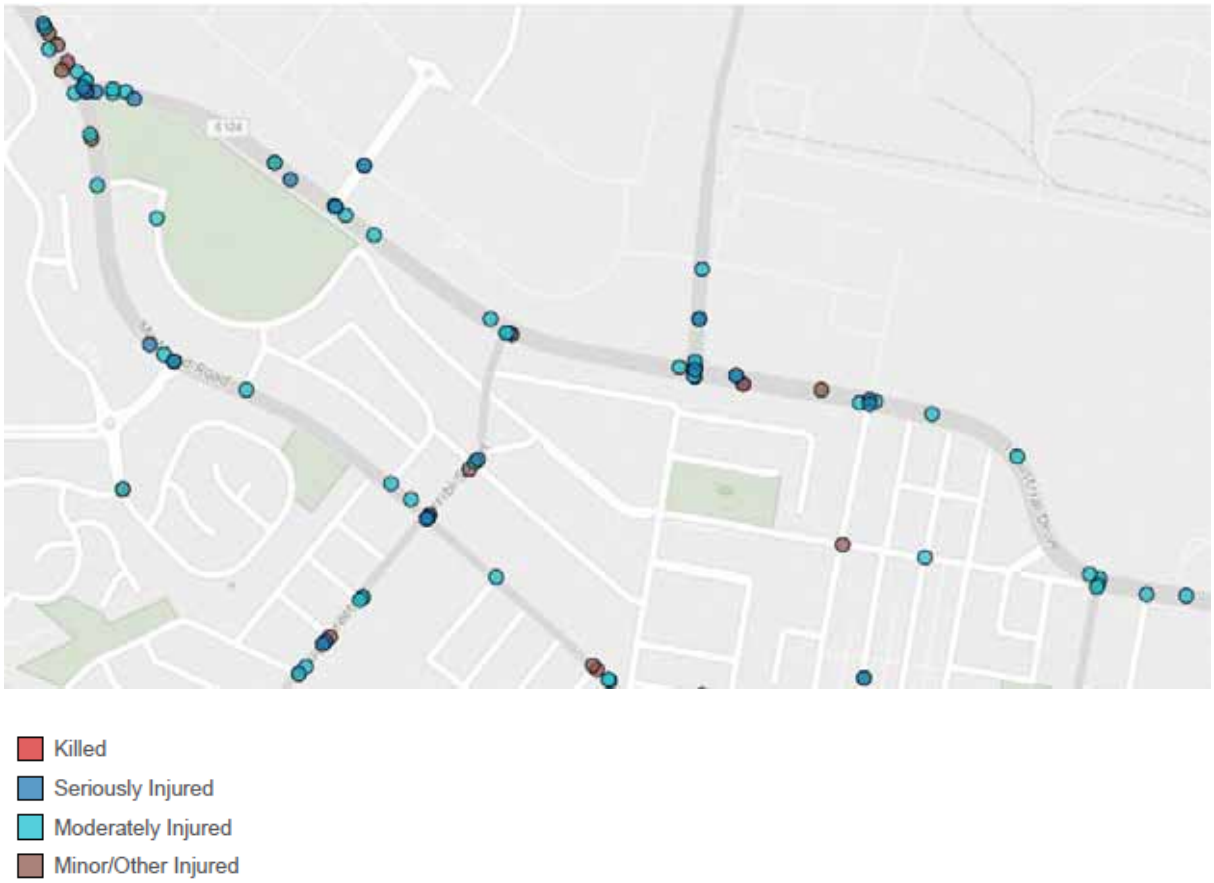


Figure 2.2 Five year accident history map for Industrial Drive at Mayfield 2011 to 2015

No fatal traffic accidents occurred on the Mayfield section of the Industrial Drive route during the five year period. The 38 recorded accidents along the route over the five year period include three accidents at the Industrial Drive/Steel River Boulevard intersection. This indicates that the intersection has a relatively good safety record for a major traffic signal controlled intersection with an average of 0.6 recorded traffic accidents each year.

2.6 Car parking

There are adequate paved areas available within the site for car parking for the future site employees and visitors. Historically with the Delta EMD site operations, the site employee car parking has mainly been provided in the south east corner of the site, which minimises the distances which employee and visitor cars have to travel within the site.

Parking for employee and visitor vehicles was originally planned to be within an existing car park in the south-east corner of the site. However, the small number of employee and visitor cars currently park close to the weighbridge area. With the large open spaces within the site, there is no need for any queuing or parking on public roads. It is proposed to formally mark the required number of site employee and visitor parking spaces in the weighbridge area.

2.7 Walking and cycling

The site is located over 1 km travel distance from the nearest residential areas of Newcastle. The future site employees and other persons are not likely to walk to and from the site unless they live within reasonable proximity.

2.8 Public transport access

A map of the current public bus routes operating within the Mayfield area is shown in Figure 2.3. Several bus routes (100, 106, 107, 111 and 118) currently operate through the Mayfield area.

Route 118, which travels via Tourle Street and Industrial Drive, passes closest to the site. However, the pedestrian accessibility between the site and any existing bus stop locations on Tourle Street is likely to be difficult and it is considered unlikely that any of the future site workforce will normally travel to and from work by public transport as a result of this constraint.

Figure 2.3 Bus routes map of the Mayfield area of Newcastle

3 The proposal

3.1 Overview

Benedict Recycling is seeking development consent for the continuation of current approved operations, with an increase in the volume of material handled at the site from 90,000 tpa to a total of 315,000 tpa.

The proposal is in response to additional demand to recycle the types of excavated materials currently approved to be received by the recycling facility.

Additional product stockpile storage capacity is proposed, as shown in Figure 3.1, which will be up to 7 m high. The additional stockpile area has an area of 13,110 m².

A description of the approved operations and changes proposed is provided below.

3.2 Approved operations

The recycling facility includes the following components which form part of approved operations, and which will continue under the proposal:

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

Waste is delivered to site by a variety of vehicles including:

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

Proposed site layout

Recycling Facility, Mayfield West
Traffic Assessment

Figure 3.1

All vehicles delivering waste are directed to the weighbridge where the load is inspected for potential contaminants and classified. The driver is instructed where to deliver the waste: either within the processing shed or external yard areas.

3.3 Traffic generation

Under approved operations, the recycling facility can accept up to 90,000 tpa of waste. This would increase to 315,000 tpa under the proposal. A comparison of the approved and proposed daily car and truck movements at the site is provided Table 3.1 and presented in more detail in Appendix B.

Table 3.1 Summary of site - generated daily vehicles and traffic movements

Activity	Approved daily vehicles	Approved daily movements	Proposed daily vehicles	Proposed daily movements
Site employees and visitors	17	34	21	42
Waste receivals	129	258	180	360
Recycled product and rejects	11	22	36	72
Ancillary operations	80	160	35	70
All site traffic	**237**	**474**	**272**	**544**

3.4 Site access and haulage routes

The site receives waste and delivers recycled products throughout the Newcastle and Lower Hunter Region of NSW. Truck origins and destinations are approximately:

- 60% east of the site via Industrial Drive (which also connects to the north and south via Tourle Street and Werribi Street); and
- 40% west of the site via Industrial Drive (which connects to other routes such as the Pacific Highway, Maitland Road and Sandgate Road).

The internal traffic circulation is shown on Figure 3.1. There are only minor changes to the circulation of traffic within the site, to extend into the additional stockpile area. In all cases, vehicle traffic will be restricted to using internal roads within the site.

3.5 Hours of operation

Approved hours of operation are in Table 3.2. No changes are proposed to the recycling facility's hours of operation.

Table 3.2 Approved hours of operation

Activity	Day	Hours
Waste processing	Monday –Saturday	7 am – 6 pm
Waste delivery and dispatch	Monday – Friday	6 am – 6 pm
	Saturday	6 am – 5 pm
	Sunday	7 am – 3 pm

At times, waste is generated by major infrastructure projects at night, particularly from road and rail works. Under approved operations, waste delivery is permitted on a 24 hour basis, subject to NCC approval to allow the waste generated by major infrastructure projects that require waste disposal at night.

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

3.6 Workforce

The recycling facility's full time workforce is expected to increase from approximately 12 to 16 employees at peak operations. Additional employee movements related to the ancillary site operations (when these occur) are separately accounted for in the generated traffic estimates in Table 3.1 and Appendix B for these site uses.

3.7 Construction traffic generation

No additional construction works are required at the site for the proposal.

4 Traffic assessment

4.1 Introduction

For the traffic impacts assessment of the effects of the proposed production increase from 90,000 tpa to 315,000 tpa, the existing surveyed site traffic (and the corresponding traffic at the Industrial Drive/Steel River Boulevard intersection) are adjusted to correspond to the situation with the site operating at the current approved production level, which will have traffic volumes higher than the actual observed site operations in August 2016.

4.2 Adjustments to surveyed base and approved traffic volumes

On the day of the site and intersection traffic surveys (11 August 2016), the recycling facility traffic captured as part of the survey is presented in Table 4.1. To estimate the traffic volumes at the Industrial Drive/Steel River Boulevard intersection including the total site traffic generated by approved operations, an adjustment of the surveyed site traffic to correspond to the total approved traffic movements has been completed in Table 4.1 and the additional net change in vehicle movements due to the proposal is also calculated.

Table 4.1 Comparison of site - generated daily traffic movements

Activity	Existing and approved operations traffic movements			Proposed site daily traffic movements	Net change in vehicle movements
	Surveyed site daily traffic movements	Approved operations site daily traffic movement	Difference (existing compared to approved)		
Site employees and visitors (cars)	10	30	20	38	+8
Maintenance vehicles (trucks)	0	4	4	4	0
Waste receivals by light vehicles	122	190	68	208	+18
Waste and product trucks	50	90	40	224	+134
Ancillary operations (light vehicles)	0	40	40	20	-20
Ancillary operations (trucks)	0	120	120	50	-70
All site traffic	**182**	**474**	**292**	**544**	**+70**

The net increase in site generated daily traffic from the proposal will be an additional 70 daily vehicle movements by the following types of vehicles:

- six car movements; and
- 64 truck movements.

During the morning and afternoon peak traffic hours, the equivalent increases to the morning and the afternoon peak hour site traffic movements, using the peak hourly traffic proportions which were determined from the site traffic survey in Appendix B, are summarised in Table 4.2 and Table 4.3, using the following peak hourly proportions for the site traffic:

- 0% site daily employee car and maintenance traffic occurs during the normal morning peak hour on Industrial Drive, 7.15 to 8.15 am;
- 15% of daily inbound and outbound site waste and product traffic occurs during the morning peak hour on Industrial Drive, 7.15 to 8.15 am;
- 50% site daily employee car and maintenance traffic (all travelling outbound) occurs during the normal afternoon peak hour on Industrial Drive, 4.30 to 5.30 pm, and
- 0% of daily inbound and outbound site waste and product traffic occurs during the afternoon peak hour on Industrial Drive, 4.30 to 5.30 pm.

Table 4.2 Comparison of morning peak hour site - generated traffic movements

Activity	Existing surveyed site traffic movements	Currently approved site traffic movement	Adjustment to surveyed site traffic movement	Proposed site traffic movement	Increased traffic movements for the proposal
Site employees and visitors (cars)	0	0	0	0	0
Maintenance vehicles (trucks)	0	0	0	0	0
Waste receivals by light vehicles	18	28	10	31	3
Waste and product trucks	8	14	6	34	20
Ancillary operations (light vehicles)	0	6	6	3	-3
Ancillary operations (trucks)	0	18	18	8	-10
All site traffic	**26**	**66**	**40**	**76**	**10**

Table 4.3 Comparison of afternoon peak hour site - generated traffic movements

Activity	Existing surveyed site traffic movements	Currently approved site traffic movement	Adjustment to surveyed site traffic movement	Proposed site traffic movement	Increased traffic movements for the proposal
Site employees and visitors (cars)	5	15	10	19	4
Maintenance vehicles (trucks)	0	2	2	2	0
Waste receivals by light vehicles	0	0	0	0	0
Waste and product trucks	0	0	0	0	0
Ancillary operations (light vehicles)	0	0	0	0	0
Ancillary operations (trucks)	0	0	0	0	0
All site traffic	**5**	**17**	**12**	**21**	**4**

From the calculations of the future site morning and afternoon peak hourly traffic movements which are presented in Table 4.2 and Table 4.3, after the adjustments to the existing site surveyed traffic are made (+40 hourly vehicle movements during the morning peak hour and +12 hourly vehicle movements during the afternoon peak hour) the net additional future site traffic movements which would be generated by the proposed production increase are:

- 10 additional truck movements, with no net additional car traffic movements during the morning peak traffic hour on Industrial Drive, 7.15 to 8.15 am; and
- four additional car movements, with no net additional truck traffic movements during the afternoon peak traffic hour on Industrial Drive, 4.30 to 5.30 pm.

4.3 Traffic impacts to the road network

The daily traffic volumes for Steel River Boulevard and Industrial Drive are presented in Table 2.1 and Table 2.2. To assess traffic impacts of the proposal, traffic associated with approved operations (see Table 4.1) has been added to the daily traffic volumes for 2016 and is presented in Table 4.4.

Table 4.4 Summary of existing network daily traffic volumes (2016) and increase associated with the proposal

Road	Existing daily traffic (based on 2016 survey))	Adjustment for approved operations	Adjusted daily traffic (all vehicles)	Additional daily traffic from the proposal (all vehicles)	Increase (%)
Steel River Boulevard (north of Industrial Drive)	7,100	292	7,392	70	0.9%
Industrial Drive (east of Steel River Boulevard)	35,000	176	35,176	42	0.1%
Industrial Drive (west of Steel River Boulevard)	34,000	116	34,116	28	0.1%

The results in Table 4.4 demonstrate that the increase in the total daily traffic movements by all vehicles on Industrial Drive, either to the east or the west of Steel River Boulevard, will be of the order of +0.1%. These increases will not generally be noticeable to existing road users.

The increases in Table 4.4 show that the additional site traffic on Steel River Boulevard will represent just under a +1% increase in all traffic using the road which is also not likely to be noticeable to existing road users.

Given the industrial nature of the roads in the locality of Steel River Boulevard including McIntosh Drive (as shown in Photographs 2.1 and 2.2), additional road widening or reconstruction is unlikely to be required as a result of the additional traffic volumes generated by the proposal.

4.4 Traffic impacts at intersections

For the additional site generated peak hourly traffic volumes which are shown in Table 4.2 and Table 4.3, the future intersection traffic impacts have been calculated, using the SIDRA intersection analysis program, for the current year 2016 traffic conditions and for predicted future year 2026 traffic conditions. An annual traffic growth of 2% has been applied (a 20% overall traffic growth factor) for the existing traffic movements at the Steel River Boulevard/Industrial Drive intersection.

4.4.1 Site operations traffic in 2016

The short term future traffic impacts of the additional peak hourly traffic generated by the proposal in 2016 are summarised in Table 4.5. The full SIDRA intersection analysis results are provided in Appendix C. The analysis is based on the adjusted year 2016 intersection volumes to account for approved operations and includes 10 additional vehicle movements per hour at the intersection (all trucks) during the morning peak hour and four additional vehicle movements per hour (all cars) during the afternoon peak hour.

Table 4.5 2016 SIDRA results for the proposed production increase (am and pm peak hours)

Intersection	Peak hour	2016 traffic with approved operations			2016 traffic with proposal		
		LoS	DOS	AVD	LoS	DOS	AVD
Industrial Drive/ Steel River Boulevard	Morning peak hour (7.15 to 8.15 am)	C	0.930	35.2	C	0.937	37.6
Industrial Drive/ Steel River Boulevard	Afternoon peak hour (4.30 to 5.30 pm)	B	0.645	18.6	B	0.645	18.6

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

The 2016 SIDRA results in Table 4.5 show that during the morning peak hour (7.15 am to 8.15 am) there will be only a minor change to the intersection operations. The average vehicle delays for all traffic at the intersection will increase from 35.2 seconds to 37.6 seconds although the intersection level of service will remain within the range of level of service 'C' (overall range 29 to 42 seconds).

During the afternoon peak hour (4.30 pm to 5.30 pm), there will be no measurable change to either the intersection operating delays or degree of saturation so no measurable traffic impact.

The predicted intersection peak hour maximum (95th percentile) traffic queue lengths, in particular for the right hand turn by the Industrial Drive westbound traffic, have also been considered. These are included in the detailed SIDRA analysis results in Appendix C.

The right turn lane for the westbound traffic on Industrial Drive has an actual length of 155 m and the 95th percentile morning and afternoon peak period traffic queues within this right turn lane will remain at approximately 140 m and 40 m respectively with only minimal change due to traffic travelling to and from the site.

4.4.2 Site operations traffic in 2026

The 10 year future intersection traffic impacts scenario has been analysed for the same additional peak hourly traffic movements generated by increased site production in 2026 (10 additional vehicle movements per hour at the intersection (all trucks) during the morning peak hour and four additional vehicle movements per hour (all cars) during the afternoon peak hour).

The analysis has been undertaken for the future base intersection traffic volumes in 2026 assuming a ten year traffic growth factor of x1.20 (corresponding to 2% annual linear traffic growth) for all the existing peak hourly traffic movements at the intersection. The detailed 2026 SIDRA analysis results are provided in Appendix D. A summary of the SIDRA intersection analysis results is presented in Table 4.6.

Table 4.6 2026 SIDRA results for the proposed production increase (am and pm peak hours)

Intersection	Peak hour	2026 traffic with approved development			2026 traffic with proposed development		
		LoS	DOS	AVD	LoS	DOS	AVD
Industrial Drive/ Steel River Boulevard	Morning peak hour (7.45 to 8.45 am)	F	1.105	95.6	F	1.105	95.4
Industrial Drive/ Steel River Boulevard	Afternoon peak hour (5.00 to 6.00 pm)	B	0.774	20.9	B	0.774	21.0

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

The 2026 SIDRA results in Table 4.6 show that during the morning peak hour (7.15 am to 8.15 am) the existing intersection will generally be operating at level of service 'F' although during the afternoon peak hour (4.30 pm to 5.30 pm), the intersection operation will generally remain at level of service 'B'.

With the increased production traffic from the recycling facility in the morning peak hour, the intersection level of service will remain at 'F' and the average vehicle delay for all traffic at the intersection will remain at approximately 95 seconds, with no measurable impact from the recycling facility traffic.

With the increased traffic from the recycling facility during the afternoon peak hour, the intersection level of service will remain at 'B' and the average vehicle delay for all traffic at the intersection will remain at approximately 21 seconds, with no measurable impact from the recycling facility traffic.

The intersection peak hour traffic queue lengths for the right turn lane for the Industrial Drive westbound traffic, have also been considered. These are included in the detailed SIDRA analysis results in Appendix D. Assuming the existing right turn lane for the westbound traffic on Industrial Drive is not increased beyond its actual length of 155 m currently, the 95th percentile morning and afternoon peak period traffic queues within (or exceeding) this right turn lane will be as follows:

- in the morning peak hour, the 95th percentile traffic queue length will be 253 m in both the traffic scenarios considered, either with or without the increased recycling facility traffic; and

- in the afternoon peak hour, the 95th percentile traffic queue length will be 49 m in both the traffic scenarios considered, either with or without the increased recycling facility traffic.

The general increases in the base traffic flows using the intersection by 2026 (ie without the proposal) will increase the 95th percentile traffic queue length at the Industrial Drive/Steel River Boulevard intersection so that the storage capacity of the right turn lane on Industrial Drive (155 m) is exceeded by approximately 100 m in the future morning peak hour.

The future intersection performance appears to deteriorate in the morning peak hour due to the inherent conflict between the eastbound major road traffic flow on Industrial Drive and the westbound right turn traffic entering the Steel River industrial estate. The intersection continues to perform well in the future year 2026 assessment during the afternoon peak hour, when the peak Industrial Drive traffic flow is westbound, but will continue to deteriorate during the morning peak hour when the Industrial Drive peak traffic flow is eastbound.

However, there is sufficient space within the central median of Industrial Drive (the grassed area between the two carriageways) to extend the length of the westbound right turn lane to accommodate the increased traffic queue lengths at the intersection in the future, which will occur either with or without the increased recycling facility traffic.

4.5 Car and truck parking

In the Newcastle Development Control Plan 2012 (Section 7.03), the car parking requirements for industrial sites are defined as either 1 space per 100 m^2 of building gross floor area or 1 space per 2 employees, whichever is the greater. Minor additional requirements also apply for bicycle and motorcycle parking.

A formal assessment of the site car parking capacity in relation to the site building floor areas is not warranted as the actual site capacity for car parking spaces is clearly adequate for the maximum proposed number of full time recycling facility employees (16) plus the maximum likely number of site visitors (three) who may be present at the site during normal weekday site operations.

Additional contractors working at the site during campaign processing periods may also generate some additional car or truck parking demand at these times. However, these activities will not result in any adverse site car parking impacts as the general availability of site car parking areas will be more than adequate to accommodate the additional site car parking needs from these activities.

4.6 Impact on road safety and traffic management

The proposal will generate approximately 64 additional truck movements each day in the locality (Mayfield West) where there are already large daily numbers of truck movements travelling on the major roads via Industrial Drive, Tourle Street and Werribi Street.

These roads have all been constructed to accommodate large volumes of heavy vehicle traffic; as such, there would be no additional traffic safety concerns for these roads as a result of the additional truck traffic movements generated by the proposal.

Within the Steel River Industrial Estate, the existing proportions of truck traffic in the overall daily traffic movements are generally lower than on Industrial Drive and occur primarily on Steel River Boulevard and McIntosh Drive. In this assessment it has been assumed that the additional recycling facility generated truck traffic movements would generally travel via Steel River Boulevard and McIntosh Drive and this traffic would not generally utilise other routes such as Murray Dwyer Circuit.

4.7 Impact on public transport services, pedestrians and cyclists

Due to the relatively low full time site workforce and site visitor numbers (19), and the likely minimum travel distance of over 1 km for access to or from the nearest residential areas, the proposal is not anticipated to create any increased demand for pedestrian or cyclist access or public transport service improvements in the Mayfield West area.

Additional contractors who are also likely to be working at the site during campaign processing periods will generally travel to and from the site in their own vehicles and would not require public transport access.

5 Summary and conclusion

The traffic impact assessment has assessed the transport impacts of the proposed production increase at the recycling facility at 1A McIntosh Drive, Mayfield West.

The approved annual processing of 90,000 tpa of waste materials at the site would increase to 315,000 tpa, in combination with a reduction in the anticipated daily car and truck traffic movements generated by the ancillary activities at the site. The result will be a daily net increase of approximately 64 additional truck movements and six additional car/other light vehicle movements on Steel River Boulevard and the surrounding road network (70 additional daily traffic movements in total).

The operational traffic impacts of the proposal have been assessed for the maximum hourly traffic during both the morning (7.15 to 8.15 am typically) and afternoon (4.30 to 5.30 pm) peak traffic hours on the surrounding road network. During these times the additional site generated traffic will potentially be:

- 10 vehicle movements per hour (all trucks) during the morning peak hour; and
- four additional vehicle movements (all cars) during the afternoon peak hour.

Based on the current waste delivery and product dispatch routes, it is anticipated that the additional site operations traffic movements will be distributed approximately 60% and 40% to and from the east and the west on Industrial Drive via the Steel River Boulevard intersection. Beyond the immediate locality of Mayfield West, the future site traffic will be further distributed onto other traffic routes, such as Tourle Street, Werribi Street, Maitland Road, the Pacific Highway and Sandgate Road, such that the future project generated traffic increases will be relatively minor on each of these routes.

The key findings of the project traffic impact assessment for the predicted future site daily and peak hour traffic movements are as follows:

- The additional daily traffic movements from the proposal will result in a minor traffic increase (0.1% approximately) on surrounding major roads which will be accommodated with minimal changes to the existing traffic flows, traffic delays or road safety. On Steel River Boulevard, the future project generated traffic increases will be around 1.0%, which will not perceptibly impact the capacity of this road.
- The main affected intersection on the surrounding road network at Industrial Drive/Steel River Boulevard, is currently operating at satisfactory peak hour traffic conditions with a level of service C during the morning peak hour (7.15 to 8.15 am) and a level of service B during the afternoon peak hour (4.30 to 5.30 pm), which will not change for the year 2016. Levels of service for the future year 2026 will change from level of service C to F in the morning peak hour (without the proposed changes to the project operations). The afternoon peak hour levels of service will remain at level of service B in 2026.
- In comparison to these future major road network traffic changes, the actual increases in the corresponding average intersection traffic delays with the proposed changes to the project operations will be effectively zero, with no measurable traffic impact, in 2026.

- The likely future car parking demand from the full time employees and visitors to the recycling facility (excluding waste receival traffic) will be approximately 19 car parking spaces. It is proposed to provide 19 marked car parking spaces for the recycling facility (for 16 employees and 3 visitors) immediately north and east of the weighbridge area. Vehicles may also parked at other locations within the ancillary waste activities area during the day or overnight. There will be no cars parked on McIntosh Drive or Murray Dwyer Circuit as a result of the activities within the site. The internal site truck access and other traffic circulation paths provide sufficient separation for the site truck access and the employee/visitor car parking areas which is desirable.

- For the ongoing future management of the recycling facility traffic within the Steel River industrial estate, it is recommended that the site generated truck traffic movements should continue to be formally directed to travel only via Steel River Boulevard and McIntosh Drive when travelling within the Steel River estate and avoid other routes such as Murray Dwyer Circuit where possible.

- The proposal is not anticipated to create any increased demand for public transport, pedestrian or cyclist access in the locality, due to the restricted access catchment for these travel modes currently and the relatively low future site employee and visitor numbers.

Based on the results of this TIA report, there are no significant traffic impacts anticipated from proposal on either traffic capacity, traffic delays or road safety on the surrounding major road network under both the 2016 and 2026 base traffic conditions.

References

Roads and Maritime Services (RMS) 2002, *Guide to Traffic Generating Developments.*

Appendix A

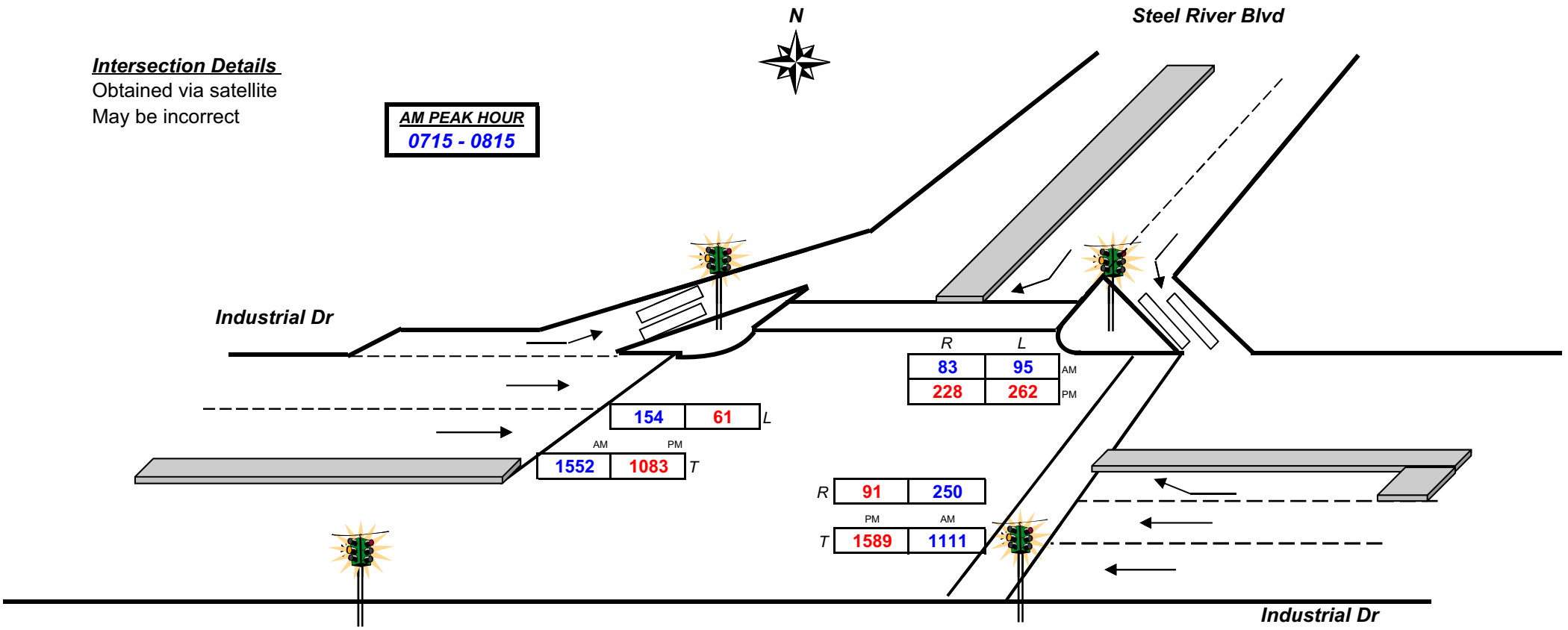
Intersection traffic survey data

R.O.A.R. DATA
Reliable, Original & Authentic Results
Ph.88196847, Mob.0418-239019

Client : EMM
Job No/Name : 6176 NEWCASTLE Steel River Blvd 2
Day/Date : Thursday 11th August 2016

Intersection Details
Obtained via satellite
May be incorrect

AM PEAK HOUR
0715 - 0815



PM PEAK HOUR
1630 - 1730

Weather >>>

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client : EMM
Job No/Name : 6176 NEWCASTLE Steel River Blvd 2
Day/Date : Thursday 11th August 2016

PEDS	WEST	NORTH	EAST	
Time Per	Industrial Dr	Steel River	Industrial Dr	TOT
0600 - 0615				0
0615 - 0630		NOT		0
0630 - 0645		REQUIRED		0
0645 - 0700				0
0700 - 0715				0
0715 - 0730				0
0730 - 0745				0
0745 - 0800				0
0800 - 0815				0
0815 - 0830				0
0830 - 0845				0
0845 - 0900				0
Per End	0	0	0	0

PEDS	WEST	NORTH	EAST	
Peak Per	Industrial Dr	Steel River	Industrial Dr	TOT
0600 - 0700	0	0	0	0
0615 - 0715	0	0	0	0
0630 - 0730	0	0	0	0
0645 - 0745	0	0	0	0
0700 - 0800	0	0	0	0
0715 - 0815	0	0	0	0
0730 - 0830	0	0	0	0
0745 - 0845	0	0	0	0
0800 - 0900	0	0	0	0
PEAK HR	0	0	0	0

Lights	WEST		NORTH		EAST		
	Industrial Dr		Steel River		Industrial Dr		
Time Per	T	L	R	L	R	T	TOT
0600 - 0615	221	14	9	14	20	95	373
0615 - 0630	310	18	8	11	21	137	505
0630 - 0645	365	57	14	16	46	192	690
0645 - 0700	209	27	11	18	43	120	428
0700 - 0715	271	28	19	23	41	225	607
0715 - 0730	368	32	19	19	55	241	734
0730 - 0745	347	48	20	23	65	255	758
0745 - 0800	392	42	22	23	68	266	813
0800 - 0815	340	29	20	25	53	246	713
0815 - 0830	296	46	12	20	91	211	676
0830 - 0845	353	33	10	33	102	212	743
0845 - 0900	338	61	15	32	86	203	735
Per End	3810	435	179	257	691	2403	7775

Heavies	WEST		NORTH		EAST		
	Industrial Dr		Steel River		Industrial Dr		
Time Per	T	L	R	L	R	T	TOT
0600 - 0615	24	0	1	2	1	9	37
0615 - 0630	28	2	0	2	0	21	53
0630 - 0645	30	3	0	1	0	20	54
0645 - 0700	32	1	1	1	2	17	54
0700 - 0715	28	1	2	1	1	25	58
0715 - 0730	37	0	1	0	2	29	69
0730 - 0745	20	1	1	1	2	23	48
0745 - 0800	21	0	0	2	2	25	50
0800 - 0815	27	2	0	2	3	26	60
0815 - 0830	21	1	5	0	1	25	53
0830 - 0845	25	0	3	2	1	26	57
0845 - 0900	32	0	0	1	3	23	59
Per End	325	11	14	15	18	269	652

Combined	WEST		NORTH		EAST		
	Industrial Dr		Steel River		Industrial Dr		
Time Per	T	L	R	L	R	T	TOT
0600 - 0615	245	14	10	16	21	104	410
0615 - 0630	338	20	8	13	21	158	558
0630 - 0645	395	60	14	17	46	212	744
0645 - 0700	241	28	12	19	45	137	482
0700 - 0715	299	29	21	24	42	250	665
0715 - 0730	405	32	20	19	57	270	803
0730 - 0745	367	49	21	24	67	278	806
0745 - 0800	413	42	22	25	70	291	863
0800 - 0815	367	31	20	27	56	272	773
0815 - 0830	317	47	17	20	92	236	729
0830 - 0845	378	33	13	35	103	238	800
0845 - 0900	370	61	15	33	89	226	794
Per End	4135	446	193	272	709	2672	8427

Lights	WEST		NORTH		EAST		
	Industrial Dr		Steel River		Industrial Dr		
Peak Per	T	L	R	L	R	T	TOT
0600 - 0700	1105	116	42	59	130	544	1996
0615 - 0715	1155	130	52	68	151	674	2230
0630 - 0730	1213	144	63	76	185	778	2459
0645 - 0745	1195	135	69	83	204	841	2527
0700 - 0800	1378	150	80	88	229	987	2912
0715 - 0815	1447	151	81	90	241	1008	3018
0730 - 0830	1375	165	74	91	277	978	2960
0745 - 0845	1381	150	64	101	314	935	2945
0800 - 0900	1327	169	57	110	332	872	2867
PEAK HR	1447	151	81	90	241	1008	3018

Heavies	WEST		NORTH		EAST		
	Industrial Dr		Steel River		Industrial Dr		
Peak Per	T	L	R	L	R	T	TOT
0600 - 0700	114	6	2	6	3	67	198
0615 - 0715	118	7	3	5	3	83	219
0630 - 0730	127	5	4	3	5	91	235
0645 - 0745	117	3	5	3	7	94	229
0700 - 0800	106	2	4	4	7	102	225
0715 - 0815	105	3	2	5	9	103	227
0730 - 0830	89	4	6	5	8	99	211
0745 - 0845	94	3	8	6	7	102	220
0800 - 0900	105	3	8	5	8	100	229
PEAK HR	105	3	2	5	9	103	227

Combined	WEST		NORTH		EAST		
	Industrial Dr		Steel River		Industrial Dr		
Peak Per	T	L	R	L	R	T	TOT
0600 - 0700	1219	122	44	65	133	611	2194
0615 - 0715	1273	137	55	73	154	757	2449
0630 - 0730	1340	149	67	79	190	869	2694
0645 - 0745	1312	138	74	86	211	935	2756
0700 - 0800	1484	152	84	92	236	1089	3137
0715 - 0815	1552	154	83	95	250	1111	3245
0730 - 0830	1464	169	80	96	285	1077	3171
0745 - 0845	1475	153	72	107	321	1037	3165
0800 - 0900	1432	172	65	115	340	972	3096
PEAK HR	1552	154	83	95	250	1111	3245

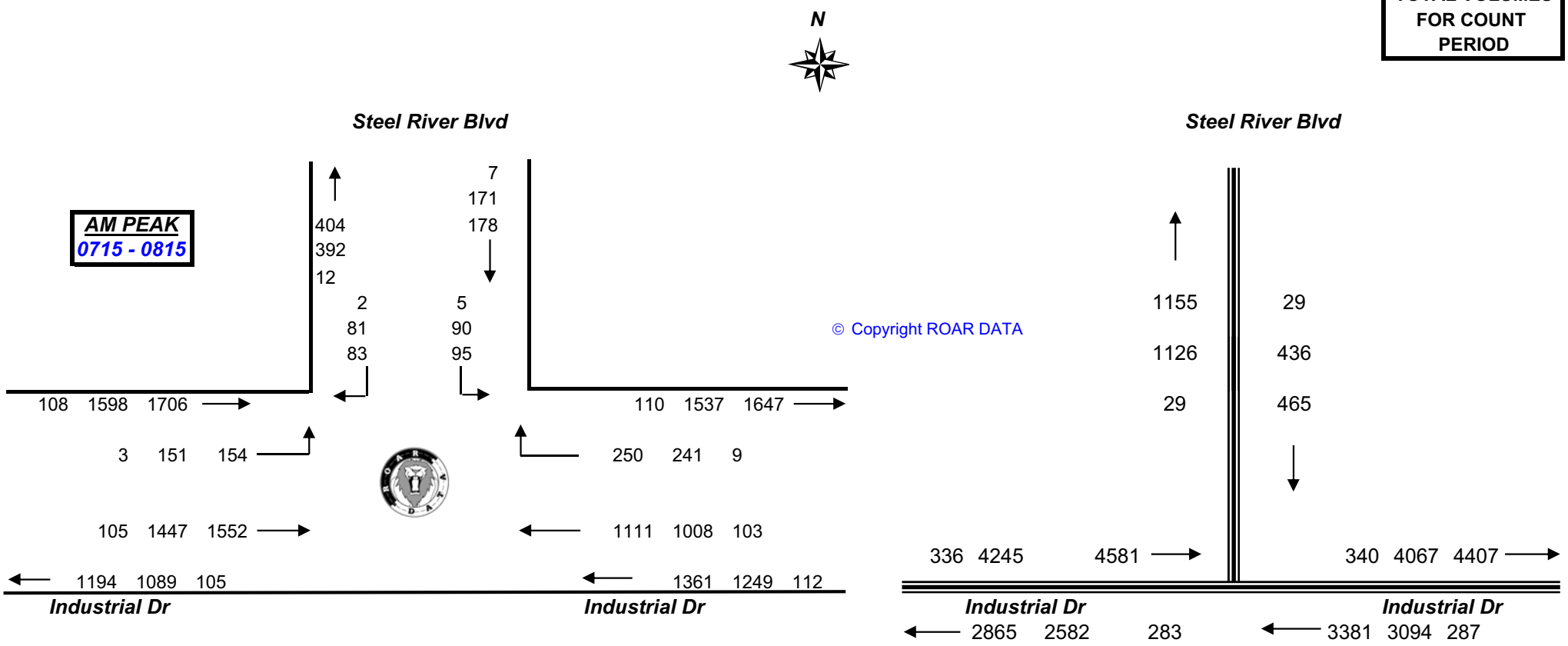
R.O.A.R. DATA

Client : EMM

Reliable, Original & Authentic Results
Ph.88196847, Mob.0418-239019

Job No/Name : 6176 NEWCASTLE Steel River Blvd 2
Day/Date : Thursday 11th August 2016

TOTAL VOLUMES FOR COUNT PERIOD



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client : EMM
Job No/Name : 6176 NEWCASTLE Steel River Blvd 2
Day/Date : Thursday 11th August 2016

PEDS	WEST	NORTH	EAST	
Time Per	*Industrial Dr*	*Steel River*	*Industrial Dr*	TOT
1500 - 1515				0
1515 - 1530		NOT		0
1530 - 1545		REQUIRED		0
1545 - 1600				0
1600 - 1615				0
1615 - 1630				0
1630 - 1645				0
1645 - 1700				0
1700 - 1715				0
1715 - 1730				0
1730 - 1745				0
1745 - 1800				0
Per End	**0**	**0**	**0**	**0**

PEDS	WEST	NORTH	EAST	
Peak Per	*Industrial Dr*	*Steel River*	*Industrial Dr*	TOT
1500 - 1600	0	0	0	**0**
1515 - 1615	0	0	0	**0**
1530 - 1630	0	0	0	**0**
1545 - 1645	0	0	0	**0**
1600 - 1700	0	0	0	**0**
1615 - 1715	0	0	0	**0**
1630 - 1730	0	0	0	**0**
1645 - 1745	0	0	0	**0**
1700 - 1800	0	0	0	**0**
PEAK HR	**0**	**0**	**0**	**0**

Lights	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Time Per	T	L	R	L	R	T	TOT
1500 - 1515	197	16	32	27	29	217	**518**
1515 - 1530	181	12	32	51	23	386	**685**
1530 - 1545	189	21	26	41	39	272	**588**
1545 - 1600	145	14	43	49	18	249	**518**
1600 - 1615	256	15	27	38	25	359	**720**
1615 - 1630	228	23	38	63	28	333	**713**
1630 - 1645	297	21	45	59	27	474	**923**
1645 - 1700	272	16	59	71	23	292	**733**
1700 - 1715	236	11	47	59	17	338	**708**
1715 - 1730	218	9	72	70	23	419	**811**
1730 - 1745	266	10	55	68	17	465	**881**
1745 - 1800	231	10	28	48	14	338	**669**
Per End	**2716**	**178**	**504**	**644**	**283**	**4142**	**8467**

Heavies	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Time Per	T	L	R	L	R	T	TOT
1500 - 1515	34	0	0	1	1	32	**68**
1515 - 1530	24	1	3	1	0	18	**47**
1530 - 1545	26	1	2	0	1	21	**51**
1545 - 1600	15	1	0	0	0	19	**35**
1600 - 1615	14	0	0	0	0	21	**35**
1615 - 1630	21	3	1	0	0	19	**44**
1630 - 1645	18	2	3	3	0	17	**43**
1645 - 1700	17	2	0	0	0	11	**30**
1700 - 1715	11	0	1	0	1	25	**38**
1715 - 1730	14	0	1	0	0	13	**28**
1730 - 1745	13	0	0	0	0	14	**27**
1745 - 1800	8	0	2	1	0	16	**27**
Per End	**215**	**10**	**13**	**6**	**3**	**226**	**473**

Combined	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Time Per	T	L	R	L	R	T	TOT
1500 - 1515	231	16	32	28	30	249	**586**
1515 - 1530	205	13	35	52	23	404	**732**
1530 - 1545	215	22	28	41	40	293	**639**
1545 - 1600	160	15	43	49	18	268	**553**
1600 - 1615	270	15	27	38	25	380	**755**
1615 - 1630	249	26	39	63	28	352	**757**
1630 - 1645	315	23	48	62	27	491	**966**
1645 - 1700	289	18	59	71	23	303	**763**
1700 - 1715	247	11	48	59	18	363	**746**
1715 - 1730	232	9	73	70	23	432	**839**
1730 - 1745	279	10	55	68	17	479	**908**
1745 - 1800	239	10	30	49	14	354	**696**
Per End	**2931**	**188**	**517**	**650**	**286**	**4368**	**8940**

Lights	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Peak Per	T	L	R	L	R	T	TOT
1500 - 1600	712	63	133	168	109	1124	**2309**
1515 - 1615	771	62	128	179	105	1266	**2511**
1530 - 1630	818	73	134	191	110	1213	**2539**
1545 - 1645	926	73	153	209	98	1415	**2874**
1600 - 1700	1053	75	169	231	103	1458	**3089**
1615 - 1715	1033	71	189	252	95	1437	**3077**
1630 - 1730	1023	57	223	259	90	1523	**3175**
1645 - 1745	992	46	233	268	80	1514	**3133**
1700 - 1800	951	40	202	245	71	1560	**3069**
PEAK HR	**1023**	**57**	**223**	**259**	**90**	**1523**	**3175**

Heavies	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Peak Per	T	L	R	L	R	T	TOT
1500 - 1600	99	3	5	2	2	90	**201**
1515 - 1615	79	3	5	1	1	79	**168**
1530 - 1630	76	5	3	0	1	80	**165**
1545 - 1645	68	6	4	3	0	76	**157**
1600 - 1700	70	7	4	3	0	68	**152**
1615 - 1715	67	7	5	3	1	72	**155**
1630 - 1730	60	4	5	3	1	66	**139**
1645 - 1745	55	2	2	0	1	63	**123**
1700 - 1800	46	0	4	1	1	68	**120**
PEAK HR	**60**	**4**	**5**	**3**	**1**	**66**	**139**

Combined	WEST		NORTH		EAST		
	Industrial Dr		*Steel River*		*Industrial Dr*		
Peak Per	T	L	R	L	R	T	TOT
1500 - 1600	811	66	138	170	111	1214	**2510**
1515 - 1615	850	65	133	180	106	1345	**2679**
1530 - 1630	894	78	137	191	111	1293	**2704**
1545 - 1645	994	79	157	212	98	1491	**3031**
1600 - 1700	1123	82	173	234	103	1526	**3241**
1615 - 1715	1100	78	194	255	96	1509	**3232**
1630 - 1730	1083	61	228	262	91	1589	**3314**
1645 - 1745	1047	48	235	268	81	1577	**3256**
1700 - 1800	997	40	206	246	72	1628	**3189**
PEAK HR	**1083**	**61**	**228**	**262**	**91**	**1589**	**3314**

R.O.A.R. DATA
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Client : EMM
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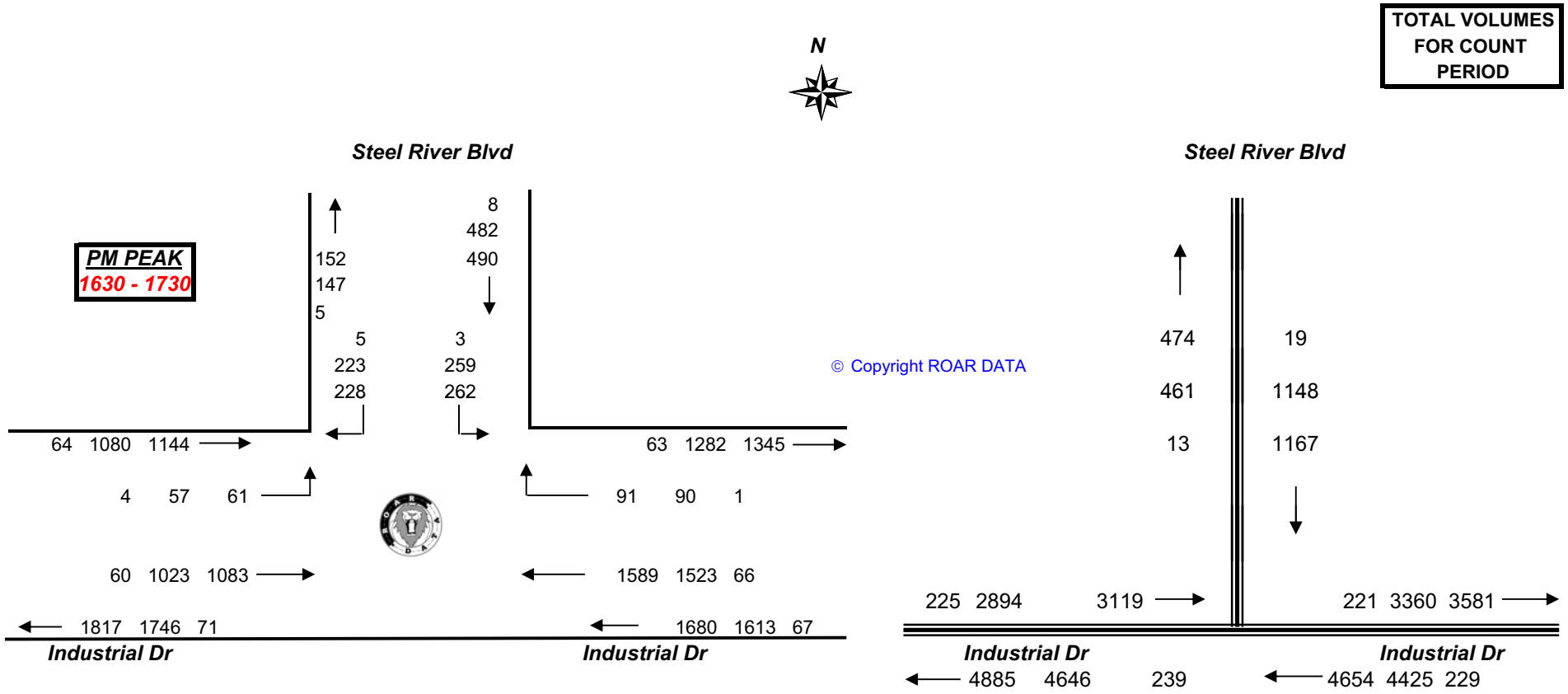


Appendix B

Site traffic survey data

Date In	Date Out	Weight	Inwards
11/08/16 06:34 A	11/08/16 06:46 A	2.3	
11/08/16 06:39 A	11/08/16 06:48 A	0.64	
11/08/16 06:49 A	11/08/16 07:01 A	1.34	
11/08/16 07:12 A	11/08/16 07:25 A	3.38	
11/08/16 07:17 A	11/08/16 07:26 A	0.98	
11/08/16 07:22 A	11/08/16 07:30 A	0.82	
11/08/16 07:32 A	11/08/16 07:43 A	0.86	
11/08/16 07:34 A	11/08/16 07:48 A	2.64	
11/08/16 07:37 A	11/08/16 07:56 A	2.3	
11/08/16 07:55 A	11/08/16 08:08 A	0.76	
11/08/16 07:55 A	11/08/16 08:08 A	0	
11/08/16 08:01 A	11/08/16 08:09 A	0.48	
11/08/16 08:01 A	11/08/16 08:20 A	2	
11/08/16 08:16 A	11/08/16 08:21 A	1.08	
11/08/16 08:16 A	11/08/16 08:21 A	0	
11/08/16 08:10 A	11/08/16 08:26 A	1.04	
11/08/16 08:15 A	11/08/16 08:30 A	1.84	
11/08/16 08:13 A	11/08/16 08:43 A	2.62	
11/08/16 08:34 A	11/08/16 08:49 A	4.68	
11/08/16 08:39 A	11/08/16 08:50 A	0.76	
11/08/16 08:24 A	11/08/16 08:58 A	1.36	
11/08/16 08:45 A	11/08/16 09:00 A	0.6	
11/08/16 09:13 A	11/08/16 09:26 A	7.08	
11/08/16 09:15 A	11/08/16 09:27 A	1.26	
11/08/16 09:17 A	11/08/16 09:32 A	2.36	
11/08/16 09:25 A	11/08/16 09:35 A	1.52	
11/08/16 09:25 A	11/08/16 09:35 A	0	
11/08/16 09:43 A	11/08/16 09:56 A	0.7	
11/08/16 09:57 A	11/08/16 10:07 A	1.78	
11/08/16 09:59 A	11/08/16 10:11 A	1.86	
11/08/16 10:10 A	11/08/16 10:21 A	0.8	
11/08/16 11:07 A	11/08/16 11:16 A	1.3	
11/08/16 10:59 A	11/08/16 11:31 A	1.7	
11/08/16 11:31 A	11/08/16 11:38 A	2.06	
11/08/16 11:25 A	11/08/16 11:49 A	2.72	
11/08/16 11:44 A	11/08/16 11:51 A	0.86	
11/08/16 11:34 A	11/08/16 11:53 A	1.36	
11/08/16 11:42 A	11/08/16 11:59 A	3.96	
11/08/16 11:55 A	11/08/16 12:08 P	1.14	
11/08/16 11:47 A	11/08/16 12:12 P	0.32	
11/08/16 11:53 A	11/08/16 12:14 P	2.72	
11/08/16 11:46 A	11/08/16 12:16 P	3.16	
11/08/16 12:07 P	11/08/16 12:18 P	2.28	
11/08/16 12:15 P	11/08/16 12:25 P	0.48	
11/08/16 12:20 P	11/08/16 12:34 P	1.68	
11/08/16 12:21 P	11/08/16 12:37 P	7.78	
11/08/16 12:22 P	11/08/16 12:40 P	1.9	
11/08/16 12:28 P	11/08/16 12:41 P	1.98	
11/08/16 12:35 P	11/08/16 12:45 P	4.38	

11/08/16 12:39 P	11/08/16 12:50 P	0.36
11/08/16 01:06 P	11/08/16 01:22 P	4.8
11/08/16 02:06 P	11/08/16 02:16 P	6.06
11/08/16 02:25 P	11/08/16 02:31 P	0.62
11/08/16 02:27 P	11/08/16 02:35 P	0.6
11/08/16 02:37 P	11/08/16 02:49 P	6.2
11/08/16 02:37 P	11/08/16 02:50 P	1.9
11/08/16 02:41 P	11/08/16 02:53 P	1.68
11/08/16 02:48 P	11/08/16 02:56 P	0.88
11/08/16 02:51 P	11/08/16 03:02 P	5.82
11/08/16 03:10 P	11/08/16 03:18 P	1.9
11/08/16 04:06 P	11/08/16 04:13 P	3.28
		125.72

Date In	Date Out	Weight	Outwards
11/08/16 06:54 A	11/08/16 06:54 A	15.68	
11/08/16 07:12 A	11/08/16 07:12 A	12.18	
11/08/16 07:52 A	11/08/16 07:52 A	11.78	
11/08/16 06:02 A	11/08/16 07:58 A	38.3	
11/08/16 08:38 A	11/08/16 08:38 A	12.1	
11/08/16 08:47 A	11/08/16 08:47 A	13.22	
11/08/16 09:25 A	11/08/16 09:25 A	31.48	
11/08/16 09:34 A	11/08/16 09:34 A	4.3	
11/08/16 09:40 A	11/08/16 09:40 A	13.24	
11/08/16 09:39 A	11/08/16 09:39 A	4.98	
11/08/16 09:44 A	11/08/16 09:44 A	12.92	
11/08/16 09:36 A	11/08/16 10:13 A	4.38	
11/08/16 10:26 A	11/08/16 10:26 A	12.98	
11/08/16 10:38 A	11/08/16 10:38 A	12.18	
11/08/16 11:29 A	11/08/16 11:29 A	14.5	
11/08/16 07:04 A	11/08/16 11:40 A	37.98	
11/08/16 11:43 A	11/08/16 11:43 A	12.92	
11/08/16 12:27 P	11/08/16 12:27 P	10.8	
11/08/16 11:15 A	11/08/16 12:43 P	34.66	
11/08/16 12:47 P	11/08/16 12:47 P	11.54	
11/08/16 01:25 P	11/08/16 01:25 P	13.5	
11/08/16 01:38 P	11/08/16 01:38 P	13.18	
11/08/16 12:01 P	11/08/16 02:13 P	31	
11/08/16 02:33 P	11/08/16 02:33 P	11.58	
11/08/16 02:43 P	11/08/16 02:43 P	12.5	
		403.88	

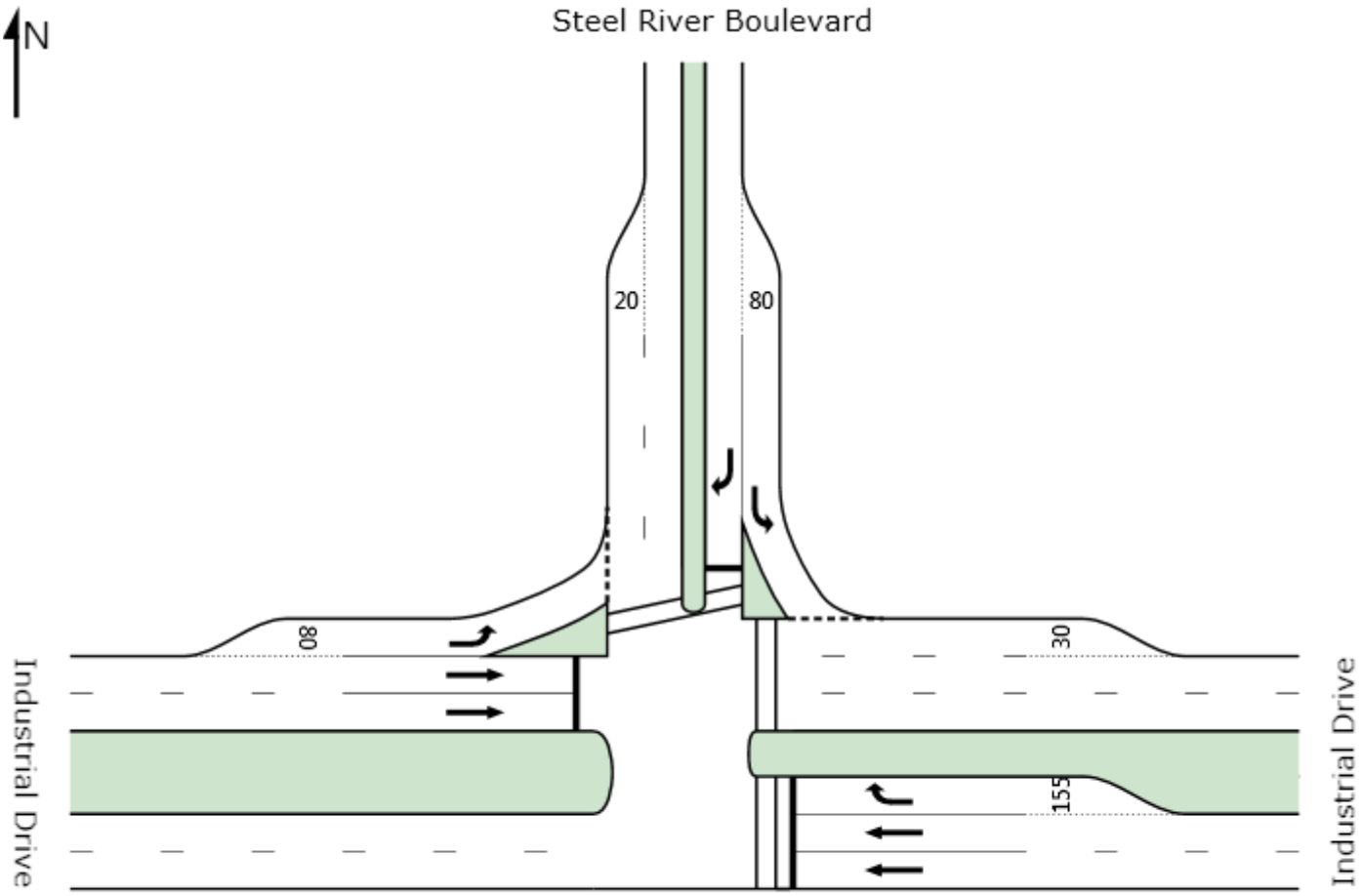
Maximum capacity truck movements

Weeks/year	50
Days/week	5.5
Days/year	275

		Vehicle trips				Vehicle movements				Truck mix						
		Current		Proposed		Current		Proposed		Current				Proposed		
	Vehicle capacity (tonnes)	Trips/day	Trips/year	Trips/day	Trips/year	Movements/day	Movements/year	Movements/ day	Movements/ year	Truck mix (by trip)	tonnes/ year	Truck mix (by tonnage)	Products/ waste (%)	tonnes/ year	Truck mix (by tonnage)	Products/ waste (%)
Employees, contractors, visitors																
Light vehicles		15	4125	19	5225	30	8250	38	10,450	88%						
Maintance vehicles		2	550	2	550	4	1100	4	1,100	12%						
Sub-total		***17***	***4675***			***34***	***9350***	***42***	***11,550***	***100%***						
Deliveries																
Small loads	0.7	95	26125			190	52250	208	57,143	559%	18287.5	20%		20,000.00	6%	
Skip truck (single/dual axle)	4	29	7975			58	15950	91	25,000	171%	31900	35%		50,000.00	16%	
Truck and dog	29	5	1375			10	2750	61	16,897	29%	39875	44%		245,000.00	78%	
Sub-total		***129***	***35475***			***258***	***70950***	***360***	***99,039***	***759%***	***90063***	***100%***		***315,000.00***	***100%***	
Dispatch (product)																
Truck and dog	29	6.5	1787.5			13	3575	50	13,759	76%	51837.5	69%		199,500.00	*70%*	
B-Double	42	2	550			4	1100	15	4,071	24%	23100	31%		85,500.00	*30%*	
Sub-total		***8.5***	***2337.5***			***17***	***4675***	***65***	***17,830***	***100%***	***74938***	***100%***	***82%***	***285,000.00***		*90%*
Dispatch (waste)																
Truck and dog	29	2	550			4	1100	8	2,069	100%	15950	100%		30,000.00	*100%*	
B-Double	42	0	0			0	0	0	0	0%	0	0%				
Sub-total		***2***	***550***			***4***	***1100***	***8***	***2,069***	***100%***	***15950***	***100%***	***18%***	30,000.00		*10%*
Dispatch (sub-total)		***10.5***	***2887.5***			***21***	***5775***	***72***	***19,899***		***90887.5***			***315,000.00***		
Recycling facility total		***27.5***	***7562.5***			***313***	***86075***	***475***	***130,488***							
Ancillary site operations																
Light vehicles		20	5500			40	11000	20.00	5,500.00	25%						
Skip truck (single/dual axle)		50	13750			100	27500	35.00	9,625.00	63%						
Multi-axle heavy vehicles		10	2750			20	5500	15.00	4,125.00	13%						
Sub-total		***80***	***22000***			***160***	***44000***	***70.00***	***19,250.00***	***100%***						
Waste centre total		**107.5**	**29562.5**			**473**	**130075**	**544.50**	**149,738.42**							
							Increase:	**71.50**	**19,663.42**							

Appendix C

2016 SIDRA intersection analysis results


N
Steel River Boulevard
20
80
80
30
155
Industrial Drive
Industrial Drive

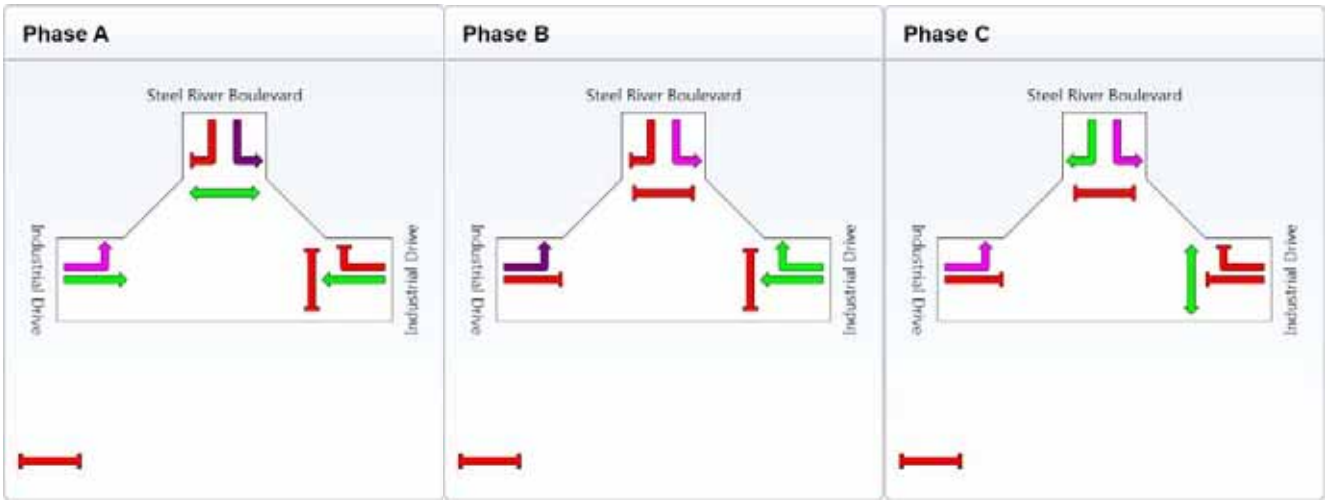
PHASING SUMMARY

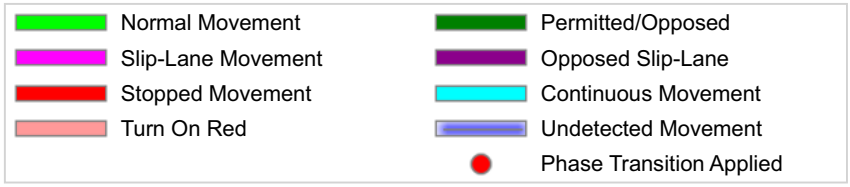
T intersection
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	58	19	25
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	64	25	31
Phase Split	53 %	21 %	26 %





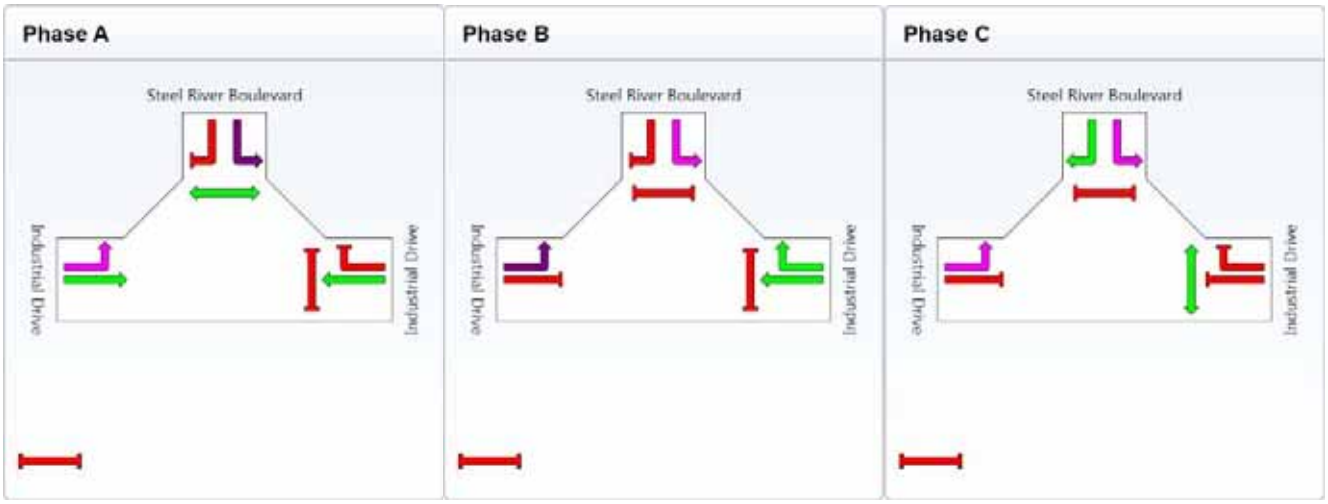
PHASING SUMMARY

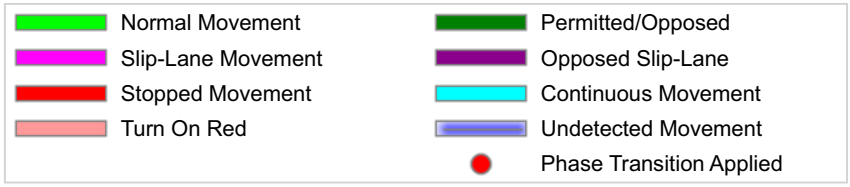
T intersection
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	66	11	25
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	72	17	31
Phase Split	60 %	14 %	26 %





MOVEMENT SUMMARY

Site: AM Peak 2016 Existing Actual

T intersection
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1169	9.3	0.460	8.8	LOS A	15.2	114.6	0.49	0.44	58.9
6	R	263	3.6	0.918	80.9	LOS F	18.3	132.3	1.00	0.99	19.5
Approach		1433	8.2	0.918	22.1	LOS B	18.3	132.3	0.58	0.54	44.6
North: Steel River Boulevard											
7	L	100	5.3	0.218	21.9	LOS B	2.8	20.8	0.57	0.71	36.5
9	R	87	2.4	0.230	50.5	LOS D	4.3	30.6	0.87	0.77	25.5
Approach		187	3.9	0.230	35.3	LOS C	4.3	30.6	0.71	0.74	30.4
West: Industrial Drive											
10	L	162	1.9	0.185	12.5	LOS A	2.0	14.1	0.28	0.70	53.4
11	T	1634	6.8	0.905	43.3	LOS D	51.7	383.2	0.99	1.03	31.5
Approach		1796	6.3	0.905	40.5	LOS C	51.7	383.2	0.93	1.00	32.5
All Vehicles		3416	7.0	0.918	32.5	LOS C	51.7	383.2	0.77	0.79	36.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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 per ped
P3	Across E approach	53	54.2	LOS E	0.2	0.2	0.95	0.95
P5	Across N approach	53	21.0	LOS C	0.1	0.1	0.59	0.59
All Pedestrians		106	37.6	LOS D			0.77	0.77

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: AM Peak 2016 With Approved Development

T intersection
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1169	9.3	0.460	8.8	LOS A	15.2	114.6	0.49	0.44	58.9
6	R	276	6.1	0.930	83.5	LOS F	19.7	145.0	1.00	1.00	19.0
Approach		1445	8.7	0.930	23.1	LOS B	19.7	145.0	0.59	0.55	43.8
North: Steel River Boulevard											
7	L	113	11.2	0.256	22.3	LOS B	3.2	24.9	0.57	0.72	36.4
9	R	96	7.7	0.261	51.1	LOS D	4.7	35.3	0.88	0.77	25.4
Approach		208	9.6	0.261	35.5	LOS C	4.7	35.3	0.71	0.74	30.4
West: Industrial Drive											
10	L	171	4.9	0.204	12.8	LOS A	2.2	16.0	0.29	0.71	53.0
11	T	1634	6.8	0.921	48.2	LOS D	54.5	403.7	1.00	1.06	29.6
Approach		1804	6.6	0.921	44.9	LOS D	54.5	403.7	0.93	1.03	30.7
All Vehicles		3458	7.6	0.930	35.2	LOS C	54.5	403.7	0.77	0.81	35.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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 per ped
P3	Across E approach	53	54.2	LOS E	0.2	0.2	0.95	0.95
P5	Across N approach	53	21.6	LOS C	0.1	0.1	0.60	0.60
All Pedestrians		106	37.9	LOS D			0.78	0.78

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: AM Peak 2016 With Proposed Development

T intersection
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1169	9.3	0.460	8.8	LOS A	15.2	114.6	0.49	0.44	58.9
6	R	279	7.2	0.902	77.3	LOS F	19.0	141.1	1.00	0.97	20.2
Approach		1448	8.9	0.902	22.0	LOS B	19.0	141.1	0.59	0.54	44.6
North: Steel River Boulevard											
7	L	116	13.6	0.266	22.9	LOS B	3.4	26.6	0.58	0.72	36.2
9	R	98	9.7	0.271	51.3	LOS D	4.9	36.8	0.88	0.78	25.4
Approach		214	11.8	0.271	35.9	LOS C	4.9	36.8	0.72	0.75	30.3
West: Industrial Drive											
10	L	173	6.1	0.209	12.9	LOS A	2.2	16.5	0.29	0.71	53.0
11	T	1634	6.8	0.937	54.2	LOS D	57.6	426.7	1.00	1.09	27.7
Approach		1806	6.7	0.937	50.2	LOS D	57.6	426.7	0.93	1.06	28.8
All Vehicles		3468	7.9	0.937	37.6	LOS C	57.6	426.7	0.78	0.82	33.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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 per ped
P3	Across E approach	53	54.2	LOS E	0.2	0.2	0.95	0.95
P5	Across N approach	53	22.2	LOS C	0.1	0.1	0.61	0.61
All Pedestrians		106	38.2	LOS D			0.78	0.78

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: PM Peak 2016 Existing Actual

T intersection
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1673	4.2	0.637	10.8	LOS A	26.5	191.9	0.60	0.55	55.7
6	R	96	1.1	0.567	68.7	LOS E	5.6	39.7	1.00	0.78	21.9
Approach		1768	4.0	0.637	13.9	LOS A	26.5	191.9	0.62	0.57	52.0
North: Steel River Boulevard											
7	L	276	1.1	0.523	13.2	LOS A	5.7	40.5	0.44	0.72	41.9
9	R	240	2.2	0.630	55.0	LOS D	13.0	92.6	0.97	0.83	24.4
Approach		516	1.6	0.630	32.7	LOS C	13.0	92.6	0.68	0.77	31.4
West: Industrial Drive											
10	L	64	6.6	0.056	10.6	LOS A	0.4	2.6	0.15	0.68	56.3
11	T	1140	5.5	0.551	18.5	LOS B	21.2	155.6	0.70	0.63	47.1
Approach		1204	5.6	0.551	18.1	LOS B	21.2	155.6	0.67	0.63	47.4
All Vehicles		3488	4.2	0.637	18.1	LOS B	26.5	191.9	0.65	0.62	46.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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 per ped
P3	Across E approach	53	54.2	LOS E	0.2	0.2	0.95	0.95
P5	Across N approach	53	16.5	LOS B	0.1	0.1	0.53	0.53
All Pedestrians		106	35.3	LOS D			0.74	0.74

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: PM Peak 2016 With Approved Development

T intersection
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1673	4.2	0.645	11.4	LOS A	27.2	197.1	0.61	0.57	54.9
6	R	96	1.1	0.567	68.7	LOS E	5.6	39.7	1.00	0.78	21.9
Approach		1768	4.0	0.645	14.5	LOS A	27.2	197.1	0.64	0.58	51.3
North: Steel River Boulevard											
7	L	283	1.5	0.536	13.3	LOS A	5.9	42.1	0.44	0.72	41.8
9	R	245	2.6	0.621	54.1	LOS D	13.2	94.2	0.96	0.83	24.6
Approach		528	2.0	0.621	32.3	LOS C	13.2	94.2	0.68	0.77	31.6
West: Industrial Drive											
10	L	64	6.6	0.056	10.6	LOS A	0.4	2.6	0.15	0.68	56.3
11	T	1140	5.5	0.559	19.2	LOS B	21.6	158.6	0.71	0.64	46.4
Approach		1204	5.6	0.559	18.7	LOS B	21.6	158.6	0.68	0.64	46.8
All Vehicles		3501	4.2	0.645	18.6	LOS B	27.2	197.1	0.66	0.63	45.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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 per ped
P3	Across E approach	53	53.2	LOS E	0.2	0.2	0.94	0.94
P5	Across N approach	53	17.1	LOS B	0.1	0.1	0.53	0.53
All Pedestrians		106	35.1	LOS D			0.74	0.74

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: PM Peak 2016 With Proposed Development

T intersection
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1673	4.2	0.645	11.4	LOS A	27.2	197.1	0.61	0.57	54.9
6	R	96	1.1	0.567	68.7	LOS E	5.6	39.7	1.00	0.78	21.9
Approach		1768	4.0	0.645	14.5	LOS A	27.2	197.1	0.64	0.58	51.3
North: Steel River Boulevard											
7	L	285	1.5	0.540	13.3	LOS A	6.0	42.6	0.44	0.72	41.8
9	R	247	2.6	0.626	54.2	LOS D	13.3	95.1	0.96	0.83	24.6
Approach		533	2.0	0.626	32.3	LOS C	13.3	95.1	0.68	0.77	31.6
West: Industrial Drive											
10	L	64	6.6	0.056	10.6	LOS A	0.4	2.6	0.15	0.68	56.3
11	T	1140	5.5	0.559	19.2	LOS B	21.6	158.6	0.71	0.64	46.4
Approach		1204	5.6	0.559	18.7	LOS B	21.6	158.6	0.68	0.64	46.8
All Vehicles		3505	4.2	0.645	18.6	LOS B	27.2	197.1	0.66	0.63	45.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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 per ped
P3	Across E approach	53	53.2	LOS E	0.2	0.2	0.94	0.94
P5	Across N approach	53	17.1	LOS B	0.1	0.1	0.53	0.53
All Pedestrians		106	35.1	LOS D			0.74	0.74

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.

Appendix D

2026 SIDRA intersection analysis results

MOVEMENT SUMMARY

Site: AM Peak 2026 With Approved Development

T intersection
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1410	9.3	0.554	9.8	LOS A	20.2	153.0	0.54	0.50	57.3
6	R	323	5.8	1.086	168.6	LOS F	34.4	253.0	1.00	1.24	10.7
Approach		1733	8.6	1.086	39.4	LOS C	34.4	253.0	0.63	0.63	33.7
North: Steel River Boulevard											
7	L	133	10.3	0.311	27.2	LOS B	4.4	33.7	0.65	0.73	33.9
9	R	113	6.5	0.305	51.5	LOS D	5.6	41.6	0.89	0.78	25.3
Approach		245	8.6	0.311	38.4	LOS C	5.6	41.6	0.76	0.76	29.4
West: Industrial Drive											
10	L	203	4.7	0.250	13.4	LOS A	2.9	21.0	0.32	0.71	52.3
11	T	1960	6.8	1.105	161.0	LOS F	114.6	848.5	1.00	1.68	12.7
Approach		2163	6.6	1.105	147.2	LOS F	114.6	848.5	0.94	1.59	13.5
All Vehicles		4141	7.5	1.105	95.6	LOS F	114.6	848.5	0.80	1.14	18.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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 per ped
P3	Across E approach	53	54.2	LOS E	0.2	0.2	0.95	0.95
P5	Across N approach	53	21.6	LOS C	0.1	0.1	0.60	0.60
All Pedestrians		106	37.9	LOS D			0.78	0.78

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: AM Peak 2026 With Proposed Development

T intersection
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	1415	9.3	0.557	9.8	LOS A	20.4	154.0	0.54	0.50	57.2
6	R	321	6.7	1.085	168.5	LOS F	34.2	253.0	1.00	1.24	10.7
Approach		1736	8.8	1.085	39.1	LOS C	34.2	253.0	0.63	0.63	33.8
North: Steel River Boulevard											
7	L	136	12.4	0.324	27.4	LOS B	4.5	35.2	0.65	0.73	33.9
9	R	115	8.3	0.314	51.7	LOS D	5.7	43.1	0.89	0.78	25.3
Approach		251	10.5	0.324	38.5	LOS C	5.7	43.1	0.76	0.76	29.3
West: Industrial Drive											
10	L	205	5.6	0.255	13.4	LOS A	2.9	21.5	0.32	0.71	52.3
11	T	1960	6.8	1.105	161.0	LOS F	114.6	848.5	1.00	1.68	12.7
Approach		2165	6.7	1.105	147.0	LOS F	114.6	848.5	0.94	1.59	13.5
All Vehicles		4152	7.8	1.105	95.4	LOS F	114.6	848.5	0.80	1.14	18.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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 per ped
P3	Across E approach	53	54.2	LOS E	0.2	0.2	0.95	0.95
P5	Across N approach	53	21.6	LOS C	0.1	0.1	0.60	0.60
All Pedestrians		106	37.9	LOS D			0.78	0.78

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: PM Peak 2026 With Approved Development

T intersection
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	2007	4.1	0.774	13.5	LOS A	38.8	281.0	0.73	0.68	51.8
6	R	115	0.9	0.678	70.4	LOS E	6.9	48.7	1.00	0.82	21.6
Approach		2122	4.0	0.774	16.6	LOS B	38.8	281.0	0.75	0.69	48.7
North: Steel River Boulevard											
7	L	339	1.6	0.715	18.9	LOS B	10.4	73.6	0.60	0.78	38.3
9	R	294	2.5	0.743	57.2	LOS E	16.7	119.4	0.99	0.88	23.9
Approach		633	2.0	0.743	36.7	LOS C	16.7	119.4	0.78	0.82	29.9
West: Industrial Drive											
10	L	77	6.8	0.070	10.8	LOS A	0.5	3.7	0.17	0.68	56.0
11	T	1368	5.5	0.671	21.0	LOS B	28.5	208.7	0.78	0.71	44.6
Approach		1445	5.6	0.671	20.5	LOS B	28.5	208.7	0.75	0.71	45.0
All Vehicles		4200	4.2	0.774	20.9	LOS B	38.8	281.0	0.75	0.72	43.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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 per ped
P3	Across E approach	53	53.2	LOS E	0.2	0.2	0.94	0.94
P5	Across N approach	53	17.1	LOS B	0.1	0.1	0.53	0.53
All Pedestrians		106	35.1	LOS D			0.74	0.74

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: PM Peak 2026 With Proposed Development

T intersection
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Industrial Drive											
5	T	2007	4.1	0.774	13.5	LOS A	38.8	281.0	0.73	0.68	51.8
6	R	115	0.9	0.678	70.4	LOS E	6.9	48.7	1.00	0.82	21.6
Approach		2122	4.0	0.774	16.6	LOS B	38.8	281.0	0.75	0.69	48.7
North: Steel River Boulevard											
7	L	341	1.5	0.719	19.1	LOS B	10.5	74.7	0.60	0.78	38.1
9	R	296	2.5	0.748	57.5	LOS E	16.9	120.7	0.99	0.88	23.8
Approach		637	2.0	0.748	36.9	LOS C	16.9	120.7	0.78	0.83	29.8
West: Industrial Drive											
10	L	77	6.8	0.070	10.8	LOS A	0.5	3.7	0.17	0.68	56.0
11	T	1368	5.5	0.671	21.0	LOS B	28.5	208.7	0.78	0.71	44.6
Approach		1445	5.6	0.671	20.5	LOS B	28.5	208.7	0.75	0.71	45.0
All Vehicles		4204	4.2	0.774	21.0	LOS B	38.8	281.0	0.75	0.72	43.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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 per ped
P3	Across E approach	53	53.2	LOS E	0.2	0.2	0.94	0.94
P5	Across N approach	53	17.1	LOS B	0.1	0.1	0.53	0.53
All Pedestrians		106	35.1	LOS D			0.74	0.74

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.

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Appendix K

Visual assessment

K.1 Introduction

This appendix provides an assessment of the potential visual impacts of the proposal. It assesses the visual impacts at private receptors and public vantage points as required by the Secretary's environmental assessment requirements (SEARs).

K.2 Visual character

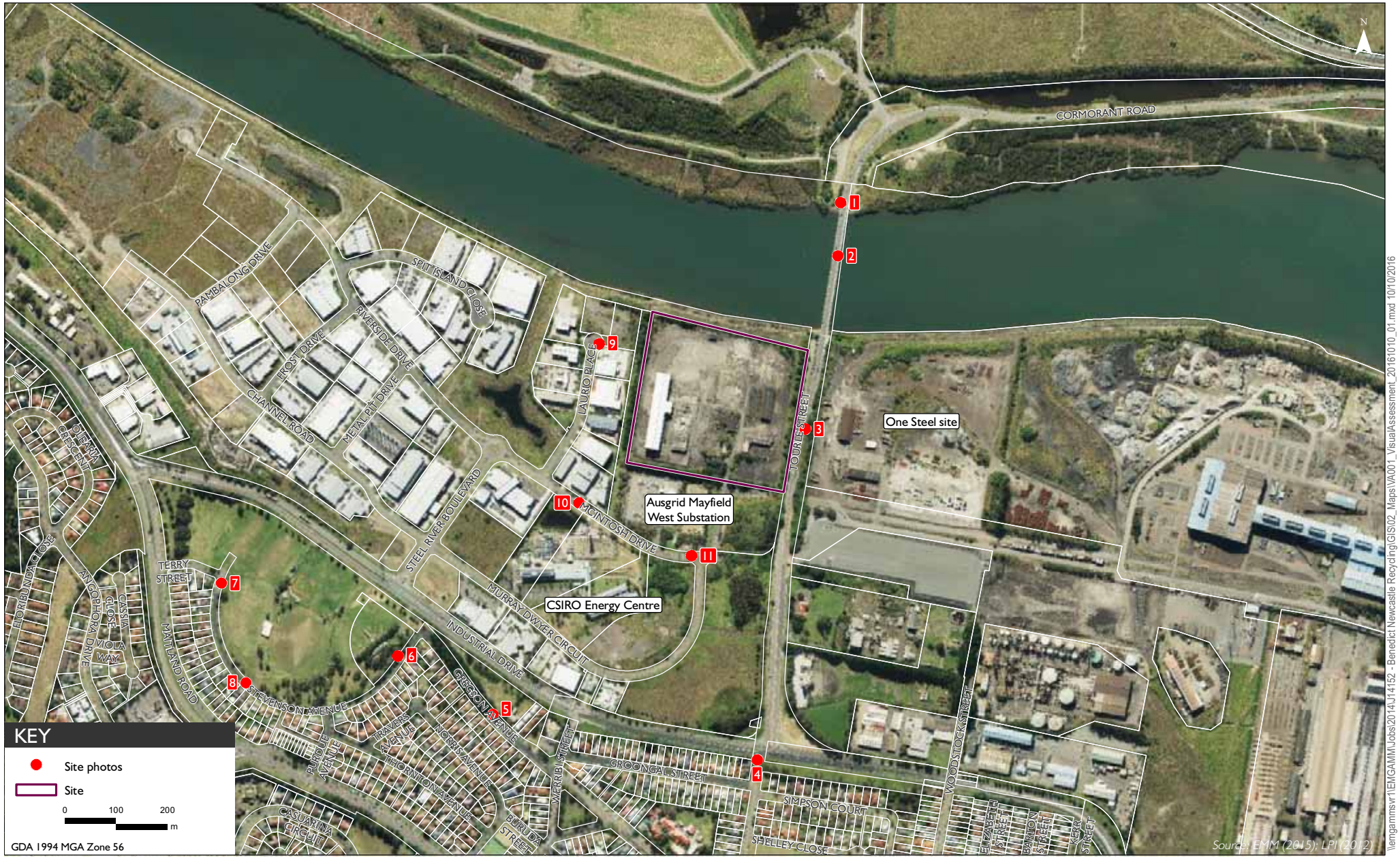
The visual character of the land surrounding the site is predominantly industrial with industrial properties located directly to the west and south of the site as well as east of Tourle Street and north of the Hunter River. Other dominant visual features surrounding the site include the Hunter River and adjoining vegetated areas to the north; and major roads Tourle Street and Industrial Drive to the east and south, respectively. The closest residential area is in Mayfield West on the far side of Industrial Drive approximately 500 m south of the site.

The visual character of the site and surrounds is shown in Photograph K.1.

Photograph K.1 Local visual character

K.3 Viewpoints

Two types of viewpoints were assessed for visual impact assessment: public vantage points and private receptors, including industrial and residential properties. The assessed viewpoints are shown in Figure K.1.



Visual assessment locations

Mayfield West Recycling Facility
Visual Assessment
Figure K.1

K.3.1 Public vantage points

i Hunter River

Views to the site from the Hunter River are shown in Photograph K.2. The main processing shed is visible from this viewpoint, though vegetation screens the remainder of the site. Moving from the north side of the river to the south side, the views of the site are increasingly blocked by the steep south bank of the river that is about 10 m high.

Proposed additional vegetation planting along the northern boundary of the site will provide improved screening of the site from views from the Hunter River although the existing roof of the main processing shed will remain visible. The tops of stockpiles in the north of the site (up to 7 m high) may be visible prior to the full establishment of landscaping plantings of Casuarina sp. The external stockpiles on site will contain of concrete (or similar) or wood and will be brown to grey and without stark colour contrasts and will have a low visual impact. Co-mingled and other waste stockpiles that may contain material with a range of colours (and therefore look more like 'rubbish') will be within existing buildings. These will not be visible from the Hunter River.

Photograph K.2 Viewpoint 1 – Hunter River north bank, west of Tourle Street Bridge

ii Tourle Street Bridge

A view to the site from the centre of Tourle Street Bridge is shown in Photograph K.3. Elements of the site including the main processing shed are visible from the south-bound traffic lane and the cyclepath on the east side of Tourle Street Bridge. Views are partially obstructed by vegetation, vehicle movements and the bridge railing. Drivers and passengers in north-bound vehicles have to look over their shoulder to have a view of the site.

Under the proposal, additional vegetation planting will provide improved screening of the site from this viewpoint though the roof of the main processing shed will remain visible and the tops of concrete (and similar) and wood stockpiles may also be seen until the full establishment of landscaping plantings of Casuarina sp along the northern boundary of the site.

RMS proposed to duplicate of Tourle Street bridge. The second bridge will be constructed on the west side of the existing bridge and will be used by north-bound traffic. This will further obscure views to the site from south-bound vehicles.

Photograph K.3 Viewpoint 2 – Tourle Street Bridge, photo taken from cyclepath on eastern side

iii Tourle Street (south of Hunter River)

Existing vegetation and the topography along the eastern boundary of the site screens the site from viewpoints on Tourle Street, south of the Hunter River. No views of the site are present and this will not change under the proposal.

Photograph K.4 Viewpoint 3 – Tourle Street, south of Hunter River

iv Industrial Drive

Views to the site from Industrial Drive are screened by vegetation and topography. No views of the site are present and this will not change under the proposal.

Photograph K.5 Viewpoint 4 – Industrial Drive, at corner of Tourle and Groongal Streets

K.3.2 Private receptors

i Residential properties

The nearest residential properties are located on Gregson Avenue. The roof of the main processing shed is visible from these locations, as shown in Photograph K.6, though it is partially obstructed by vegetation and neighbouring industrial properties. Residential properties on Terry Street and Stevenson Avenue also have partial views of the upper portion of the main processing shed as shown in Photograph K.7 to Photograph K.9. The proposal will not change the main processing shed structure or external appearance and will therefore have no visual impact at these residential properties.

Views to the site from residential properties on Groongal Street are screened by an existing 1.8 m fence and vegetation.

ii Industrial properties

Neighbouring industrial properties include light industrial buildings to the west and south-west of the site on Laurio Place and Ausgrid Mayfield West Substation to the south on McIntosh Drive. Existing elements of the site are visible from some locations on these properties. However, existing vegetation along the site boundaries provides low to moderate screening from the west and high screening from the south.

Additional plantings under the proposal will improve screening of the site from the west, though it is likely that some views, particularly of the main processing shed, will remain.

Photograph K.6 Viewpoint 5 – Gregson Avenue

Photograph K.7 **Viewpoint 6 – corner of Terry Street and Stevenson Avenue**

Photograph K.8 **Viewpoint 7 – Stevenson Avenue (west)**

Photograph K.9 Viewpoint 8 – Stevenson Avenue (east)

Photograph K.10 Viewpoint 9 – end of Laurio Place

Photograph K.11 Viewpoint 10 – McIntosh Drive

Photograph K.12 Viewpoint 11 – McIntosh Drive, near intersection with Murray Dwyer Circuit

K.4 Management measures

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

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

K.5 Visual impact assessment

The proposal is unlikely to have significant visual impacts given that it is located within an existing industrial estate and is consistent with the visual character of the area. Further, the proposal will result in improved screening of the site through the planting of vegetation along the northern boundary and northern-end of the western boundary where existing vegetation is sparse.

Partial views of the upper portion of the main processing shed will remain from viewpoints due to its height. However, these will generally be unchanged from the existing views.

The tops of concrete (and similar) and wood stockpiles in the north of the site may also be visible from public vantage points on Hunter River and Tourle Street Bridge prior to the full establishment of landscaping plantings of Casuarina sp. The only external stockpiles will contain of concrete (or similar) or wood and will be brown to grey and without stark colour contrasts and will have a low visual impact.

Therefore, there will be no additional visual impacts and no loss of visual amenity expected as a result of the proposal.

Appendix L

Biodiversity assessment

15 September 2016

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Ernest Dupere
Benedict Recycling Pty Ltd
Po Box 431
Frenchs Forest NSW 1641

Re: Ecological Assessment, Mayfield West Recycling Facility, 1a McIntosh Drive, Mayfield West

Dear Ernest,

1 Introduction

Benedict Recycling Pty Ltd (Benedict) proposes to increase the capacity of its recycling facility at 1a McIntosh Drive, Mayfield West. Development consent (DA 15-291) was granted for the recycling facility on 8 March 2016.

Since approval, Benedict has identified additional demand for the disposal and recycling of excavated materials. The recycling facility requires development consent under the State Significant Development (SSD) provisions within Division 4.1 of Part 4 of the EP&A Act to enable it to handle a greater volume of waste. Accordingly, an environmental impact statement (EIS) has been prepared to support a development application for the proposal. This letter accompanies the EIS, providing an assessment of the biodiversity values within the site.

1.1 Site history

The site is located south of the Hunter River and east of Tourle Street; light industrial buildings are to the west and Ausgrid Mayfield West Substation is to the south. Further to the south, the land rises to about 24 metres above Australian height datum (AHD) before dropping to about 20 mAHD along Industrial Drive. The site was previously used by Delta EMD Pty Ltd for the processing of electrolytic manganese dioxide and has been remediated prior to the commencement of recycling operations by Benedict.

2 Assessment approach

The Secretary's environmental assessment requirements (SEARs) issued by the Department of Planning and Environment (DP&E) required an assessment of biodiversity including:

> an assessment that is fully consistent with the requirements of the Framework for Biodiversity Assessment.

Under the Framework for Biodiversity Assessment: NSW Biodiversity Offsets Policy for Major Projects (FBA) (OEH 2014), a biodiversity assessment report (BAR) must be prepared, unless exempt in accordance with paragraph 3.3.1.3 of the FBA, which states:

> If during the assessment of biodiversity values of a vegetation zone, the assessor determines that:
>
> (a) it does not contain native vegetation; or
>
> (b) it has a site value score of 17 or less; and

(c) a PCT identified in the vegetation zone is not listed as a critically endangered or endangered ecological community (EECs).

The proposal involves an increase to the volume to material handled at the facility within the existing site boundary. The site layout changes include an extension of the material stockpile area which comprises hardstand areas and does not include native vegetation. Furthermore all of the vegetation within the site is planted and does not reflect any naturally occurring plant community type (PCT), and therefore the site does not include any EECs. It is therefore determined that the site satisfies point (a) and (c) of paragraph 3.3.1.3 of the FBA and a BAR is not required. A detailed discussion of vegetation and biodiversity values is presented in this letter.

Other relevant legislation includes the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Actions that may have a significant impact on a matter of national environmental significance (MNES) are 'controlled actions' and require approval from the Commonwealth. MNES include world heritage properties, wetlands of international importance and listed threatened species and ecological communities. Accordingly, MNES have also been considered during preparation of this assessment.

3 Method

This assessment was undertaken by Eugene Dodd, an EMM ecologist, who is an accredited assessor in accordance with s142B (1)(c) of the *Threatened Species Conservation Act 1995* (TSC Act).

A review of desktop material was used to inform the ecological assessment of the site, with following resources utilised:

- an ecological assessment of the site, by Hunter Wetlands Research and Management (1997);
- Atlas of NSW Wildlife (BioNet) records search to determine if any migratory or threatened species have been recorded within the site or adjacent areas (26/08/16); and
- an EIS prepared for the current use of the site as a recycling facility (EMM 2015).

A site inspection was conducted by an EMM ecologist on 29 August 2016. The aim of this inspection was to verify the previous studies undertaken for the site and to confirm that no native vegetation or important fauna habitat exists within the additional stockpile area. In addition, the vegetation and habitat outside of the additional stockpile area within the site was also described for completeness.

4 Results

4.1 Flora and vegetation

The site is highly disturbed. Consequently, remnant vegetation is absent and there are no naturally occurring vegetation communities. The site inspection did not identify any threatened flora species, nor is there any habitat likely to support them. No threatened flora have been recorded within the site or the immediate vicinity (Bionet 2016).

The majority of the site is hardstand, constituting concrete slabs, hardpacked fill and gravel. This includes the entire additional stockpile area with vegetation limited to non-native Fountain Grass (*Cenchrus setaceus*) and Red Natal Grass (*Melinis repens*) (refer to Photograph 1).

Photograph 1 Proposed additional stockpile area

Native species have been planted along bunds and the drainage channels around the periphery of the site. These narrow corridors of trees and shrubs are anticipated to be no older than 20 years and were planted to consolidate sediments and to provide visual screening of the site (refer to Photograph 2). The dominant species are the Small-leaved Fig (*Ficus oblica*) and Swamp Oak (*Casuarina glauca*), with occasional Narrow-leaved Paperbark (*Melaleuca linariifolia*) and Sweet Pittosporum (*Pittosporum undulatum*).

The vegetation composition along the northern and eastern edge of the site is similar to that of the southern and western edges, however it is more sparse, with additional species including Swamp Mahogany (*Eucalyptus robusta*) and large shrubs such as the Swamp Wattle (*Acacia elongata*) and (*Acacia fimbrata*). Benedict has recently planted Swamp Oak along the northern and western bund in order to increase screening of the site. Ground cover and small shrubs are mostly restricted to weeds such as Bitou Bush (*Chrysanthemoides monilifera subsp. rotundata*), Lantana (*Lantana camara*) and Red Natal Grass, although occasional tufts of Spiny-head Mat-rush (*Lomandra longifolia*) also occur.

Photograph 2 Planted vegetation along the southern boundary

Landscape plantings also exist around several building within the site, which includes several native species such as Broad-leaved Paperbark (*Melaleuca quinquenervia*), Spotted Gum (*Corymbia maculata*) and Sweet Pittosporum.

The vegetation around the periphery of the site and the landscape planting will not be impacted.

4.2 Noxious weeds

Four noxious weeds declared in the Local Control Authority area of Newcastle City Council, were recorded within the site. These weeds are listed under the Noxious Weeds Act (1993), with the relevant control requirements listed in Table 1.

Table 1 Noxious weeds recorded within the site

Scientific Name	Common name	Class	Control Requirement
Cortaderia species	Pampas Grass	3	The plant must be fully and continuously suppressed and destroyed and the plant must not be sold, propagated or knowingly distributed
Chrysanthemoides monilifera subsp. rotundata	Bitou bush	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread
Ageratina adenophora	Crofton weed	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed
Cenchrus setaceus	Fountain Grass	5	There are no requirements to control existing plants of Class 5 weeds. However, the weeds are "notifiable" and a range of restrictions on their sale and movement exists

4.3 Fauna

The Bionet search revealed that no threatened or migratory fauna have been recorded within the site. Given that the additional stockpile area is entirely cleared, habitat for threatened fauna is considered absent.

The vegetation surrounding the site provides habitat for a range of common species with Grey Fantail (*Rhipidura albiscapa*), Superb Fairy-wren (*Malurus cyaneus*) and Noisy Miner (*Manorina melanocephala*) observed during the site inspection. This habitat will not be impacted. Furthermore it is unlikely that any threatened fauna species are resident or reliant on this habitat given its small size, poor connectivity to other vegetated areas and lack of old growth trees with hollows.

Threatened species with the potential to occur are likely to be highly mobile species such as the Grey-headed Flying-Fox (*Pteropus poliocephalus*), which is listed vulnerable under both the TSC Act and the EPBC act. One Grey-headed Flying-fox has been recorded 170 m east of the site. This species may utilise the Small-leaved Fig fruit as a seasonal foraging resource. No Small-leaved Figs will be impacted by the proposal.

5 Impact assessment

The additional stockpile area is composed of hardstand areas and compacted fill which does not provide any habitat of value to threatened flora or fauna. Clearance of vegetation is restricted to non-native species (weeds).

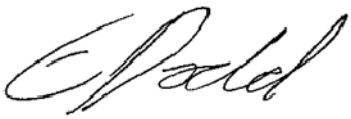
There is limited potential for vegetation around the periphery of the site to provide habitat for transient threatened species such as the Grey-headed Flying Fox. There will be no direct impacts to this habitat and any indirect impacts such as noise and light pollution are likely to be negligible, reflecting a continuation of the sites current use.

The proposal will not have any significant impacts on any threatened species listed under the EPBC or any other MNES.

As part of the statement of commitments for the previous EIS (EMM 2015) a series of water management controls were specified which are documented in an Environmental Management Plan (EMP). This control augments the existing drain and sediment controls to ensure that poor quality water is not discharged from site. This will prevent any impacts to the environs outside of the site.

It is recommended that weed control measures, including hygiene controls in vehicles and control of weeds on site, are added into the EMP. The frequent vehicle movements to and from the site have the potential to spread weeds offsite and two of the weeds species have wind borne seeds with the ability to disperse widely.

The results from the site inspection and desktop studies confirmed that the site, and in particular the additional stockpile area, does not include any native vegetation and by proxy does not include any EECs. Therefore the proposal is exempt from a BAR under Paragraph 3.3.1.3 of the FBA.



Yours sincerely

Eugene Dodd
Senior Ecologist
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References

Bionet, *Atlas of NSW Wildlife, Office of Environment and Heritage Online Search, completed 26/08/2016*

EMM 2016, *Mayfield West Recycling Facility Environmental Impact Statement,* prepared for Benedict Recycling facility

Hunter Wetlands Research and Management 1997, *Flora and Fauna Assessment for the Steel River Project, Tourle Street Mayfield*

NSW Biodiversity Offsets Policy for Major Projects 2014, Framework for Biodiversity Assessment, Office of Environment and Heritage.

Appendix M

Capital investment value

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10 October 2016

Benedict Recycling Pty Ltd

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NSW 2075

Attention – Ernest Dupere

Dear Sirs

Mayfield West Recycling Facility Expansion – Capital Investment Value

As requested we have included below our calculation of the Capital Investment Value of the above project. This calculation is in accordance with the definition of the CIV as per the Environmental Planning and Assessment Regulation 2000 and the update as of 7 May 2010 of the State Environmental Planning Policy Amendment (Capital Investment Value) 2010.

The figures below are exclusive of GST but include Design, Construction , Services, Plant and Equipment and Labour Costs for the proposed project:

Structures & Infrastructure (relocated fuel tank enclosure)	$45,000
Site Services	$0
Plant & Equipment – Hyundai HL760-9 Wheel Loader	$288,869
Design Fees	$60,000
Total as at October 2016 excl GST	**$393,869**

I trust this meets with your requirements, however, should you require further information please contact Alan Jenkins at the above address.

Yours faithfully,

Alan Jenkins AAIQS, ARICS

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