APPENDIX J

Air Quality and Odour Assessment

March 2016
Report No. 147628002

Pacific Environment Limited

Consulting • Technologies • Monitoring • Toxicology

Report

WETHERILL PARK RESOURCE RECOVERY FACILITY UPGRADE – ODOUR ASSESSMENT

GOLDER ASSOCIATES PTY LTD

Job ID. 20503

4 February 2016

PROJECT NAME:	Wetherill Park Resource Recovery Facility Upgrade – Odour Assessment
JOB ID:	20503
DOCUMENT CONTROL NUMBER	AQU-NW-004-20503
PREPARED FOR:	GOLDER ASSOCIATES PTY LTD
APPROVED FOR RELEASE BY:	Jane Barnett
DISCLAIMER & COPYRIGHT:	This report is subject to the copyright statement located at www.pacific-environment.com © Pacific Environment Operations Pty Ltd ABN 86 127 101 642

DOCUMENT CONTROL

VERSION	DATE	COMMENT	PREPARED BY	REVIEWED BY
01	21/09/2015	Draft	Li Fitzmaurice	Judith Cox
02	8/12/2015	Final draft	Li Fitzmaurice	Jane Barnett
03	16/12/2015	Final	Li Fitzmaurice	Jane Barnett
04	04/02/2015	Final with amendment	Li Fitzmaurice	Jane Barnett

Pacific Environment Operations Pty Ltd: ABN 86 127 101 642

BRISBANE
Level 1, 59 Melbourne Street, South Brisbane Qld 4101
PO Box 3306, South Brisbane Qld 4101
Ph: +61 7 3004 6400
Fax: +61 7 3844 5858

Unit 1, 22 Varley Street
Yeerongpilly, Qld 4105
Ph: +61 7 3004 6460

ADELAIDE
35 Edward Street, Norwood SA 5067
PO Box 3187, Norwood SA 5067
Ph: +61 8 8332 0960
Fax: +61 7 3844 5858

SYDNEY
Suite 1, Level 1, 146 Arthur Street
North Sydney, NSW 2060
Ph: +61 2 9870 0900
Fax: +61 2 9870 0999

MELBOURNE
Level 10, 224 Queen Street
Melbourne Vic 3000
Ph: +61 3 9036 2637
Fax: +61 2 9870 0999

PERTH
Level 1, Suite 3
34 Queen Street, Perth WA 6000
Ph: +61 8 9481 4961
Fax: +61 2 9870 0999

DISCLAIMER

Pacific Environment acts in all professional matters as a faithful advisor to the Client and exercises all reasonable skill and care in the provision of its professional services.

Reports are commissioned by and prepared for the exclusive use of the Client. They are subject to and issued in accordance with the agreement between the Client and Pacific Environment. Pacific Environment is not responsible for any liability and accepts no responsibility whatsoever arising from the misapplication or misinterpretation by third parties of the contents of its reports.

Except where expressly stated, Pacific Environment does not attempt to verify the accuracy, validity or comprehensiveness of any information supplied to Pacific Environment for its reports.

Reports cannot be copied or reproduced in whole or part for any purpose without the prior written agreement of Pacific Environment.

Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by the client or their nominees during the visit, visual observations and any subsequent discussions with regulatory authorities. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Pacific Environment is both complete and accurate. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s), unless explicitly stated otherwise.

CONTENTS

FIGURES

TABLES

1 INTRODUCTION

Pacific Environment has been commissioned by Golder Associates on behalf of SUEZ to conduct an odour assessment on the proposed upgrade to the Wetherill Park Resource Recovery Facility (WPRRF).

The WPRRF is located at 20 Davis Road, Wetherill Park, within the Fairfield Local Government Area (LGA). It consists of a purpose built facility to accept and process waste materials through on-site segregation and the transfer of material for alternative processing or disposal offsite. The facility provides a consolidation point for unsorted material collected from residential or commercial premises and from the public.

The WPRRF is one of eight waste transfer station facilities operated by SUEZ in the Sydney metropolitan area. Currently the WPRRF accepts 90,000 tonnes per annum (tpa) of non-putrescible waste and 10,000 tpa of putrescible waste.

SUEZ is seeking to obtain development consent to increase the licence capacity of the WPRRF from the existing 10,000 tpa of general solid waste (putrescible) to 140,000 tpa. There will be no increase to the non-putrescible waste.

The assessment is based on the use of the computer-based dispersion model (CALPUFF) to predict off site odour levels. To assess the effect that potential emissions could have on existing air quality, the dispersion model predictions have been compared to relevant regulatory air quality criteria.

The assessment follows a conventional approach using the procedures outlined in the NSW Environment Protection Authority's (EPA) document titled "Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW" (**EPA, 2005**). Other documents considered are the "Assessment and management of odour from stationary sources in NSW" (**EPA, 2006**).

In summary, this report provides information on the following:

- discussion of operations,
- discussion of air quality criteria,
- meteorological conditions in the area,
- emission sources and estimates of these emissions,
- methods used to predict off-site impact levels from expected emissions from the site, and
- expected dispersion patterns and predicted impacts.

2 PROJECT DESCRIPTION

The WPRRF is located within an industrial estate approximately 29 kilometres west of the Sydney CBD, with the land to the east and south zoned as "General Industry". Prospect Reservoir is located approximately 880 metres north of the site.

The Site currently accepts waste from both commercial and domestic site users, with the waste streams including municipal solid waste (putrescible), commercial & industrial waste, construction & demolition waste and garden organics.

The processing of waste is within a single large transfer station building. It has multiple doors for natural ventilation. A 1.5 m deep surge pit has been used for sorting and processing the waste. Some recyclables are removed and sorted by site plant, with the residual waste being pushed along the surge pit by a bulldozer, through a waste pit, into transfer trucks parked at a lower loading level for transportation.

The transfer station building is the predominant structure on the site and includes a workshop and administration facilities. In addition to this building, the site also contains a weighbridge and car parking area.

The site location is shown in **Figure 2.1.** An indicative proposed site layout is provided in **Appendix C**.

There are sensitive receptors located around the WPRRF, primarily north and east of the facility. The locations of sensitive receivers are presented in **Table 2.1**. The identified receptor locations are shown in **Figure 2.1**. These identified sensitive receptors represent nearby commercial properties to the east, north and north east. Residential properties are much further away (approximately 1.5 km) and are not considered in this assessment.

Table 2.1: Sensitive Receptors

Sensitive Receptor ID	UTM Zone 56 Easting (m)	UTM Zone 56 Northing (m)
R1	305403	6254043
R2	305466	6253940
R3	305502	6253943
R4	305542	6253941
R5	305595	6253942
R6	305637	6253945
R7	305607	6254033

The WPRRF receives putrescible waste from residents (councils) and commercial sources where it is sorted and transferred from the site. This activity takes place daily, with no waste left on site for more than 24 hours. WPRRF currently has approval to operate 24 hours a day, and 7 days a week.

The purpose of this assessment is to estimate the potential off-site odour caused by the acceptance of putrescible waste as outlined above.

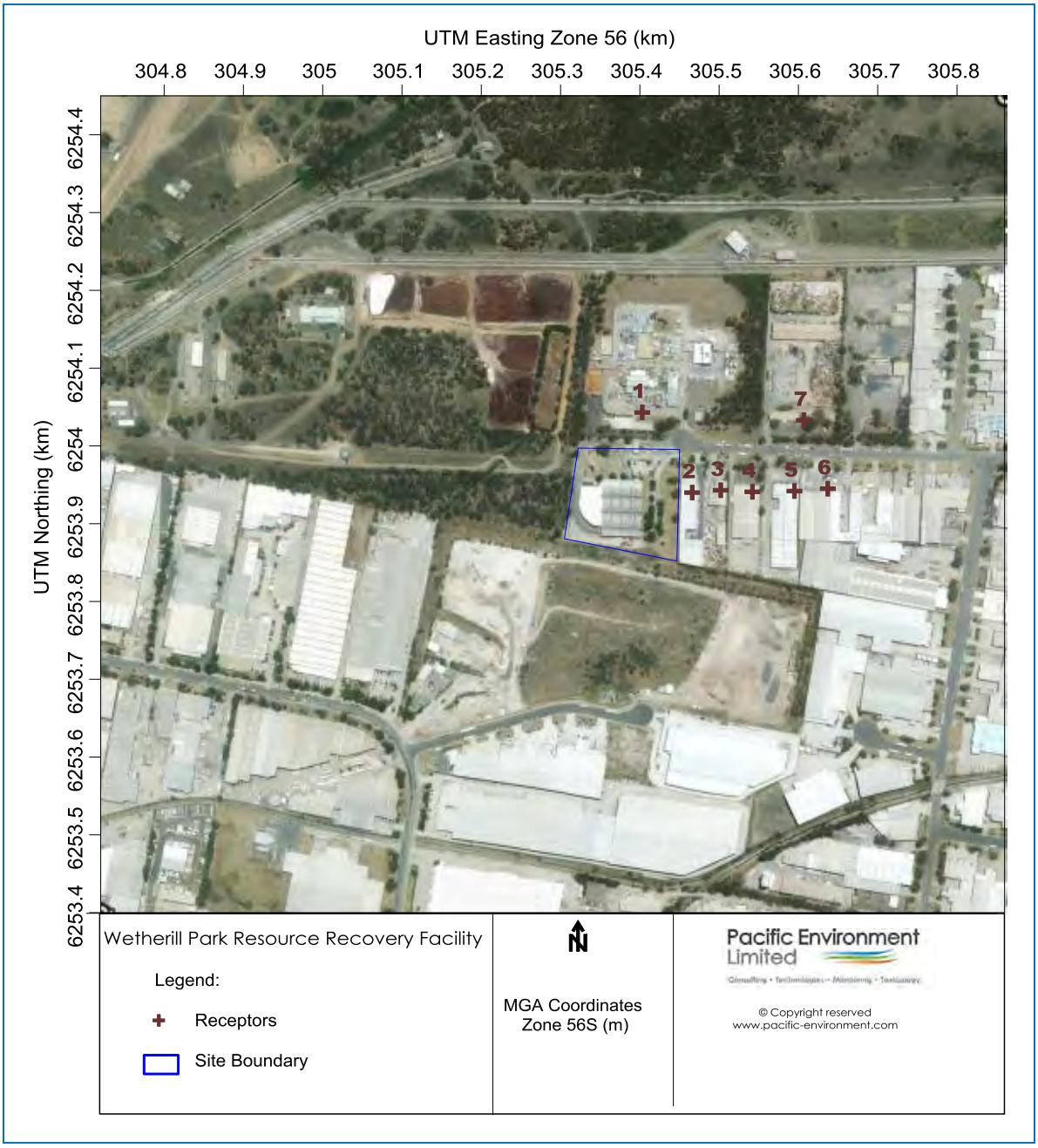


Figure 2.1: Location of the site and nearest sensitive receptors

3 DISCUSSION OF AIR QUALITY ISSUES

3.1 Odour Performance Criteria

3.1.1 Introduction

The determination of air quality goals for odour and their use in the assessment of odour impacts is recognised as a difficult topic in air pollution science. The topic has received considerable attention in recent years and the procedures for assessing odour impacts using dispersion models have been refined considerably. There is still considerable debate in the scientific community about appropriate odour goals as determined by dispersion modelling.

The NSW Environment Protection Authority (NSW EPA) has developed odour goals and the way in which they should be applied with dispersion models to assess the likelihood of nuisance impact arising from the emission of odour.

There are two factors that need to be considered:

1. What "level of exposure" to odour is considered acceptable to meet current community standards in NSW and
2. How can dispersion models be used to determine if a source of odour meets the goals which are based on this acceptable level of exposure

The term "level of exposure" has been used to reflect the fact that odour impacts are determined by several factors the most important of which are (the so-called **FIDOL** factors):

- the **F**requency of the exposure
- the **I**ntensity of the odour
- the **D**uration of the odour episodes
- the **O**ffensiveness of the odour
- the **L**ocation of the source

In determining the offensiveness of an odour it needs to be recognised that for most odours the context in which an odour is perceived is also relevant. Some odours, for example the smell of sewage, hydrogen sulfide, butyric acid, landfill gas etc., are likely to be judged offensive regardless of the context in which they occur. Other odours such as the smell of jet fuel may be acceptable at an airport, but not in a house, and diesel exhaust may be acceptable near a busy road, but not in a restaurant.

In summary, whether or not an individual considers an odour to be a nuisance will depend on the FIDOL factors outlined above and although it is possible to derive formulae for assessing odour annoyance in a community, the response of any individual to an odour is still unpredictable. Odour goals need to take account of these factors.

3.1.2 Complex Mixture of Odorous Air Pollutants

The "Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW" (**EPA, 2005**) include ground-level concentration (glc) criterion for complex mixtures of odorous air pollutants. They have been refined by the NSW EPA to take account of population density in the area. **Table 3.1** lists the odour criterion to be exceeded not more than 1% of the time, for different population densities.

The difference between odour goals is based on considerations of risk of odour impact rather than differences in odour acceptability between urban and rural areas. For a given odour level there will be a wide range of responses in the population exposed to the odour. In a densely populated area there

will therefore be a greater risk that some individuals within the community will find the odour unacceptable than in a sparsely populated area.

Based on the population density of the surrounding area, the impact assessment criterion of 2 OU (at the 99th percentile; **EPA, 2005**) has been applied for this assessment.

Table 3.1: Odour Performance Criteria for the Assessment of Odour

Population of affected community	Criteria for complex mixtures of odour (OU)
≤ ~2	7
~10	6
~30	5
~125	4
~500	3
Urban (>2000) and/or schools and hospitals	2

3.2 Peak-to-Mean Ratios

It is common practice to use dispersion models to determine compliance with odour goals. This introduces a complication because Gaussian dispersion models directly predict concentrations over an averaging period of 3-minutes or greater. The human nose, however, responds to odours over periods of the order of a second or so. During a 3-minute period, odour levels can fluctuate significantly above and below the mean depending on the nature of the source.

To determine more rigorously the ratio between the one-second peak concentrations and 3-minute and longer period average concentrations (referred to as the peak-to-mean ratio) that might be predicted by a Gaussian dispersion model, the EPA commissioned a study by **Katestone Scientific Pty Ltd (1995, 1998)**. This study recommended peak-to-mean ratios for a range of variables, such as source type, receptor distance, stability class, and stack height (for point sources).

A summary of the factors for determining peak-to-mean ratios is provided in **Appendix A**.

For this project, the sources were modelled as volume sources as the emissions would come off the waste transfer building via doors and windows. A peak to mean ratio of 2.3 was used.

Note that the Approved Methods take account of this peaking factor and the goals shown in **Table 3.1** are based on nose-response time.

3.3 Dust Generation Potential

Dust generation is not anticipated to be a significant issue in terms of air quality for the following reasons:

- onsite roads are sealed;
- the tipping of material and material handling occurs inside a building, with dust and odour suppression system in use; and
- exposed area subject to wind erosion are limited.

Therefore quantitative dust assessment is not required for this project.

4 LEVELS OF ODOUR ASSESSMENT

Odour is arguably the most widespread and complex local air pollution problem in Australia. It often accounts for the majority of complaints received by environmental authorities and can be a major source of annoyance and stress in affected communities.

In November 2006, the EPA released two guidance documents: Technical framework for the Assessment and Management of Odour from Stationary Sources in NSW and its associated Technical notes for the Assessment and Management of Odour from Stationary Sources in NSW. Those documents outline the EPA's proposed approach for the assessment of odour emissions, using a three-level system of odour assessment of increasing complexity and detail. For this assessment, a Level 2 assessment is required. The only difference between a Level 2 and Level 3 assessment is the use of site-specific odour emissions. For this project, odour emission rates measured at similar sites have been used.

- Level 1 is a screening-level technique based on generic parameters for the type of activity and site. It requires minimal data and uses simple equations to provide a broad estimate of the extent of any odour impact. It may be used to identify the potentially affected zone and site suitability for a proposed facility or new neighbouring development or expansion of an existing facility.
- Level 2 is a screening-level dispersion modelling technique, using worst-case input data (rather than site-specific data). It is more rigorous and more realistic than a Level 1 assessment. It may be used to assess site suitability and odour mitigation measures for new, modified or existing activities.
- Level 3 is a refined-level dispersion modelling technique using site-specific input data. This is the most comprehensive and most realistic level of assessment available. It may be used to assess site suitability and odour mitigation measures for new, modified or existing activities.

5 METHODOLOGY

5.1 Approach to Assessment

The overall approach to the assessment follows the "Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales" (**EPA, 2005**), hereafter referred to as the Approved Methods. The Approved Methods specify how assessments based on the use of air dispersion models should be completed. They include guidelines for the preparation of meteorological data to be used in dispersion models and the relevant air quality criteria for assessing the significance of predicted concentration and deposition rates from the Project.

The air dispersion modelling conducted for this assessment is based on an advanced modelling system using the models TAPM and CALMET/CALPUFF.

The modelling system works as follows:

- The Air Pollution Model, or TAPM, is a prognostic meteorological model that generates gridded three-dimensional meteorological data[a] for each hour of the model run period based on historical global meteorological data. The model predicts airflow important to local scale air pollution, such as sea breezes and terrain induced flows, against a background of larger scale meteorology provided by synoptic analyses. TAPM was developed by the CSIRO Division of Atmospheric Research. Detailed description of the TAPM model and its performance is provided in **Hurley (2008)** and **Hurley and Edwards et al (2008)**.
- CALMET, the meteorological pre-processor for the dispersion model CALPUFF, calculates fine resolution three-dimensional meteorological data based upon input data of observed ground and upper level meteorological data, as well as modelled meteorological data generated for example by TAPM.

  CALMET includes an objective analysis and parameterised treatments of slope flows, terrain effects and terrain blocking effects. It produces fields of wind components, air temperature, relative humidity, mixing height and other micro-meteorological variables to produce the three-dimensional meteorological fields that are utilised in the CALPUFF dispersion model (i.e. the CALPUFF dispersion model requires meteorological data in three dimensions). CALMET uses the meteorological inputs in combination with land use and geophysical information for the modelling domain to predict gridded meteorological fields for the region.

- CALPUFF then calculates the dispersion of plumes within this three-dimensional meteorological field. It is a multi-layer, multi species, non-steady-state puff dispersion modelb that can simulate the effects of time-varying and space-varying meteorological conditions on pollutant transport, transformation and removal. The model contains algorithms for near-source effects such as building downwash, partial plume penetration, sub-grid scale interactions as well as longer range effects such as pollutant removal, chemical transformation, vertical wind shear and coastal interaction effects. The model employs dispersion equations based on a Gaussian distribution of pollutants across released puffs and takes into account the complex arrangement of emissions from point, area, volume and line sources (**Scire et al., 2000**).

CALMET/CALPUFF is endorsed by the US EPA and recommended by the NSW EPA for use in complex terrain and non-steady state conditions (that is, conditions that change in time and space).

[a] TAPM also has a dispersion modelling component, but generally not used for single source assessment.

[b] Gaussian plume models are considered steady-state because the plume equation is independent of time, that is, dispersion from the source to receptor is instantaneous for each hour of meteorological data. CALPUFF however, 'remembers' the plume from the previous hour taking into account residual concentrations at each grid point from the hours before and is therefore non-steady-state.

5.2 Model Specifications

Surface weather data for CALMET was sourced from two Bureau of Meteorology weather stations. The Horsley Park weather station is approximately 4 km south west of the project, and the Bankstown Airport station is 13 km south east. Surface data include wind speed, wind direction, temperature, relative humidity, sea-level pressure and cloud heights and cloud amounts. These data were obtained from Bureau of Meteorology as 1-minute data and they were processed into hourly averages. The missing data in hourly averages were then filled before being used by CALMET.

TAPM was modelled to provide upper air data for CALMET.

One recent year of meteorology, 2013, was modelled for this project to represent various seasonal and diurnal weather conditions experienced at the project location. Based on climate statistics, this year had typical meteorology for the location[c].

5.2.1 TAPM Setup

TAPM was setup with four domains, composed of 33 grids along both the x and the y axes, centred on the project. The domains had a grid resolution of 30 km, 10 km, 3 km and 1 km respectively. From the inner most domain output, upper air data was extracted at the centre of the domain, to be used for CALMET input.

5.2.2 CALMET Setup

CALMET was set up using the "observation only" option, driven only by TAPM upper air data and surface weather observations.

It was modelled with a horizontal domain size of 10 km x 10 km, with a fine resolution of 100 m to resolve localised wind conditions. The project site was located in the model of the domain. Vertical cell face heights are 0, 20, 40, 80, 160, 320, 640, 1280, 2500, and 3600 m. They are dense near the surface to better represent the meteorology in lower atmosphere, where the emissions are to be dispersed and receptors are located.

High resolution of terrain and land use data were used for CALMET. The terrain data was produced from Shuttle Radar Topography Mission (SRTM) data, and land use from Australian Collaborative Land Use and Management Program (ACLUMP) data. SRTM data has a resolution of approximately 90 m. ACLUMP data has fine resolution for the project area.

5.2.3 CALPUFF Setup

CALPUFF is the dispersion module of the CALMET/CALPUFF suite of models. It is a multi-layer, multi species, non-steady-state puff dispersion model[d] that can simulate the effects of time-varying and space-varying meteorological conditions on pollutant transport, transformation and removal. The model contains algorithms for near-source effects such as building downwash, partial plume penetration, sub-grid scale interactions as well as longer range effects such as pollutant removal, chemical transformation, vertical wind shear and coastal interaction effects. The model employs dispersion equations based on a Gaussian distribution of pollutants across released puffs and takes into account the complex arrangement of emissions from point, area, volume and line sources (**Scire *et al.*, 2000**).

[c] http://www.bom.gov.au/climate/data/

[d] Gaussian plume models are considered steady-state because the plume equation is independent of time, that is, dispersion from the source to receptor is instantaneous for each hour of meteorological data. CALPUFF however, 'remembers' the plume from the previous hour taking into account residual concentrations at each grid point from the hours before and is therefore non-steady-state.

Odour generating sources in this assessment were represented by volume sources. Model predictions were made across the domain at gridded receptors with a nesting factor of 3 (equivalent of at a spacing of 33.3 m x 33.3 m), as well as at seven discrete receptors representing nearby commercial properties to the east, north and north east. The locations of the discrete receptors are presented in **Section 2**.

6 METEOROLOGY

To examine the meteorology for the project location, a set of time series data were extracted from the CALMET output at the project location. These data were analysed and presented below.

6.1 Wind Speed and Directions

Wind speed and direction are highly important for plume dispersion. Wind direction dictates the direction in which the plume travels. Thus, over a long period, the temporal variation of wind directions determines the spatial pattern of average ground level concentrations. Wind speed influences the initial dilution of the plume as it leaves the source, with higher wind speeds generally resulting in lower plume concentrations.

The wind roses show the frequency of occurrence of winds by direction and strength. Some guidance on the interpretation of wind roses is presented in **Appendix B**. Wind speed and direction data were extracted from the CALMET generated wind field at the WWTP location and are presented as annual and seasonal wind roses in **Figure 6.1**.

On an annual basis, the predominant direction is southwest. Seasonal wind roses show strong seasonal variations in predominant wind directions: south easterlies for summer, and south westerlies for all other seasons.

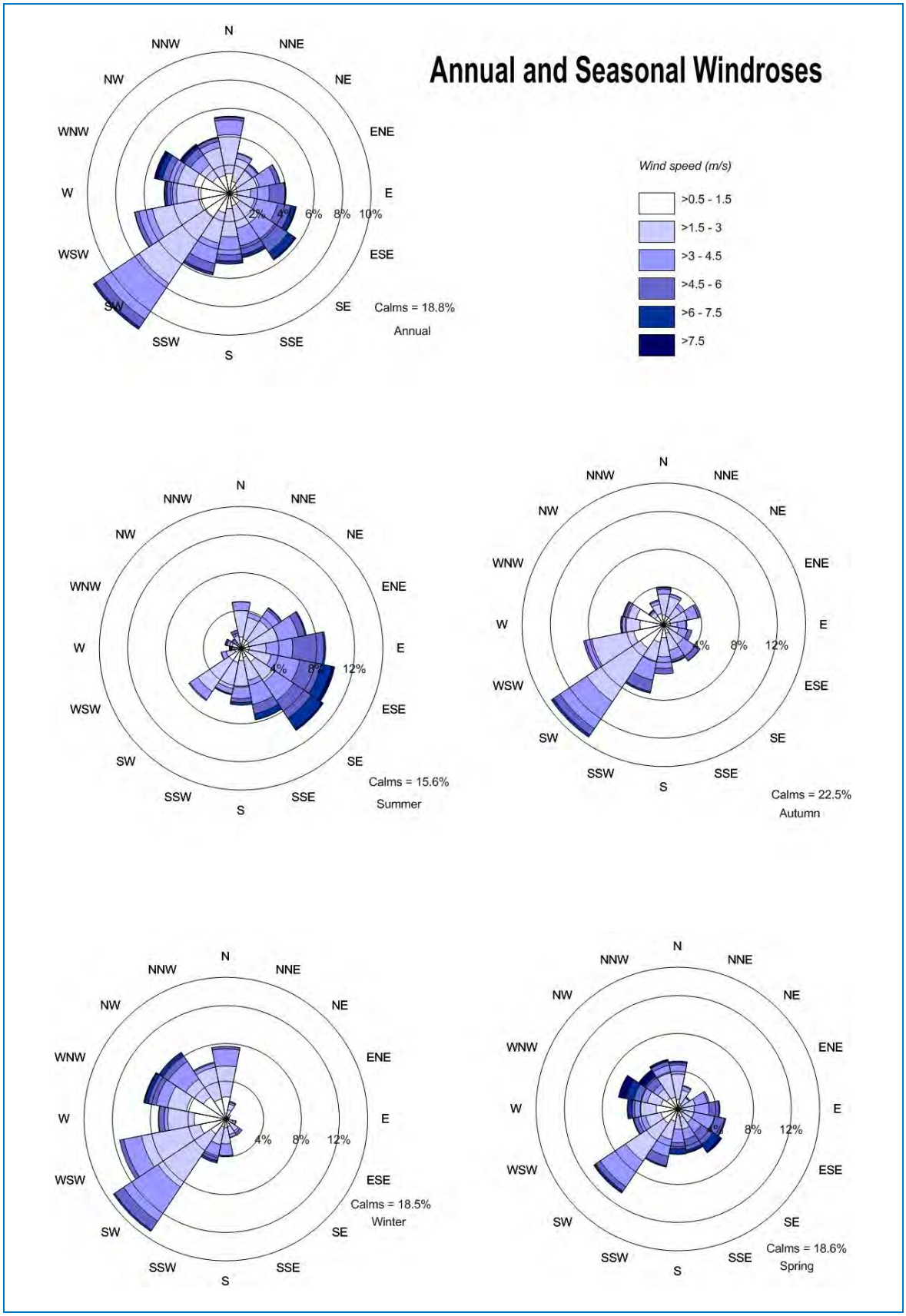


Figure 6.1: Annual and seasonal wind roses for the project site for 2013 (CALMET extract)

6.2 Atmospheric Stability

Atmospheric turbulence is an important factor in plume dispersion. Turbulence acts to increase the cross-sectional area of the plume due to random motions, thus diluting or diffusing a plume. As turbulence increases, the rate of plume dilution or diffusion increases. Weak turbulence limits plume diffusion and is a critical factor in causing high plume concentrations downwind of a source, particularly when combined with very low wind speeds.

Turbulence is related to the vertical temperature gradient, the condition of which determines what is known as stability, or thermal stability. For traditional dispersion modelling using Gaussian plume models, categories of atmospheric stability are used in conjunction with other meteorological data to describe atmospheric conditions and thus dispersion.

The most well-known stability classification is the Pasquill-Gifford scheme, which denotes stability classes from A to F. Class A is described as highly unstable and occurs in association with strong surface heating and light winds, leading to intense convective turbulence and much enhanced plume dilution. At the other extreme, class F denotes very stable conditions associated with strong temperature inversions and light winds, which commonly occur under clear skies at night and in early mornings. Under these conditions plumes can remain relatively undiluted for considerable distances downwind.

Intermediate stability classes grade from moderately unstable (B), through neutral (D) to slightly stable (E). Whilst classes A and F are strongly associated with clear skies, class D is linked to windy and/or cloudy weather, and short periods around sunset and sunrise when surface heating or cooling is small. As a general rule, unstable (or convective) conditions dominate during the daytime and stable flows are dominant at night. This diurnal pattern is most pronounced when there is relatively little cloud cover and light to moderate winds.

The CALMET-generated meteorological data can be used to estimate stability classes and the frequency distribution of estimated stability classes is presented in **Figure 6.2**. The data show a high proportion of neutral conditions (39% D-class) and lower but similar proportion of stable conditions (33% E and F-class).

It is noted that a turbulence based scheme within CALPUFF was used in the modelling and the P-G stability class frequency is shown for information only. The use of turbulence based dispersion coefficients is recommended (**TRC, 2010**) and the US EPA has replaced P-G-based dispersion with a turbulence-based approach in their regulatory model (AERMOD) and is in accordance with best science practice and model evaluation studies.

6.3 Mixing Height

Mixing height is the depth of the atmospheric mixing layer near the surface. It is beneath an elevated temperature inversion layer. It is an important parameter in air pollution meteorology as vertical diffusion or mixing of a plume is generally considered to be limited by the mixing height. This is because the air above this layer tends to be stable, with restricted vertical motions.

The estimated diurnal variation of mixing height at the site is presented in **Figure 6.3**. The diurnal cycle is clear in this figure. At night, mixing height is normally relatively low. After sunrise, it increases in response to convective mixing due to solar heating of the earth's surface. The estimated mixing height behaviour is consistent with expectations.

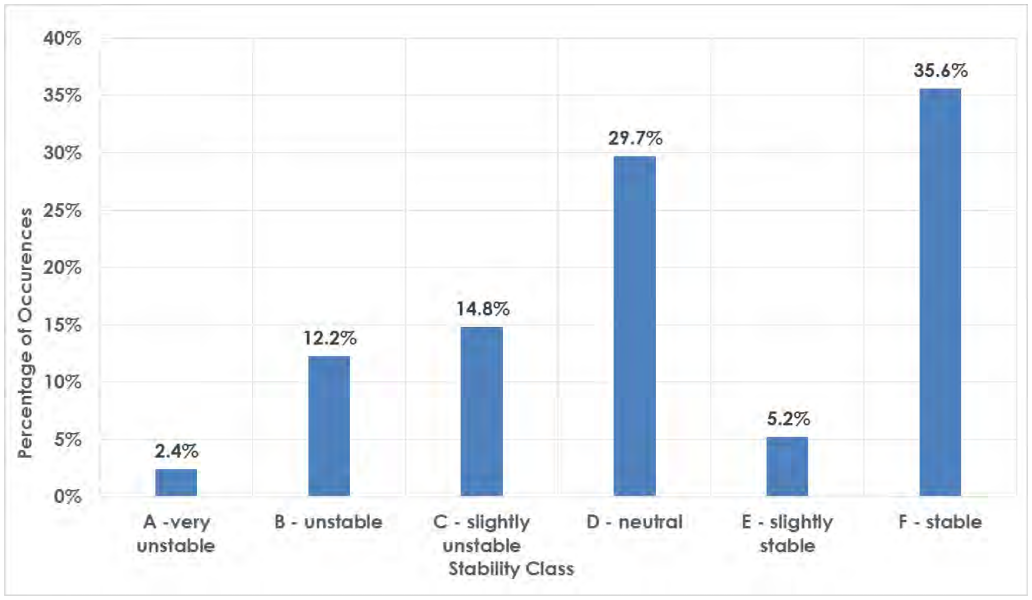


Figure 6.2 Stability class summary data

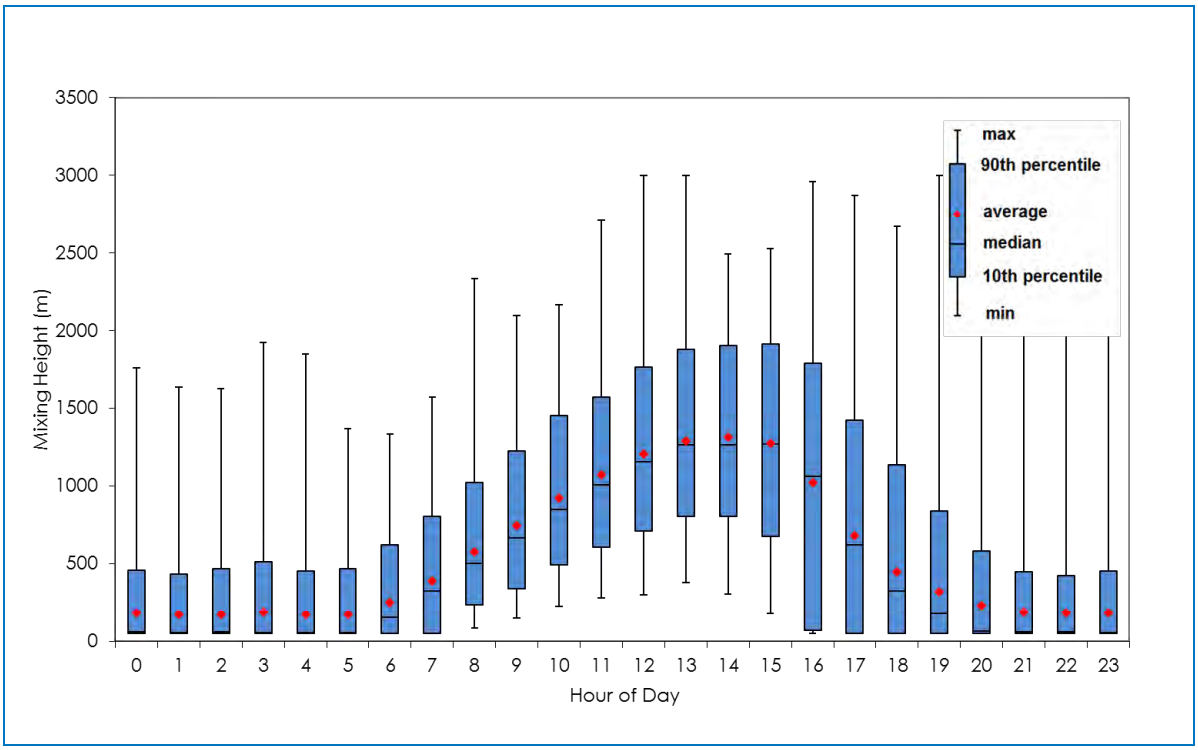


Figure 6.3 Mixing height vs. hour of day

7 EMISSION ESTIMATION

7.1 Modelling scenarios

Two scenarios have been modelled in this assessment. These are:

- Existing – Current operations of the WPRRF
- Future – Proposed operations of the WPRRF

7.2 Emission sources

The odour emission sources identified are the areas within the pit and in the transfer station building for waste processing.

To estimate emissions, the exposed waste area of the pit was calculated by Golder/SUEZ as below:

Inputs:

- Annual total waste allowable waste tonnage:

  Existing: 100 tpa total waste (10 tpa putrescible – 10%)

  Future: 230 tpa total waste (140 tpa putrescible – 61%)

- Density of waste (mix of putrescible and non-putrescible, somewhat compacted in pit): This could possibly range from 0.7 – 1 t/m^3 (EPA, 2015). Conservatively assume 0.7 t/m^3 for this assessment.
- Pit depth = 1.5 m
- Maximum time waste resides on site = 1 day

Calculations of Existing scenario:

- Annual volume: V = 100,000 tpa / 0.7 t/m^3 = 142,857 m^3
- Daily volume: 142,857 m^3/365 = 391 m^3
- Assume half of the waste is transferred to waste trucks: Daily max volume in pit = 200 m^3
- Area of waste in pit: 200 m^3 / 1.5m = 130 m^2

Calculations of Future scenario:

- Annual volume: V = 230,000 tpa / 0.7 t/m^3 = 328,571 m^3
- Daily volume: 328,571 m^3/365 = 900 m^3
- Assume half of the waste is transferred to waste trucks: Daily max volume in pit = 450 m^3
- Area of waste in pit: 450 m^3 / 1.5m = 300 m^2

7.3 Emission rates

Odour emission rates from area sources are probably the most difficult to measure for a variety of reasons. Firstly the source is often heterogeneous; secondly, unlike stack emissions, it is difficult to measure the volumetric flow of the odour. Lastly, there are uncertainties associated with olfactometry laboratory testing. These add another level of complexity to odour assessments.

To estimate the emissions at the WPRRF, odour emission rates have been sourced from the recent odour sampling data at landfills and recycling facilities in NSW and neighbour states, sampled over fresh waste. These sources are considered comparable to this project.

With area sources of emissions such as landfills there are several possible ways to determine emission rates but unfortunately the different methods return vastly different values. It is generally difficult to reconcile the differences and the most reliable approach is to rely on data that have been generated from isolation flux hood or flux chamber sampling of the emitting surfaces, in line with Australian Standard 4323.4 'Stationary source emissions - Area source sampling – Flux chamber technique'.

An isolation flux hood is a device that imposes an artificial condition over the emitting surface, which is normally exposed to the ambient conditions of wind and other elements that lead to variations in emission rate. The flow conditions inside a flux hood result in emission rates similar to those in stable, light wind conditions in the real world. These tend to be the critical conditions for determining odour impacts from area sources and so the flux rates from flux hood sampling are the most appropriate to use for this purpose. For this assessment, the area sources are located within a building and therefore the wind speed over the surface would be light, and thus it is appropriate to use isolation flux hood measurement.

Reports by SLR (2012) and Golder Associates (2012), and those produced in house were reviewed to evaluate data on odour emissions. Those from fresh mixed waste streams (putrescible and non-putrescible) that were measured by isolation flux hood and laboratory tested with dynamic olfactometry were evaluated. Recent measurement results were summarised in **Table 7.1**. Data measured in the earlier years were not included as the Australian Standard 4323.3 'Stationary source emissions - Part 3: Determination of odour concentration by dynamic olfactometry" was established at 2001 and the Australian Standard 4323.4 was established in 2009.

Table 7.1: Summary of Odour Measurement Data from Fresh Mixed Waste Streams

(for specific odour emission rate, which is odour emission rate per square meter of exposed surface area)

Measured Specific Odour Emission Rate ($OU.m^3/m^2/s$)			
Location	**Emission Rate**	**References**	**Note**
Lucas Heights	1.56, and 2.54	Holmes Air Sciences* 2006	Two samples were taken, with an average of 2.05
Eastern Creek	1.91, 0.36 and 3.65	PAEHolmes* 2010	Three samples were taken, with an average of 1.97
Woodlawn	0.70	SLR 2012 (referencing URS 2010)	-
Spring Farm	0.325 and 0.424	Pacific Environment* 2014	Two samples, with the higher value reported
Whyte Gully	1.115	PAEHolmes* 2012	One sample
Nambour	2.6	Golder 2012 (referencing Katestone Environmental, 2007)	-

* PAEHolmes and Holmes Air Sciences were previous names for Pacific Environment.

The variations of odour measurement data in the above table reflect both site differences and the heterogeneous nature of a landfill tipping face.

Based on these data in **Table 7.1**, it was determined to use the following specific odour emission rates for this assessment:

- 3.65 $ou.m^3/m^2/s$, for odour emission rates over putrescible waste, and
- 0.36 $ou.m^3/m^2/s$, for odour emission rates over non-putrescible waste.

These values should be both conservative as the maximum value in **Table 7.1** was used for putrescible waste. For the non-putrescible waste, odour emissions are generally considered to be negligible; therefore an emission rate of 0.36 $ou.m^3/m^2/s$ should be conservative.

The estimated odour emission rates for this assessment are listed in **Table 7.2.** In this table, the exposed area for putrescible waste was calculated as the total waste area multiplied by the percentage of waste that is putrescible. The same method is used to calculate exposed area for non-putrescible waste.

Table 7.2: Estimated Odour Emission Rates

Source	Specific odour emission rate ($ou.m^3/m^2/s$)	Exposed Area (m^2)	Total Emission ($ou.m^3/s$)
Existing WPRRF			
Pit area for processing putrescible waste	3.65	130 X 0.1 = 13	47
Pit area for processing non-putrescible waste	0.36	130 X 0.9 = 117	42
Future WPRRF			
Pit area for processing putrescible waste	3.65	300 X 0.61 = 183	667
Pit area for processing non-putrescible waste	0.36	300 X 0.39 = 117	42

7.4 Operating Hours

The WPRRF has approval to operate 24 hours a day, and 7 days a week.

In the modelling assessment, constant emissions were assumed 24 hours a day, and 7 days a week for both existing and future scenarios.

8 ASSESSMENT RESULTS

Modelling results are presented for the existing and the proposed upgrade to the WPRRF. Ground level concentrations resulting from the odorous emission sources have been estimated around the facility.

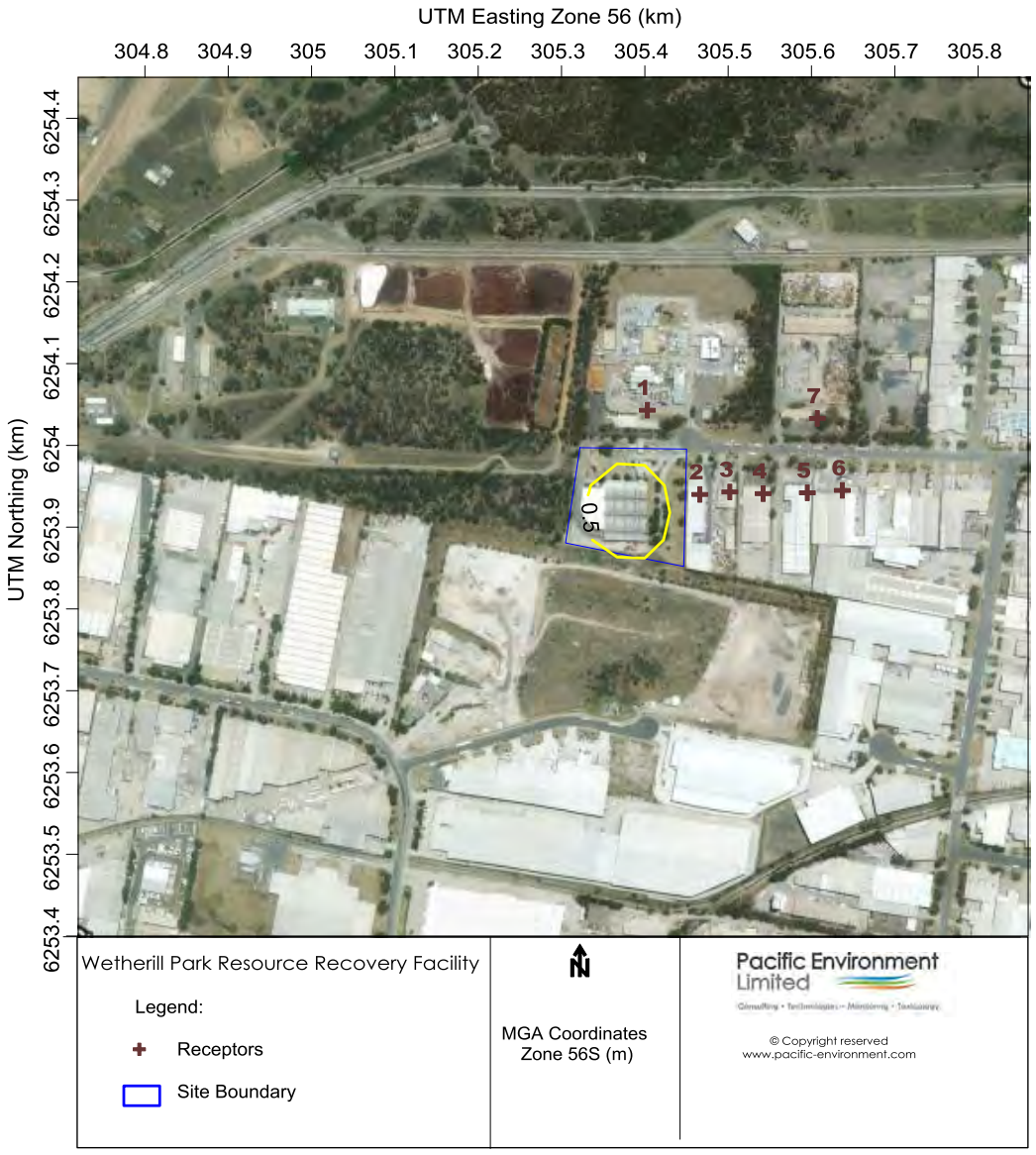
The predicted results for the sensitive receptors for the existing and future scenarios are presented in **Table 8.1**.

Table 8.1: Dispersion Modelling Results at the Sensitive Receptors

Residence ID	Existing operations	Future operations
R1	< 1	1
R2	< 1	2
R3	< 1	1
R4	< 1	1
R5	< 1	1
R6	< 1	< 1
R7	< 1	1

NOTE: [1] 99th percentile, 1-second nose response

Figure 8.1 presents the predicted 99th percentile ground level odour concentrations due to existing operations. It shows compliance with most stringent EPA criterion of 2 OU (99th percentile).



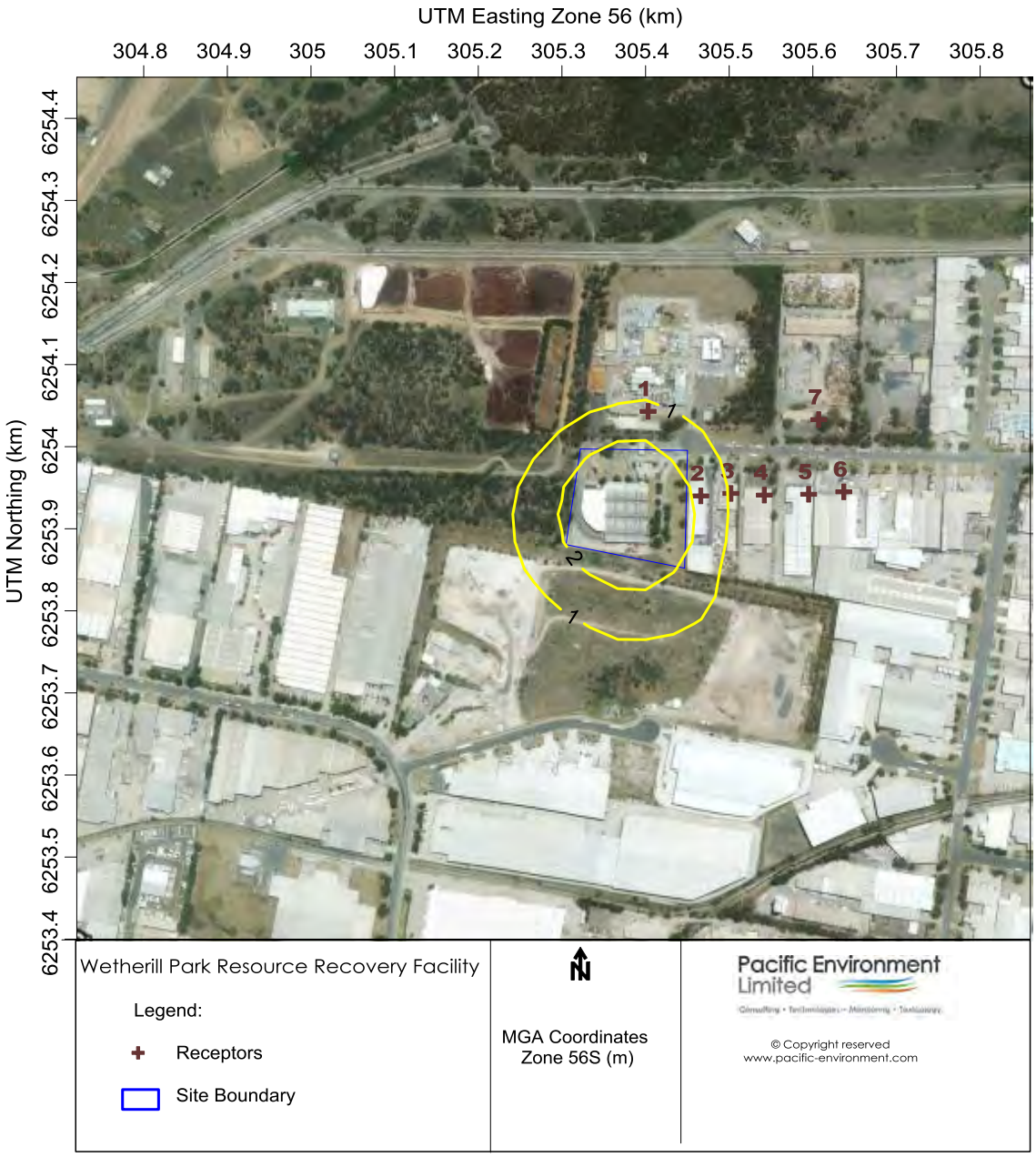
Species: Odour	**Averaging Time:** 1-hour (peak to mean adjusted)	**Percentile:** 99th	**Scenario:** Existing	**Location:** Wetherill
Model Used: CALPUFF v6.42	**Units:** OU	**Criterion:** 2	**Met Data:** 2013 (CALMET)	**Plot:** L Fitzmaurice

Figure 8.1: Predicted 99th percentile odour concentrations for existing operations (OU)

Figure 8.2 presents the 99th percentile odour concentrations predicted for the proposed operations. No sensitive receptors are predicted to exceed the most stringent EPA odour criterion of 2 OU.

The results show that receptor 2, immediately adjacent to the project site on the east side, is potentially the most impacted from this proposal. However, odour levels are not predicted to exceed the EPA criterion at this location. In addition, a solid high wall separates the facility from this receptor. This has not been included in the model, but the effect of this wall may help to further reduce impacts at these receptors.

As a conservative assessment, the model output has not incorporated the management strategies currently in practice at the facility, including dust and odour suppression system. With these considerations in place the impact at receptor 2 is likely to be further reduced.



Species: Odour	**Averaging Time:** 1-hour (peak to mean adjusted)	**Percentile:** 99th	**Scenario:** Future	**Location:** Wetherill
Model Used: CALPUFF v6.42	**Units:** OU	**Criterion:** 2	**Met Data:** 2013 (CALMET)	**Plot:** L Fitzmaurice

Figure 8.2: Predicted 99th percentile odour concentrations for future operations

9 MITIGATION MEASURES

A number of control measures are proposed to ensure that the potential for any odour and dust impacts off-site are minimal. These controls include:

- Continuing existing operation of the dust and odour suppression system;
- No waste will be left on site for more than 24 hours;
- Traffic management procedures to co-ordinate the delivery schedule and avoid a queue of the incoming or outgoing trucks for extended periods of time;
- Spill management procedures to include immediate cleaning up of any spill/leakage from incoming and outgoing trucks;
- Maintaining an odour complaint logbook and in the event of a complaint immediately investigate any unusual odour sources (including spill or leakage in the traffic areas) within the site boundary and take appropriate action to eliminate these;
- Reviewing operational practices and management plans regularly and training of relevant staff regarding waste handling and transfer.

It should also be noted that the dispersion modelling has not taken into account the use of these control measures and it is likely that the predicted impacts have overstated the potential impact from the site. Most of these measures have already been implemented in the existing operation.

10 CONCLUSIONS

Pacific Environment has completed an odour assessment for the proposed upgrade to the Wetherill Resource Recovery Facility (WPRRF).

The assessment modelled both the current operations and the proposed future operations at the site to represent the potential odour impacts would have on nearby commercial properties. The residential properties are much further away and hence won't be impacted by the WPRRF.

For the current operation, the dispersion modelling predicted odour concentrations far below the relevant odour assessment criterion at nearby commercial properties. This is supported by the fact that the site has not received any odour complaints since 2011.

For the future operation, the modelling assessment predicted no exceedances at the nearby commercial properties.

The model predictions show that receptor 2, next to the project site on the east side, is most impacted from this proposal due to prevailing winds and proximity to the sources. The predictions are conservative as the model has not included any of the existing odour controls and the presence of a high blocking wall separating the WPRRF from this receptor.

11 REFERENCES

EPA (2005), "Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales". NSW Department of Environment & Conservation. Sydney.

EPA (2006), "Assessment and management of odour from stationary sources in NSW", Technical Framework. NSW Department of Environment & Conservation. Sydney.

EPA (2015), "Waste Levy Guidelines", version 2. NSW Environment Protection Authority, Sydney.

Golder Associates (2012), "Hanson Landfill and Quarry Risk Assessment".

Holmes Air Sciences (2006), "Odour Audit: Lucas Heights Waste & Recycling Centre".

Hurley, P. (2008) "The Air Pollution Model (TAPM) Version 4. Part 1, Technical Description", CSIRO Atmospheric Research Technical Paper No. 25, CSIRO Division of Atmospheric Research, Melbourne.

Hurley, P., Physick, W.L., Luhar, A.K. & Edwards M. (2008) "The Air Pollution Model (TAPM) Version 4. Part 2: Summary of Some Verification Studies", CSIRO Atmospheric Research Technical Paper No. 26, CSIRO Division of Atmospheric Research, Melbourne.

Katestone Scientific Pty Ltd (1995), "The evaluation of peak-to-mean ratios for odour assessments" Volume 1 - Main Report, May 1995.

Katestone Scientific (1998), "Report from Katestone Scientific to Environment Protection Authority of NSW, Peak to Mean Ratios for Odour Assessments".

PAEHolmes (2010), "Air quality assessment – odour and dust: proposed modification to the northern extension landfill at Eastern Creek".

PAEHolmes (2012), "Air quality assessment – Whytes Gully new landfill cell".

Pacific Environment (2014), "Spring Farm residential development P700-P800 level 3 odour impact assessment".

Scire, J.S., Strimaitis, D.G. & Yamartino, R.J. (2000) A User's Guide for the CALPUFF Dispersion Model (Version 5), Earth Tech, Inc., Concord.

SLR (2012). Air Quality and Greenhouse Gas Assessment, Proposed Landfill, Boundary Road, Dromana.

Appendix A PEAK TO MEAN RATIOS

Table A.1: Factors for Estimating Peak Concentration

Source Type	Pasquill-Gifford stability class	Near field P/M60*	Far field P/M60
Area	A, B, C, D	2.5	2.3
	E, F	2.3	1.9
Line	A – F	6	6
Surface point	A, B, C	12	4
	D, E, F	25	7
Tall wake-free point	A, B, C	17	3
	D, E, F	35	6
Wake-affected point	A – F	2.3	2.3
Volume	A – F	2.3	2.3

*Ratio of peak 1-second average concentrations to mean 1-hour average concentrations

Appendix B INTERPRETATION OF A WIND ROSE

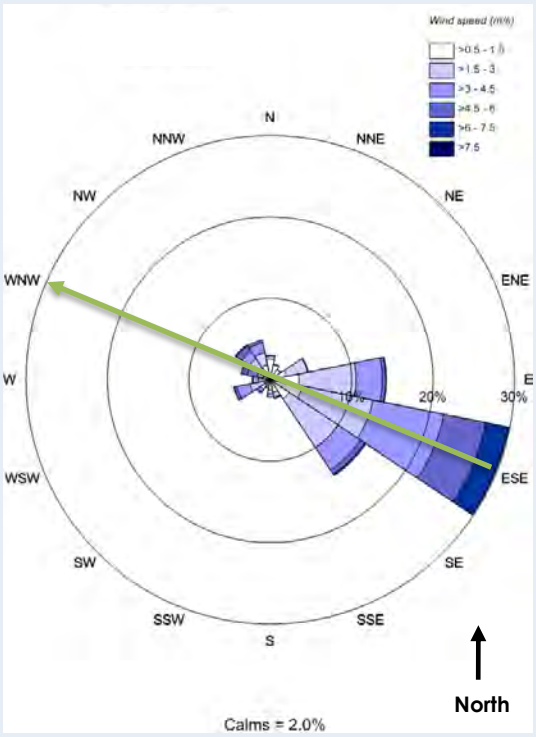
How to read a wind rose

A wind rose shows the frequency of occurrence of winds by direction and strength, presented as 16 bars that correspond to the compass points (N, NNE, NE, etc). The length of each bar represents the frequency of occurrence of winds from that direction, and the colours of the bar sections correspond to wind speed categories, the darker colours representing stronger winds.

In this example, 30% of winds are from the ESE direction, and the winds from this direction have the following speed distribution:

- 10% between 1.5 m/s and 3 m/s
- 10% between 3 m/s and 4.5 m/s
- 7% between 4.5 m/s and 6 m/s
- 3% between 6 m/s and 7.5 m/s

Predominant wind direction



Appendix C PROPOSED SITE PLAN

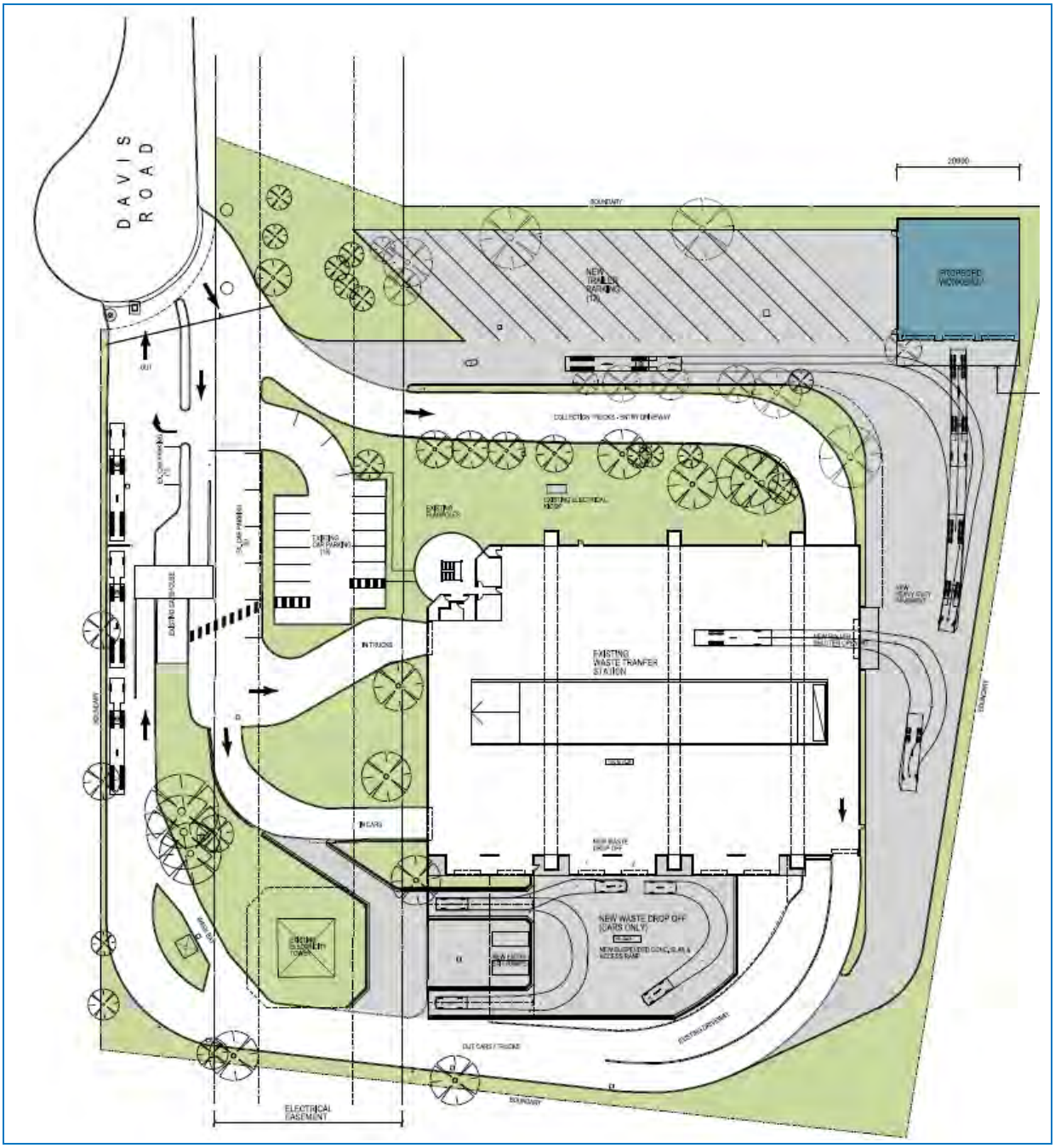


Figure C.1 Proposed Site Plan

APPENDIX K

Traffic and Transport Assessment

peopletrans

Wetherill Park Resource Recovery Park

Transport Impact Assessment

peopletrans

Wetherill Park Resource Recovery Park

Transport Impact Assessment

Client:	SUEZ
Job Number:	15S480
Issue:	B
Date:	23/3/16

Quality Record

Issue	Date	Details	Prepared By	Reviewed By	Approved By
B	23/3/16	Final	Matthew Houlden	Alan Stewart	

Table of Contents

Appendices

Tables

Figures

1. Introduction

1.1 Background

The Wetherill Park Resource Recovery Facility is located at 20 Davis Road in Wetherill Park, within the Fairfield Local Government Area (LGA). It consists of a purpose built facility to accept and process waste materials through on-site segregation and the transfer of material for alternative processing or disposal offsite. The facility provides a consolidation point for unsorted material collected from residential or commercial premises and from the public.

Wetherill Park Resource Recovery Facility is one of eight waste transfer station facilities operated by SUEZ in the Sydney metropolitan area and currently, the Wetherill Park Resource Recovery Facility accepts 90,000 tonnes per annum (tpa) of non-putrescible waste and 10,000 tpa of putrescible waste.

SUEZ is seeking to obtain development consent to increase the licence capacity of Wetherill Park Resource Recovery Facility from the existing 10,000 tpa of general solid waste (putrescible) to 140,000 tpa of general solid waste (putrescible). This would increase the total waste accepted at the site from 100,000 tpa to 230,000 tpa.

The Proposal would be designed to receive the same amount of general solid waste (non-putrescible) currently accepted at the site and is not proposing to change the existing footprint of the transfer station building or the hours of operations.

PeopleTrans was commissioned by SUEZ via Golder Associates Pty Ltd in June 2015 to undertake a transport impact assessment of the proposed development to accompany the Environmental Impact Statement to the Department of Planning and Environment (DPE).

1.2 Scope and Objectives of this Report

This report sets out an assessment of the anticipated transport implications of the proposed development, including consideration of the following:

(1) the existing traffic, transport and parking conditions on and surrounding the site
(2) the adequacy of the proposed parking supply and layout
(3) the adequacy of the existing weighbridge to support the future operation
(4) the transport generating characteristics of the proposed development
(5) the transport impact of the Proposal on the surrounding road network.

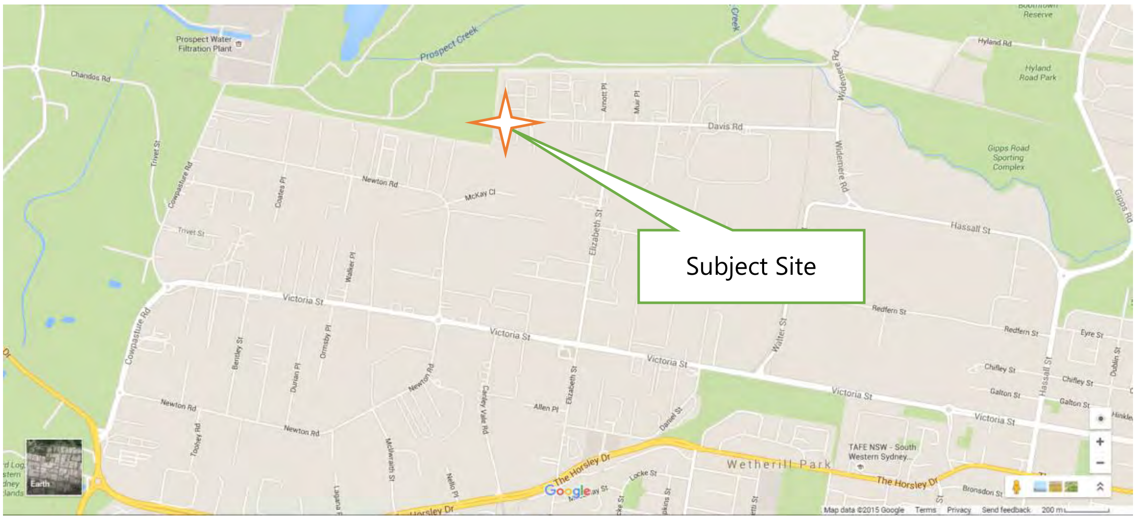
2. Existing Conditions

2.1 Site Location

The subject site is located at 20 Davis Road in Wetherill Park, is approximately 2.05 hectares in size and has a frontage of approximately 40m with a crossover to Davis Road. The site is currently zoned IN1 General Industrial.

The surrounding properties predominantly include industrial uses with the Prospect Reservoir located to the north of the site. The location of the subject site and its immediate vicinity is shown in Figure 2.1.

Figure 2.1: Subject Site and Its Environs



2.2 Road Network

2.2.1 Adjoining Roads

Details of the roads in close proximity to the site are provided in Table 2.1.

Table 2.1 Summary of Adjoining Roads

Road Name	Classification	Orientation	Configuration	Approx. Width (m)	Daily Volume [1]	On-Street Restrictions
Davis Road	Local Road	East-West	1 lane in each direction	13	2,200 (west of Elizabeth Street) to 7,000 (west of Widemere Road)	Generally unrestricted
Elizabeth Street	Local Road between Victoria Street and Davis Road. State Road south of Victoria Street	North-South	1 lane in each direction	12-18	6,500 (north) to 10,200 (south)	Generally unrestricted
Victoria Street	State Road	East-West	Divided Road – 1 bus lane and 2 general traffic lanes in each direction	23	22,000 (West of Elizabeth Street)	No parking permitted in the vicinity of Davis Road
Widemere Road	Local Road	North-South	1 lane in each direction south of Davis Road and 2 lanes in each direction north of Davis Road	13	13,000 (north of Davis Road	No parking permitted in the vicinity of Davis Road

Based on an average of the AM and PM peak hour volumes on the relevant intersection leg and dividing by 10% for local roads and 8% for State Roads

2.2.2 Surrounding Intersections

The key existing intersections in the vicinity of the site are summarised in Table 2.2.

Table 2.2 Existing Key Intersections in the Vicinity of the Site

Intersection	Intersection Control
Davis Road / Elizabeth Street	Unsignalised T-Intersection (priority to Davis Road)
Elizabeth Street / Victoria Street	Signalised X-Intersection
Davis Road / Widemere Road	Signalised T-Intersection

2.3 Vehicle Movements

A summary of the existing vehicle movements within the vicinity of the subject site is set out in the following sections.

2.3.1 Turning Movement Counts

PeopleTrans commissioned vehicle movement counts at key intersections in the vicinity of the site on Tuesday 23 June 2015 during the following peak periods:

- 6:00am and 9:00am
- 2:00pm and 4:00pm.

The AM and PM peak hour traffic volumes are summarised in Figure 2.2, with full results contained in Appendix A.

Figure 2.2: Existing AM Peak Hour Traffic Volumes – Tue 23/6/15 7:15am to 8:15am

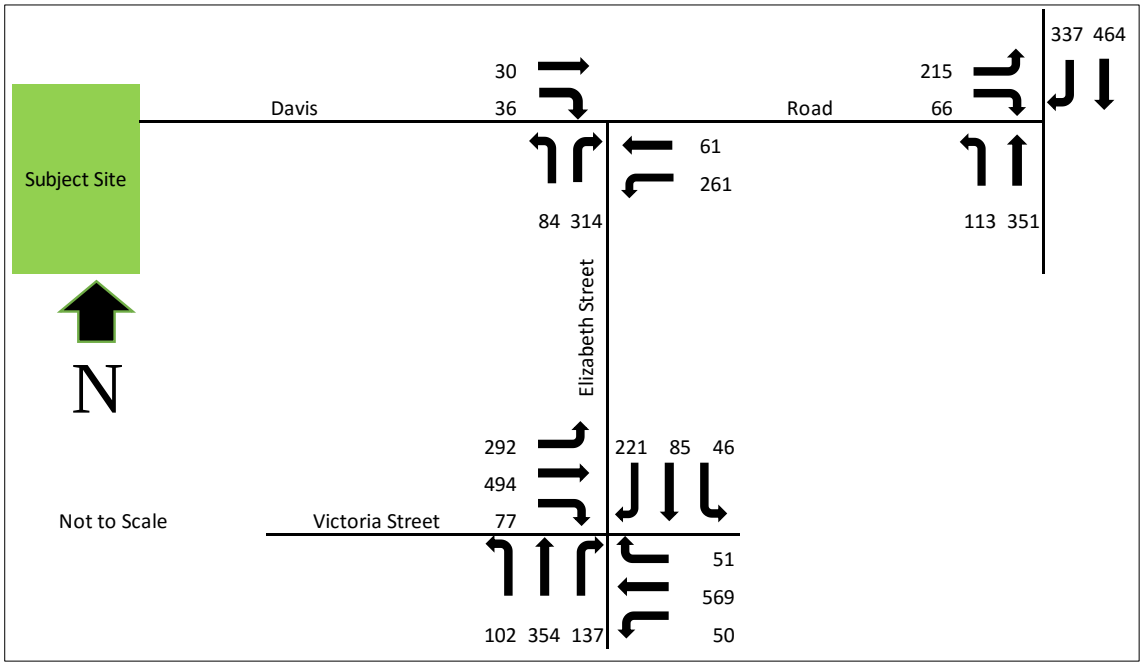
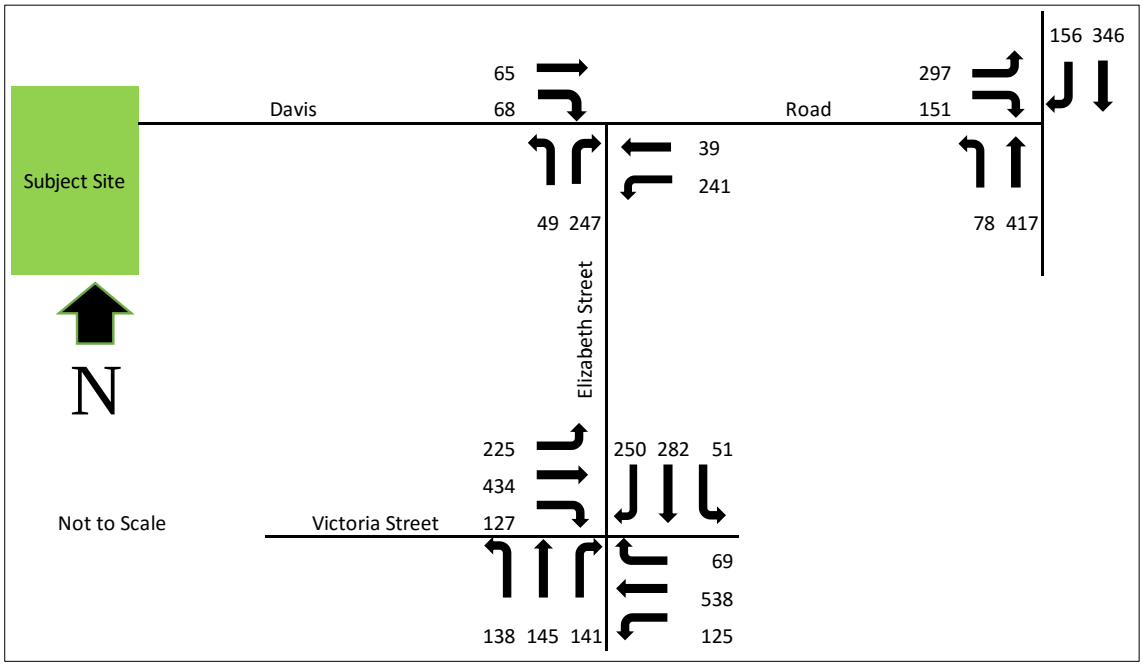


Figure 2.3: Existing PM Peak Hour Traffic Volumes – Tue 23/6/15 3:00pm to 4:00pm



2.3.2 Tube Surveys

PeopleTrans commissioned tube surveys on the site driveway and on roads in the vicinity of the site. The location of the surveys that were undertaken from Friday 19 June 2015 to Thursday 25 June 2015 are shown in Figure 2.4.

Figure 2.4: Tube Survey Locations

A summary of the site entry and exit data along with weighbridge data that was provided by SUEZ for June 2015 is provided in Figure 2.5. Detailed tube survey data is provided in Appendix B.

Figure 2.5: Comparison of Weighbridge Exit Data and Tube Count Data

Figure 2.5 indicates that for the survey day (with the exception of Tuesday 9 June 2015 which followed a public holiday) had the highest volume for the month and as such can be considered the maximum generation for the existing site.

Figure 2.5 indicates that the Site Entries are higher than the Site Exits. This is a result of the location of tube surveys which captured all vehicles entering and only vehicles exiting the site via the weighbridge. The data indicates that staff and visitors to the site, that is, vehicles not using the weighbridge, account for an average of 34 vehicles per weekday or approximately 20% of the total generation of the site.

2.3.3 Summary of Existing Site Traffic Generation

The existing site traffic generation is summarised in Table 2.3.

Table 2.3: Existing Site Traffic Generation

Period	Existing Total Site Movements		
	In	Out [3]	Total
AM Peak Hour [1]	23	23	46
PM Peak Hour [2]	23	23	46
Daily	191	191	382

[1] Based on tube count data for Tuesday 23/6/15

[2] The maximum hourly flow for the AM period has been applied to the PM peak period to provide a conservative assessment

[3] Assumed based on the entry flows

Table 2.3 indicates that the site currently generates 46 movements during the AM peak hour and 48 movements during the PM peak hour with 382 daily movements on a weekday. To provide a conservative future assessment of the traffic impact of the development, it is assumed that the existing peak hours for the site coincide with the road network peak hours.

2.4 Intersection Operation

The operation of the key intersections within the study area have been assessed using SIDRA INTERSECTION, a computer based modelling package which calculates intersection performance.

The commonly used measure of intersection performance, as defined by RMS, is vehicle delay. SIDRA INTERSECTION determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 2.4 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service.

Table 2.4 RMS SIDRA INTERSECTION Level of Service Criteria

Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	0 to 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Table 2.5 provides a summary of the existing operation of the intersection, with full results presented in Appendix C of this report.

Table 2.5 Existing Operating Conditions

Intersection	Peak	Leg	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
1. Davis Road / Elizabeth Street	AM	South	0.40	7	17	A
		East	0.21	4	0	A
		West	0.06	5	3	A
		Total	**0.40**	**6**	**17**	**NA**
	PM	South	0.31	7	10	A
		East	0.19	4	0	A
		West	0.10	4	4	A
		Total	**0.31**	**5**	**10**	**NA**
2. Elizabeth Street / Victoria Street	AM	South	0.81	76	188	F
		East	0.63	58	183	E
		North	0.76	70	163	E
		West	0.65	49	221	D
		Total	**0.81**	**61**	**221**	**E**
	PM	South	0.68	57	103	E
		East	0.62	47	155	D
		North	0.70	55	151	D
		West	0.64	44	144	D
		Total	**0.70**	**49**	**155**	**D**
3. Davis Road / Widemere Road	AM	South	0.64	25	60	B
		North	0.65	12	71	A
		West	0.52	18	28	B
		Total	**0.65**	**17**	**71**	**B**
	PM	South	0.58	22	57	B
		North	0.60	15	63	B
		West	0.58	20	40	B
		Total	**0.60**	**19**	**63**	**B**

NA - Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Table 2.5 indicates that all intersections with the exception of Elizabeth Street / Victoria Street during the AM peak hour, operate with acceptable degrees of saturation. The Level of Service for Intersection 2 during the AM peak hour is Level of Service F for a number of movements and Level of Service E overall, which is a result of the long cycle times and priority given to bus movements at the intersection.

2.5 Car Parking

A 16 space car park near the entrance of the site is provided for use by staff and visitors. There are a number of other locations on-site (marked and unmarked) which could be used to park vehicles if required. A spot car parking survey was undertaken on 10 September 2015 at approximately 9:00am. A total of 11 cars were parked in the main car park. Information provided by SUEZ indicates that there are currently 11 staff on-site which suggests that all staff currently drive to work and park on-site.

Other car parking spaces are available on-site however they are fenced off and currently not accessible from the main car park.

3. Proposed Development

3.1 Description of Proposal

The Proposal seeks to obtain development consent to increase the licence capacity of Wetherill Park Resource Recovery Facility from the existing 10,000 tpa of general solid waste (putrescible) to 140,000 tpa of general solid waste (putrescible). This would increase the total amount of waste accepted at the Wetherill Park Resource Recovery Facility by 130,000 tpa from 100,000 tpa, to total of 230,000 tpa.

No expansion of the transfer station building footprint is proposed. The proposed relocated domestic drop off area (outside the existing building) would be located under an existing roofed area.

In addition, it is proposed to revise operational procedures to allow for an increase in capacity.

3.2 Vehicle Access

No change to the existing vehicle access on Davis Road is proposed.

3.3 Car Parking

Currently, the site has a total of 11 full time staff working on-site at any one time. Under the proposed development, information provided by SUEZ indicates that the full time staff working on-site at any one time will increase to 16 once the site is fully developed.

There is currently only one shift for employees at the site and this is not proposed to change as part of the proposed development. The suitability of the car parking provision is discussed in Section 4 of this report.

3.4 Weighbridge

No changes are proposed to the existing weighbridge on the Site at the north of existing resource recovery building. The suitability of the proposed weighbridge arrangements is discussed in Section 5 of this report.

4. Car Parking

4.1 Car Parking Requirements

The car parking provision requirements for different development types are set out in Fairfield Council's 'City Wide DCP Chapter 12 – Car Parking, Vehicle and Access Management Version 17'. While the DCP does state a car parking rate for industrial uses, car parking rates for a transfer station are not provided. In this instance it is considered that the future parking requirements are best guided by the future number of staff that will be working on the site.

Information provided by SUEZ indicates that there are currently 11 full time staff on-site with only 1 shift each day and in the future, the amount of staff on the site would increase from 11 to 16 staff with the same single shift arrangements.

Currently, 11 staff spaces and 5 visitor car parking spaces are provided on-site in the main car park at the entry to the site. It is recommended that 16 staff spaces and 5 visitor spaces are provided as part of the upgrade of the site. It is further recommended that one of the visitor spaces be an accessible parking space.

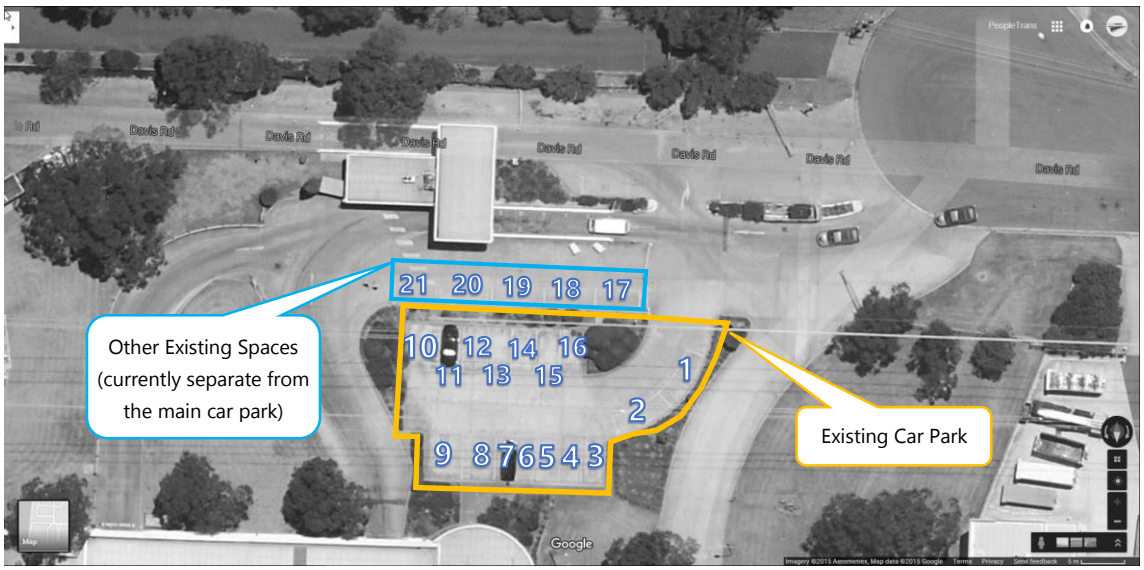
4.2 Car Parking Layout

PeopleTrans has assessed the proposed car parking layout against the requirements of Fairfield Council's DCP and the Australian Standard for Off Street Car Parking (AS/NZS2890.1:2004).

PeopleTrans has also undertaken a swept path assessment of the largest vehicle that will access the site.

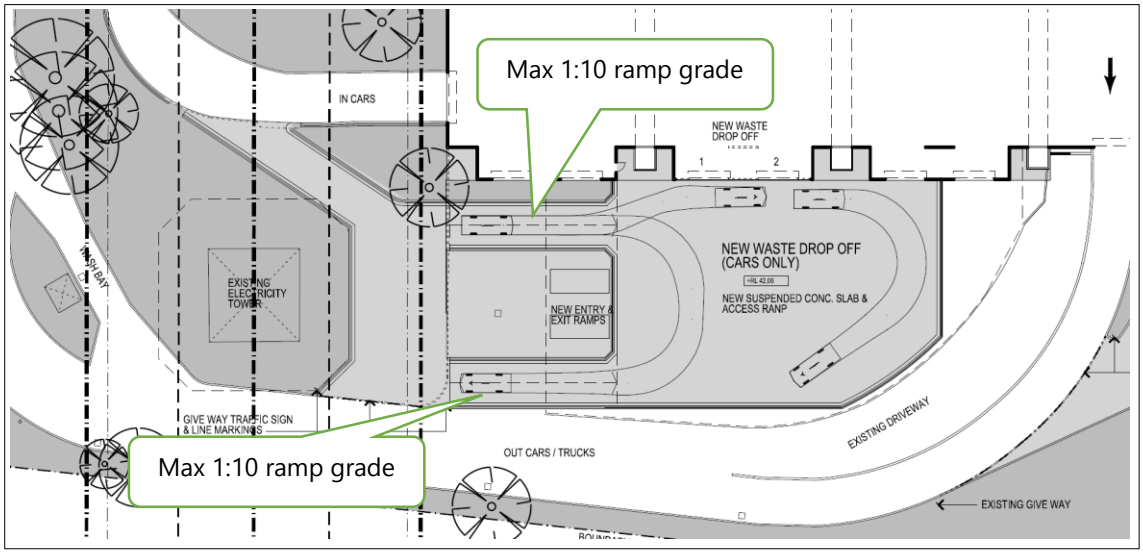
No changes to the existing 21 spaces provided near the entrance to the site as shown in Figure 4.1 is proposed, which means that the development provides sufficient car parking spaces.

Figure 4.1: Existing Site Car Parking Spaces



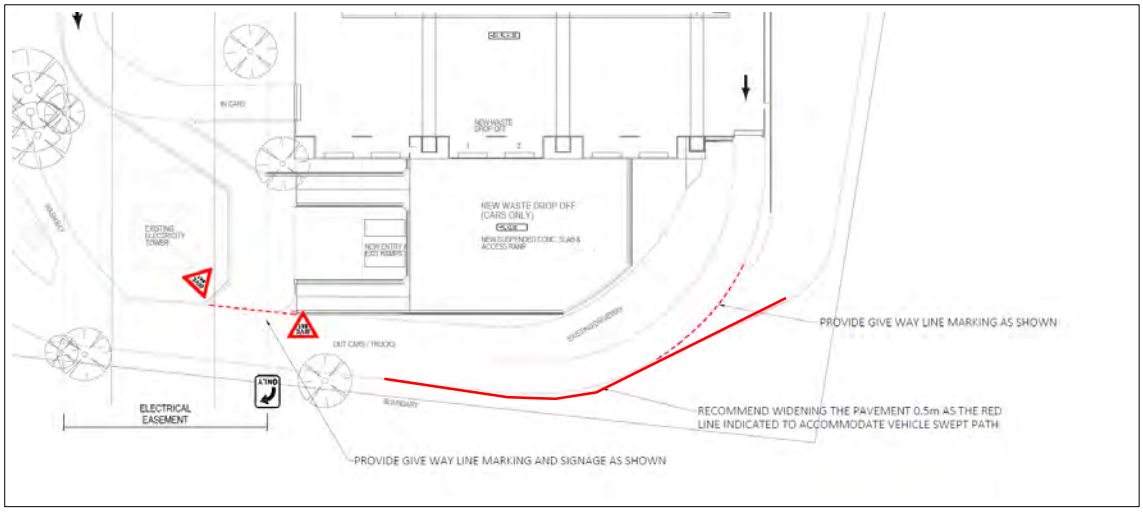
Access to the public drop off area is proposed to be provided by two ramps. It is recommended that the design of the ramps be reviewed at a later stage to ensure that the slope of the ramp is appropriate for a car and trailer to access. A review by PeopleTrans indicates that a maximum ramp gradient of 1:10 is recommended as shown in Figure 4.2.

Figure 4.2: Recommended Ramp Design Changes



Following an AutoTURN swept path assessment it is also recommended that signage, line marking and minor changes to a kerb be provided as shown in Figure 4.3.

Figure 4.3: Recommended Design Changes



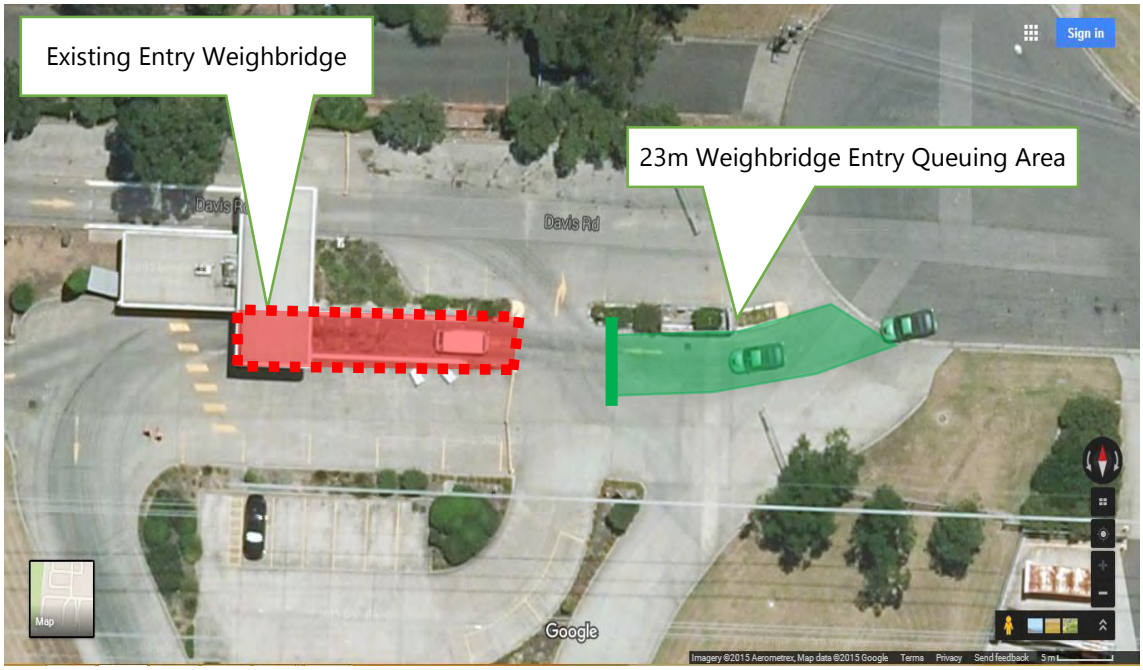
It is recommended that the design be updated at a later stage and subject to the recommendations, the proposed layout is considered satisfactory.

5. Weighbridge Operation

5.1 Existing Weighbridge Capacity

Currently one weighbridge is provided on-site, at the location indicated in Figure 5.1. With only one vehicle able to utilise the weighbridge at a time, queuing vehicles must wait behind the green line indicated in Figure 5.1. This is to allow for the exit of vehicles from the staff / visitor carpark. The distance from this green line to Davis Road is approximately 23 metres which means that depending on the size of the vehicle, up to 4 vehicles can store in this area.

Figure 5.1: Wetherill Park Transfer Station Entrance and Weighbridge



A survey conducted by PeopleTrans on 10/9/15 revealed an average weighbridge entry service time of 56 seconds per vehicle. Rounding up to 60 seconds per vehicle, the existing weighbridge has an existing average service rate of 60 vehicles per hour.

Tubes placed on the entrance driveway showed a maximum arrival rate of 23 vehicles per hour on Tuesday 23 June 2015.

PeopleTrans has undertaken a queuing assessment using the queuing theory formulas provided in Austroads Guide to Traffic Management Part 2[1]. Based on this approach, the existing weighbridge was determined to be operating at 38% of capacity during the peak hour.

The tube surveys on the entry driveway indicated the class of vehicle entering the weighbridge. From this data and Austroads Vehicle Classification[2], the average length of vehicles utilising the weighbridge service in the peak hour was determined to be 7.06 metres.

1 Austroads Guide to Traffic Management Part 2: Traffic Theory, Austroads, 2008

2 http://www.rms.nsw.gov.au/documents/projects/northern-nsw/woolgoolga-to-ballina/wells-crossing-to-iluka-road/wells-crossing-clg-no3-minutes-attachmenta-grafton.pdf - last accessed 7/12/15

The current average queue length was determined to be 0.62 vehicles, indicating that for the majority of the time there are no vehicles in the weighbridge system or waiting to use the weighbridge. The 95th percentile queue was determined to be 2.62 vehicles. This means that the current queue behind the green line is approximately half of the area available. This matched with what was observed on-site.

5.2 Future Weighbridge Operation

To determine the likely number of vehicles using the weighbridge in future and whether there is sufficient capacity, PeopleTrans analysed detailed vehicle weight data from the Eastern Creek landfill site. Information was also provided for the existing site weighbridge for June 2015 which indicated an average load per vehicle of 3.58 tonnes.

As previously identified, a total increase of 130,000 tpa of general waste (putrescible) is proposed to be accepted by the facility. General waste (putrescible) is identified as:

- *"household waste that contains putrescible organics*
- *waste from litter bins collected by or on behalf of local councils*
- *manure and night soil*
- *disposable nappies, incontinence pads or sanitary napkins*
- *food waste*
- *animal waste*
- *grit or screenings from sewage treatment systems that have been dewatered so that the grit or screenings do not contain free liquids*
- *any mixture of the wastes referred to above."* [3]

It is assumed based on the above, that all putrescible waste will be transported to the site by trucks

To determine the average weight of the load delivered per vehicle, PeopleTrans has analysed 11 months of data provided for the Eastern Creek Landfill site. A review of all vehicles recorded in the year 2014 identified an average load of 5.94 tonnes per vehicle. This is higher than the existing average for the Wetherill Park site of 3.58 tonnes per vehicle.

It is assumed that the additional 130,000 tonnes that will be delivered to this site will be done so in trucks with an average weight of 5.94 tonnes. This equates to a total of 21,866 additional vehicles accessing the weighbridge over the course of the year, an average of 1,823 per month and an average of 455 additional vehicles for every week across the year.

A review of the 2014 data for the Eastern Creek site showed the following percentage of weight delivered across the week:

- Monday – 19%
- Tuesday – 18%
- Wednesday – 16%
- Thursday – 18%
- Friday – 19%
- Saturday – 6%

[3] http://www.epa.nsw.gov.au/resources/wasteregulation/140796-classify-waste.pdf

- Sunday – 4%

Based on the above, it is estimated that 18% of the total weight will be delivered on an average weekday which equates to: 455 x 0.18 = Additional 82 vehicles per weekday.

On Tuesday 23/6/15, a total of 166 vehicles were recorded as having used the weighbridge. An additional 82 vehicles would result in a total of 248 vehicles or an increase of approximately 49%.

It is assumed that the profile of waste delivery at the site will remain the same and the current recorded maximum hourly flow on Tuesday 23/6/15 of 23 vehicles, would increase to 35 vehicles per hour across the weighbridge.

Using the queuing theory formulas, a service rate of 60 vehicles per hour and an arrival rate of 35 vehicles per hour would result in a 95th percentile queue of 3.9 vehicles in the system. This means that excluding the vehicle on the weighbridge, up to 3 vehicles could be waiting to enter the weighbridge. An arrival rate of 35 vehicles an hour means that the weighbridge system would be operating at 58% of capacity.

Assuming an average vehicle length of 7.5 metres, plus distance between queuing vehicles, it is likely that the increase in vehicles would result in a 95th percentile queue distance of 24.5m which is longer than the distance between the current holding line and Davis Road of 23m as shown in Figure 5.1.

To reduce the potential impact on Davis Road, it is recommended that the distance from the stop line / speed hump to Davis Road be increased by 1.5m. This would result in an increased queuing distance of 24.5m Alternatively, two queuing lanes could be provided for vehicles to store for before entry to the weighbridge. This will be considered as part of the detailed design of the site.

6. Operational Impacts

6.1 Future Trip Generation

Traffic generation estimates for the proposed development have been sourced from a first principles assessment based on the future additional truck volumes calculated in Section 5.2.

As identified in Section 2.3.2, data for the existing site indicates that staff and visitors to the site (vehicles not using the weighbridge) account for an average of 34 vehicles per weekday or approximately 20% of the total generation of the site.

Assuming that this ratio remains, this means that on a typical weekday, a total of 248 vehicles are anticipated to use the weighbridge and a total of 310 vehicles are anticipated to enter and exit the site across the day.

Estimates of peak hour and daily traffic volumes resulting from the Proposal are set out in Table 6.1.

Table 6.1: Traffic Generation Estimates

Period	Existing Site Movements			Future Weighbridge Movements		
	In	Out	Total	In	Out	Total
AM Peak Hour [1]	23	23	46	35	35	70 (+24)
PM Peak Hour [2]	23	23	46	35	35	70 (+24)
Daily	191	191	382	310	310	620 (+238)

[1] Based on tube count data for Tuesday 23/6/15

[2] The maximum hourly flow for the AM period has been applied to the PM peak period to provide a conservative assessment

Table 6.1 indicates that the site could potentially generate 70 vehicle movements in a peak hour with 620 over the course of a typical weekday. To provide a conservative assessment of the impact that the proposed development could have on the road network, it is assumed that the AM and PM peak generation coincides with the AM and PM road network peak hours.

6.2 Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

(1) configuration of the road network in the vicinity of the site
(2) existing operation of intersections providing access between the local and arterial road network
(3) likely distribution of employee's residences and waste vehicle origins in relation to the site.

Considering the above, the additional vehicle movements have been added to the road network based on the existing turning movement splits at nearby intersections.

Figure 6.1 and Figure 6.2 have been prepared to show the estimated increase in turning movements in the vicinity of the subject site following development.

Figure 6.1: AM Peak Hour Additional Site Generated Traffic Volumes

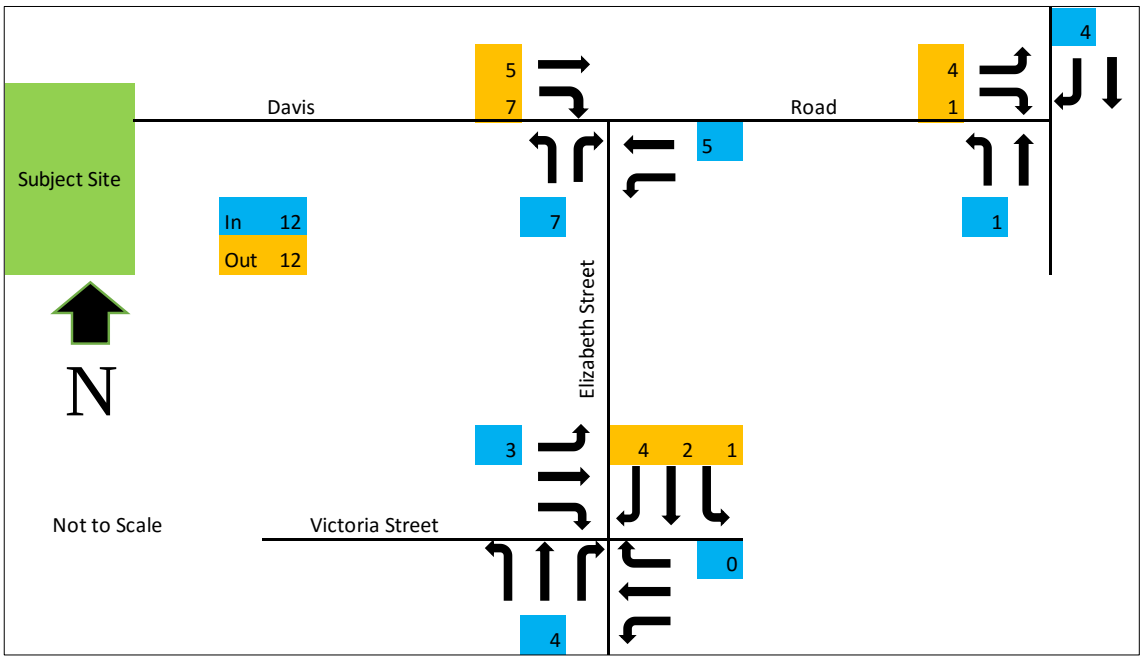


Figure 6.2: PM Peak Hour Additional Site Generated Traffic Volumes

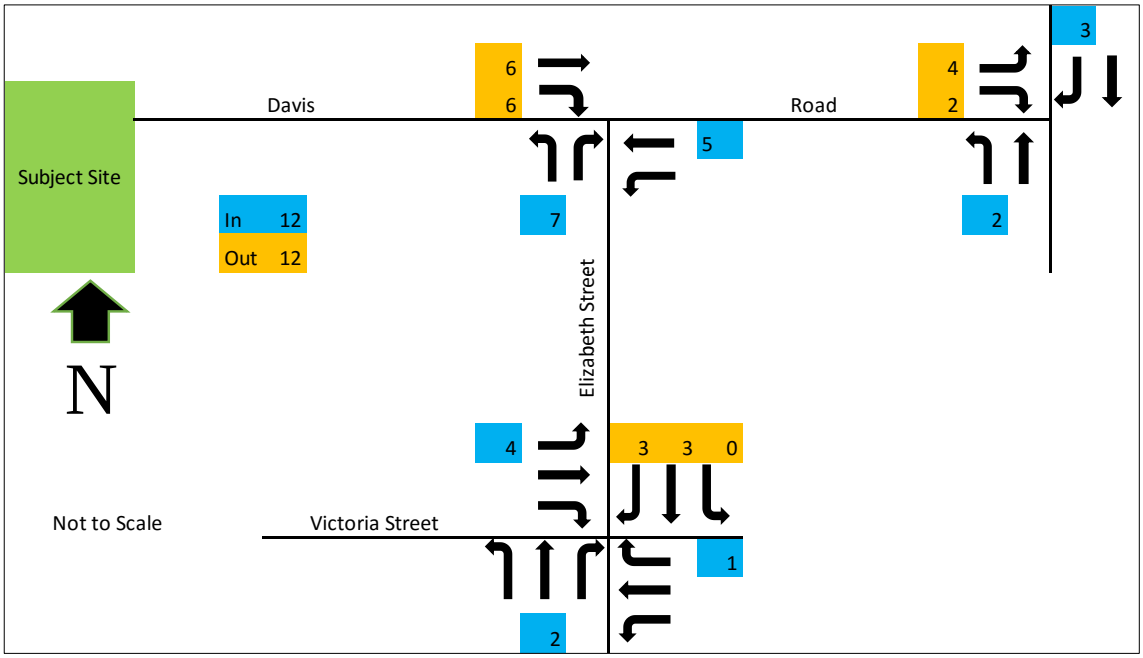


Figure 6.3: AM Peak Hour Post Development Traffic Volumes

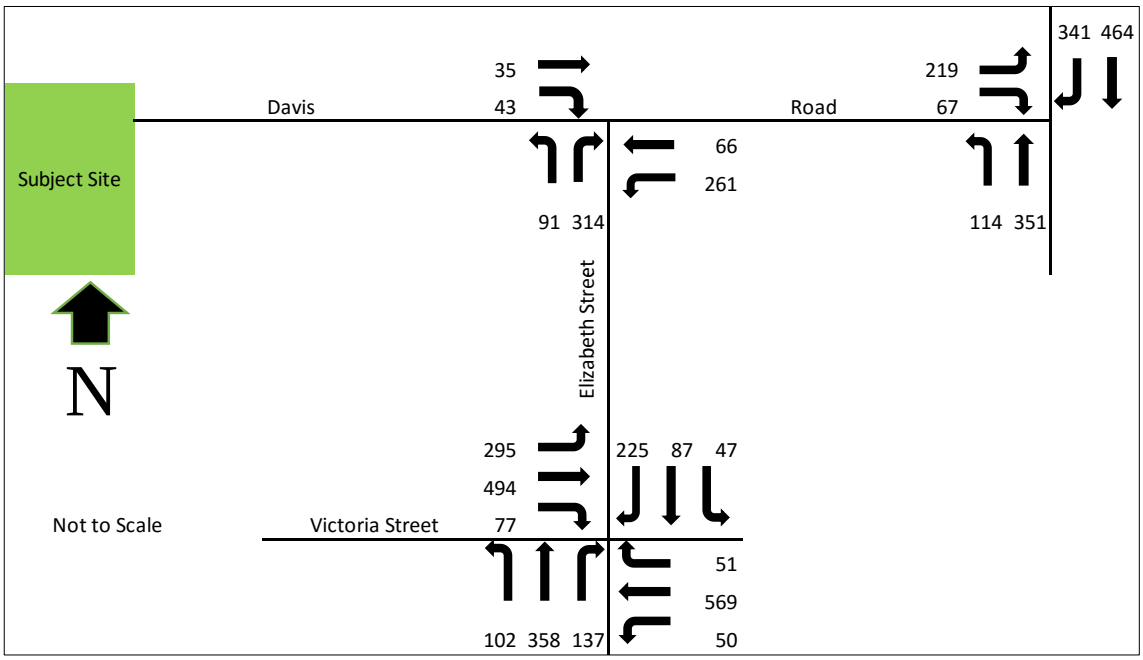
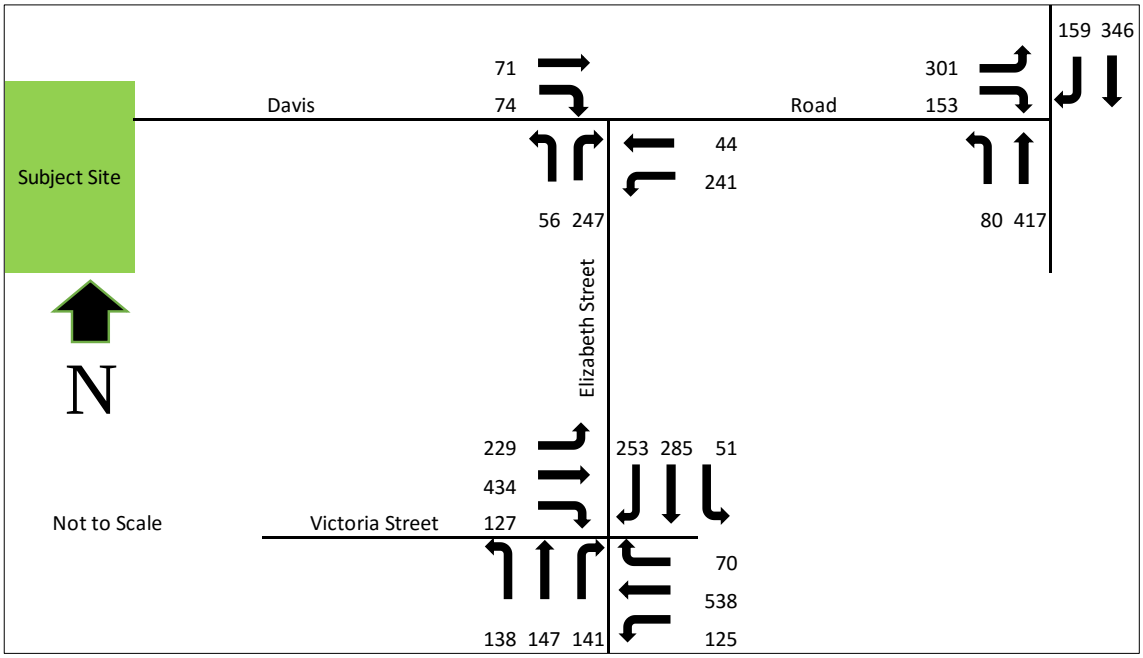


Figure 6.4: PM Peak Hour Post Development Traffic Volumes



6.3 Transport Impact Assessment

To assess a worst case scenario, it is assumed that the AM and PM peak generation of the site will coincide with the road network peak hours. To provide a conservative assessment, it is also assumed that all additional vehicles to the site will all be heavy vehicles. Based on the above, Sidra Modelling has been undertaken and is reported in Table 6.2 with full results provided in Appendix D.

Table 6.2: Post Development Operating Conditions

Intersection	Peak	Leg	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
1. Davis Road / Elizabeth Street	AM	South	0.41	7	18	A
		East	0.21	4	0	A
		West	0.08	5	4	A
		Total	**0.41**	**6**	**18**	**NA**
	PM	South	0.32	7	11	A
		East	0.19	4	0	A
		West	0.12	4	5	A
		Total	**0.32**	**5**	**11**	**NA**
E2. Elizabeth Street / Victoria Street	AM	South	0.82	77	191	F
		East	0.63	58	183	E
		North	0.78	71	169	F
		West	0.65	49	222	D
		Total	**0.82**	**61**	**222**	**E**
	PM	South	0.68	57	104	E
		East	0.62	47	155	D
		North	0.71	55	154	D
		West	0.64	44	145	D
		Total	**0.71**	**50**	**155**	**D**
3. Davis Road / Widemere Road	AM	South	0.64	25	61	B
		North	0.65	12	72	A
		West	0.53	18	29	B
		Total	**0.65**	**17**	**72**	**B**
	PM	South	0.59	22	57	B
		North	0.60	15	63	B
		West	0.60	20	41	B
		Total	**0.60**	**19**	**63**	**B**

A comparison between Table 6.2 and the existing traffic volume analysis in Table 2.5, is provided in Table 6.3.

Table 6.3: Comparison of Post Development to Existing Intersection Operating Conditions

Intersection	Peak	Leg	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
1. Davis Road / Elizabeth Street	AM	Total	0.41 (+.01)	6 (+0)	18 (+1)	NA (no change)
	PM	Total	0.32 (+.01)	5 (+0)	11 (+1)	NA (no change)
E2. Elizabeth Street / Victoria Street	AM	Total	0.82 (+.01)	61 (+0)	222 (+1)	E (no change)
	PM	Total	0.71 (+.01)	50 (+1)	155 (+0)	D (no change)
3. Davis Road / Widemere Road	AM	Total	0.65 (+0)	17 (+0)	72 (+1)	B (no change)
	PM	Total	0.60 (+0)	19 (+0)	63 (+0)	B (no change)

Table 6.3 indicates that no change is anticipated to occur to the existing intersection Levels of Service as a result of the proposed development. Based on this, the additional traffic generated by the proposed development is not expected to compromise the safety or function of the surrounding road network and no road network upgrades are considered necessary.

6.4 Haul Roads to Lucas Heights

The waste will be transported to the Lucas Heights Resource Recovery Park, with exception of recyclables which would be sold to independent contractors. There are a number of routes that drivers could take to the Lucas Heights Resource Recovery Park and the chosen route will depend on the time of day and the driver. Information provided by SUEZ have indicated their preference for drivers to travel on arterial roads and to avoid the use of local roads wherever possible. This approach is considered a satisfactory due to the significant distance between the two sites (approximately 35 to 49km depending on which route is taken).

7. Construction Impacts

Construction methods would be determined at the time of construction (in accordance with the Project approval conditions) and construction is likely not to be staged. All construction would be carried out in accordance with a CEMP and Construction Quality Assurance plan to be completed by others and would comprise the following general steps:

- site establishment
- clear and grub
- site preparation
- formwork
- pouring slabs
- erection of workshop building and suspended slabs and access ramps.

7.1 Construction Hours and Duration

Due to the industrial setting of the site, hours of construction are proposed to be 24 hours to shorten construction period and minimise disturbance to neighbouring industries.

The site will be closed for the construction period. The construction period is expected to be approximately 20 weeks.

7.2 Construction Haul Roads

Construction vehicles and trucks would avoid local residential roads where possible and around the site would use Elizabeth Street or Hassell Street / Widemere Street to access Davis Road. These are the same roads that the trucks accessing the site under its existing operation currently use.

7.3 Construction Traffic Impact

Construction vehicles are expected to be of a similar size and volume to the existing vehicles that frequent the site. The vehicles would likely be a mixture of trucks, delivery vans, utility vehicles and cars. The site is proposed to be closed for the construction period. Based on a similar volume to the existing site operation, the impact on the surrounding road network will be approximately the same as the existing site operation and as such, no changes to the road network are proposed.

8. Conclusions

Based on the analysis and discussions presented within this report, the following conclusions are made:

(1) Based on a future 16 staff, it is recommended that 16 staff spaces be provided plus an additional 5 visitor spaces. It is recommended that one of the visitor spaces be an accessible space.

(2) Based on the observed weighbridge vehicle entry service times and the anticipated volume of future vehicles using the weighbridge, no changes to the existing weighbridge are proposed. This is considered satisfactory subject to relocating the existing stop line / speed hump forward by approximately 1.5m.

(3) Subject to the recommendations outlined in Section 4.2 and 5.2, the proposed layout is considered satisfactory. The detailed design will be completed at a later stage.

(4) The Proposal is expected result in the site generating up to 70 movements in the AM and PM peak hour and up to 620 vehicle movements across a typical weekday following full development of the subject site. This is an increase of 24 vehicles during the AM and PM peak hour or an average of 1 additional vehicle every 2.5 minutes.

(5) There is sufficient capacity in the existing surrounding road network to cater for the anticipated traffic generated by the proposed development during the operational phase.

(6) No impact to the road network is anticipated during the construction period as the site will be closed during construction.

8.1 References

In preparing this report, reference has been made to the following:

- an inspection of the site and its surrounds
- Fairfield Council Development Control Plan (DCP) 2012
- traffic and car parking surveys undertaken by Austraffic as referenced in this report
- Austroads Guide to Traffic Management, Part 2
- other documents and data as referenced in this report.

Appendix A

Turning Movement Counts

Intersection of Davis Road / Elizabeth Street

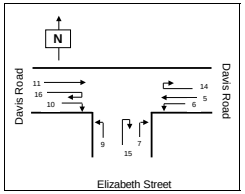
Tuesday, 23 June 2015

Austraffic

Survey Start **6:00 AM 14:00 PM**
Intersection Type T Junction
Intersection No. **1**
North Approach
East Approach **Davis Road**
South Approach **Elizabeth Street**
West Approach **Davis Road**

Date **23/06/15**

Classfication **Light Heavy**



TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			7			8			9			10			11			12			13			14			15			16			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
6:00 - 6:15													11	0	11	12	0	12	52	17	69				19	0	19	4	0	4	5	0	5				0	0	0	0	0	0	0	0	0				103	17	120
6:15 - 6:30													19	1	20	29	4	33	53	10	63				21	3	24	5	0	5	5	0	5				0	0	0	0	0	0	0	0	0				132	18	150
6:30 - 6:45													10	3	13	36	10	46	54	18	72				6	2	8	9	1	10	5	2	7				0	0	0	0	0	0	0	0	0				120	36	156
6:45 - 7:00													9	4	13	54	10	64	55	11	66				14	3	17	5	5	10	2	4	6				0	0	0	0	0	0	0	0	0				139	37	176
7:00 - 7:15													12	5	17	49	10	59	51	20	71				16	7	23	3	2	5	2	5	7				0	0	0	0	0	0	0	0	0				133	49	182
7:15 - 7:30													17	4	21	52	11	63	56	20	76				15	6	21	8	7	15	3	7	10				0	0	0	0	0	0	0	0	0				151	55	206
7:30 - 7:45													10	2	12	52	12	64	52	28	80				15	6	21	5	6	11	4	2	6				0	0	0	0	0	0	0	0	0				138	56	194
7:45 - 8:00													12	0	12	56	16	72	59	14	73				19	2	21	3	4	7	4	3	7				0	0	0	0	0	0	0	0	0				153	39	192
8:00 - 8:15													11	5	16	48	14	62	67	18	85				17	4	21	3	0	3	2	5	7				0	0	0	0	0	0	0	0	0				148	46	194
8:15 - 8:30													16	2	18	50	15	65	52	11	63				17	1	18	12	6	18	4	3	7				0	0	0	0	0	0	0	0	0				151	38	189
8:30 - 8:45													9	5	14	57	13	70	38	23	61				17	1	18	4	2	6	7	5	12				0	0	0	0	0	0	0	0	0				132	49	181
8:45 - 9:00													12	1	13	43	15	58	48	24	72				11	1	12	6	2	8	5	1	6				0	0	0	0	0	0	0	0	0				125	44	169
Σ													148	32	180	538	130	668	637	214	851				187	36	223	67	35	102	48	37	85				0	0	0	0	0	0	0	0	0				1625	484	2109

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			7			8			9			10			11			12			13			14			15			16			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
14:00 - 14:15													8	4	12	35	16	51	39	13	52				10	3	13	20	6	26	10	4	14				0	0	0	0	0	0	0	0	0				122	46	168
14:15 - 14:30													4	6	10	27	6	33	35	20	55				10	1	11	17	4	21	14	4	18				0	0	0	0	0	0	0	1	1				107	42	149
14:30 - 14:45													11	7	18	32	18	50	44	14	58				11	4	15	11	4	15	21	4	25				0	0	0	0	0	0	0	0	0				130	51	181
14:45 - 15:00													12	7	19	32	17	49	32	19	51				9	2	11	13	0	13	17	9	26				0	0	0	0	0	0	0	0	0				115	54	169
15:00 - 15:15													6	6	12	42	19	61	52	12	64				12	2	14	12	3	15	20	6	26				0	0	0	0	0	0	0	0	0				144	48	192
15:15 - 15:30													3	2	5	55	17	72	39	14	53				3	1	4	11	4	15	7	1	8				0	0	0	0	0	0	0	0	0				118	39	157
15:30 - 15:45													8	4	12	51	9	60	55	12	67				8	3	11	18	4	22	11	3	14				0	0	0	0	0	0	0	0	0				151	35	186
15:45 - 16:00													7	3	10	39	9	48	54	9	63				16	4	20	16	0	16	14	3	17				0	0	0	0	0	0	0	0	0				146	28	174
Σ													59	39	98	313	111	424	350	113	463				79	20	99	118	25	143	114	34	148				0	0	0	0	0	0	0	1	1				1033	343	1376

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			7			8			9			10			11			12			13			14			15			16			GRAND TOTAL			
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	
6:00 - 7:00	0	0	0	0	0	0	0	0	0	0	0	0	49	8	57	131	24	155	214	56	270	0	0	0	60	8	68	23	6	29	17	6	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	494	108	602	
6:15 - 7:15	0	0	0	0	0	0	0	0	0	0	0	0	50	13	63	168	34	202	213	59	272	0	0	0	57	15	72	22	8	30	14	11	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	524	140	664	
6:30 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	48	15	63	191	41	232	216	69	285	0	0	0	51	18	69	25	15	40	12	18	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	543	177	720	
6:45 - 7:45	0	0	0	0	0	0	0	0	0	0	0	0	48	15	63	207	43	250	214	79	293	0	0	0	60	22	82	21	20	41	11	18	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	561	197	758	
7:00 - 8:00	0	0	0	0	0	0	0	0	0	0	0	0	51	11	62	209	49	258	218	82	300	0	0	0	65	21	86	19	19	38	13	17	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	575	199	774	
7:15 - 8:15	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**50**	**11**	**61**	**208**	**53**	**261**	**234**	**80**	**314**	**0**	**0**	**0**	**66**	**18**	**84**	**19**	**17**	**36**	**13**	**17**	**30**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**590**	**196**	**786**	**Peak**
7:30 - 8:30	0	0	0	0	0	0	0	0	0	0	0	0	49	9	58	206	57	263	230	71	301	0	0	0	68	13	81	23	16	39	14	13	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	590	179	769	
7:45 - 8:45	0	0	0	0	0	0	0	0	0	0	0	0	48	12	60	211	58	269	216	66	282	0	0	0	70	8	78	22	12	34	17	16	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	584	172	756	
8:00 - 9:00	0	0	0	0	0	0	0	0	0	0	0	0	48	13	61	198	57	255	205	76	281	0	0	0	62	7	69	25	10	35	18	14	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	556	177	733	

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			7			8			9			10			11			12			13			14			15			16			GRAND TOTAL			
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	
14:00 - 15:00	0	0	0	0	0	0	0	0	0	0	0	0	35	24	59	126	57	183	150	66	216	0	0	0	40	10	50	61	14	75	62	21	83	0	0	0	0	0	0	0	1	1	0	0	0	474	193	667	
14:15 - 15:15	0	0	0	0	0	0	0	0	0	0	0	0	33	26	59	133	60	193	163	65	228	0	0	0	42	9	51	53	11	64	72	23	95	0	0	0	0	0	0	0	1	1	0	0	0	496	195	691	
14:30 - 15:30	0	0	0	0	0	0	0	0	0	0	0	0	32	22	54	161	71	232	167	59	226	0	0	0	35	9	44	47	11	58	65	20	85	0	0	0	0	0	0	0	0	0	0	0	0	507	192	699	
14:45 - 15:45	0	0	0	0	0	0	0	0	0	0	0	0	29	19	48	180	62	242	178	57	235	0	0	0	32	8	40	54	11	65	55	19	74	0	0	0	0	0	0	0	0	0	0	0	0	528	176	704	
15:00 - 16:00	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**24**	**15**	**39**	**187**	**54**	**241**	**200**	**47**	**247**	**0**	**0**	**0**	**39**	**10**	**49**	**57**	**11**	**68**	**52**	**13**	**65**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**559**	**150**	**709**	**Peak**

Intersection of Davis Road / Widemere Road

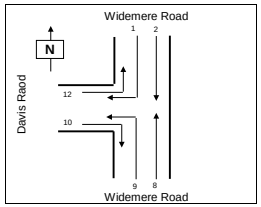
Tuesday, 23 June 2015

Austraffic

Survey Start **6:00 AM 14:00 PM**
Intersection Type T Junction
Intersection No. **2**
North Approach **Widemere Road**
East Approach
South Approach **Widemere Road**
West Approach **Davis Raod**

Date **23/06/15**

Classfication **Light Heavy**



TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
6:00 - 6:15	33	5	38	85	1	86																49	9	58	15	0	15	7	1	8				35	19	54	224	35	259
6:15 - 6:30	52	7	59	99	14	113																40	20	60	27	3	30	3	4	7				26	8	34	247	56	303
6:30 - 6:45	48	9	57	100	15	115																55	27	82	20	7	27	4	7	11				38	9	47	265	74	339
6:45 - 7:00	80	14	94	115	12	127																51	25	76	28	10	38	5	8	13				35	11	46	314	80	394
7:00 - 7:15	72	13	85	98	17	115																48	19	67	21	8	29	8	10	18				37	11	48	284	78	362
7:15 - 7:30	76	7	83	122	17	139																53	19	72	17	12	29	7	8	15				41	13	54	316	76	392
7:30 - 7:45	78	13	91	95	8	103																67	26	93	17	0	17	8	10	18				27	21	48	292	78	370
7:45 - 8:00	54	15	69	102	17	119																80	19	99	29	4	33	8	8	16				44	10	54	317	73	390
8:00 - 8:15	80	14	94	82	21	103																61	26	87	27	7	34	6	11	17				44	15	59	300	94	394
8:15 - 8:30	53	9	62	81	18	99																86	31	117	28	4	32	5	9	14				29	9	38	282	80	362
8:30 - 8:45	68	11	79	84	26	110																70	19	89	20	8	28	9	9	18				32	17	49	283	90	373
8:45 - 9:00	58	9	67	98	16	114																51	16	67	17	4	21	9	7	16				29	17	46	262	69	331
Σ	752	126	878	1161	182	1343																711	256	967	266	67	333	79	92	171				417	160	577	3386	883	4269

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
14:00 - 14:15	17	17	34	56	27	83																65	16	81	17	10	27	24	10	34				48	12	60	227	92	319
14:15 - 14:30	22	8	30	55	26	81																53	11	64	14	10	24	13	7	20				41	16	57	198	78	276
14:30 - 14:45	17	15	32	67	18	85																90	19	109	19	7	26	31	7	38				59	14	73	283	80	363
14:45 - 15:00	23	14	37	53	16	69																67	11	78	9	12	21	15	8	23				34	16	50	201	77	278
15:00 - 15:15	16	14	30	52	22	74																83	17	100	14	11	25	33	11	44				73	6	79	271	81	352
15:15 - 15:30	22	16	38	67	27	94																71	14	85	15	6	21	30	9	39				43	11	54	248	83	331
15:30 - 15:45	36	13	49	79	24	103																118	11	129	10	5	15	37	4	41				72	12	84	352	69	421
15:45 - 16:00	27	12	39	60	15	75																85	18	103	11	6	17	22	5	27				71	9	80	276	65	341
Σ	180	109	289	489	175	664																632	117	749	109	67	176	205	61	266				441	96	537	2056	625	2681

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			7			8			9			10			11			12			GRAND TOTAL			
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	
6:00 - 7:00	213	35	248	399	42	441	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	195	81	276	90	20	110	19	20	39	0	0	0	134	47	181	1050	245	1295	
6:15 - 7:15	252	43	295	412	58	470	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	194	91	285	96	28	124	20	29	49	0	0	0	136	39	175	1110	288	1398	
6:30 - 7:30	276	43	319	435	61	496	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	207	90	297	86	37	123	24	33	57	0	0	0	151	44	195	1179	308	1487	
6:45 - 7:45	306	47	353	430	54	484	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	219	89	308	83	30	113	28	36	64	0	0	0	140	56	196	1206	312	1518	
7:00 - 8:00	280	48	328	417	59	476	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	248	83	331	84	24	108	31	36	67	0	0	0	149	55	204	1209	305	1514	
7:15 - 8:15	**288**	**49**	**337**	**401**	**63**	**464**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**261**	**90**	**351**	**90**	**23**	**113**	**29**	**37**	**66**	**0**	**0**	**0**	**156**	**59**	**215**	**1225**	**321**	**1546**	**Peak**
7:30 - 8:30	265	51	316	360	64	424	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	294	102	396	101	15	116	27	38	65	0	0	0	144	55	199	1191	325	1516	
7:45 - 8:45	255	49	304	349	82	431	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	297	95	392	104	23	127	28	37	65	0	0	0	149	51	200	1182	337	1519	
8:00 - 9:00	259	43	302	345	81	426	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	268	92	360	92	23	115	29	36	65	0	0	0	134	58	192	1127	333	1460	

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			7			8			9			10			11			12			GRAND TOTAL			
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	
14:00 - 15:00	79	54	133	231	87	318	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	275	57	332	59	39	98	83	32	115	0	0	0	182	58	240	909	327	1236	
14:15 - 15:15	78	51	129	227	82	309	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	293	58	351	56	40	96	92	33	125	0	0	0	207	52	259	953	316	1269	
14:30 - 15:30	78	59	137	239	83	322	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	311	61	372	57	36	93	109	35	144	0	0	0	209	47	256	1003	321	1324	
14:45 - 15:45	97	57	154	251	89	340	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	339	53	392	48	34	82	115	32	147	0	0	0	222	45	267	1072	310	1382	
15:00 - 16:00	**101**	**55**	**156**	**258**	**88**	**346**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**357**	**60**	**417**	**50**	**28**	**78**	**122**	**29**	**151**	**0**	**0**	**0**	**259**	**38**	**297**	**1147**	**298**	**1445**	**Peak**

Intersection of Elizabeth Street / Victoria Street

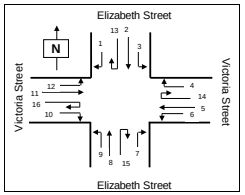
Tuesday, 23 June 2015

Austraffic

Survey Start **6:00 AM 14:00 PM**
Intersection Type Cross Junction
Intersection No. **3**
North Approach **Elizabeth Street**
East Approach **Victoria Street**
South Approach **Elizabeth Street**
West Approach **Victoria Street**

Date **23/06/15**

Classfication **Light Heavy**



TIME PERIOD	VEHICLE MOVEMENT																																		GRAND TOTAL		
	1			2			3			4			5			6			7			8			9			10			11			12			13			14			15			16					
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
6:00 - 6:15	11	10	21	8	7	15	6	1	7	12	0	12	53	8	61	12	1	13	17	10	27	55	9	64	8	1	9	9	5	14	49	16	65	36	17	53	0	0	0	0	0	0	0	0	0	0	0	0	276	85	361
6:15 - 6:30	13	8	21	9	7	16	5	2	7	8	1	9	58	19	77	13	1	14	23	5	28	55	4	59	16	3	19	12	3	15	57	28	85	46	19	65	0	0	0	0	0	0	0	0	0	0	0	0	315	100	415
6:30 - 6:45	18	14	32	13	5	18	11	2	13	11	5	16	64	15	79	7	1	8	30	5	35	59	7	66	26	2	28	16	4	20	72	29	101	44	13	57	0	0	0	0	0	0	0	0	0	0	0	0	371	102	473
6:45 - 7:00	41	13	54	16	1	17	7	2	9	7	4	11	104	20	124	8	3	11	43	8	51	83	10	93	23	4	27	11	0	11	66	31	97	46	23	69	0	0	0	1	0	1	0	0	0	0	0	0	456	119	575
7:00 - 7:15	25	12	37	11	10	21	2	1	3	14	5	19	78	18	96	6	1	7	29	5	34	60	16	76	25	3	28	14	5	19	63	47	110	57	18	75	0	0	0	2	0	2	0	0	0	0	0	0	386	141	527
7:15 - 7:30	40	19	59	14	10	24	6	5	11	15	3	18	95	25	120	7	4	11	27	8	35	89	8	97	23	4	27	21	3	24	83	37	120	38	24	62	0	0	0	0	0	0	0	0	0	0	0	0	458	150	608
7:30 - 7:45	33	18	51	11	7	18	6	3	9	13	4	17	123	40	163	10	4	14	16	4	20	69	14	83	25	3	28	9	4	13	96	36	132	49	16	65	0	0	0	1	0	1	0	0	0	0	0	0	461	153	614
7:45 - 8:00	50	18	68	21	5	26	12	5	17	9	1	10	97	27	124	14	3	17	36	8	44	88	11	99	21	1	22	29	2	31	77	33	110	55	15	70	0	0	0	0	0	0	0	0	0	0	0	0	509	129	638
8:00 - 8:15	27	16	43	12	5	17	7	2	9	6	0	6	116	46	162	8	0	8	35	3	38	73	2	75	23	2	25	8	1	9	97	35	132	64	31	95	0	0	0	2	0	2	0	0	0	0	0	0	478	143	621
8:15 - 8:30	39	25	64	19	2	21	11	8	19	16	2	18	113	28	141	6	1	7	41	8	49	50	5	55	20	4	24	20	3	23	74	27	101	40	21	61	0	0	0	0	0	0	0	0	0	0	0	0	449	134	583
8:30 - 8:45	33	28	61	24	4	28	13	3	16	12	6	18	104	40	144	0	2	2	34	14	48	42	3	45	29	6	35	9	0	9	108	29	137	56	27	83	0	0	0	0	0	0	0	0	0	0	0	0	464	162	626
8:45 - 9:00	26	19	45	14	5	19	10	3	13	17	4	21	119	34	153	1	1	2	27	5	32	46	7	53	25	3	28	19	4	23	91	37	128	51	21	72	0	0	0	0	0	0	0	0	0	0	1	1	446	144	590
Σ	356	200	556	172	68	240	96	37	133	140	35	175	1124	320	1444	92	22	114	358	83	441	769	96	865	264	36	300	177	34	211	933	385	1318	582	245	827	0	0	0	6	0	6	0	0	0	0	1	1	5069	1562	6631

TIME PERIOD	VEHICLE MOVEMENT																																		GRAND TOTAL		
	1			2			3			4			5			6			7			8			9			10			11			12			13			14			15			16					
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
14:00 - 14:15	31	15	46	42	1	43	6	5	11	15	5	20	117	38	155	26	6	32	32	7	39	35	3	38	31	5	36	31	5	36	114	40	154	31	22	53	0	0	0	1	0	1	0	0	0	0	0	0	512	152	664
14:15 - 14:30	32	31	63	63	6	69	9	6	15	8	3	11	105	43	148	22	3	25	27	9	36	25	11	36	33	3	36	25	2	27	77	32	109	30	20	50	0	0	0	0	0	0	0	0	0	0	0	0	456	169	625
14:30 - 14:45	31	23	54	43	7	50	11	4	15	18	6	24	101	28	129	26	2	28	29	5	34	23	10	33	37	4	41	29	2	31	75	36	111	36	16	52	0	0	0	0	0	0	0	0	0	0	0	0	459	143	602
14:45 - 15:00	39	16	55	28	5	33	7	4	11	13	3	16	108	40	148	41	5	46	17	7	24	32	3	35	31	3	34	29	1	30	78	33	111	31	32	63	0	0	0	0	0	0	0	0	0	0	0	0	454	152	606
15:00 - 15:15	38	21	59	77	5	82	14	6	20	17	2	19	108	36	144	35	1	36	28	11	39	29	6	35	27	1	28	28	2	30	95	25	120	41	17	58	0	0	0	1	0	1	0	0	0	0	0	0	530	133	671
15:15 - 15:30	35	27	62	62	3	65	7	7	14	15	4	19	80	45	125	25	4	29	42	3	45	31	3	34	31	3	34	24	1	25	69	27	96	30	21	51	0	0	0	0	0	0	0	0	0	0	0	0	451	148	599
15:30 - 15:45	56	17	73	63	6	69	5	2	7	12	3	15	108	38	146	30	3	33	27	7	34	34	7	41	34	4	38	32	3	35	97	26	123	44	7	51	0	0	0	1	1	2	0	0	0	0	0	0	543	124	667
15:45 - 16:00	42	14	56	65	1	66	7	3	10	15	1	16	97	26	123	24	3	27	21	2	23	30	5	35	36	2	38	34	3	37	77	18	95	49	16	65	0	0	0	1	0	1	0	0	0	0	0	0	498	94	592
Σ	304	164	468	443	34	477	66	37	103	113	27	140	824	294	1118	229	27	256	223	51	274	239	48	287	260	25	285	232	19	251	682	237	919	292	151	443	0	0	0	4	1	5	0	0	0	0	0	0	3911	1115	5026

TIME PERIOD	VEHICLE MOVEMENT																																		GRAND TOTAL			
	1			2			3			4			5			6			7			8			9			10			11			12			13			14			15			16						
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	
6:00 - 7:00	83	45	128	46	20	66	29	7	36	38	10	48	279	62	341	40	6	46	113	28	141	252	30	282	73	10	83	48	12	60	244	104	348	172	72	244	0	0	0	1	0	1	0	0	0	0	0	0	1418	406	1824	
6:15 - 7:15	97	47	144	49	23	72	25	7	32	40	15	55	304	72	376	34	6	40	125	23	148	257	37	294	90	12	102	53	12	65	258	135	393	193	73	266	0	0	0	3	0	3	0	0	0	0	0	0	1528	462	1990	
6:30 - 7:30	124	58	182	54	26	80	26	10	36	47	17	64	341	78	419	28	9	37	129	26	155	291	41	332	97	13	110	62	12	74	284	144	428	185	78	263	0	0	0	3	0	3	0	0	0	0	0	0	1671	512	2183	
6:45 - 7:45	139	62	201	52	28	80	21	11	32	49	16	65	400	103	503	31	12	43	115	25	140	301	48	349	96	14	110	55	12	67	308	151	459	190	81	271	0	0	0	4	0	4	0	0	0	0	0	0	1761	563	2324	
7:00 - 8:00	148	67	215	57	32	89	26	14	40	51	13	64	393	110	503	37	12	49	108	25	133	306	49	355	94	11	105	73	14	87	319	153	472	199	73	272	0	0	0	3	0	3	0	0	0	0	0	0	1814	573	2387	
7:15 - 8:15	**150**	**71**	**221**	**58**	**27**	**85**	**31**	**15**	**46**	**43**	**8**	**51**	**431**	**138**	**569**	**39**	**11**	**50**	**114**	**23**	**137**	**319**	**35**	**354**	**92**	**10**	**102**	**67**	**10**	**77**	**353**	**141**	**494**	**206**	**86**	**292**	**0**	**0**	**0**	**3**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**1906**	**575**	**2481**	**Peak**
7:30 - 8:30	149	77	226	63	19	82	36	18	54	44	7	51	449	141	590	38	8	46	128	23	151	280	32	312	89	10	99	66	10	76	344	131	475	208	83	291	0	0	0	3	0	3	0	0	0	0	0	0	1897	559	2456	
7:45 - 8:45	149	87	236	76	16	92	43	18	61	43	9	52	430	141	571	28	6	34	146	33	179	253	21	274	93	13	106	66	6	72	356	124	480	215	94	309	0	0	0	2	0	2	0	0	0	0	0	0	1900	568	2468	
8:00 - 9:00	125	88	213	69	16	85	41	16	57	51	12	63	452	148	600	15	4	19	137	30	167	211	17	228	97	15	112	56	8	64	370	128	498	211	100	311	0	0	0	2	0	2	0	0	0	0	1	1	1837	583	2420	

TIME PERIOD	VEHICLE MOVEMENT																																		GRAND TOTAL			
	1			2			3			4			5			6			7			8			9			10			11			12			13			14			15			16						
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	
14:00 - 15:00	133	85	218	176	19	195	33	19	52	54	17	71	431	149	580	115	16	131	105	28	133	115	27	142	132	15	147	114	10	124	344	141	485	128	90	218	0	0	0	1	0	1	0	0	0	0	0	0	1881	616	2497	
14:15 - 15:15	140	91	231	211	23	234	41	20	61	56	14	70	422	147	569	124	11	135	101	32	133	109	30	139	128	11	139	111	7	118	325	126	451	138	85	223	0	0	0	1	0	1	0	0	0	0	0	0	1907	597	2504	
14:30 - 15:30	143	87	230	210	20	230	39	21	60	63	15	78	397	149	546	127	12	139	116	26	142	115	22	137	126	11	137	110	6	116	317	121	438	138	86	224	0	0	0	1	0	1	0	0	0	0	0	0	1902	576	2478	
14:45 - 15:45	**168**	**81**	**249**	**230**	**19**	**249**	**33**	**19**	**52**	**57**	**12**	**69**	**404**	**159**	**563**	**131**	**13**	**144**	**114**	**28**	**142**	**126**	**19**	**145**	**123**	**11**	**134**	**113**	**7**	**120**	**339**	**111**	**450**	**146**	**77**	**223**	**0**	**0**	**0**	**2**	**1**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**1986**	**557**	**2543**	**Peak**
15:00 - 16:00	171	79	250	267	15	282	33	18	51	59	10	69	393	145	538	114	11	125	118	23	141	124	21	145	128	10	138	118	9	127	338	96	434	164	61	225	0	0	0	3	1	4	0	0	0	0	0	0	2030	499	2529	

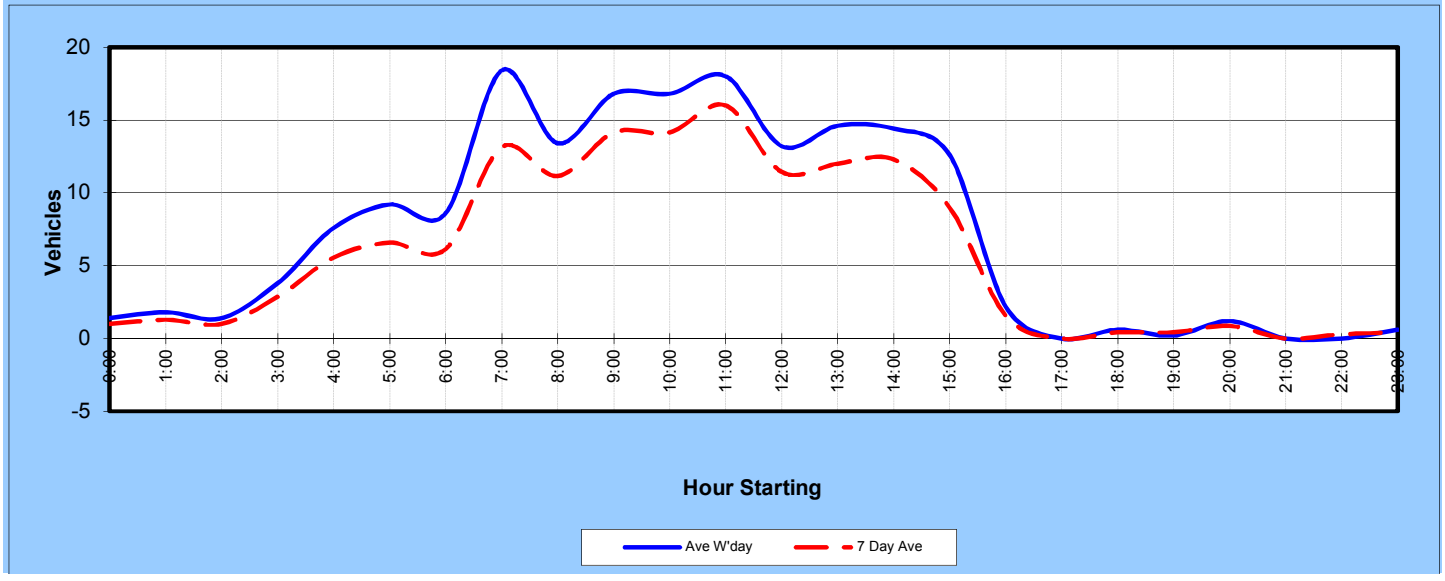
Appendix B

Tube Counts

Road	01 Site Entrance	
Location	driveway	
Site No.	1	
Start Date	Friday	19-Jun-15
Direction	Westbound	

Average Weekday	177
7 Day Average	142
Weekday Heavy's	16.1%
7 Day Heavy's	15.8%

	Day of Week							Ave	7 Day
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	W'day	Ave
Time	22-Jun	23-Jun	24-Jun	25-Jun	19-Jun	20-Jun	21-Jun		
AM Peak	22	23	20	22	22	14	11		
PM Peak	14	19	16	24	18	7	11		
0:00	1	3	1	1	1	0	0	1	1
1:00	2	6	0	0	1	0	0	2	1
2:00	1	0	2	0	4	0	0	1	1
3:00	3	3	1	3	9	0	1	4	3
4:00	10	3	8	3	14	1	0	8	6
5:00	14	8	11	9	4	0	0	9	7
6:00	11	8	9	5	10	0	0	9	6
7:00	22	15	19	21	15	0	0	18	13
8:00	13	13	20	13	8	8	3	13	11
9:00	12	15	13	22	22	11	4	17	14
10:00	13	23	13	18	17	4	11	17	14
11:00	16	23	15	19	17	14	8	18	16
12:00	8	13	16	13	16	3	11	13	11
13:00	14	19	9	18	13	3	8	15	12
14:00	8	16	15	24	9	7	7	14	12
15:00	14	13	11	7	18	0	0	13	9
16:00	0	4	1	3	3	0	0	2	2
17:00	0	0	0	0	0	0	0	0	0
18:00	1	0	0	2	0	0	0	1	0
19:00	0	0	1	0	0	0	2	0	0
20:00	0	6	0	0	0	0	0	1	1
21:00	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	2	0	0
23:00	0	0	1	2	0	0	0	1	0
Total	163	191	166	183	181	51	57	177	142
% Heavies	16.6%	14.7%	19.9%	13.7%	16.0%	15.7%	12.3%	16.1%	15.8%

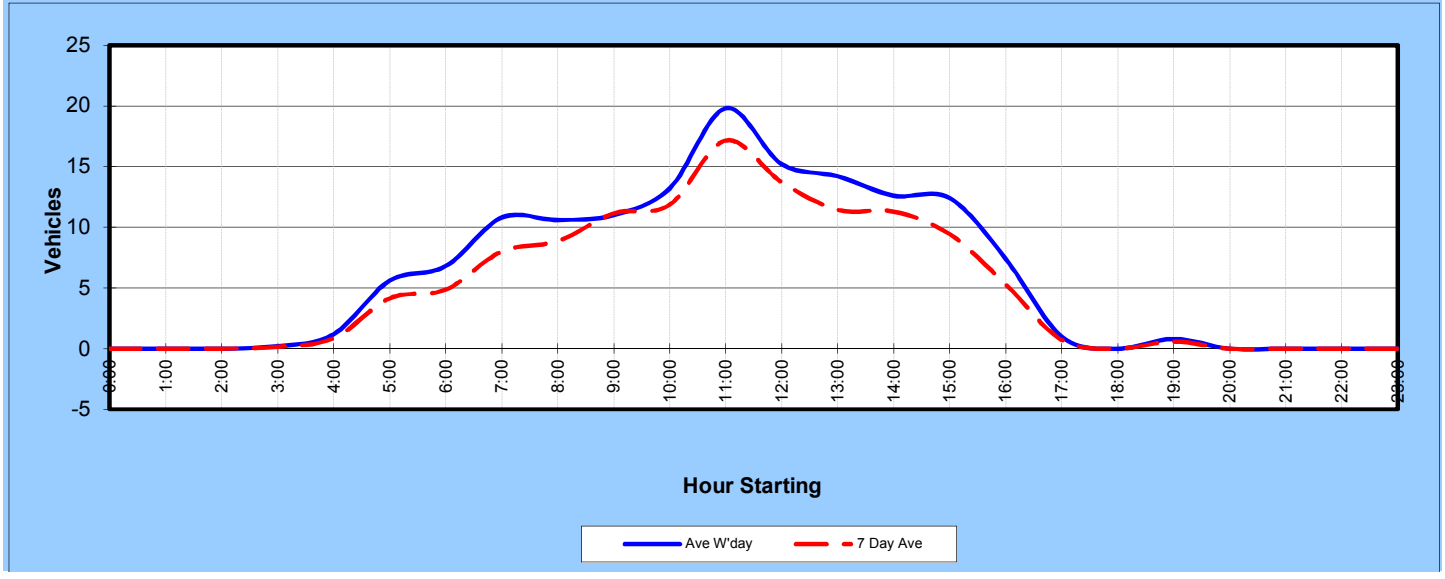


Prepared by : Austraffic

Road	02 Site Exit	
Location	driveway	
Site No.	2	
Start Date	Friday	19-Jun-15
Direction	Eastbound	

Average Weekday	143
7 Day Average	119
Weekday Heavy's	34.6%
7 Day Heavy's	31.7%

Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	22-Jun	23-Jun	24-Jun	25-Jun	19-Jun	20-Jun	21-Jun		
AM Peak	21	26	15	19	18	15	10		
PM Peak	14	17	18	17	17	11	9		
0:00	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0
3:00	1	0	0	0	0	0	0	0	0
4:00	2	1	0	1	2	0	0	1	1
5:00	5	3	8	7	5	1	0	6	4
6:00	2	9	13	4	6	0	0	7	5
7:00	17	6	9	16	6	0	2	11	8
8:00	10	11	14	10	8	8	1	11	9
9:00	10	9	12	14	10	15	8	11	11
10:00	10	14	10	14	18	7	10	13	12
11:00	21	26	15	19	18	14	7	20	17
12:00	14	15	18	12	17	11	9	15	14
13:00	13	14	14	17	13	4	5	14	11
14:00	8	17	11	15	12	9	7	13	11
15:00	14	14	8	13	13	3	1	12	9
16:00	7	13	6	5	6	0	0	7	5
17:00	1	1	1	1	1	0	0	1	1
18:00	0	0	0	0	0	0	0	0	0
19:00	0	0	4	0	0	0	0	1	1
20:00	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0
Total	135	153	143	148	135	72	50	143	119
% Heavies	31.1%	35.9%	34.3%	35.1%	36.3%	19.4%	8.0%	34.6%	31.7%

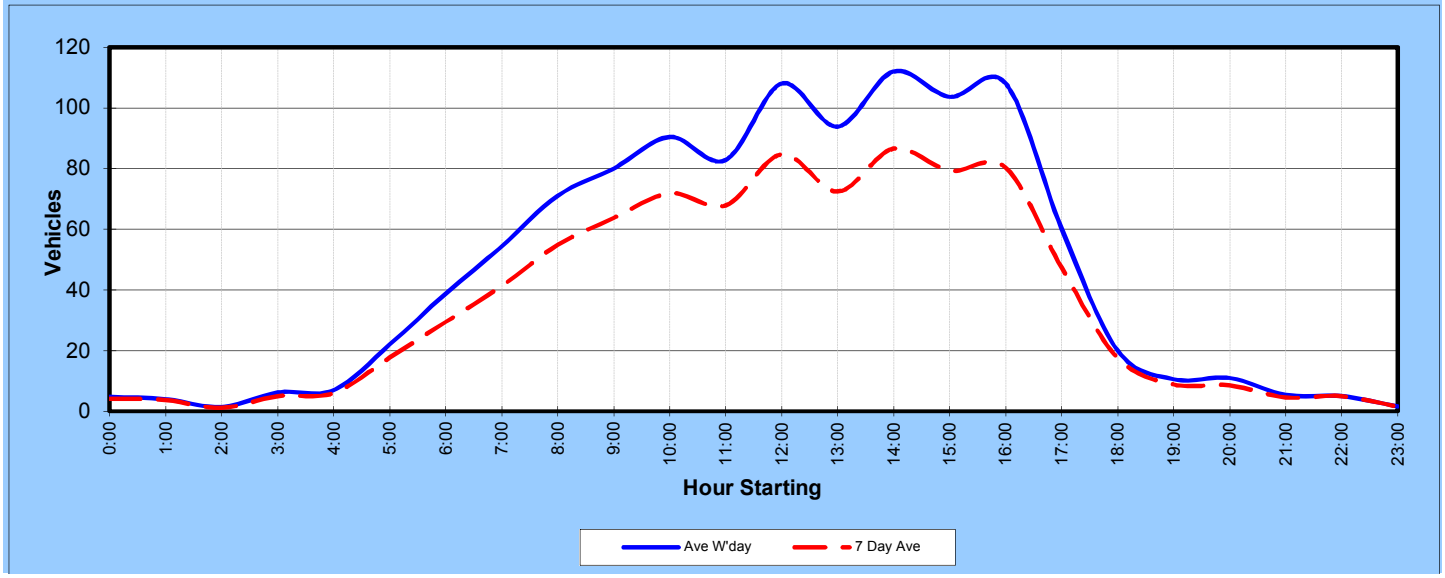


Prepared by : Austraffic

Road	03 Davis Road	
Location	immediately west of Elizabeth Street	
Site No.	3	
Start Date	Friday	19-Jun-15
Direction	Eastbound	

Average Weekday	1102
7 Day Average	863
Weekday Heavy's	26.6%
7 Day Heavy's	25.9%

	Day of Week							Ave	7 Day
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	W'day	Ave
Time	22-Jun	23-Jun	24-Jun	25-Jun	19-Jun	20-Jun	21-Jun		
AM Peak	103	92	86	91	93	48	13		
PM Peak	120	127	124	110	129	33	21		
0:00	2	5	7	5	5	1	4	5	4
1:00	7	5	3	2	3	3	3	4	4
2:00	1	1	2	1	2	1	0	1	1
3:00	3	8	5	7	8	2	2	6	5
4:00	8	5	7	6	9	2	5	7	6
5:00	22	19	23	24	22	10	4	22	18
6:00	39	37	45	39	34	8	4	39	29
7:00	54	62	58	54	44	16	1	54	41
8:00	77	68	74	76	60	26	3	71	55
9:00	76	72	86	86	80	36	10	80	64
10:00	94	92	82	91	93	39	12	90	72
11:00	103	92	71	71	77	48	13	83	68
12:00	97	126	103	85	129	32	21	108	85
13:00	98	95	102	94	80	22	16	94	72
14:00	104	127	106	107	116	33	13	112	87
15:00	91	114	110	110	93	19	18	104	79
16:00	120	126	124	92	78	14	8	108	80
17:00	78	67	45	58	53	17	13	60	47
18:00	13	18	17	22	30	14	9	20	18
19:00	11	15	12	11	4	5	4	11	9
20:00	9	15	8	7	16	1	4	11	9
21:00	4	7	8	3	5	4	1	5	5
22:00	2	11	3	5	4	4	6	5	5
23:00	1	1	1	4	1	3	0	2	2
Total	1114	1188	1102	1060	1046	360	174	1102	863
% Heavies	28.1%	25.3%	26.2%	25.4%	28.1%	21.9%	13.2%	26.6%	25.9%

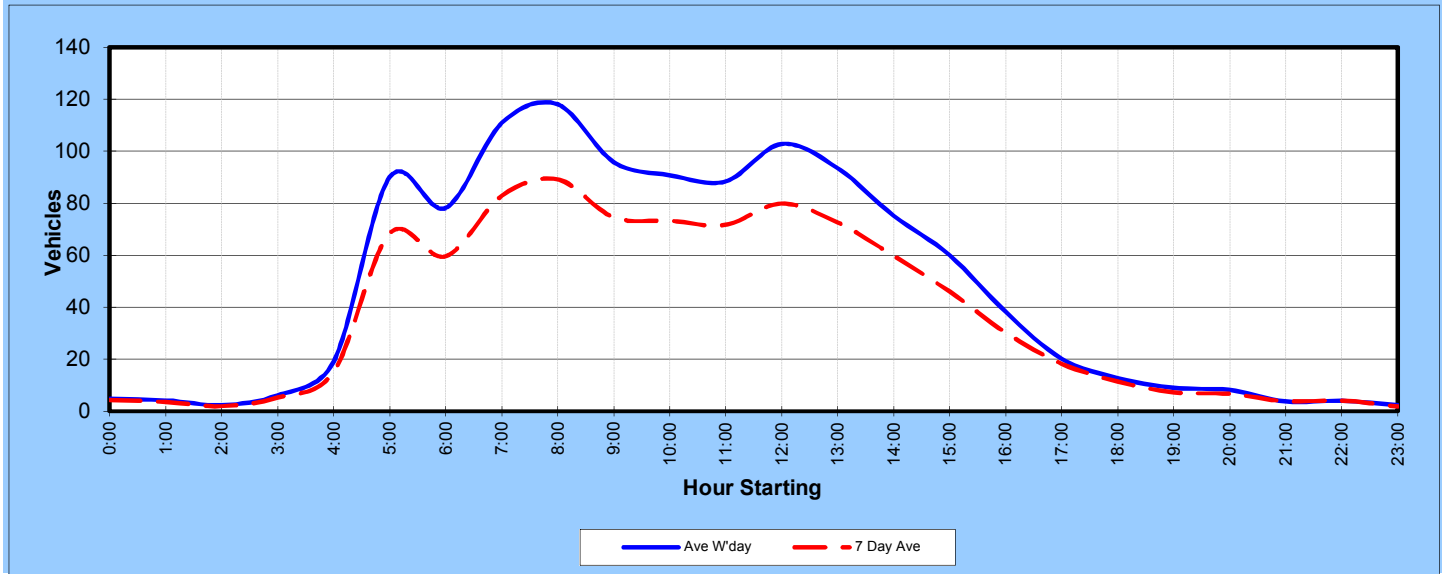


Prepared by : Austraffic

Road	03 Davis Road	
Location	immediately west of Elizabeth Street	
Site No.	3	
Start Date	Friday	19-Jun-15
Direction	Westbound	

Average Weekday	1139
7 Day Average	892
Weekday Heavy's	28.5%
7 Day Heavy's	27.5%

	Day of Week							Ave	7 Day
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	W'day	Ave
Time	22-Jun	23-Jun	24-Jun	25-Jun	19-Jun	20-Jun	21-Jun		
AM Peak	125	119	119	124	104	44	18		
PM Peak	99	104	110	101	100	29	20		
0:00	1	3	9	5	6	2	5	5	4
1:00	8	5	3	3	2	2	2	4	4
2:00	1	3	3	1	4	1	1	2	2
3:00	3	9	5	9	5	4	2	6	5
4:00	21	15	18	21	21	5	6	19	15
5:00	80	93	102	93	82	26	3	90	68
6:00	70	76	101	75	69	22	4	78	60
7:00	117	119	104	115	99	24	2	111	83
8:00	125	118	119	124	104	25	9	118	89
9:00	103	86	95	101	94	35	8	96	75
10:00	97	94	78	84	101	41	18	91	73
11:00	98	110	79	78	77	44	16	88	72
12:00	99	104	110	101	100	25	20	103	80
13:00	97	103	90	94	83	21	20	93	73
14:00	65	92	65	83	71	29	13	75	60
15:00	63	65	59	52	61	12	10	60	46
16:00	42	44	43	28	34	14	7	38	30
17:00	17	17	22	24	21	12	15	20	18
18:00	11	9	15	13	16	14	2	13	11
19:00	8	8	8	13	8	2	4	9	7
20:00	7	12	8	7	7	2	4	8	7
21:00	2	7	4	2	4	5	3	4	4
22:00	2	9	3	5	1	3	6	4	4
23:00	4	1	1	5	1	1	0	2	2
Total	1141	1202	1144	1136	1071	371	180	1139	892
% Heavies	29.6%	27.6%	28.0%	27.1%	30.1%	21.0%	10.6%	28.5%	27.5%

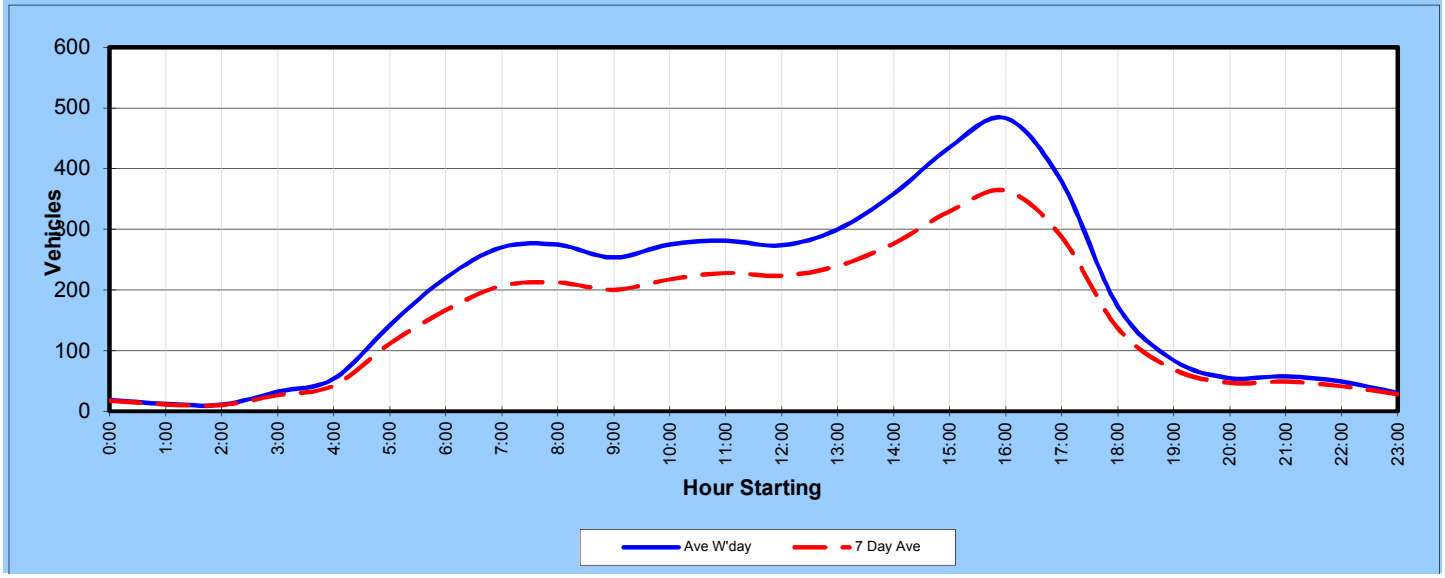


Prepared by : Austraffic

Road	04 Davis Road	
Location	west of Widemere Road	
Site No.	4	
Start Date	Friday	19-Jun-15
Direction	Eastbound	

Average Weekday	4520
7 Day Average	3542
Weekday Heavy's	25.1%
7 Day Heavy's	23.9%

	Day of Week							Ave	7 Day
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	W'day	Ave
Time	22-Jun	23-Jun	24-Jun	25-Jun	19-Jun	20-Jun	21-Jun		
AM Peak	327	285	275	291	306	147	48		
PM Peak	496	527	515	459	421	136	68		
0:00	13	18	20	17	26	9	20	19	18
1:00	8	14	14	14	11	10	9	12	11
2:00	11	10	15	7	11	17	2	11	10
3:00	24	34	29	43	32	21	3	32	27
4:00	43	69	59	47	50	21	8	54	42
5:00	145	131	155	143	134	47	25	142	111
6:00	244	229	236	209	183	44	22	220	167
7:00	327	277	261	260	226	73	23	270	207
8:00	310	260	262	268	272	78	36	274	212
9:00	245	244	275	263	240	97	38	253	200
10:00	270	285	260	291	269	98	48	275	217
11:00	271	280	269	279	306	147	44	281	228
12:00	265	266	263	272	301	136	61	273	223
13:00	265	284	307	303	340	109	68	300	239
14:00	320	352	387	332	399	94	52	358	277
15:00	441	445	445	424	421	72	59	435	330
16:00	496	527	515	459	418	79	50	483	363
17:00	382	403	378	396	331	69	52	378	287
18:00	168	173	180	182	163	50	43	173	137
19:00	82	90	93	84	71	25	39	84	69
20:00	67	59	50	44	54	26	27	55	47
21:00	45	57	54	78	55	29	25	58	49
22:00	55	53	42	49	45	24	21	49	41
23:00	38	31	28	27	28	27	17	30	28
Total	4535	4591	4597	4491	4386	1402	792	4520	3542
% Heavies	25.5%	24.9%	26.3%	25.1%	23.5%	13.1%	9.2%	25.1%	23.9%

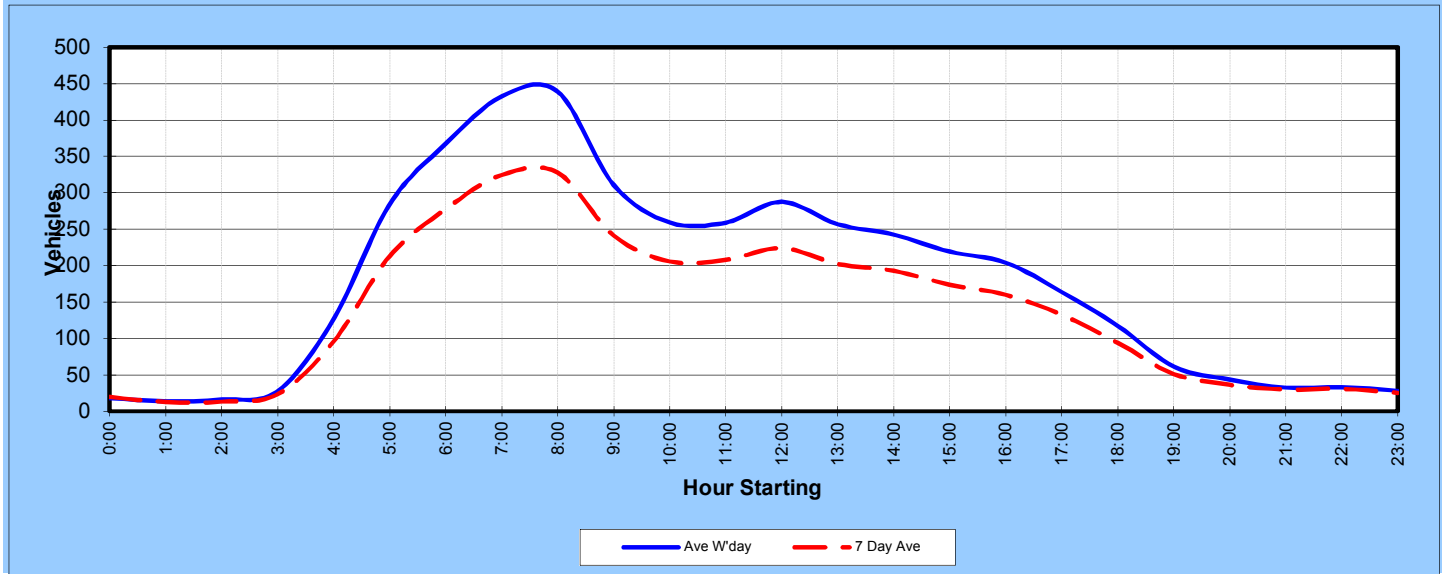


Prepared by : Austraffic

Road	04 Davis Road	
Location	west of Widemere Road	
Site No.	4	
Start Date	Friday	19-Jun-15
Direction	Westbound	

Average Weekday	4246
7 Day Average	3317
Weekday Heavy's	25.7%
7 Day Heavy's	24.5%

	Day of Week							Ave	7 Day
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	W'day	Ave
Time	22-Jun	23-Jun	24-Jun	25-Jun	19-Jun	20-Jun	21-Jun		
AM Peak	447	453	475	437	417	102	58		
PM Peak	281	261	278	296	323	90	57		
0:00	12	15	22	23	18	18	29	18	20
1:00	19	13	11	11	15	13	7	14	13
2:00	16	11	14	19	20	5	8	16	13
3:00	32	28	28	24	27	21	6	28	24
4:00	131	130	132	130	113	29	6	127	96
5:00	260	303	288	289	282	57	13	284	213
6:00	392	372	379	368	326	83	23	367	278
7:00	447	453	428	437	397	90	20	432	325
8:00	439	438	475	425	417	71	29	439	328
9:00	317	300	310	324	303	89	46	311	241
10:00	266	253	250	264	263	99	45	259	206
11:00	236	286	260	263	251	102	58	259	208
12:00	281	260	278	296	323	87	44	288	224
13:00	270	261	260	258	235	78	55	257	202
14:00	243	240	240	256	234	90	47	243	193
15:00	206	244	235	215	196	73	48	219	174
16:00	195	204	238	185	199	55	45	204	160
17:00	168	143	161	182	166	51	57	164	133
18:00	130	111	128	100	118	39	34	117	94
19:00	58	74	57	57	62	30	21	62	51
20:00	37	49	42	49	41	12	25	44	36
21:00	32	39	31	32	29	23	24	33	30
22:00	32	33	32	27	41	24	28	33	31
23:00	36	32	21	30	22	20	16	28	25
Total	4255	4292	4320	4264	4098	1259	734	4246	3317
% Heavies	25.9%	24.7%	25.9%	25.7%	26.3%	13.8%	9.3%	25.7%	24.5%

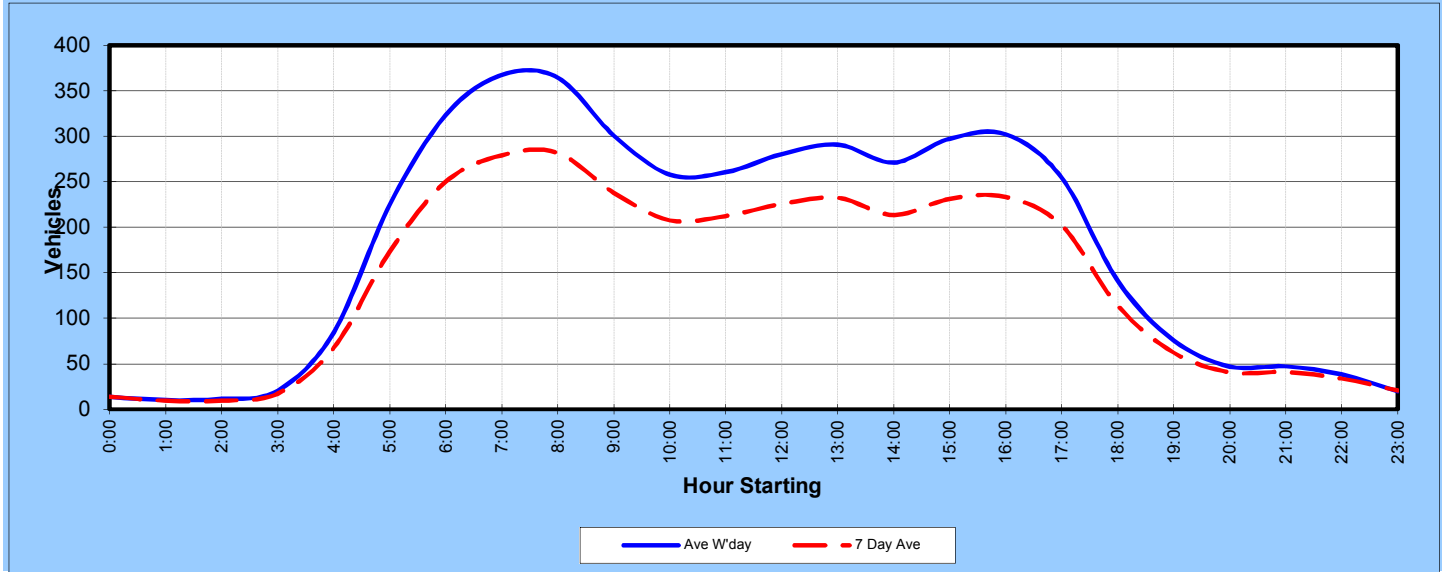


Prepared by : Austraffic

Road	05 Elizabeth Street	
Location	immediately south od Davis Road	
Site No.	5	
Start Date	Friday	19-Jun-15
Direction	Northbound	

Average Weekday	4304
7 Day Average	3409
Weekday Heavy's	25.8%
7 Day Heavy's	24.6%

	Day of Week							Ave	7 Day
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
Time	22-Jun	23-Jun	24-Jun	25-Jun	19-Jun	20-Jun	21-Jun	W'day	Ave
AM Peak	390	392	365	362	366	135	63		
PM Peak	333	308	324	309	308	115	78		
0:00	12	12	17	13	14	10	19	14	14
1:00	11	8	14	11	7	7	8	10	9
2:00	9	11	11	12	14	7	2	11	9
3:00	21	24	19	22	17	15	3	21	17
4:00	78	102	78	83	81	33	17	84	67
5:00	216	225	230	243	210	71	18	225	173
6:00	328	328	341	311	308	102	32	323	250
7:00	390	392	348	362	345	95	21	367	279
8:00	390	356	365	345	366	107	43	364	282
9:00	300	286	313	306	299	124	38	301	238
10:00	262	268	239	263	257	101	63	258	208
11:00	260	264	243	273	262	135	49	260	212
12:00	259	272	300	276	294	115	63	280	226
13:00	252	280	305	309	308	94	78	291	232
14:00	253	270	282	273	277	86	53	271	213
15:00	310	298	324	273	281	74	58	297	231
16:00	333	308	302	284	283	73	50	302	233
17:00	236	265	263	272	236	74	67	254	202
18:00	142	143	151	125	145	48	43	141	114
19:00	71	77	78	86	67	20	37	76	62
20:00	53	55	48	39	40	24	26	47	41
21:00	29	43	49	66	49	28	22	47	41
22:00	47	38	34	35	37	24	22	38	34
23:00	27	22	14	17	19	26	19	20	21
Total	4289	4347	4368	4299	4216	1493	851	4304	3409
% Heavies	26.5%	25.6%	26.3%	25.7%	24.6%	16.0%	10.3%	25.8%	24.6%

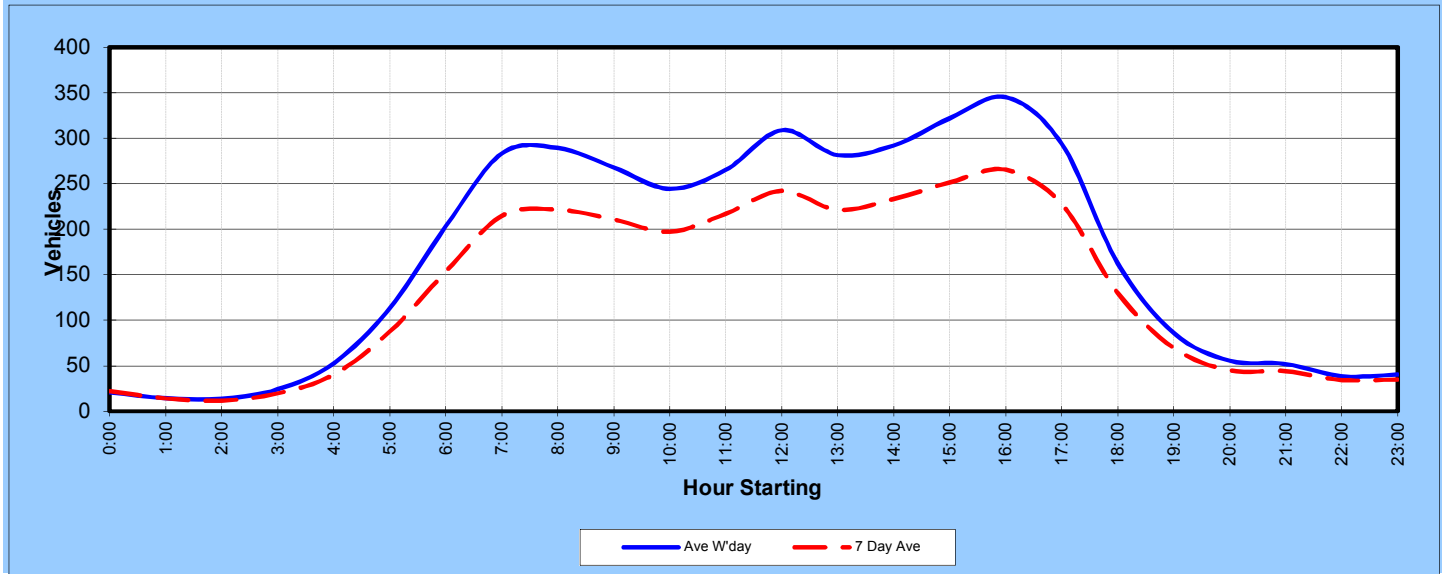


Prepared by : Austraffic

Road	05 Elizabeth Street	
Location	immediately south od Davis Road	
Site No.	5	
Start Date	Friday	19-Jun-15
Direction	Southbound	

Average Weekday	4070
7 Day Average	3209
Weekday Heavy's	26.1%
7 Day Heavy's	25.0%

	Day of Week							Ave	7 Day
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	W'day	Ave
Time	22-Jun	23-Jun	24-Jun	25-Jun	19-Jun	20-Jun	21-Jun		
AM Peak	291	299	302	297	276	137	57		
PM Peak	328	353	393	326	361	113	60		
0:00	10	19	24	26	25	17	33	21	22
1:00	22	13	9	9	19	15	12	14	14
2:00	12	10	12	16	20	7	5	14	12
3:00	21	27	25	22	26	13	4	24	20
4:00	54	52	63	51	44	11	7	53	40
5:00	103	123	103	127	110	37	10	113	88
6:00	208	209	203	201	194	44	14	203	153
7:00	291	299	277	297	252	73	14	283	215
8:00	282	295	302	291	276	77	27	289	221
9:00	272	253	282	274	259	95	40	268	211
10:00	251	242	221	243	265	107	51	244	197
11:00	248	279	249	277	272	137	57	265	217
12:00	288	298	302	295	361	100	51	309	242
13:00	292	255	269	290	301	89	53	281	221
14:00	288	271	287	305	309	113	59	292	233
15:00	299	338	348	311	313	94	57	322	251
16:00	328	353	393	326	325	75	57	345	265
17:00	293	314	280	307	276	64	60	294	228
18:00	172	137	174	164	166	45	53	163	130
19:00	79	101	88	87	75	31	26	86	70
20:00	50	59	56	59	54	11	26	56	45
21:00	46	58	59	57	40	24	25	52	44
22:00	44	36	36	32	45	24	24	39	34
23:00	35	40	34	44	48	28	15	40	35
Total	3988	4081	4096	4111	4075	1331	780	4070	3209
% Heavies	27.1%	25.8%	26.3%	24.8%	26.7%	15.6%	10.9%	26.1%	25.0%



Prepared by : Austraffic

Appendix C

Existing Sidra Intersection Modelling Results

MOVEMENT SUMMARY

▽ Site: Davis Road / Elizabeth Street AM Existing

15S480 - Wetherill Park Transfer Station Upgrade
Existing AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Elizabeth Street											
1	L2	88	21.4	0.064	5.0	LOS A	0.3	2.2	0.17	0.50	45.5
3	R2	331	25.5	0.396	7.4	LOS A	2.0	17.1	0.47	0.74	44.3
Approach		419	24.6	0.396	6.9	LOS A	2.0	17.1	0.40	0.69	44.6
East: Davis Road											
4	L2	275	20.3	0.206	4.8	LOS A	0.0	0.0	0.00	0.43	46.8
5	T1	64	18.0	0.206	0.0	LOS A	0.0	0.0	0.00	0.43	47.3
Approach		339	19.9	0.206	3.9	NA	0.0	0.0	0.00	0.43	46.9
West: Davis Road											
11	T1	32	56.7	0.063	1.8	LOS A	0.3	3.0	0.45	0.36	46.7
12	R2	38	47.2	0.063	7.1	LOS A	0.3	3.0	0.45	0.36	45.2
Approach		69	51.5	0.063	4.7	NA	0.3	3.0	0.45	0.36	45.9
All Vehicles		827	24.9	0.396	5.5	NA	2.0	17.1	0.24	0.55	45.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: Davis Road / Elizabeth Street PM Existing

15S480 - Wetherill Park Transfer Station Upgrade
Existing PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Elizabeth Street											
1	L2	52	20.4	0.036	4.9	LOS A	0.1	1.2	0.13	0.49	45.6
3	R2	260	19.0	0.310	6.9	LOS A	1.3	10.3	0.45	0.71	44.6
Approach		312	19.3	0.310	6.6	LOS A	1.3	10.3	0.40	0.67	44.8
East: Davis Road											
4	L2	254	22.4	0.185	4.8	LOS A	0.0	0.0	0.00	0.45	46.6
5	T1	41	38.5	0.185	0.0	LOS A	0.0	0.0	0.00	0.45	47.1
Approach		295	24.6	0.185	4.1	NA	0.0	0.0	0.00	0.45	46.7
West: Davis Road											
11	T1	68	20.0	0.101	1.1	LOS A	0.5	3.8	0.39	0.31	47.2
12	R2	72	16.2	0.101	6.1	LOS A	0.5	3.8	0.39	0.31	46.2
Approach		140	18.0	0.101	3.7	NA	0.5	3.8	0.39	0.31	46.7
All Vehicles		746	21.2	0.310	5.1	NA	1.3	10.3	0.24	0.52	45.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Victoria Street / Elizabeth Street AM Existing

15S480 - Wetherill Park Transfer Station Upgrade
Existing AM Peak Hour
Signals - Fixed Time Isolated Cycle Time = 170 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Elizabeth Street											
1	L2	103	9.8	0.809	79.2	LOS F	24.6	186.4	1.00	0.96	26.5
2	T1	358	9.9	0.809	73.6	LOS F	24.6	186.4	1.00	0.94	26.9
3	R2	138	16.8	0.809	79.4	LOS F	24.1	187.7	1.00	0.91	26.4
Approach		599	11.5	0.809	75.9	LOS F	24.6	187.7	1.00	0.93	26.7
East: Victoria Street											
4	L2	51	22.0	0.631	43.3	LOS D	21.4	181.1	0.71	0.73	35.0
5	T1	575	24.3	0.631	56.7	LOS E	21.6	182.7	0.93	0.81	31.0
6	R2	52	15.7	0.437	90.6	LOS F	4.3	33.9	1.00	0.76	23.8
Approach		677	23.4	0.631	58.3	LOS E	21.6	182.7	0.92	0.80	30.6
North: Elizabeth Street											
7	L2	46	32.6	0.417	58.9	LOS E	8.7	77.4	0.92	0.77	30.7
8	T1	86	31.8	0.417	52.9	LOS D	8.7	77.4	0.92	0.77	31.7
9	R2	223	32.1	0.761	79.0	LOS F	18.2	162.5	1.00	0.87	25.8
Approach		356	32.1	0.761	70.1	LOS E	18.2	162.5	0.97	0.83	27.6
West: Victoria Street											
10	L2	295	29.5	0.648	42.3	LOS C	22.4	196.3	0.81	0.84	35.0
11	T1	499	28.5	0.648	48.5	LOS D	25.3	220.5	0.90	0.82	33.1
12	R2	78	13.0	0.354	79.4	LOS F	6.0	46.4	0.96	0.77	25.6
Approach		872	27.5	0.648	49.2	LOS D	25.3	220.5	0.87	0.82	32.9
All Vehicles		2503	23.2	0.809	61.0	LOS E	25.3	220.5	0.93	0.84	29.8

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Victoria Street / Elizabeth Street PM Existing

15S480 - Wetherill Park Transfer Station Upgrade
Existing PM Peak Hour
Signals - Fixed Time Isolated Cycle Time = 140 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Elizabeth Street											
1	L2	139	7.2	0.677	52.9	LOS D	12.3	93.6	0.98	0.88	32.2
2	T1	146	14.5	0.677	52.0	LOS D	12.9	102.5	0.99	0.87	31.4
3	R2	142	16.3	0.677	65.8	LOS E	12.9	102.5	0.99	0.84	28.9
Approach		428	12.7	0.677	56.9	LOS E	12.9	102.5	0.99	0.86	30.8
East: Victoria Street											
4	L2	126	8.8	0.624	39.2	LOS C	18.3	153.3	0.75	0.75	36.6
5	T1	543	27.0	0.624	45.8	LOS D	18.3	153.3	0.92	0.80	34.0
6	R2	70	14.5	0.483	74.3	LOS F	4.7	37.3	1.00	0.77	26.7
Approach		739	22.7	0.624	47.4	LOS D	18.3	154.5	0.90	0.79	33.6
North: Elizabeth Street											
7	L2	52	35.3	0.701	56.8	LOS E	19.9	151.3	0.97	0.83	31.6
8	T1	285	5.3	0.701	51.0	LOS D	19.9	151.3	0.97	0.84	32.5
9	R2	253	31.6	0.701	58.2	LOS E	17.0	149.2	0.97	0.85	30.3
Approach		589	19.2	0.701	54.6	LOS D	19.9	151.3	0.97	0.84	31.5
West: Victoria Street											
10	L2	227	27.1	0.559	34.7	LOS C	14.8	126.0	0.78	0.80	37.9
11	T1	438	22.1	0.559	39.9	LOS C	17.3	143.7	0.88	0.79	35.9
12	R2	128	7.1	0.635	71.6	LOS F	8.7	64.3	1.00	0.81	27.2
Approach		794	21.1	0.635	43.5	LOS D	17.3	143.7	0.87	0.79	34.6
All Vehicles		2551	19.7	0.701	49.4	LOS D	19.9	154.5	0.92	0.81	32.9

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Davis Road / Widemere Road AM Existing

15S480 - Wetherill Park Transfer Station Upgrade
Existing AM Peak Hour
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Widemere Road											
1	L2	119	20.4	0.635	28.8	LOS C	7.2	60.2	0.94	0.83	40.9
2	T1	369	25.6	0.635	24.1	LOS B	7.2	60.2	0.95	0.82	42.5
Approach		488	24.4	0.635	25.2	LOS B	7.2	60.2	0.95	0.83	42.1
North: Widemere Road											
8	T1	355	14.5	0.648	4.4	LOS A	9.1	71.0	0.43	0.40	55.5
9	R2	488	13.6	0.648	17.1	LOS B	9.1	71.0	0.79	0.88	45.7
Approach		843	14.0	0.648	11.7	LOS A	9.1	71.0	0.64	0.68	49.4
West: Davis Road											
10	L2	226	27.4	0.250	12.5	LOS A	3.3	28.2	0.52	0.71	47.9
12	R2	69	56.1	0.524	37.1	LOS C	2.2	22.4	0.99	0.78	35.8
Approach		296	34.2	0.524	18.3	LOS B	3.3	28.2	0.63	0.73	44.4
All Vehicles		1627	20.8	0.648	17.0	LOS B	9.1	71.0	0.73	0.73	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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Davis Road / Widemere Road PM Existing

15S480 - Wetherill Park Transfer Station Upgrade
Existing PM Peak Hour
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Widemere Road											
1	L2	82	35.9	0.584	26.7	LOS B	6.8	56.5	0.91	0.78	42.2
2	T1	439	14.4	0.584	21.6	LOS B	7.0	54.8	0.92	0.78	44.0
Approach		521	17.8	0.584	22.4	LOS B	7.0	56.5	0.92	0.78	43.7
North: Widemere Road											
8	T1	164	35.3	0.163	4.8	LOS A	2.0	17.9	0.43	0.36	55.6
9	R2	364	25.4	0.595	19.5	LOS B	7.4	63.1	0.84	0.87	43.9
Approach		528	28.5	0.595	15.0	LOS B	7.4	63.1	0.72	0.71	47.0
West: Davis Road											
10	L2	313	12.8	0.334	13.8	LOS A	5.1	39.5	0.59	0.74	47.5
12	R2	159	19.2	0.584	32.5	LOS C	4.6	37.7	0.97	0.81	38.1
Approach		472	15.0	0.584	20.1	LOS B	5.1	39.5	0.72	0.77	43.9
All Vehicles		1521	20.6	0.595	19.1	LOS B	7.4	63.1	0.79	0.75	44.8

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix D

Post Development Sidra Modelling Results

MOVEMENT SUMMARY

▽ Site: Davis Road / Elizabeth Street AM Post Dev

15S480 - Wetherill Park Transfer Station Upgrade
AM Post Dev Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Elizabeth Street											
1	L2	96	27.5	0.072	5.1	LOS A	0.3	2.6	0.18	0.50	45.4
3	R2	331	25.5	0.408	7.7	LOS A	2.1	18.0	0.49	0.77	44.2
Approach		426	25.9	0.408	7.1	LOS A	2.1	18.0	0.42	0.71	44.4
East: Davis Road											
4	L2	275	20.3	0.211	4.8	LOS A	0.0	0.0	0.00	0.42	46.8
5	T1	69	24.2	0.211	0.0	LOS A	0.0	0.0	0.00	0.42	47.3
Approach		344	21.1	0.211	3.8	NA	0.0	0.0	0.00	0.42	46.9
West: Davis Road											
11	T1	37	62.9	0.079	2.0	LOS A	0.4	4.0	0.47	0.37	46.5
12	R2	45	55.8	0.079	7.5	LOS A	0.4	4.0	0.47	0.37	44.9
Approach		82	59.0	0.079	5.0	NA	0.4	4.0	0.47	0.37	45.6
All Vehicles		853	27.2	0.408	5.6	NA	2.1	18.0	0.26	0.56	45.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: Davis Road / Elizabeth Street PM Post Dev

15S480 - Wetherill Park Transfer Station Upgrade
PM Post Dev Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Elizabeth Street											
1	L2	59	30.4	0.044	5.0	LOS A	0.2	1.6	0.15	0.49	45.4
3	R2	260	19.0	0.319	7.2	LOS A	1.3	11.0	0.47	0.73	44.5
Approach		319	21.1	0.319	6.8	LOS A	1.3	11.0	0.41	0.69	44.7
East: Davis Road											
4	L2	254	22.4	0.189	4.8	LOS A	0.0	0.0	0.00	0.45	46.6
5	T1	46	45.5	0.189	0.0	LOS A	0.0	0.0	0.00	0.45	47.1
Approach		300	26.0	0.189	4.0	NA	0.0	0.0	0.00	0.45	46.7
West: Davis Road											
11	T1	75	26.8	0.115	1.3	LOS A	0.6	4.7	0.41	0.32	47.1
12	R2	78	23.0	0.115	6.4	LOS A	0.6	4.7	0.41	0.32	46.0
Approach		153	24.8	0.115	3.9	NA	0.6	4.7	0.41	0.32	46.5
All Vehicles		772	23.7	0.319	5.1	NA	1.3	11.0	0.25	0.52	45.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Victoria Street / Elizabeth Street AM Post Dev

15S480 - Wetherill Park Transfer Station Upgrade
AM Post Dev Peak Hour
Signals - Fixed Time Isolated Cycle Time = 170 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Elizabeth Street											
1	L2	103	9.8	0.817	80.0	LOS F	24.9	190.2	1.00	0.96	26.3
2	T1	362	10.9	0.817	74.4	LOS F	24.9	190.2	1.00	0.94	26.7
3	R2	138	16.8	0.817	80.1	LOS F	24.4	191.2	1.00	0.92	26.3
Approach		603	12.1	0.817	76.7	LOS F	24.9	191.2	1.00	0.94	26.5
East: Victoria Street											
4	L2	51	22.0	0.631	43.3	LOS D	21.4	181.1	0.71	0.73	35.0
5	T1	575	24.3	0.631	56.7	LOS E	21.6	182.7	0.93	0.81	31.0
6	R2	52	15.7	0.437	90.6	LOS F	4.3	33.9	1.00	0.76	23.8
Approach		677	23.4	0.631	58.3	LOS E	21.6	182.7	0.92	0.80	30.6
North: Elizabeth Street											
7	L2	47	34.0	0.430	59.4	LOS E	8.9	80.4	0.92	0.77	30.6
8	T1	88	33.3	0.430	53.4	LOS D	8.9	80.4	0.92	0.77	31.5
9	R2	227	33.3	0.780	80.3	LOS F	18.8	169.1	1.00	0.88	25.5
Approach		363	33.4	0.780	71.0	LOS F	18.8	169.1	0.97	0.84	27.4
West: Victoria Street											
10	L2	298	30.2	0.652	42.2	LOS C	22.5	197.2	0.81	0.85	35.0
11	T1	499	28.5	0.652	48.6	LOS D	25.5	221.9	0.90	0.82	33.1
12	R2	78	13.0	0.354	79.4	LOS F	6.0	46.4	0.96	0.77	25.6
Approach		875	27.7	0.652	49.1	LOS D	25.5	221.9	0.88	0.83	32.9
All Vehicles		2517	23.6	0.817	61.3	LOS E	25.5	221.9	0.93	0.85	29.7

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Victoria Street / Elizabeth Street PM Post Dev

15S480 - Wetherill Park Transfer Station Upgrade
PM Post Dev Peak Hour
Signals - Fixed Time Isolated Cycle Time = 140 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Elizabeth Street											
1	L2	139	7.2	0.682	53.2	LOS D	12.4	94.9	0.98	0.89	32.1
2	T1	148	15.6	0.682	52.3	LOS D	13.0	103.6	0.99	0.87	31.4
3	R2	142	16.3	0.682	65.9	LOS E	13.0	103.6	0.99	0.84	28.9
Approach		430	13.1	0.682	57.1	LOS E	13.0	103.6	0.99	0.86	30.7
East: Victoria Street											
4	L2	126	8.8	0.624	39.2	LOS C	18.3	153.3	0.75	0.75	36.6
5	T1	543	27.0	0.624	45.8	LOS D	18.3	153.3	0.92	0.80	34.0
6	R2	71	15.7	0.494	74.4	LOS F	4.8	38.2	1.00	0.77	26.7
Approach		740	22.8	0.624	47.4	LOS D	18.3	154.5	0.90	0.79	33.5
North: Elizabeth Street											
7	L2	52	35.3	0.712	57.1	LOS E	20.2	154.4	0.97	0.84	31.6
8	T1	288	6.3	0.712	51.2	LOS D	20.2	154.4	0.97	0.84	32.5
9	R2	256	32.4	0.712	58.7	LOS E	17.3	152.8	0.97	0.86	30.2
Approach		595	20.0	0.712	54.9	LOS D	20.2	154.4	0.97	0.85	31.4
West: Victoria Street											
10	L2	231	28.4	0.563	34.6	LOS C	14.8	126.8	0.78	0.80	37.9
11	T1	438	22.1	0.563	39.9	LOS C	17.4	145.0	0.88	0.79	35.9
12	R2	128	7.1	0.635	71.6	LOS F	8.7	64.3	1.00	0.81	27.2
Approach		798	21.5	0.635	43.5	LOS D	17.4	145.0	0.87	0.80	34.6
All Vehicles		2564	20.1	0.712	49.6	LOS D	20.2	154.5	0.92	0.82	32.8

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Davis Road / Widemere Road AM Post Dev

15S480 - Wetherill Park Transfer Station Upgrade
AM Post Dev Peak Hour
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Widemere Road											
1	L2	120	21.1	0.636	28.9	LOS C	7.2	60.5	0.94	0.83	40.9
2	T1	369	25.6	0.636	24.1	LOS B	7.2	60.5	0.95	0.83	42.5
Approach		489	24.5	0.636	25.3	LOS B	7.2	60.5	0.95	0.83	42.1
North: Widemere Road											
8	T1	359	15.5	0.653	4.5	LOS A	9.1	71.5	0.44	0.40	55.4
9	R2	488	13.6	0.653	17.2	LOS B	9.1	71.5	0.80	0.89	45.7
Approach		847	14.4	0.653	11.8	LOS A	9.1	71.5	0.64	0.68	49.4
West: Davis Road											
10	L2	231	28.8	0.256	12.5	LOS A	3.3	29.1	0.52	0.72	47.9
12	R2	71	56.7	0.533	37.2	LOS C	2.2	22.9	0.99	0.79	35.7
Approach		301	35.3	0.533	18.3	LOS B	3.3	29.1	0.63	0.73	44.3
All Vehicles		1638	21.3	0.653	17.0	LOS B	9.1	71.5	0.73	0.73	46.0

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Davis Road / Widemere Road PM Post Dev

15S480 - Wetherill Park Transfer Station Upgrade
PM Post Dev Peak Hour
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Widemere Road											
1	L2	84	37.5	0.587	26.7	LOS B	6.9	57.0	0.91	0.78	42.1
2	T1	439	14.4	0.587	21.6	LOS B	7.0	55.2	0.92	0.78	44.0
Approach		523	18.1	0.587	22.4	LOS B	7.0	57.0	0.92	0.78	43.7
North: Widemere Road											
8	T1	167	36.5	0.168	4.9	LOS A	2.0	18.5	0.43	0.36	55.6
9	R2	364	25.4	0.595	19.6	LOS B	7.4	63.1	0.84	0.87	43.9
Approach		532	28.9	0.595	14.9	LOS B	7.4	63.1	0.72	0.71	47.0
West: Davis Road											
10	L2	317	14.0	0.341	13.8	LOS A	5.2	40.6	0.59	0.74	47.4
12	R2	161	20.3	0.595	32.7	LOS C	4.7	38.7	0.97	0.82	38.0
Approach		478	16.1	0.595	20.2	LOS B	5.2	40.6	0.72	0.77	43.8
All Vehicles		1533	21.2	0.595	19.1	LOS B	7.4	63.1	0.79	0.75	44.8

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.


peopletrans

APPENDIX L

Noise Impact Assessment

Pacific Environment Limited

Consulting • Technologies • Monitoring • Toxicology

Report

WETHERILL PARK RESOURCE RECOVERY FACILITY UPGRADE NOISE ASSESSMENT

GOLDER ASSOCIATES PTY LTD.

Job ID. 20503

22 December 2015

PROJECT NAME:	Wetherill Park Resource Recovery Facility Upgrade Noise Assessment
JOB ID:	20503
DOCUMENT CONTROL NUMBER	ACO-NW-002-20503
PREPARED FOR:	GOLDER ASSOCIATES PTY LTD.
APPROVED FOR RELEASE BY:	A. McKenzie
DISCLAIMER & COPYRIGHT:	This report is subject to the copyright statement located at www.pacific-environment.com © Pacific Environment Operations Pty Ltd ABN 86 127 101 642

DOCUMENT CONTROL

VERSION	DATE	COMMENT	PREPARED BY	REVIEWED BY
01	10/12/2015	Draft report	M. Guitart	A. McKenzie
02	22/12/2015	Comments added	M. Guitart	A. McKenzie

Pacific Environment Operations Pty Ltd: ABN 86 127 101 642

BRISBANE
Level 1, 59 Melbourne Street, South Brisbane Qld 4101
PO Box 3306, South Brisbane Qld 4101
Ph: +61 7 3004 6400
Fax: +61 7 3844 5858

Unit 1, 22 Varley Street
Yeerongpilly, Qld 4105
Ph: +61 7 3004 6460

ADELAIDE
35 Edward Street, Norwood SA 5067
PO Box 3187, Norwood SA 5067
Ph: +61 8 8332 0960
Fax: +61 7 3844 5858

SYDNEY
Suite 1, Level 1, 146 Arthur Street
North Sydney, NSW 2060
Ph: +61 2 9870 0900
Fax: +61 2 9870 0999

MELBOURNE
Level 10, 224 Queen Street
Melbourne Vic 3000
Ph: +61 3 9036 2637
Fax: +61 2 9870 0999

PERTH
Level 1, Suite 3
34 Queen Street, Perth WA 6000
Ph: +61 8 9481 4961
Fax: +61 2 9870 0999

DISCLAIMER

Pacific Environment acts in all professional matters as a faithful advisor to the Client and exercises all reasonable skill and care in the provision of its professional services.

Reports are commissioned by and prepared for the exclusive use of the Client. They are subject to and issued in accordance with the agreement between the Client and Pacific Environment. Pacific Environment is not responsible for any liability and accepts no responsibility whatsoever arising from the misapplication or misinterpretation by third parties of the contents of its reports.

Except where expressly stated, Pacific Environment does not attempt to verify the accuracy, validity or comprehensiveness of any information supplied to Pacific Environment for its reports.

Reports cannot be copied or reproduced in whole or part for any purpose without the prior written agreement of Pacific Environment.

Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by the client or their nominees during the visit, visual observations and any subsequent discussions with regulatory authorities. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Pacific Environment is both complete and accurate. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s), unless explicitly stated otherwise.

CONTENTS

List of Figures

1 INTRODUCTION

Pacific Environment was commissioned by Golder Associates Pty Ltd. to undertake a construction and operational noise impact assessment for the proposed expansion of the SUEZ (previously SITA) Wetherill Park Resource Recovery Facility ('the project'). The project is located at 20 Davis Road, Wetherill Park, NSW.

This noise impact assessment forms part of the submission for the Environmental Impact Statement (EIS) to be prepared for the project as SUEZ wishes to modify its approved putrescible waste received at the facility from 10,000 to 140,000 tonnes per annum.

1.1 Study Requirements

The Secretary's Environmental Assessment Requirements (SEARs) issued on 6th October 2015 relating to the Noise and Vibration assessment includes:

- A Noise and Vibration assessment will be completed for the proposal and would provide for the predictions of noise for the increased traffic volumes likely to be generated during operation, in addition to noise associated with operations.
- The technical report completed as part of the EIS would include measuring the existing background noise levels and assessing the Proposal against the relevant noise criteria for the site in consultation with relevant authorities/ stakeholders.

1.2 Scope of work

This assessment aims to discuss the potential noise impact of the proposed development on the nearest most-affected receivers.

This noise assessment report includes an assessment of all construction and operational noise aspects (including traffic increase generation) of the proposed development and has been prepared considering the following documents:

- NSW Industrial Noise Policy (INP) (EPA, 2000)
- Draft Industrial Noise Guideline (EPA, 2015)
- Interim Construction Noise Guidelines (ICNG) (EPA, 2006)
- NSW Road Noise Policy (RNP) (EPA, 2013) and Environmental Noise Management Manual
- (ENMM) (RMS, 2001).
- Australian Standard (AS) 1055.1-1997 *Acoustics - Description and Measurement of Environmental Noise – General procedures*.

The following documentation has also been referenced for the preparation of this report

- Request for Secretary's Environmental Assessment (RSEAR) by Golder Associates (Ref.147628002_016_R_Rev0, dated 8 September 2015)
- Drawings provided by SBA Architects:
  15233_DA-101_C_Site_Plan, 15233_DA-201_C_Ground Plan, 15233_DA-203_B_Roof Plan
  15233_DA-301_B_Elevations, 15233_DA-305_B_Sections
- Traffic report provided by Peopletrans (Ref. 15S480 dated 7 December 2015)
- 2 m contour topographic survey provided by NSW Land & Property Information.

This report also provides consideration to Draft Industrial Noise Guideline (EPA 2015) criteria for the proposed development within the vicinity of the nearest potentially affected noise receivers.

This noise assessment is based on the noise data obtained from attended noise measurements carried out on the existing premises of the proposed development and its surroundings during November 2015.

2 PROJECT DESCRIPTION

The Wetherill Park Resource Recovery Facility is located 29 kilometres west of the Sydney CBD at 20 Davis Road, Wetherill Park, within the Fairfield Local Government Area (LGA). It consists of a purpose built facility to accept and process waste materials through on-site segregation and the transfer of material for alternative processing or disposal offsite. The facility provides a consolidation point for unsorted material collected from residential or commercial premises and from the public.

The Site currently accepts waste from both commercial and domestic site users, with the waste streams including municipal solid waste (putrescible), commercial & industrial waste, construction & demolition waste and garden organics.

The processing of waste is within a single large building, the transfer station building. It has multiple doors for natural ventilation. A 1.5 m deep surge pit has been used for sorting and processing the waste. Some recyclables are removed and sorted by site plant, with the residual waste being pushed along the surge pit by a bulldozer, through a waste pit, into transfer trucks parked at a lower loading level for transportation.

The transfer station building is the predominant structure on the Site and includes a workshop and administration facilities. In addition to this building, the Site also contains a weighbridge and car parking area.

The operational phase of the project will results in traffic movements between the Project and the road network. The number of vehicles for operation (according table 6.1 from the traffic report provided by Peopletrans (Ref. 15S480)) includes 35 vehicles or 70 vehicles movements (55 light and 15 heavy) in and out during peak hour time. Minimal additional traffic movements are expected during construction of the project.

Traffic movements are split between adjoining nearby roads and streets and farther away by arterial and major roads. **Table 2.1** presents existing traffic counts (from the traffic report provided by Peopletrans (Ref. 15S480)) for nearby roads and streets.

Table 2.1: Existing Traffic Counting

Road / Street section	Existing Traffic Counting	
	Am Peak Hour	Pm Peak Hour
Davis Road (from Elizabeth Street intersection to the site)	150	177
Davis Road (from Elizabeth Street intersection to the site)	390	523
Davis Road (between Elizabeth Street and Wildemere Road)	915	689
Elizabeth Street (between Davis Road and Victoria Street)	150	177

Table 2.2 presents the data from the nearest automatic traffic counting stations (source www.rms.gov.au) as complimentary road network information.

Table 2.2: Existing Nearest Automatic Traffic Average Counts

	Bound	Average Daily Existing Traffic	
		Weekdays	Weekends
Gipps Road (Station ID 68225) (Smithfield – South of Long Street)	Northbound	11,700	4,800
	Southbound	12,100	5,000
Smithfield Road (Station ID 66248) (Smithfield – North of Robert Street, Prospect Creek)	Northbound	34,600	24,700
	Southbound	34,500	24,600

3 EXISTING ENVIRONMENT

The site is located within the Wetherill Park industrial area, NSW. The site is bounded by Davis Road to the est, a nearby industrial warehouse to the north and former landfill to the south.

The closest noise sensitive premises to the proposed development are identified as follows:

- R1: residential at 38-5 Trivet Street. Nearest receiver (> 1.5 km)
- R2: residential at 144 – 156 Ferrers Road
- R3: residential at 105 Ferrers Road
- R4: residential at 165-167 Chandos Road
- R5: residential at 172 Chandos Road
- I1: industrial at 19 Davis Road
- I2: industrial at 22 Davis Road
- I3: industrial at 157 Newtown Road

Figure 3.1 presents the site, surrounds and identifies the noise measurements locations and noise sensitive receivers.

Figure 3.1: Site Location, Surrounding Area and Monitoring Locations

A summary of the most affected receivers and attended monitoring locations is presented in **Table 3.1**.

Table 3.1: Nearest Affected receivers and Monitoring Locations (WGS84, Zone 56J)

IDs	Easting	Northing
R1 – A1	303835	6253797
R2 – A2	303390	6253988
R3	303246	6254029
R4	303004	6254127
R5 – A3	302970	6254206
I1	305451	6253909
I2	305386	6254029
I3	305173	6253759

3.1 Proposed Development

SUEZ is proposing increase of the licence capacity of putrescible waste from 10,000 tpa to 140,000 tpa. In addition, SUEZ is proposing various upgrade to the site to improve operations and safety including installation of additional exit from transfer station facility and creating dedicated area for small vehicle drop off as per **Figure 3.2** and **Figure 3.3** site plans (provided by SBA Architects).

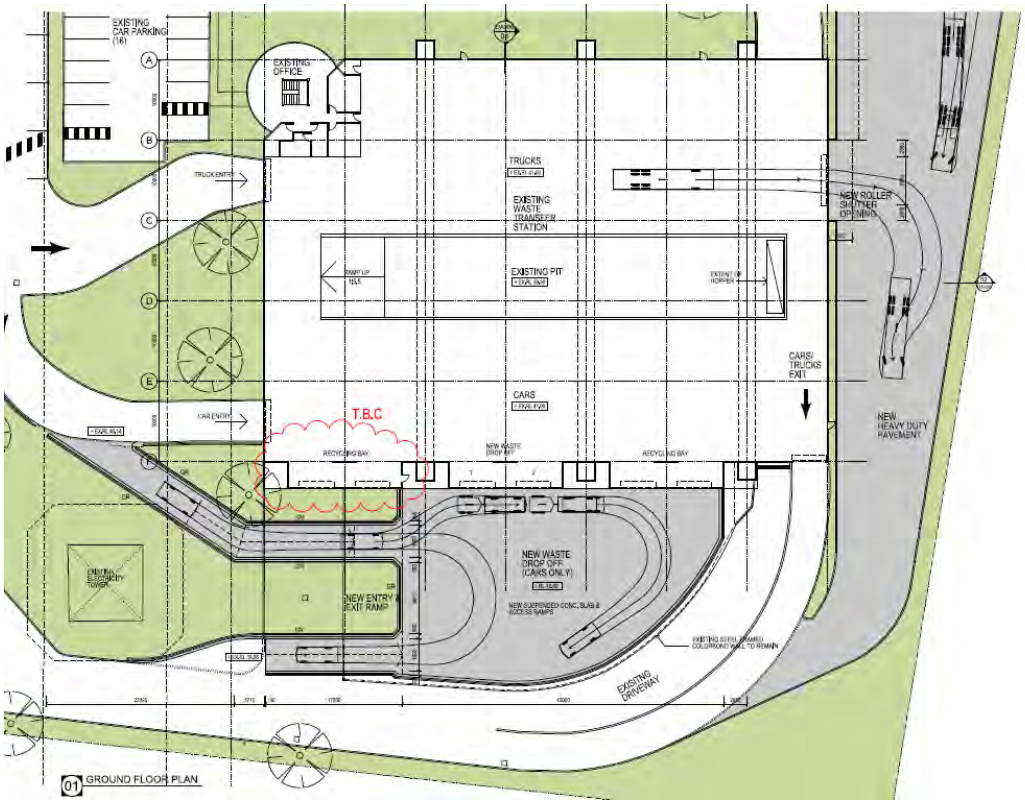


Figure 3.2: Proposed Development - Plan View

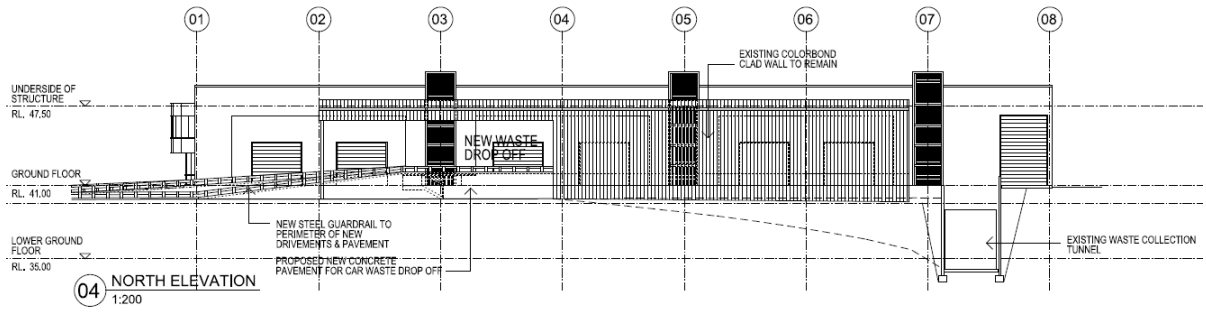


Figure 3.3: Proposed Development – North Elevation View

3.2 Existing Noise Environment

The NSW Industrial Noise Policy (INP) defines background and ambient noise levels for the daytime, evening and night time periods as follows:

Day:	7:00 am to 6:00 pm.
Evening:	6:00 pm to 10:00 pm.
Night:	10:00 pm to 7:00 am.

3.3 Noise Monitoring Methodology

Due to the distance to nearest residences intervening industrial land uses monitoring was limited to short term attended noise measurements. Measurements were carried out on the 10th November 2015 during day time period. The facility was operating under normal conditions during noise monitoring.

Measurements within the site were undertaken in order to provide source information for noise modelling.

Measurements outside the site, at the nearest receivers, were undertaken over 15 minute intervals using an NTI Audio XL2 hand held Type 1 sound level meter (S/N: A2A-06905-E0).

Field calibration was checked before and after each measurement occasion with no significant drift (±0.5 dB) observed. Measurements were undertaken with consideration to AS 1055.1-1997 *Description and Measurement of Environmental Noise* and the NSW INP.

3.4 Meteorological Conditions

The weather conditions on the 10th November 2015 included clear skies, temperatures ranged between 26 and 29 degrees Celsius with nil winds observed on site.

3.5 Existing Ambient Noise Levels

The local ambient noise level is dominated by the typical hum noise from industrial areas nearby and a high component of road traffic.

3.6 Noise Monitoring Results

3.6.1 Site Attended measurements

Environmental noise measurements were conducted nearby potential noise impacted receivers. **Table 3.2** provides results of the attended noise measurements at nearest potential affected receivers.

Table 3.2: Attended Noise Measurement Results (at potential affected receivers)

Start Time	Location	Descriptor				Comments
		$L_{A1,15min}$	$L_{A10,15min}$	$L_{A90,15min}$	$L_{Aeq,15min}$	
12:45	A1	60	54.7	43	51	Intermittent traffic on Trivet Street and nearby industrial noise.
13:15	A2	63	53.7	41	52	Rural background noise and far intermittent traffic noise on Ferrers Road.
13:47	A3	73	65.8	46	62	Very close road traffic noise on Chandos Road.

3.7 Meteorological Analysis

Meteorology data prepared for the Project site for the odour assessment (**Pacific Environment 2015**) has been referenced to determine the likelihood of noise enhancing weather conditions.

Meteorological features were determined in accordance with the INP to identify the likelihood of weather conditions which may increase noise levels at sensitive receivers in the project area.

As stated in the INP, a noise enhancing wind is considered to be a feature of the site if winds 3 m/s or below occur for more than 30% of the time in any assessment period in any season.

Table 3.3 presents statistical analysis of wind speeds and directions completed using the EPA's Noise Enhancement Wind Analysis Program (**NEWA, 2013**). The field of influence applied to determine wind occurrence was a 45 degrees either side of the source.

Table 3.3: Wind Frequency by Assessment Period under 3 m/s

Wind Direction	Wind Frequencies, % of Season and Time Period (< 3 m/s)											
	Summer			Autumn			Winter			Spring		
	Day	Even.	Night	Day	Even.	Night	Day	Even.	Night	Day	Even.	Night
N	6.2%	**31.1%**	**44.1%**	17.0%	**41.3%**	**36.2%**	14.4%	**31.3%**	18.6%	6.3%	**35.7%**	**34.7%**
NE	2.4%	17.8%	**44.1%**	17.6%	**44.3%**	**61.5%**	20.8%	**49.7%**	**43.6%**	8.5%	**32.4%**	**52.3%**
E	2.5%	4.2%	26.2%	19.7%	**30.4%**	**58.6%**	29.2%	**47.8%**	**60.7%**	10.1%	25.3%	**46.9%**
SE	4.5%	1.9%	10.5%	17.6%	14.1%	25.0%	27.3%	**30.2%**	**39.6%**	15.0%	17.3%	25.4%
S	18.2%	10.3%	9.9%	19.2%	13.3%	5.0%	22.3%	16.0%	18.4%	17.4%	10.7%	11.2%
SW	18.3%	**35.0%**	11.9%	17.0%	13.0%	1.4%	5.8%	2.7%	0.6%	14.2%	14.8%	3.1%
W	16.9%	**38.3%**	17.5%	18.0%	14.7%	2.4%	7.1%	4.6%	0.5%	12.1%	21.2%	4.0%
NW	14.5%	**35.3%**	22.2%	15.3%	18.5%	5.2%	8.9%	7.3%	1.0%	10.1%	26.6%	7.4%

Note: Bold text indicates a dominant wind direction where the wind directions occur for at least 30 percent of the time.

Dominant winds were identified during the evening and night between north east and south-east. As all the receivers as shown in **Figure 3.1** are located west of the site, east wind direction only has been considered as a worst case modelling scenario.

In accordance with Table C2 in Appendix C of the INP, the potential for temperature inversions was considered, where they occur for 30% or more of the time during the night time period (6.00 pm-7.00 am) in the winter months (June, July and August).

Analysis of stability class data has been performed using CALMET data prepared for the Project. The frequency distribution of estimated stability classes is presented in **Figure 3.4.** The data show a high proportion of neutral conditions (30% D-class) and (36% F-class).

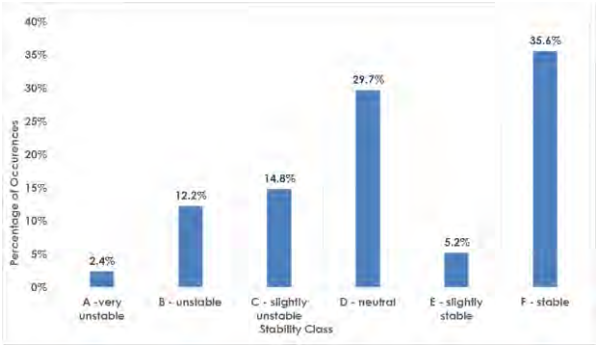


Figure 3.4 Stability Class Summary Data

4 ASSESSMENT NOISE CRITERIA

4.1 NSW Industrial Noise Policy

The NSW Government's policy for the assessment of industrial noise is presented in the Industrial Noise Policy (INP) (EPA 2000). The INP recommends intrusiveness criteria for residential receivers to address the potential for disturbance and amenity criteria to maintain acoustic amenity appropriate to the relevant land use category of the area.

The criteria are based on the results of the ambient and background noise attended monitoring, addressing two components:

- Controlling intrusive noise into nearby residences (Intrusiveness Criteria).
- Maintaining noise level amenity for particular land uses (Amenity Criteria).

Once both criteria are established the most stringent for each considered assessment period (day, evening, night) is adopted as the project-specific noise level (PSNL).

4.1.1 Intrusiveness Criteria

The intrusiveness criterion can be summarised as follows:

- $L_{Aeq,\ 15\ minute} \leq$ RBL background noise level plus 5 dB(A)

The intrusiveness criterion for the closest residential receivers is presented in **Table 4.1**. In the absence of long term noise monitoring data the default minimum RBL of 30 dB(A) has been adopted in this assessment, in accordance with the INP.

Table 4.1: INP Intrusiveness Criteria

Period	Noise Descriptor – dB(A)	Noise Criteria – All residential receivers
Daytime 7.00am – 6.00pm	$L_{Aeq,15min} \leq RBL_{,15min} + 5$	35
Evening 6.00pm – 10.00pm		
Night 10.00pm – 7.00am		

4.1.2 Amenity Criteria

The amenity assessment is based on noise criteria specific to land use and associated activities. The criteria relate only to industrial type noise and do not include road, rail or community noise.

The maximum ambient L_{Aeq} noise level within the day, evening and night assessment period should not exceed acceptable noise levels, dependant on the relevant receiver type and relevant area category for residential receivers.

Table 4.2 presents recommended amenity L_{Aeq} noise levels from industrial noise sources.

Table 4.2: INP Amenity Criteria for Suburban Residential and Industrial Receivers

Period	Recommended Residential L_{Aeq} Noise Level, dB(A)	
	Acceptable	Recommended Maximum
Daytime 7.00am – 6.00pm	55	60
Evening 6.00pm – 10.00pm	45	50
Night 10.00pm – 7.00am	40	45
Period	**Recommended Industrial L_{Aeq} Noise Level, dB(A)**	
	Acceptable	**Recommended Maximum**
When in use	70	75

4.1.3 Project Specific Noise Levels

After determining the relevant noise levels from the intrusive and amenity criteria, the project-specific noise levels (PSNL) can be assigned.

The PSNLs reflect the most stringent noise level requirement from the intrusive and amenity criteria as presented in **Table 4.3.**

Table 4.3: project Specific Noise Levels

Receiver Type	Period	Intrusiveness criteria $LA_{eq,\ 15\ min}$ dB(A)	Amenity criteria LA_{eq} dB(A)	PSNL
Residential	Day	35	55 - 60	35 $L_{Aeq,\ 15\ min}$
	Evening	35	45 - 50	35 $L_{Aeq,\ 15\ min}$
	Night	35	40 - 45	35 $L_{Aeq,\ 15\ min}$
Industrial	When in use	-	70 - 75	70 L_{Aeq}

Where necessary, noise mitigation measures will be incorporated in the design to ensure that noise levels comply with the above PSNLs .

4.1.4 Low Frequency Noise

The characteristics of a noise source can increase annoyance for sensitive receivers. Examples of annoying characteristics are: prominent tones, impulsiveness, intermittent sources and low frequency noise. The INP provides guidance on 'modifying factors' which should be applied to predicted or measured noise levels when a dominant low frequency[a] noise characteristic is present. Table 4.1 of the INP states that low frequency noise is considered dominant where the difference between the A-weighted and C-weighted noise levels is 15 dB or greater. Where this difference occurs the INP recommends a modifying factor of 5 dB is added to the predicted noise level.

4.2 Draft Industrial Noise Guideline

In September 2015, the NSW EPA released a draft updated noise policy document for consultation. The Industrial Noise Guideline (ING) provides assessment criteria updates. The assessment criteria differences between the ING and INP are discussed in the following sections.

[a] Contains the major components within the low frequency range (20 Hz – 250 Hz) of the frequency spectrum.

4.2.1 Intrusiveness - Amenity Criteria

The ING includes a revised approach to establishing an amenity noise limit. Intrusive limits are consistent across both documents.

The ING amenity goals are consistent with the INP as presented in **Table 4.2** of this report, however the draft ING recommends the project amenity noise level be set at the recommended amenity level minus 5 dB(A). As such a night time noise limit of 35 dB(A) would apply for all residential receivers. Note: For exiting industrial noise sites where noise emissions from the site exceed the project noise trigger, regulatory authorities and the operator may negotiate achievable noise limits for the site.

4.2.2 Low Frequency Noise

Table C1 of the draft ING states that low frequency noise is considered dominant where the difference between the A-weighted and C-weighted noise levels exceeds 15 dB and for noise levels in the range of 10-160Hz:

- Where any of the 1/3 octave noise levels in Table C2 are exceeded by up to 5 dB and cannot be mitigated, a 2 dB(A) positive adjustment to measured/predicted A weighted levels applies for the evening/night period.
- Where any of the 1/3 octave noise levels in Table C2 are exceeded by more than 5 dB and cannot be mitigated, a 5 dB(A) positive adjustment to measured/predicted A weighted levels applies for the evening/night period and a 2 dB positive adjustment applies for the daytime period.

Table 4-4: Draft *Industrial Noise Guideline* (Table C2: Low Frequency Thresholds)(extract)

One-third octave $L_{Zeq,\ 15\ minute}$ Threshold Level													
f, Hz	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Notes: dB(z) = decibel (Z-weighted); f,Hz = frequency in Hertz; Hz/dB(Z) = hertz per decibel (Z-weighted). For the assessment of low frequency noise, care should be taken to select a wind screen that has wind-induced noise characteristics at least 10 dB below the threshold values in Table C2 for wind speeds up to 5 metres per second. It is likely that high performance larger diameter wind screens (nominally 175 mm) will be required to achieve this performance (Hessler et.al. 2008). In any case, the performance of the wind screen and wind speeds at which data will be excluded needs to be stated.
Low frequency noise shall be assessed under the meteorological conditions under which noise limits would apply. Measurements should be made between 1.2 and 1.5 metres above ground level unless otherwise approved through a planning instrument (consent/approval) or Environment Protection Licence and at locations nominated in the development consent or license.

4.2.3 Maximum Noise levels

The draft ING identified a night time project trigger level of $L_{Aeq\ 15min}$ of 40 dB(A) and a maximum noise level screening criteria of L_{Amax} 52 dB(A).

4.3 Sleep Disturbance Criteria

World Health Organisation *Guidelines for Community Noise* (WHO, 1999), and states the following:

> *'As a rule in planning for short-term or transient noise events, for good sleep over eight hours, the indoor sound pressure level measured as a maximum instantaneous value should not exceed approximately 45dB(A) LA_{max} more than 10-15 times per night. The corresponding external noise level, assuming partially closed windows, is 52dB(A) LA_{max}, measured in the free field.'*

Furthermore, it states that the guidelines should be based on the combination of values of ambient L_{Aeq} noise and the L_{Amax}. The WHO guideline external value for sleep disturbance is L_{Amax} 60 dB(A). This value is an external level, based upon the assumed outside to inside correction of 15 dB assuming windows are open. However it has been noted that the outside to inside correction has been observed to vary

between 5-15dB[b] where windows are open to windows partially closed. Therefore in order to provide a conservative approach, a value of L_{Amax} 50 dB(A) has been used.

4.4 Road Traffic Noise Criteria

The *NSW Road Noise Policy (EPA, 2011)* provides guidance, criteria and procedures for assessing noise impacts from existing, new and redeveloped roads and traffic generating developments. The assessment of road traffic noise impacts on public roads is assessed under the RNP.

The RNP provides several assessment criteria for traffic generating developments. The criteria are expressed as absolute levels and relative increase criteria for different land uses.

The noise assessment criteria for residential land uses affected by additional traffic generated by land uses developments are presented in **Table 4-5**.

Table 4-5: Road Traffic Noise Assessment Criteria for Residential Land Uses

Road Category	Type of Project/Land use	Assessment Criteria – dB(A)[1]	
		Day (7.00am to 10.00pm)	Night (10.00pm to 7.00am)
Freeway/arterial/sub-arterial	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq,15hr}$ 60 (external)	$L_{Aeq,9hr}$ 55 (external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq,1hr}$ 55 (external)	$L_{Aeq,1hr}$ 50 (external)

Note: 1. Noise level criteria are façade-corrected noise levels.

The RNP specifies relative increase criteria for the increase in total traffic noise level due to a traffic generating project where the existing traffic noise level is significantly below the criteria in **Table 4-5**. Where this occurs an increase must be limited to 12 dB above the existing day or night noise level and not exceed the traffic noise criteria.

Additional specific relative increase criteria apply to traffic generating developments affecting existing sensitive land uses. The Road Noise Policy Application Notes (EPA, 2013) states the following:

"any increase in the total traffic noise level as a result of the development should be limited to 2 dB above that of the noise level without the development. This limit applies wherever the noise level without the development is within 2 dB of, or exceeds the relevant day or night noise assessment criterion."

4.5 Construction Noise

Construction noise management levels are given in the *NSW Interim Construction Noise Guideline* (ICNG) (DECCW, 2009) and are based on measured background noise to minimise the annoyance from construction. Construction noise management levels for residential receivers are presented in **Table 4.6**. The management levels represent the level at which when exceeded, the measures outlined in **Table 4.7** would apply.

[b] Outside to Inside correction as documented in the following publications: Queensland Department of Environment and Heritage Protection EcoAccess Guideline Planning for Noise Control, NSW Environmental Criteria for Road Traffic Noise, NSW RTA Environmental Noise Management Manual and WHO Guidelines for Community Noise.

Table 4.6: Construction Noise Management Levels at Residences

Time of Day	Management Level $L_{Aeq,15min}$	How to Apply
Recommended Standard Hours: Monday to Friday 7.00 am to 6.00 pm Saturday 8.00 am to 1.00 pm No work on Sundays or Public Holidays	Noise affected RBL + 10 dB(A)	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq,(15min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences 2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5 dBA	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.

Relevant construction noise management levels for non-residential receivers are presented in **Table 4.7**.

Table 4.7: Non-residential land use construction noise management levels

Land Use	Noise Management Level
Industrial	$L_{Aeq,(15min)}$ 75 dB(A) (external)

4.6 Vibration

Impacts from vibration can be considered both in terms of effects on building occupants (human comfort) and the effects on the building structure (building damage). Of these considerations, the human comfort limits are the most stringent. Therefore, for occupied buildings, if compliance with human comfort limits is achieved, it will follow that compliance will be achieved with the building damage objectives.

4.6.1 Human Comfort

The EPA's *Assessing Vibration: A Technical Guideline* provides acceptable values for continuous and impulsive vibration in the range 1-80Hz.

Where vibration is intermittent, such as for construction sources, a vibration dose is calculated and acceptable values are shown in **Table 4.8** below.

Table 4.8: Acceptable Vibration Dose Values for Intermittent Vibration (m/s$^{1.75}$)

Location	Daytime[1]		Night Time[1]	
	Preferred Value	Maximum Values	Preferred Value	Maximum Value
Critical areas [2]	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Notes: 1 Daytime is 7.00am to 10.00pm and night time is 10.00pm to 7.00am.

2 Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous or impulsive criteria for critical areas. Source BS 6472-1992.

4.6.2 Building Damage

German Standard *DIN 4150-3-1999 Structural Vibration – Part 3 Effects of vibration on structures* provides methods for evaluating the effects of vibration on structures in the absence of an Australian Standard.

The recommended limits (guide values) from DIN 4150 for transient vibration to ensure minimal risk of cosmetic damage to residential and industrial buildings are presented in **Table 4.9**.

Table 4.9: Guideline Vibration Values for Short Term Vibration on Structures (mm/s)

Type of Building	Guideline values for velocity (mm/s)			
	1 to 10 Hz	10 to 50 Hz	50 to 100 Hz	Vibration at horizontal plane of highest floor at all frequencies
Commercial and Industrial Building	20	20-40	40-50	40
Dwellings and buildings of similar occupancy or design	5	5-15	15-20	15
Structures that, because of their particular sensitivity to vibration cannot be classified under lines 1 and 2 and are of great intrinsic value	3	3-8	8-10	8

5 OPERATIONAL NOISE AND VIBRATION ASSESSMENT

5.1 Operational Noise

5.1.1 Modelling Methodology

Noise modelling has been undertaken using the *ISO 9613 Acoustics – Attenuation of sound during propagation* outdoors (**ISO, 1996**) and CONCAWE's *Special Task Forces in Noise Propagation* (**CONCAWE, 1981**) algorithms, as implemented within the CadnaA 4.5 acoustic modelling package. The noise modelling takes into consideration the sound power level of the proposed site operations, activities and equipment, and applies adjustments for attenuation from geometric spreading, acoustic shielding from intervening ground topography, ground effect, meteorological effects and atmospheric absorption. Topographic data for the project area was based on NSW Land and Property Information 2 metre contour data.

Table 5.2 presents modelling parameters. A conservative scenario for normal operation within 15 minute period have been used.

Table 5.1: Noise Modelling Parameters

Modelling Parameters	
Noise Propagation Algorithm	ISO9613-Concawe
Ground Absorption Coefficient (Rural residential areas)	1
Ground Absorption Coefficient (Industrial areas)	0.5
Receivers and Contour Maps Height	1.5 m

5.1.2 Machinery - Noise Sources

Table 5.2 presents sound power and sound pressure levels used for the model

Table 5.2: Noise Modelling Sound Power/Pressure Levels

Normal Operational Assumptions (Day Time, 15 minute period)	
Truck (heavy vehicle) sound power level (Lw)[1]	104 dB(A)
Car (light vehicle) sound power level (Lw)	85 dB(A)
Internal (reverberant field) Facility sound pressure level (SPL)[2]	84 dB(A)

Notes: 1. SWL referenced from DEFRA database.
2. Measured SPL "in situ" with Table 5.3 heavy machinery noise sources on. This level is likely to be reduced in the future as less heavy machinery will be needed due to proposed moving floor.

Table 5.3: Heavy Machinery Used and Status during Attended Measurements

Heavy Machinery	Status
CAT 922 Dozer	ON
Volvo EC220DL 23T Excavator	ON
CAT 924K Loader	ON
CAT 312D Excavator	ON
Hyundai 80CR-9 Excavator	OFF
Bobcat S160	OFF

Two of the heavy machinery were not working at the moment where the internal noise level was stablished, although from other measurements undertaken same day we can confirm that the overall internal noise levels will not be increased as they are not significant noise contributors.

5.1.3 Noise Breakout

Noise breakout from the warehouse has been included. **Table 5.4** details the building openings. **Appendix B** presents the openings location.

Table 5.4: Building's Openings and Roof Noise Model Specifications

Opening Name	Location	Dimensions (W x H) (m)	Details
Entrance 1	North – Ground Level	5 x 6	Open
Entrance 2	North – Ground Level	5 x 6	Open
Western Exit	West - Ground Level	5 x 6	Open
Western Openings (6x)	West - Ground Level	3 x 6	Open
Southern Opening (new)	South - Ground Level	6 x 4	Open
Collector Truck Entrance	East – Basement Level	8.7 x 5	Open
Collector Truck Exit	West – Basement Level	4 x 4	Open
Roof	Roof	50 x 70	Metal Sheet

Table 5.5 presents transmission loss values for 0.8mm thick steel roofing (from INSUL version 8.0) used in the model for roof noise breakout.

Table 5.5: 0.8mm Steel Roofing Transmission Loss Values

	Octave Band Centre Frequency (Hz)							
	63 Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
Transmission Loss (TL)	9	12	16	21	26	32	37	40

5.1.3.1 Vehicle Movements

Table 5.6 presents the future distribution of all vehicles (from the traffic report provided by Peopletrans and information provided from the management of the existing facility) within the site over a 15 minute period. A conservative approach has been considered as the vehicle noise is constant over a 15 minutes period and all the vehicles are leaving the site through western exits (same direction where sensitive receivers are located).

Table 5.6: Noise Modelling Day Time Vehicle Movements (15 minute duration)

ID[1]	Entering the Site	Number of Vehicles
1	Collector (Heavy vehicles)	1
2	Entrance 1 (Light vehicles)	5
	Entrance 1 (Heavy vehicles)	3
3	Entrance 2 (Light vehicles)	5
4	Small vehicle drop off (Light vehicles)	5
	Leaving the Site	
1'	Collector (Heavy vehicles)	1
2'& 3'	From Entrance 1 (Light vehicles)	5
	From Entrance 1 (Heavy vehicles)	3
	From Entrance 2 (Light vehicles)	5
4'	Small vehicle drop off (Light vehicles)	5

Notes: 1. See Appendix B for vehicle routes layout.

Table 5.7 presents the predicted night time traffic movement distribution (provided by Golder) within the site in a 15 minute period. Note that **Table 5.7** traffic movements are expected to occur between 4:00 am and 7:00 am only. It has been conservatively assumed that vehicle noise is constant 50% of the time for each 15 minute period. Although vehicles leaving the site at night time through the new southern exit are also expected only 2'Exit west has been modelled as a conservative approach (same direction of the most sensitive receivers). Leaving the site through both new southern exit and 2'Exit west are not expected to happen within 15min period.

Table 5.7: Noise Modelling Night Time Vehicle Movements (15 minutes duration)

ID[1]	Entering the Site	Number of Vehicles
2	Entrance 1	1
Leaving the Site		
2' Exit West	From Entrance 1	1

Notes: 1. See Appendix B for vehicle route layout.

5.1.4 Modelling Scenarios

The modelling has assumed a conservative 15 minute scenario for the proposed operations. **Appendix B** contains the locations of equipment modelled and vehicle routes on site. Further, to present a conservative approach, each of the equipment used is assumed to have 100% utilisation.

5.1.5 Meteorological Conditions

Table 5.8 presents the meteorological conditions included in the assessment. As all the noise sensitive receivers are located west of the site the worst case scenario considers is easterly winds.

Table 5.8: Meteorological Modelling Scenarios

Scenario ID	Period	Meteorological Conditions	Wind	Modelling Parameters		
				Pasquil-Gifford Stability Class	Relative Humidity	Air Temperature
1	Day	Neutral	No Wind	D	70%	20°C
2	Evening/Night	Neutral	No Wind	D	90%	10°C
3	Evening/Night	Gradient Wind	3 m/s E	D	90%	10°C
4	Evening/Night	Adverse	No Wind	F	90%	10°C

5.2 Operational Noise Modelling Results

Predicted noise levels for the nearest receivers are presented in **Table 5.9** for normal future operations. The noise contours are shown in **Appendix C**. All receivers are predicted to receive acceptable noise levels for all assessed meteorological conditions during future normal operations when assessed against the INP.

Table 5.9: Predicted Operational Noise per Meteorological Scenario

Receiver ID	Receiver Type	Criteria $L_{Aeq,15min}$			Predicted Noise Level $L_{Aeq,15min}$ dB(A)			
					Day	Eve/Night	Eve/Night	Eve/Night
		D	E	N	1 (Neutral)	2 (Neutral)	3 (Gradient Wind)	4 (Adverse)
R1	Residence	35	35	35	29	29	34	34
R2					25	25	30	30
R3					23	21	27	27
R4					**26**[1]	20	26	26
R5					**26**[1]	**25**[1]	26	26
I1	Industrial	70 - 75 (L_{Aeq})			64	56	54	57

Receiver ID	Receiver Type	Criteria $L_{Aeq,15min}$			Predicted Noise Level $L_{Aeq,15min}$ dB(A)			
		D	E	N	Day	Eve/Night	Eve/Night	Eve/Night
					1 (Neutral)	2 (Neutral)	3 (Gradient Wind)	4 (Adverse)
I2		When in use			68	60	59	60
I3					39	**41**[1]	38	38

Notes: 1. (5dB) Low frequency modifying factor applied (INP). Under ING only industrial receivers I1 and I2 modifying factor would be applied.

For information purposes **Table 5.10** presents low frequency assessment (difference between A-Weighted and C-Weighted) for all predicted values.

Table 5.10: Low Frequency Assessment

Receiver ID	Day		Eve/Night		Eve/Night		Eve/Night	
	1 (Neutral)		2 (Neutral)		3 (Gradient Wind)		4 (Adverse)	
	dB(C)	C-A	dB(C)	C-A	dB(C)	C-A	dB(C)	C-A
R1	43	13	41	13	44	10	44	10
R2	40	14	38	14	41	11	41	11
R3	37	15	35	14	38	12	38	12
R4	37	**15**[1]	35	15	38	12	38	12
R5	37	**16**[1]	35	**15**[1]	38	12	38	12
I1	71	7	64	9	64	10	64	8
I2	75	7	67	8	67	8	68	8
I3	53	15	51	**16**[1]	52	14	52	14

Note: 1. Value exceeds 15dB low frequency modifying factors criteria.

5.3 Sleep Disturbance

5.3.1 Methodology

Sleep disturbance events have the potential to be caused by short high level noise events from operations. These can be caused by a number of activities and equipment items including trucks being unloaded/loaded, engine start-ups and revving, tonal reversing alarms, warning and system alarms.

A conservative noise level of L_{Amax} 120 dB(A) has been assumed to represent typical maximum noise level events from unloading a truck, truck air break release, banging/dropping event while handling the waste or similar peak noise events.

5.3.2 Sleep Disturbance Noise Modelling Results and Assessment

The predicted maximum noise level results at the most sensitive residential receivers are presented in **Table 5.11**. Results are below the sleep disturbance criteria for all receivers scenario modelled. Worst case night time predictions (meteorological scenario 4, night time, no wind, F stability class) are presented.

Table 5.11: Predicted L_{Amax} Noise Levels for Future Operations

Receiver ID	Receiver Type	Criterion L_{Amax} Night	Predicted Noise Level L_{Amax} dB(A) Eve/Night Scenario 4 (Adverse)
R1	Residence	52	35
R2			32
R3			31
R4			29
R5			28

5.4 Operational Vibration

No operational vibration sources are anticipated to impact on the nearest residential due to the distance (>1.5km) areas from operations at the facility.

No vibration impacts higher than exiting industrial normal operations are expected within nearby industrial receivers due to future operations. No perceptible vibration was observed on site.

6 CONSTRUCTION NOISE ASSESSMENT

6.1 Noise Modelling Methodology

Construction noise levels were predicted for the original construction scenario using the noise model approach described in **Section 5.1.1**.

6.2 Modelling Scenarios

As the scale of the construction works is not major (demolishing an existing wall, construct a workshop and truck parking area and roadworks) the three construction activities that will occur have been modelled simultaneously as a conservative approach.

6.2.1 Construction Hours

All construction works will occur during standard construction hours.

6.2.2 Construction Sound Power Levels

Sound power levels were sourced from AS 2436 *Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites,* the UK's Department for Environment, Food and Rural Affairs *Noise Database for Prediction of Noise on Construction and Open Sites* and the ENMM.

The sound power levels for construction equipment are presented in **Table 6.1.**

Table 6.1: Construction Equipment Sound Power Levels, dB(A)

Construction Fleet	Sound Power Level, L_{Aeq} dB(A)
Excavator with Concrete Wall Breaker	116
Power tools (pneumatic)	112
Hand Tools	98
Heavy Vehicle/Concrete Mix Truck (1x)	104
Light Vehicles (2x)	85
Heavy Vehicle Idling/ Concrete Mix Truck (1x)	89

6.2.3 Construction Noise Modelling Results and Assessment

Full predicted noise levels for construction scenario are presented in **Table 6.2** at the most affected receiver locations.

Noise levels were predicted under the daytime neutral meteorological condition identified in **Table 5.8**.

Table 6.2: Predicted Construction Noise (Standard Hours)

Receiver ID	Receiver Type	Standard Hours Criteria $L_{Aeq,15min}$	Predicted Noise Level $L_{Aeq,15min}$ dB(A) Standard Hours (7am – 6pm) Scenario 1 (Neutral)
R1	Residence	Noise affected RBL + 10 = 40dB(A) Highly noise affected >75 dB(A)	33
R2			23
R3			<20
R4			<20
R5			<20
I1	Industrial	75 (L_{Aeq}) When in use	67
I2			54
I3			34

The results show that for the construction works, the anticipated noise level at the most sensitive receivers will be below the construction noise criteria during standard hours.

Further, no receivers are predicted to be highly noise affected (noise levels of 75 dB(A) or above) for the construction scenario modelled.

6.3 Construction Vibration Assessment

The methodology contained in the USA's Federal Transit Administration *Noise and Vibration Impact Assessment Manual*, (FTA Manual, 2006) as recommended in *Assessing Vibration a Technical Guideline*, was used to predict vibration levels of plant at a range of distances. Vibration source levels were taken from the ENMM and the FTA Manual. **Table 6.3** presents a summary of the predicted levels.

Table 6.3: Predicted Vibration Levels

Item[1]	Guideline Levels (mm/s)[2]			Predicted Vibration Level PPV mm/s at Distance (m)					
	Commercial	Residential	Sensitive	5	10	20	30	40	50
Jackhammers	20	5	3	1.4	0.5	0.3	0.2	0.1	0.1
Rock Breaker				17.0	6.0	2.1	1.5	0.8	0.5

Note: 1. Vibration source levels taken from Section 9 of ENMM. Predictions are indicative only and will vary depending on specific type of plant and geotechnical conditions.
2. 3. Criteria presented are the most stringent criteria from DIN 4150-3

The results indicate that vibration from construction activities will have no significant impact at the nearest sensitive receivers due to the construction activities. The nearest receiver (Industrial site, I1) is located approximately 50 m from the site and the nearest residential receiver (R1) is over 1.5 km away.

7 ROAD TRAFFIC NOISE

The traffic report provided by Peopletrans (Ref. 15S480) presents existing peak vehicle movements (23 movements) and future generation (35 movements). The overall road traffic noise increase would equate to approximately 1.8 dB near the site. This traffic noise generation does not exceeed traffic noise generation criterion of <2 dB from **Section 4.4**.

There are no residential receivers located near the premises where future traffic generation will occur. Traffic from the site splits to access other streets and major roads at a distance of approximately 400 m from the site (on Elizabeth St), therefore traffic impacts will be less significant past this point.

Table 7.1 presents a comparison between existing and future traffic generated due to the development within nearby streets and roads. As stated above no negative traffic noise impacts (<2 dB) are expected as the traffic increase is minimal compared with the exiting traffic.

Table 7.1: Traffic Counting Comparison

Road / Street section	Existing Traffic Counting		Additional traffic generated by the site	
	Am Peak Hour	Pm Peak Hour	Am Peak Hour	Pm Peak Hour
Davis Road (from Elizabeth St intersection to the site)	150	177	24	24
Davis Road (from Elizabeth St intersection to the site)	390	523	10	11
Davis Road (between Elizabeth St and Widemere Rd)	915	689	14	10
Elizabeth Street (between Davis Rd and Victoria St)	150	177	24	24

8 CONCLUSIONS

This report presents the results of a study of operational and construction works noise emission from the proposed expansion to the SUEZ Wetherill Park Resource Recovery Facility at 20 Davis Road, Wetherill Park.

This report forms a part of the Environmental Impact Assessment (EIS) for the proposed development. It addresses the requirements of the Secretary's Environmental Assessment Requirements (SEARs).

In relation to operational noise, the assessment indicated the following:

- The predicted noise levels will comply with the most stringent operational noise criteria (with low frequency modifying factor applied where applicable) under the normal operational assumptions stated in **Section 5.**
- No exceedances of traffic noise and sleep disturbance criteria are predicted.

The report has adopted conservative assumptions with regard to the duration of the vehicle movements as per **Section 5.1.3.1**.

Predicted receivers noise values are unlikely to be measureable on site as exiting background noise levels are much higher than the predicted ones.

In relation to construction noise, the assessment indicated that construction noise levels will be below relevant construction noise criteria for standard construction hours at all receivers.

The road traffic noise assessment indicated that the majority of project related traffic is expected on Davis Road (with no sensitive receivers) and then split in through different suburban and major roads. The assessment indicated that increases in traffic noise would be below the traffic noise increase criteria of 2 dB.

Appendix A GLOSSARY OF ACOUSTIC TERMS

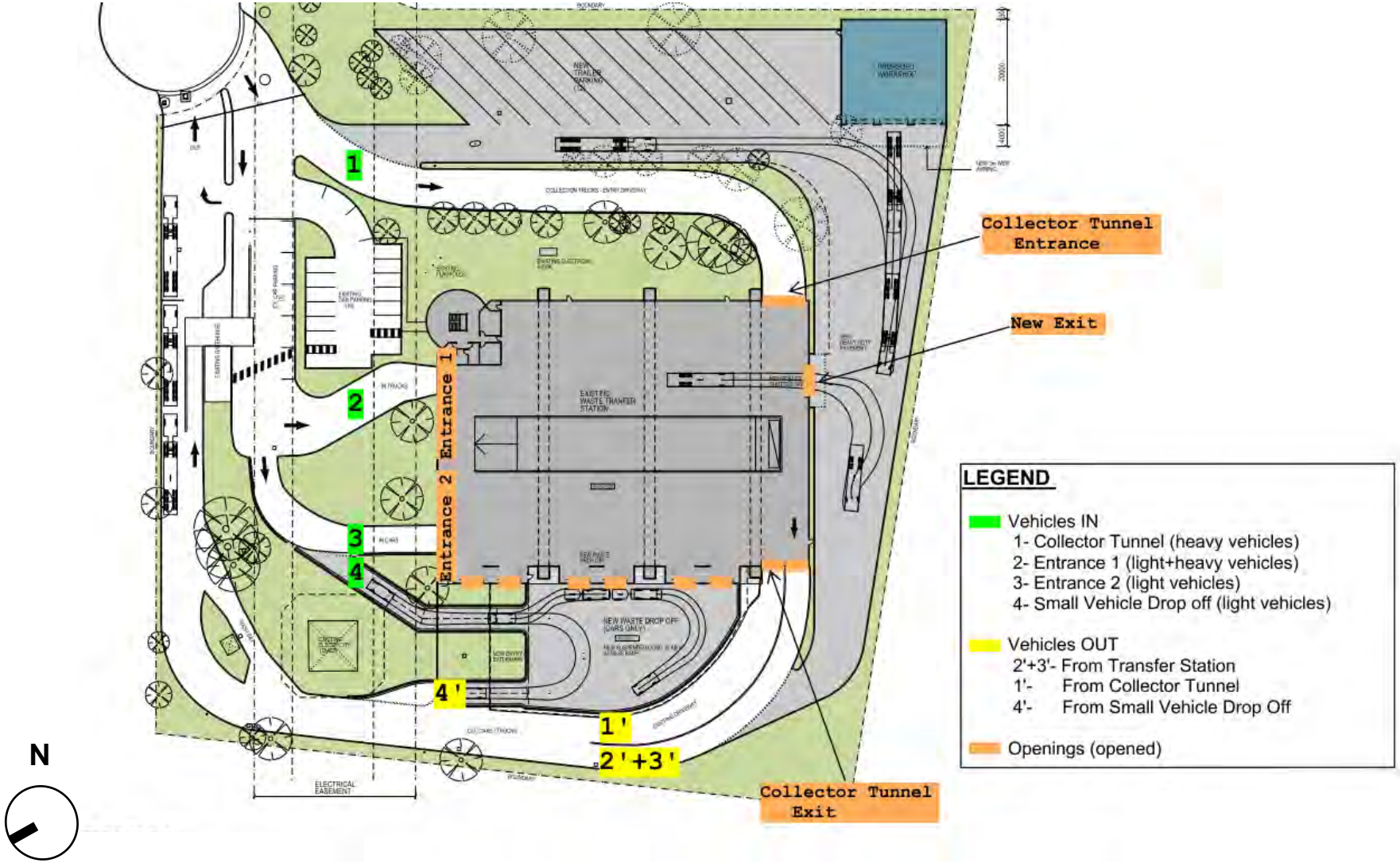
A.1 GLOSSARY OF ACOUSTIC TERMS

Adverse Weather	Weather conditions that affect noise measurements (wind, rain and temperature inversions) that occur at a particular site for a significant period of time. The maximum wind speed allowed when acoustics measurements are in process is 5m/s. No rain is allowed.
Ambient noise	The all-encompassing noise environment at a given location, made up of many sources in the near and far field.
Assessment Period	The period in a day over which assessments are made.
A-weighting	Adjustment made to a noise level based on international standards. It approximates a human's hearing response to frequency at lower sound levels.
Background Noise	Background noise is the term used to describe the underlying level of noise present in an area, measured in the absence of any extraneous noise. Typically when measured with a sound level meter is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period (LA90,T).
dB	Decibel, the logarithmic ratio of a given sound pressure to a reference pressure.
dB(A)	A-weighted decibels.
Fee-field	A sound field where the effects of reflection are negligible throughout the region of interest.
Frequency	The number of cycles per unit of time. It is measured with cycles per second (cps) or the interchangeable Hertz (Hz). Frequency can be associated as a synonymous to pitch.
Impulsive Nosie	Noise characterised by having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent Noise	Level that drops to the background noise level several times during the period of observation.
Heavy Vehicle	A truck or other vehicle with either two or three axles, two groups or three or more axles, more than two groups.
Light Vehicle	Passenger vehicles (cars, vans utilities, motorcycles etc.).
LA1,T	The noise level exceeded for 1% of the time period, T.
LA10,T	The noise level exceeded for 10% of the time period, T.
LA90,T	The noise level exceeded for 90% of the time period, T. Commonly referred to as the background noise level.
$L_{Aeq,T}$	The equivalent average noise level of the time period, T. It represents in a single number, the energy of the actual fluctuating noise level over the period.

$L_{Amax,T}$	The maximum noise level measured during the period, T.
RBL	Rating Background Level. The background noise level as defined by the NSW Industrial Noise Policy (EPA, 2000). It is calculated by the taking the median value of the lowest 10th percentile LA90 measurements in any day, evening or night period.
Reflection	Sound wave changed in direction of propagation due to an object met on its path.
Rw	The weighted sound Reduction Index is a number used to rate effectiveness of a material, partition or a like.
Sound Absorption	The ability of a material to transform sound energy through its conversion into thermal energy.
Sound Pressure Level (SPL)	Is the difference between the pressure produced by a sound wave and the barometric (ambient) pressure at the same point in space. Typically expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound Power Levels (Lw)	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power. Typically associated with noise sources.
Tonal noise	Noise containing a prominent frequency and characterised by a definite pitch.
Transmission Loss	Is the number of sound decibels that are stopped by a wall or other structure. Is the difference between power incident and the transmitted downstream
Insertion Loss	The reduction of noise level at a given location due to placement of a noise control device in the sound path.

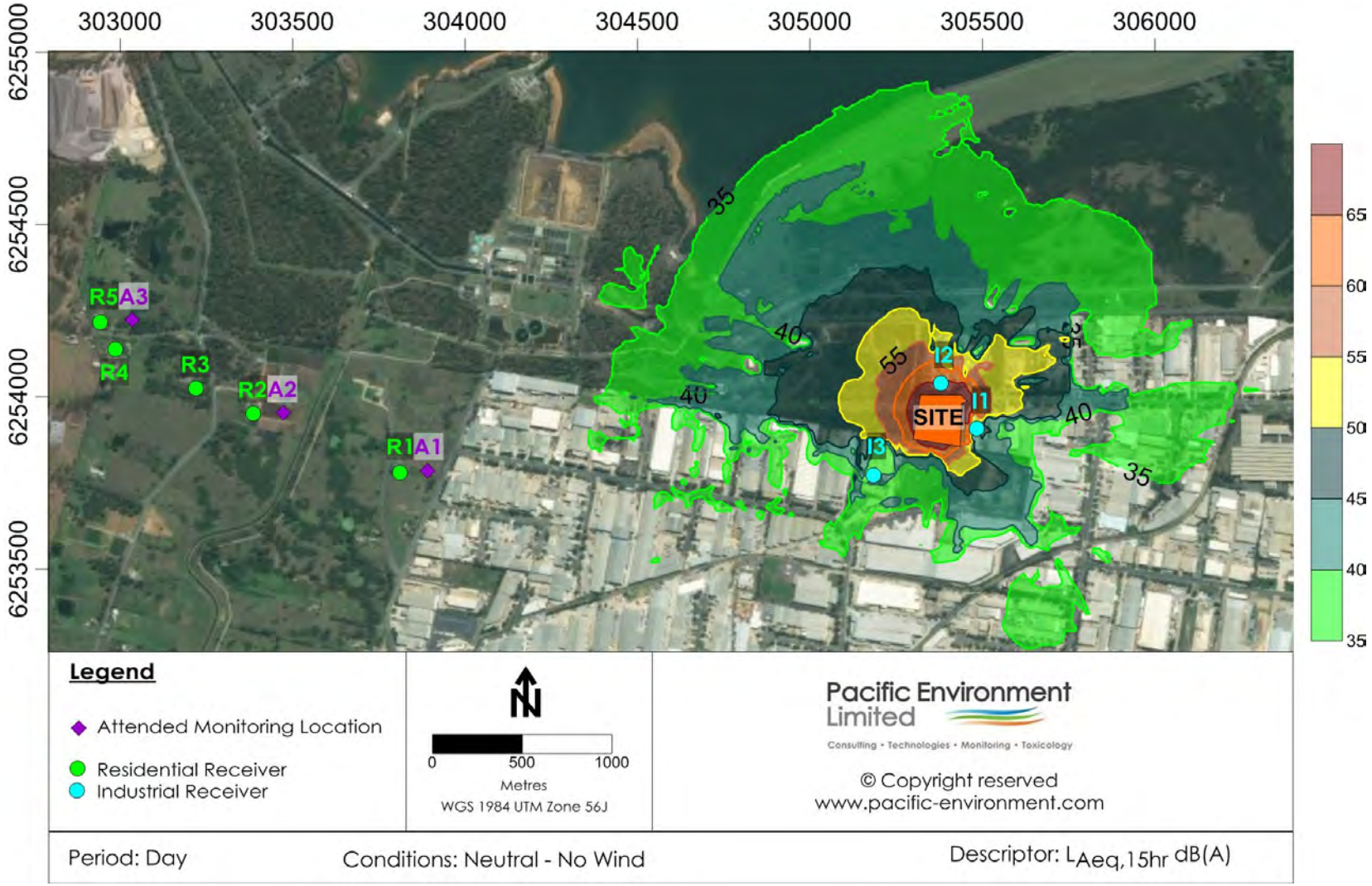
Appendix B NOISE SOURCES LOCATION

B.1 NORMAL OPERATION - VEHICLE MOVEMENTS AND OPENINGS LOCATION

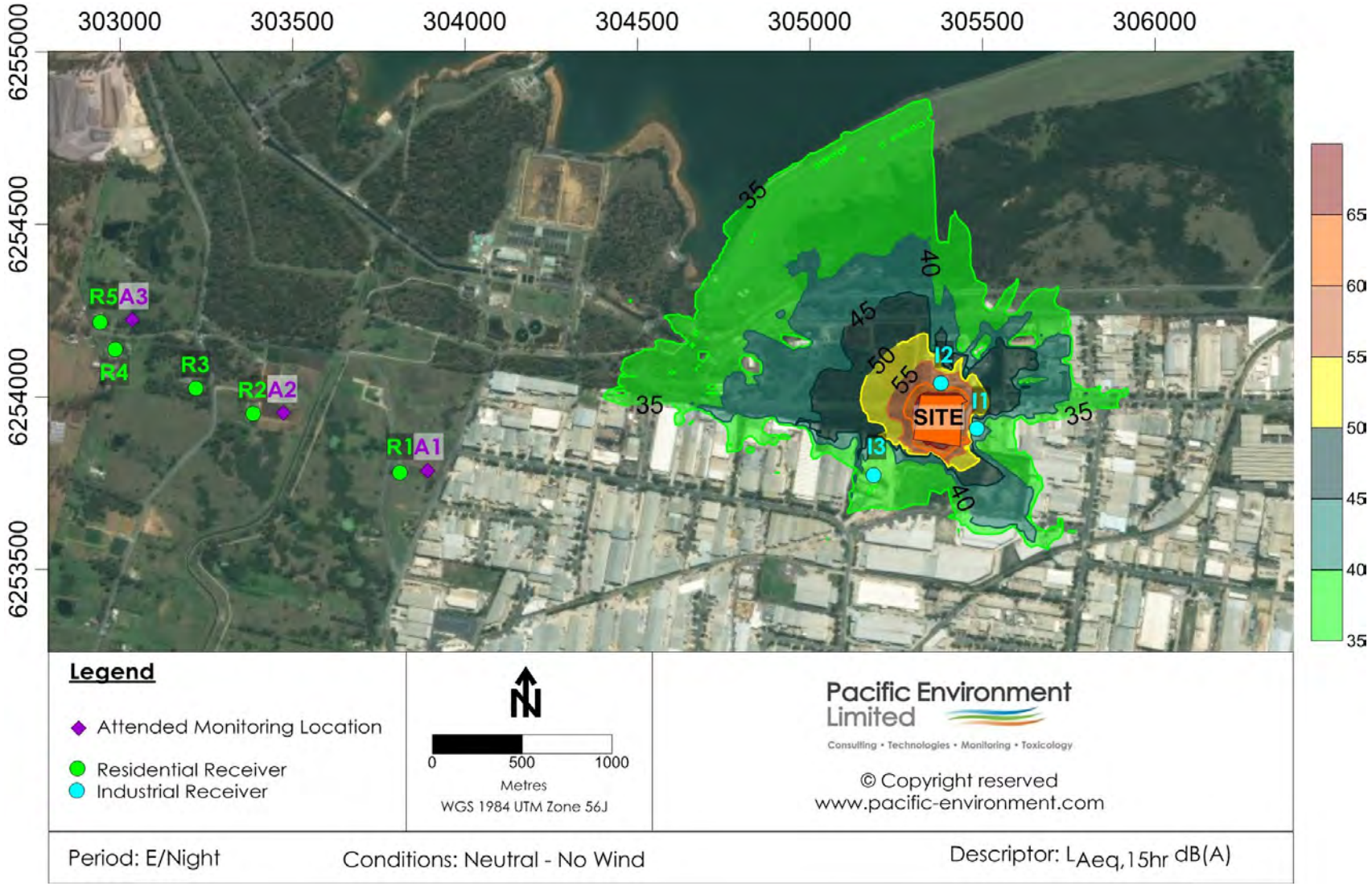


Appendix C NOISE CONTOURS

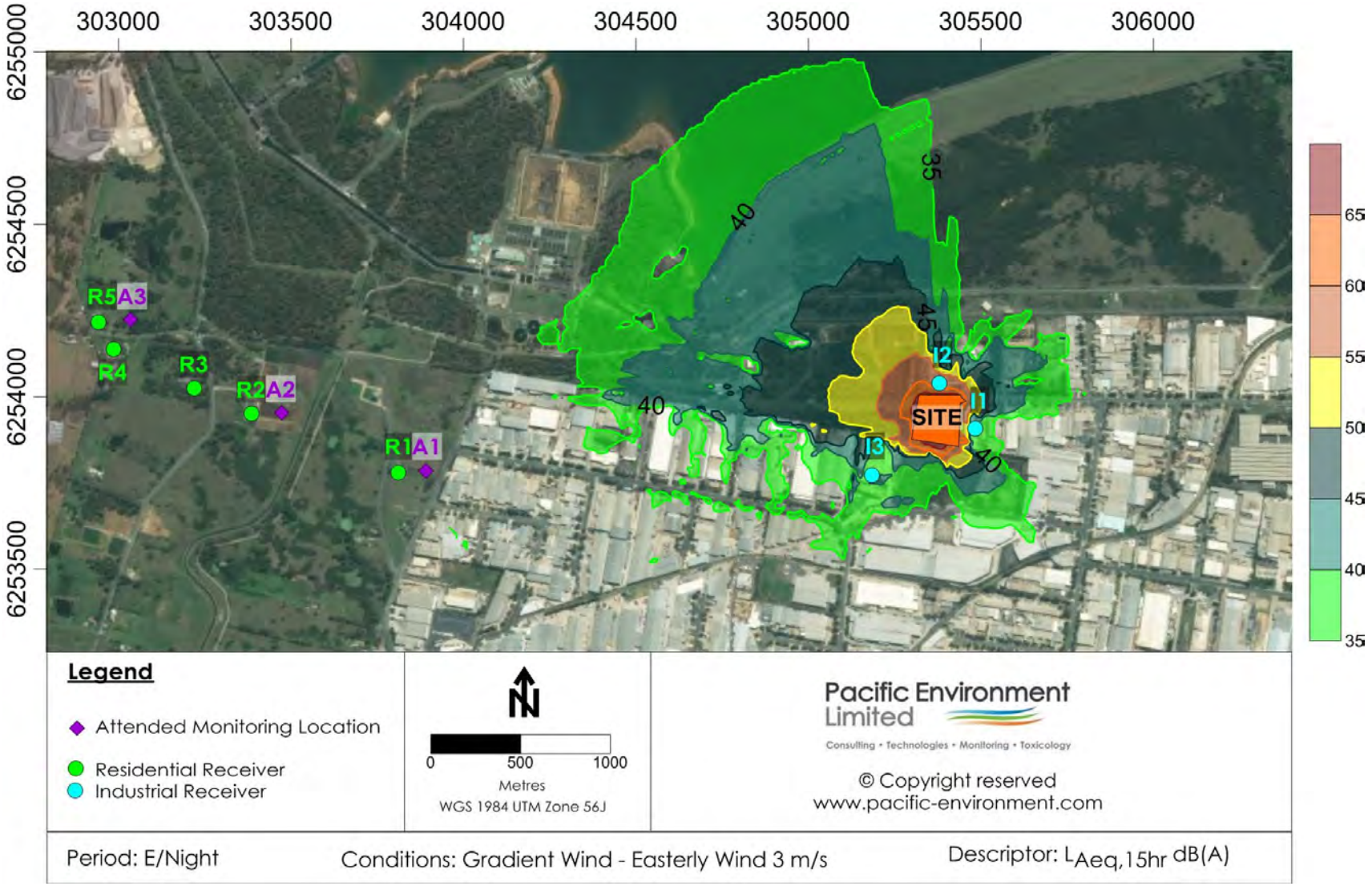
C.1 OPERATIONAL DAY TIME NEUTRAL CONDITIONS



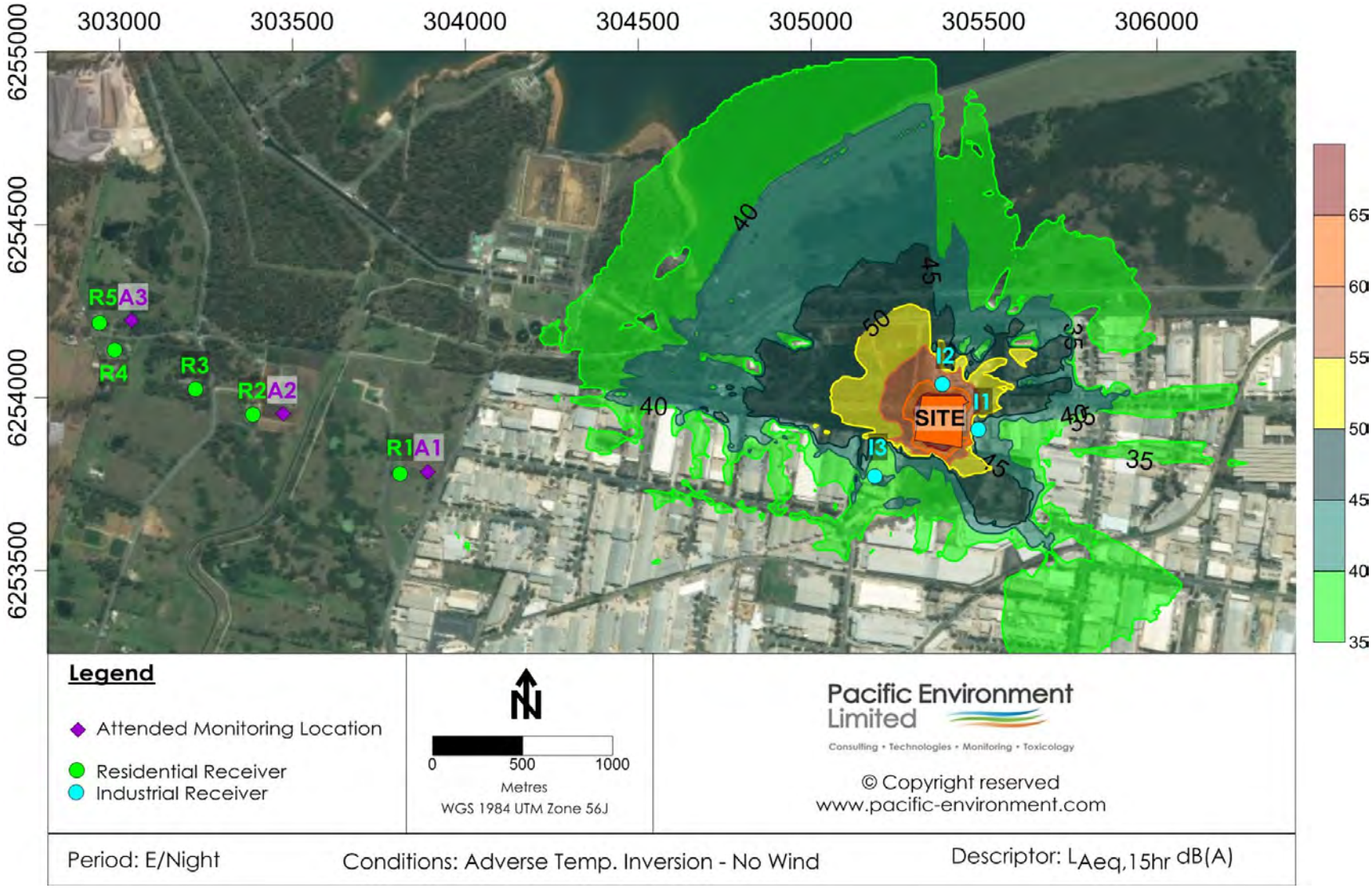
C.2 OPERATIONAL EVENING/NIGHT TIME NEUTRAL CONDITIONS



C.3 OPERATIONAL EVENING/NIGHT TIME GRADIENT WIND (EASTRELY 3 M/S) CONDITIONS



C.4 OPERATIONAL EVENING/NIGHT TIME ADVERSE TEMPERATURE INVERSION CONDITIONS



APPENDIX M

Preliminary Hazard Analysis

REPORT

SEPP 33 RISK SCREENING AND PRELIMINARY HAZARD ANALYSIS

Environmental Impact Statement: Wetherill Park Resource Recovery Facility

Submitted to:
SUEZ

Report Number. 147628002-025-R-RevA

Golder Associates

Table of Contents

1.0 INTRODUCTION

SUEZ is seeking to obtain development consent to increase the capacity of Wetherill Park Resource Recovery Park located at 20 Davis Road, Wetherill Park (the Site), within the Fairfield Local Government Area (LGA).

Currently the Wetherill Park Resource Recovery Park accepts 90 000 tonnes per annum (tpa) of non-putrescible waste and 10,000 tpa of general solid waste (putrescible) waste. SUEZ is seeking to increase from the existing 10,000 tpa to 140,000 tpa of putrescible waste (the Proposal).

The Site is located within an existing industrial estate and is zoned IN1 General Industrial with the land to the east and south. Prospect Reservoir is located approximately 880 metres north of the site. Based upon previous assessment and information within relevant legislative instruments including *Fairfield Local Environment Plan 2013,* the Site does not have existing terrestrial biodiversity constraints, nor does it have built or indigenous heritage constraints, nor is it affected by bushfire prone land designation.

While the Proposal includes an intensification of licenced capacity, it also proposes improvements to the existing facility such as separation of domestic drop-off arrangements from commercial waste streams to improve accessibility, safety and efficiency of the operations. However, it does not propose any change to aspects of the Site previously approved. This includes no change to the storage, handling and transport of materials on the Site other than the increase in putrescible waste acceptance. As such all materials classified as dangerous goods (for the purposes of the risk screening process) are approved in accordance with the Environmental Protection Licence (EPL) for the Site pursuant to the *Protection of the Environment Operations Act 1997* (POEO Act),

In addition the Proposal seeks no change to the existing operations on the Site with regard to:

- General solid waste (non-putrescible) capacity currently accepted at the site;
- The existing footprint of the transfer station building;
- Egress/ingress to and from the site;
- Operating hours;
- Equipment; and/or
- Acceptance/handling of asbestos including transportation to/from the site.

As such no further comment will be made on these issues within this report.

Refer to the Environmental Impact Statement (EIS) for the Proposal description and interaction with existing operations including the continued need for an Environmental Protection Licence under the *Protection of the Environment Operations Act 1997*.

2.0 METHODOLOGY

The Proposal has been declared as State Significant Development (SSD 7267) and as such, Secretary's Environmental Assessment Requirements (SEARs) were issued for the Proposal on the 6 October 2015 by the Secretary of the NSW Department of Planning and Environment (DPE). The SEARs for SSD 7267 were issued following consultation with government stakeholders to scope the EIS requirements for the Proposal.

SSD 7267 identify the need for a preliminary risk screening in accordance with *State Environmental Planning Policy No.33 – Hazardous and Offensive Development* (SEPP 33).

SSD 7267 specifically states in relation to hazards and risk:

- "a preliminary risk screening undertaken in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) and Applying SEPP 33 (DoP, 2011), and if necessary, a Preliminary Hazard Analysis (PHA)"; and

- "an assessment of the likely toxicity levels of loads transported to and from the site".

This report addresses the above issues including the preliminary risk screening in accordance with SEPP 33 and "Applying SEPP 33" (DoP, 2011) and identifies controls and management measures for the Proposal, which build upon the existing management documentation of the Site.

3.0 LEGISLATIVE REQUIREMENTS

3.1 State Environmental Planning Policy 33 – Hazardous and Offensive Development (SEPP 33)

The aim of SEPP 33 is to allow for the assessment of the environmental and safety performance of hazardous and offensive or potentially hazardous and offensive development. SEPP 33 seeks to:

- Amend the definitions of hazardous and offensive industries where used in environmental planning instruments.
- Render ineffective a provision of any environmental planning instrument that prohibits development for the purpose of a storage facility on the ground that the facility is hazardous or offensive if it is not a hazardous or offensive storage establishment as defined in the Policy.
- Ensure that in determining whether a development is a hazardous or offensive industry, any measures proposed to be employed to reduce the impact of the development are taken into account.
- Ensure that in considering any application to carry out potentially hazardous or offensive development, the consent authority has sufficient information to assess whether the development is hazardous or offensive and to impose conditions to reduce or minimise any adverse impact.

Under SEPP 33 potentially hazardous and potentially offensive industries have the following definitions:

- 'Potentially hazardous industry' is defined as development for the purposes of any industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality:
  - To human health, life or property; or
  - To the biophysical environment, and includes a hazardous industry and a hazardous storage establishment.
- 'Potentially offensive industry' means a development for the purposes of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would emit a polluting discharge (including for example, noise) in a manner which would have a significant adverse impact in the locality or on the existing or likely future development on other land, and includes an offensive industry and an offensive storage establishment.

3.2 Applying SEPP 33

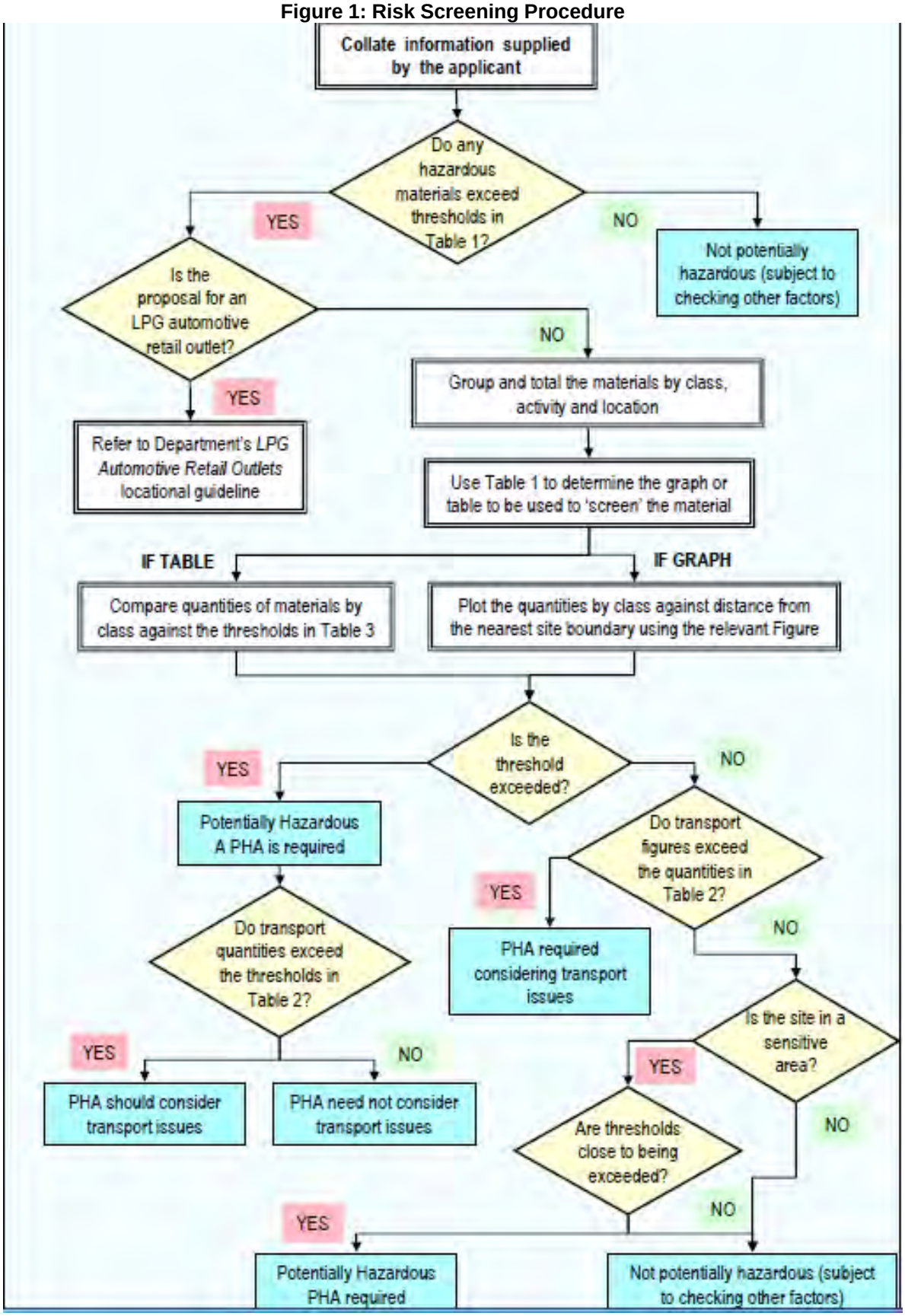
The objective of "Applying SEPP 33: Hazardous and Offensive Development Application Guidelines" (DoP, 2011) is to provide advice on implementing SEPP 33 by:

- Clarifying the type of development to which the policy applies, particularly in respect to storage establishments.

- Establishing a risk screening process with screening thresholds and provides a discussion of factors that can cause a development to be potentially hazardous, even when screening thresholds are not exceeded.
- Listing all screening thresholds and specifies separate screening thresholds for residential/sensitive land uses and other less sensitive uses, where appropriate.

The risk screening procedure is shown in the Figure 1 flowchart as adopted from Applying SEPP 33. If this procedure identifies that the Proposal as a 'potentially hazardous industry' a PHA will be undertaken in accordance with SSD 7267, SEPP33, Applying SEPP 33 and Hazardous Industry Advisory Papers.

Figure 1: Risk Screening Procedure



4.0 RISK SCREENING PROCESS

4.1 Materials Stored on Site

Dangerous goods are substances or articles that pose a risk to people, property or the environment, due to their chemical or physical properties. Dangerous goods are usually classified with reference to the immediate hazard they pose rather than the long-term health effects.

In Australia, dangerous goods are defined by the Australian Dangerous Goods Code (ADG). Details of the dangerous goods proposed to be stored at the Site for the Proposal and their corresponding screening method and threshold (as identified in Applying SEPP 33) are provided in Table 1. Locations are provided in Figure X. As previously noted all acceptance, storage and handling of the materials identified in Table 1 are currently approved in accordance with the Environmental Protection Licence for the Site pursuant to the POEO Act,

Table 1: Material Details

Material	Classification	Max Estimated Quantity	Storage Location	Threshold	Notes
Diesel fuel	C1: Combustible liquids	3000 Litres	Outside Transfer Station	N/A	Small quantities of diesel fuel storage for front end loader and further vehicles onsite. * Note that C1 combustible liquids are not a dangerous good under UN (United Nations) classification. They are defined as dangerous goods under workplace legislation.
Flammable gases (various)	2.1	500 kg	Transfer Station LPG (above ground) Transfer station Admin Building/Weighbridge/ Transfer Station Transfer Station	10 tonne or 16m^3	Autogas and forklift gas for plant Gas bottles collected within transfer station. Minor quantities of repair, pest control and cleaning products. Acetylene for welding and machinery repairs
Non-flammable, non-toxic gases	2.2	80 Kg	Transfer Station	None prescribed	Argoshield Universal for use during welding and machinery repairs.
Toxic Gases	2.3	50 Kg	Transfer Station	1 tonne	Liquid Chlorine stored within cylinders <100 kg

Material	Classification	Max Estimated Quantity	Storage Location	Threshold	Notes
Flammable liquids	3 PGIII	<10 Litres	Admin Building/ Transfer Station /Weighbridge/	5000 kg	Minor quantities of lubricants, repair and cleaning products. In addition to approved accepted waste streams on the site.
Unleaded Petrol	3 PGII	200 Litres	Transfer Station	5000 kg	For plant.
Toxic Substances	6.1	<.5 tonne	Transfer Station	2.5 tonne	Approved waste material accepted at the site including waste inks and dyes and fluorescent tubes.
Corrosive Substances (various)	8PGI	< 1 tonne	Waste Water Treatment Plant Transfer Station	5 tonne	This includes Sodium Hydroxide (50%) for use at the Water Seperator on the site Approved waste streams accepted on site including Caustic Soda.
Corrosive Substances	8PGIII	10 tonne	Transfer Station	50 tonne	This includes batteries and/or e waste within the approved waste streams accepted on site.

Based on the information in Table 1, the volumes of chemicals proposed to be stored on-site are well below the screening thresholds for their quantities and no not trigger the requirement for a PHA. Furthermore all materials identified in Table 1 are to be located at least 20 metres from the boundary of the Site within or adjacent to the existing built form, with the site being located within an industrial area located over 1 kilometre from the nearest residential receiver. As such the Proposal is not considered to be potentially hazardous.

The Proposal will not introduce potentially new hazardous materials to Wetherill Park Resource Recovery Park. The staff at the site are familiar with the potential hazards associated with these materials and operates with existing technical and management safeguards in accordance with existing conditions of consent.

4.2 Toxicity of Loads

The Site will continue to accept putrescible and non-putrescible waste in accordance with existing requirements with waste operations remaining largely the same as existing operations as identified in Chapter 9. Section 9.2 of the EIS addresses the transport of waste to and from the site including the process of waste acceptance through the weighbridge and quality control. This includes the screening process, which includes a process of assessment to deal with non-conforming waste management, which may potentially include waste toxicity to be accepted at the Site and the transfer of waste from the Site.

Any general solid waste (putrescible) and/or general solid waste (non-putrescible) received for storage or recovery or processing at the premises will be assessed and classified in accordance with the Waste Classification Guidelines Part 1: Classifying Waste (DECC, 2008).

4.3 Non-conforming Waste Storage and Transport

Approach to non-conforming waste is discussed in Chapter 9 Waste Management.

5.0 POTENTIAL HAZARD SCENARIOS

The identification of potential hazardous incidents and scenarios is a key step in identifying potential hazards and risk. As identified in Table 2 this process lists potential causes and consequences in addition to safeguards and management measures to mitigate the potential impact of the Proposal upon people, property and/or the environment on site or off site at Wetherill Park Resource Recovery Facility. This identification process enables the establishment of the adequacy and relevancy of proposed safeguards and mitigation should they be required.

The following potential scenarios are identified for the Proposal. These scenarios are not new to the existing site and have been managed (as required) since the commencement of operations at Wetherill Park Resource Recovery Facility using existing procedures and systems that will continue to be in place for the Proposal.

Results of the hazard identification for each of the potential scenarios identified above are provided in Table 2. It is considered that the scenarios and the hazard identification completed in Table 2 do not identify any significant hazards or major off site consequences with identified safeguards, mitigation and management.

5.1 Hierarchy of Controls

In identifying hazard mitigation and management measures for the Proposal, the following hierarchy of controls (which range from most effective to least effective) will be considered, which are a continuation of existing practices at the Site.

1) **Elimination** is a permanent solution and should be attempted in the first instance. The hazard is eliminated altogether. For example, the elimination of a hazardous process or substance.

2) **Substitution** involves replacing the hazard by one that presents a lower risk. This could involve the substitution of a toxic substance with a less toxic substance.

3) **Engineering** controls involve some structural change to the work environment or work process to place a barrier to, or interrupt the transmission path between, the worker and the hazard, or the environment and the hazard. This may include machine guards, isolation or enclosure of hazards, the use of extraction ventilation, bunding and manual handling devices.

4) **Isolation**: This involves the separation of persons or environment from the hazard by means or relocation of the hazard to a remote location, or by segregating the hazard to prevent personal exposure.

5) **Administrative** (procedural) controls reduce or eliminate exposure to a hazard by adherence to procedures or instructions. Documentation should emphasise all the steps to be taken and the controls to be used in carrying out a task safely & with environmental awareness. Successful administrative controls are dependent on appropriate human behaviour. Examples include safe working procedures and permits to work, training/inductions.

6) **Personal Protective Equipment** (PPE)/Environmental Control Equipment (ECE) are worn/used by people as a barrier between themselves/the environment and the hazard. The success of this control is dependent on the protective equipment being chosen correctly, as well as fitted correctly and worn at all times when required.

Table 2: Hazard Identification Scenarios

Event	Cause / Comments	Potential Consequences	Prevention / Protection / Safeguards
Fire in site vehicles, infrastructure and/or buildings	Plant equipment not operating correctly Overheating of combustible materials. Ignition of flammable material Decomposition of solid waste in anaerobic conditions can generate heat, methane and other gases.	Fire on site Environmental damage if spill is not contained. Risk of fire Personnel hazard and damage to property	■ Maintenance of vehicles and/or plant equipment ■ No smoking outside of designated areas/on site ■ Fire suppression systems serviced and inspected periodically ■ Training and procedures in place for fire ■ Site emergency response plan including emergency contact numbers provided within management system for the site ■ Regular maintenance/housekeeping of buildings ■ Spillage of flammable materials to be cleared up immediately. ■ Evacuation procedure and training to operators ■ Measures to reduce the threat of fire spreading
Fire or explosion from dangerous goods	Unsafe storage of flammable gas/liquid which ignites.	Material damage, personnel injury potential and/or potential for spread to other areas	■ Regular inspections and maintenance ■ Fire protection system available on site to reduce damage from fire. ■ Fire management strategy ■ Implementation of AS1940:2004 The storage and handling of flammable and combustible liquids ■ Training to site personnel. ■ Emergency response plans and procedures.
Unsafe vehicle unloading of waste to designated area	Mechanical failure of plant, site equipment and/or public vehicles. Falling objects, impact on other vehicles/ plant/pedestrians Loss of containment of materials through improper	Environmental damage if load/spill is not contained Risk of Fire Personnel hazard to staff and public	■ Regular inspections and maintenance ■ Any spills cleaned up immediately. Spill kits located at appropriate location on site with staff appropriately trained in their use ■ Processes for the storage of materials. ■ Spill containment to be managed in accordance with AS 1940 ■ Site emergency response plan including emergency contact numbers provided within management system for the site

Event	Cause / Comments	Potential Consequences	Prevention / Protection / Safeguards
	use or handling of equipment. Unsecure/ unstable/ overloaded loads Vehicle movements/congestion	Physical harm and property damage Impact upon environment/amenity (vehicle exhaust, odour, noise)	■ Fire protection (including fire extinguishers, fire hose reel etc. provided and inspected periodically. Distances in accordance with AS 1940 ■ No smoking around plant equipment ■ Plant is used in accordance with specifications ■ Stop work of plant equipment in the event of plant failure ■ Training for site operators ■ Appropriate traffic control through weighbridge operation
Unsafe storage/stockpiling of waste	Falling objects, impact on vehicles/ plant/pedestrians Loss of containment of materials through improper use or handling of equipment.	Environmental damage if load/spill is not contained Risk of Fire Personnel hazard to staff and public Physical harm and property damage	■ Plant is used in accordance with specifications ■ Training for site operators ■ Site emergency response plan including emergency contact numbers provided within management system for the site ■ Regular inspections and maintenance ■ Evacuation procedure and training to operators ■ Designated storage/stockpiling areas to be outlined in the OEMP.
Unsafe handling/storage of Asbestos	Infrastructure failure (storage containers) Unsecure/unstable/ loads Inappropriate handling of asbestos	Personnel hazard to staff and public Physical harm and property damage	■ Handling, transport and storage in accordance with WI063.3 - Asbestos Waste Management and SOP029 - Asbestos Waste for the Site. ■ Training for site operators ■ Stop work of plant equipment in the event of plant failure ■ Appropriate PPE for all workers
Chemical Spill and loss of containment	Possible Fire Release of dangerous goods	Risk of Fire Environmental damage if spill is not contained.	■ Smoking in designated areas only. ■ Ongoing monitoring by operators to ensure potential fire situations are identified and addressed appropriately. ■ Fire management strategy (as to be outlined in the OEMP). ■ Training to site personnel.

Event	Cause / Comments	Potential Consequences	Prevention / Protection / Safeguards
	Decomposition of solid waste in anaerobic conditions can generate heat, methane and other gases	Personnel hazard and damage to property Skin contact/ inhalation	■ Site emergency response plan including emergency contact numbers provided within management system for the site. ■ Implementation of AS1940:2004 The storage and handling of flammable and combustible liquids ■ Storage in a separate bund or within a storage area where there are no flammable materials stored.
Loss of containment of leachate from putrescible waste	Storm events /Flood Failure of plant/ infrastructure on site Plant equipment not operating correctly	Release of dangerous goods offsite Skin contact/ inhalation Potential offsite discharge Environmental/amenity impacts to site and surrounding area	■ Maintenance of vehicles and/or plant equipment ■ Regular inspections and maintenance ■ Stop work of plant equipment in the event of plant failure ■ Spillage of flammable materials to be cleared up immediately. ■ Training for site operators ■ Implementation of AS1940:2004 The storage and handling of flammable and combustible liquids ■ Site emergency response plan including emergency contact numbers provided within management system for the site ■ Management and mitigation in accordance with an OEMP.
Delivery and/or processing of materials not licenced to be accepted at site.	This may include delivery and/or processing of waste not specified within the EIS and/or foreign substances within the plant equipment. Spills, exposure to hazardous substances	Generation of toxic fumes Plant equipment failure Personnel exposure to toxic substances	■ Training to operators. ■ Resource recovery source monitoring/screening by operators. ■ Regular inspections and maintenance of plant equipment. ■ Monitoring and review of waste acceptance at weighbridge and within designated drop-off area in accordance with the OEMP
Construction hazard segregation	Entry/access of unauthorised persons to construction site areas	Plant Failure	■ Security of the site construction areas maintained during Construction.

Event	Cause / Comments	Potential Consequences	Prevention / Protection / Safeguards
	Exposure to hazardous substances Working in proximity to industrial equipment and workplaces	Potential injury to person on site. Environmental/Amenity impacts	■ Not allowing unauthorised persons access to construction areas of the site ■ Appropriate signage and controls to direct traffic movement and unauthorised people appropriately.
Dust generated from operating equipment, vehicle movements and bulk material handling	Respiratory health impacts (e.g. asthma), eye and skin irritation	Physical harm Environmental/amenity impacts	■ Waste acceptance within designated areas ■ Sealed roads and regular cleaning ■ Covered loads ■ Ventilation system. ■ Maintaining equipment and plant. ■ Process in the storage of materials. I.e. ensuring storage drums are sealed, storage within bunded areas on site etc. ■ Dust suppression system
Vehicle exhaust generated from movement of vehicles in the existing enclosed building	Respiratory health impacts (e.g. asthma), eye and skin irritation	Physical harm Environmental/amenity impacts	■ Vehicles maintenance to reduce particulate discharge. ■ Ventilation system. ■ Dust suppression system
Noise generation	Generation of noise from operation of heavy equipment within transfer station enclosed area	Personnel hazard and potential offsite impacts. Environmental/amenity impacts	■ Maintaining equipment and plant appropriately. ■ Hours of construction and operation. ■ Use of Personal Protective Equipment. ■ Further measures as identified within the OEMP.
Natural Disaster	Earthquake/Storm/Flood/Windstorm	Risk of Fire Personnel hazard	■ Site emergency response plan including emergency contact numbers provided within management system for the site

Event	Cause / Comments	Potential Consequences	Prevention / Protection / Safeguards
		Physical and property damage Plant Failure Loss of Containment Environmental/Amenity impacts	■ Fire protection (including fire extinguishers, fire hose reel etc. provided and inspected periodically. Distances in accordance with AS 1940 ■ Training for site operators ■ Regular inspections and maintenance ■ Processes for the storage of materials. ■ Spill containment to be managed in accordance with AS 1940
Injury to public (accessing unauthorised areas)	Entry/access of unauthorised persons to site areas	Potential injury to person on site.	■ Security of the site maintained during operation and Construction. ■ Not allowing unauthorised persons access to areas of the site ■ Appropriate signage and controls to direct traffic movement and unauthorised people appropriately.
Biological hazards	Exposure Risk of infection such as tetanus from cuts and abrasions. Pathogen containing putrescibles wastes.	Threats to people and the environment, on site personnel and/or spread of disease offsite	■ Waste screening in accordance with OEMP ■ Litter control. ■ Vermin and pests controlled as outlined in the draft OEMP. ■ Good hygiene practices and Personal Protective Equipment. ■ Implementation of a site OH&S plan.
Microbial due to decomposition of putrescible waste	Involves the formation of moulds and other microbial spores that can become airborne when disturbed. The speed of decomposition depends on: the surface area; aeration and moisture. Respiratory health impacts (e.g. asthma) Microbial	Physical harm	■ Waste acceptance within designated areas ■ Minimise residency time to reduce mould formation in the refuse.

Event	Cause / Comments	Potential Consequences	Prevention / Protection / Safeguards
	contaminants including pollen and microbial spores are a common trigger of asthma.		
Gases/ odours due to the decomposition of putrescible wastes	Generate gases, typically methane (CH4) and carbon dioxide (CO2) (comprises 99%). Respiratory health impacts	Physical harm	■ Waste acceptance within designated areas ■ Odour control system ■ Odour mitigation measure in accordance with OEMP Complaint management system in accordance with OEMP
General occupational health and safety hazards to workers during operation	Working in proximity to industrial equipment and workplaces	Personnel hazard	■ Operational maintenance and plant equipment procedures ■ Training to operators ■ Implementation of a site OH&S plan in accordance with the conditions of approval and all relevant standards

5.2 Management Standards and Guidelines

As discussed in Chapter 9, An OEMP and supporting specific management plans will be developed for the Proposal that build upon the existing Environmental Management Plan and procedure documentation for the Site. These documents will be written to reduce the likelihood and address potential hazardous incidences expediently should they occur. The operational procedures to manage the risks associated with activities on the Site will be generally consistent with existing management plans for SUEZ waste operations and include the following key documents:

- Operational Environmental Management Plan (OEMP);
- Incident Response Plan (IRP);
- Emergency Response Plan (ERP);
- Screening and Recording of Waste Procedure;
- Vermin and Pest Control Plan; and
- Pollution Incident Response Management Plan (PIRMP).

6.0 CONCLUSION

The Proposal is not considered to be hazardous based upon the hazard and risk screening and identification and assessment of potentially hazardous scenarios identified to be potentially associated for the Proposal. Subject to complying with the existing and future EPL it is considered the Proposal is not offensive or hazardous in accordance with SEPP 33, and that identified risk levels associated with the Proposal do not preclude approval with appropriate mitigation and safeguards.

The Proposal seeks to build upon the existing operations and management of the Site, with the key change being the increased capacity of putrescible waste to be accepted at the Site. However, this will not result in change to the quantity or type of hazardous material to be stored at the Site.

The Proposal will not introduce potentially new hazardous materials to Wetherill Park Resource Recovery Facility. The staff at the site are familiar with the potential hazards associated with these materials and operates with existing technical and management safeguards in accordance with existing conditions of consent.

Utilising the risk screening procedure as identified in Applying SEPP33 (refer to Figure 1) it is considered that the Proposal is not considered to be potentially hazardous as it does not exceed the screening thresholds of the applicable legislation.

All materials identified in Table 1 are located centrally on the Site at least 20 metres from the boundary, within or adjacent to the existing built form, with the Site being located within an industrial area located over 1 kilometre from the nearest residential receiver. All material will continue to be stored appropriately within containers and bunding in accordance with relevant standards including AS1940:2004 “The storage and handling of flammable and combustible liquids”.

Applicable management standards and guidelines will continue to be applied on the Site and will be updated to include the Proposal requirements.

All mitigation measures identified in the hazard identification scenarios will be implemented within a comprehensive OEMP as part of an update of the environmental management plan documents for the Proposal.

7.0 REFERENCES

AS 1940-2004 “The storage and handling of flammable and combustible liquids”.

Commonwealth of Australia (2014) “The Australian Dangerous Goods Code” Edition 7.3

Department of Environment and Climate Change (DECC) (2008), *Waste Classification Guidelines Part 1: Classifying Waste*, April 2008

Department of Planning and Infrastructure (2011) “Applying SEPP 33” State of New South Wales through the Department of Planning

Department of Planning and Infrastructure (2011) *Hazardous Industry Planning Advisory Paper No. 6 — Hazard Analysis*

Department of Planning and Infrastructure (2011) *Multi-Level Risk Assessment guideline*

Secretary’s Environmental Assessment Requirements SSD 7267 issued for the Proposal on the 6 October 2015.

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

WorkCover NSW (2005), *Code of Practice for the Storage and Handling of Dangerous Goods.*

SUEZ Environnement (November 2014) SOP029 - Asbestos Waste

SUEZ Environnement (November 2014) WI063.3 - Asbestos Waste Management - Wetherill Park RRF

SUEZ Environnement (April 2015) Wetherill Park Resource Recovery Facility Pollution Incident Response Management Plan V4

SUEZ Environnement (September 2014) PlanS003 – Emergency Response Plan V3.

STUDY LIMITATIONS

This Document has been provided by Golder Associates Pty Ltd ("Golder") subject to the following limitations:

This Document has been prepared for the particular purpose outlined in Golder's proposal and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.

The scope and the period of Golder's Services are as described in Golder's proposal, and are subject to restrictions and limitations. Golder did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Golder in regards to it.

Conditions may exist which were undetectable given the limited nature of the enquiry Golder was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.

In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. Golder's opinions are based upon information that existed at the time of the production of the Document. It is understood that the Services provided allowed Golder to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.

Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.

Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Golder for incomplete or inaccurate data supplied by others.

Golder may have retained subconsultants affiliated with Golder to provide Services for the benefit of Golder. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any direct legal recourse to, and waives any claim, demand, or cause of action against, Golder's affiliated companies, and their employees, officers and directors.

This Document is provided for sole use by the Client and is confidential to it and its professional advisers. No responsibility whatsoever for the contents of this Document will be accepted to any person other than the Client. Any use which a third party makes of this Document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this Document.

APPENDIX N

Certificates of Title

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 402/603454

SEARCH DATE	TIME	EDITION NO	DATE
13/1/2016	10:32 AM	3	4/4/2007

LAND

LOT 402 IN DEPOSITED PLAN 603454
AT WETHERILL PARK
LOCAL GOVERNMENT AREA FAIRFIELD
PARISH OF PROSPECT COUNTY OF CUMBERLAND
TITLE DIAGRAM DP603454

FIRST SCHEDULE

SITA AUSTRALIA PTY LTD (CN AD32689)

SECOND SCHEDULE (6 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 J259850 EASEMENT FOR TRANSMISSION LINE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
2412165 EASEMENT VESTED IN NEW SOUTH WALES ELECTRICITY TRANSMISSION AUTHORITY
3 DP249417 RESTRICTION(S) ON THE USE OF LAND
4 DP249417 EASEMENT TO DRAIN WATER AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
5 DP646345 EASEMENT FOR RESTRICTION ON USE 3.5 WIDE APPURTENANT TO THE LAND ABOVE DESCRIBED
* 6 AH500502 RESTRICTION(S) ON THE USE OF LAND

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

[redacted]ICATE OF TITLE

NEW SOUTH WALES

[redacted] PROPERTY ACT, 1900

Vol. 14032 Fol. 20

Appln. No. 7860

Prior Title Vol. 13348 Fol. 124

EDITION ISSUED

9 1 1980

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

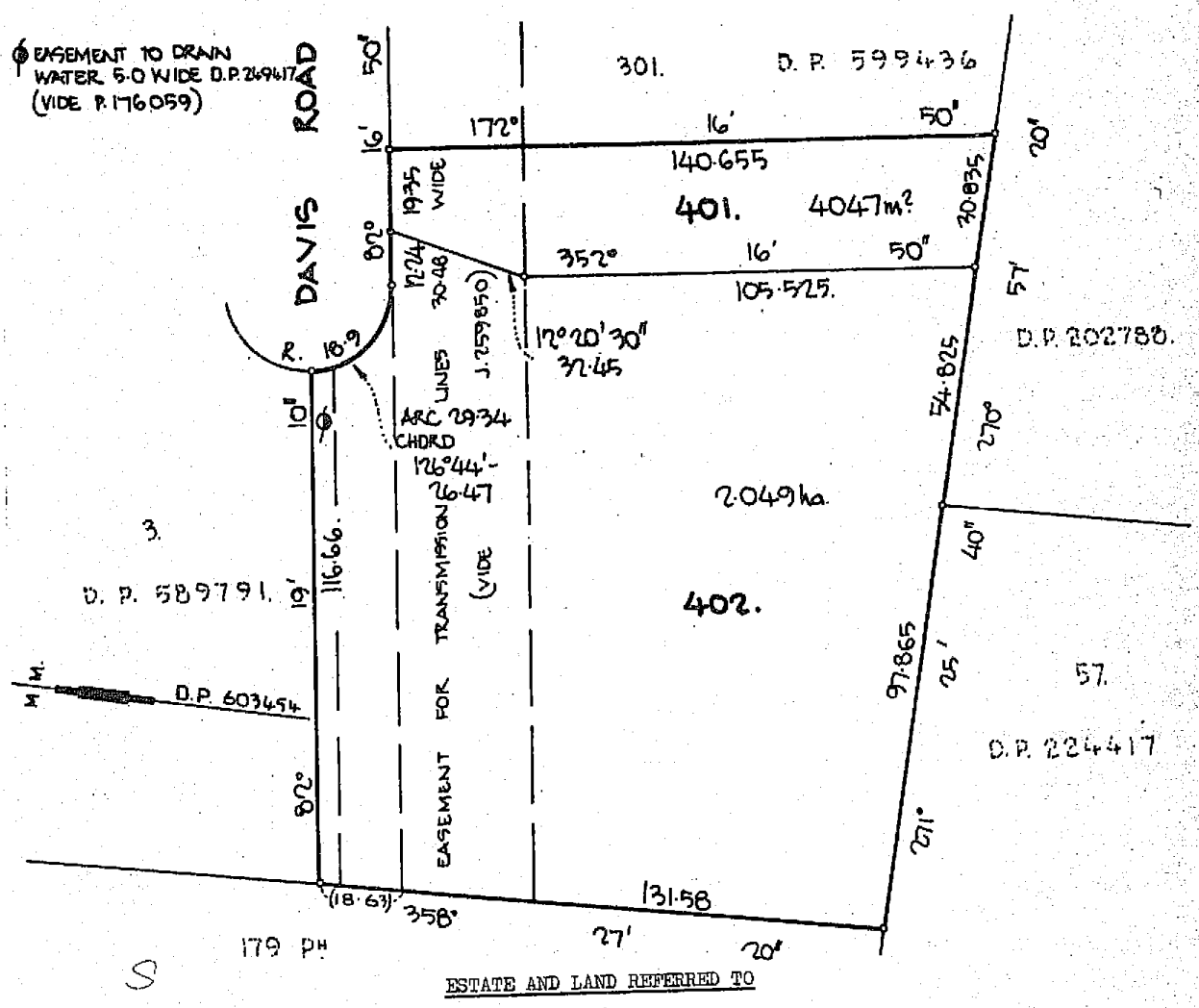
CANCELLED

Registrar General.

SEE AUTO FOLIO

PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES



ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 402 in Deposited Plan 603454 at Wetherill Park in the City of Fairfield Parish of Prospect and County of Cumberland being part of Portion 67 granted to Thomas Hyland on 31-12-1834.

FIRST SCHEDULE

M. ~~J.~~ DAVIS INDUSTRIAL PTY. LIMITED.

SECOND SCHEDULE

GRY

1. Reservations and conditions, if any, contained in the Crown Grant above referred to.
2. J259850 P Easement for Transmission Line affecting the part of the land above described shown so burdened in Deposited Plan 603454.
3. DP249417 P Restriction as to user (see P176059).
4. DP249417 P Easement to drain water affecting the part of the land above described shown so burdened in Deposited Plan 603454 (see P176059).
5. ~~R250092 Mortgage to Commonwealth Trading Bank of Australia.~~ Discharged S406112

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

Vol. 14032 Fol. 20

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	REGISTERED	Signature of Registrar General
~~Monodi Pty.Limited. by Transfer S406113,Registered 13-4 1981~~				
Camide Pty. Limited by Transfer X512030. Registered 5-5-1988				

BALANCE FILM

SEE AUTO FILM

R646810T
S406112 D/M - 3 Mtg - 4 Mtg S4061 26/1/8
S911064 M 5 M/M
CT 29/1/8
V249393 DM
X512028 DM -30 T

SECOND SCHEDULE (continued)

INSTRUMENT NATURE	INSTRUMENT NUMBER	PARTICULARS	REGISTERED	Signature of Registrar General	CANCELLATION	
~~S406114~~		~~Mortgage to Australia and New Zealand Banking Group Limited.Registered 13-4-1981~~			Cancelled	V249393
S911064		Mortgage to Australian International Finance Corporation Limited. Registered 10-2-9 1982.			Discharged	V249393
~~S406114~~		~~Mortgage)~~				
S911064		Mortgage) Priority S911064, S406 14 by Postponement S911065. Registered 10-2-1982.			Cancelled	V249393
~~S406114~~		~~Mortgage to Australia and New Zealand Banking Group Limited. Registered 13-4 1981.~~			~~Cancelled~~	~~V249393~~
~~S406114~~		~~Mortgage to Australia and New Zealand Banking Group Limited. Registered 13-4-1981~~			Discharged	X512028

(Page 2 of 2 pages)

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

CERTIFICATE OF TITLE

13348124

NEW SOUTH WALES

REAL PROPERTY ACT, 1900

Vol. 13348 Fol. 124

Appln. No. 7860

Prior Titles Vol.12743 Fols.218 & 219

EDITION ISSUED

16 6 1977

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

Registrar General.

(Page 1) Vol. 13348 Fol. 124

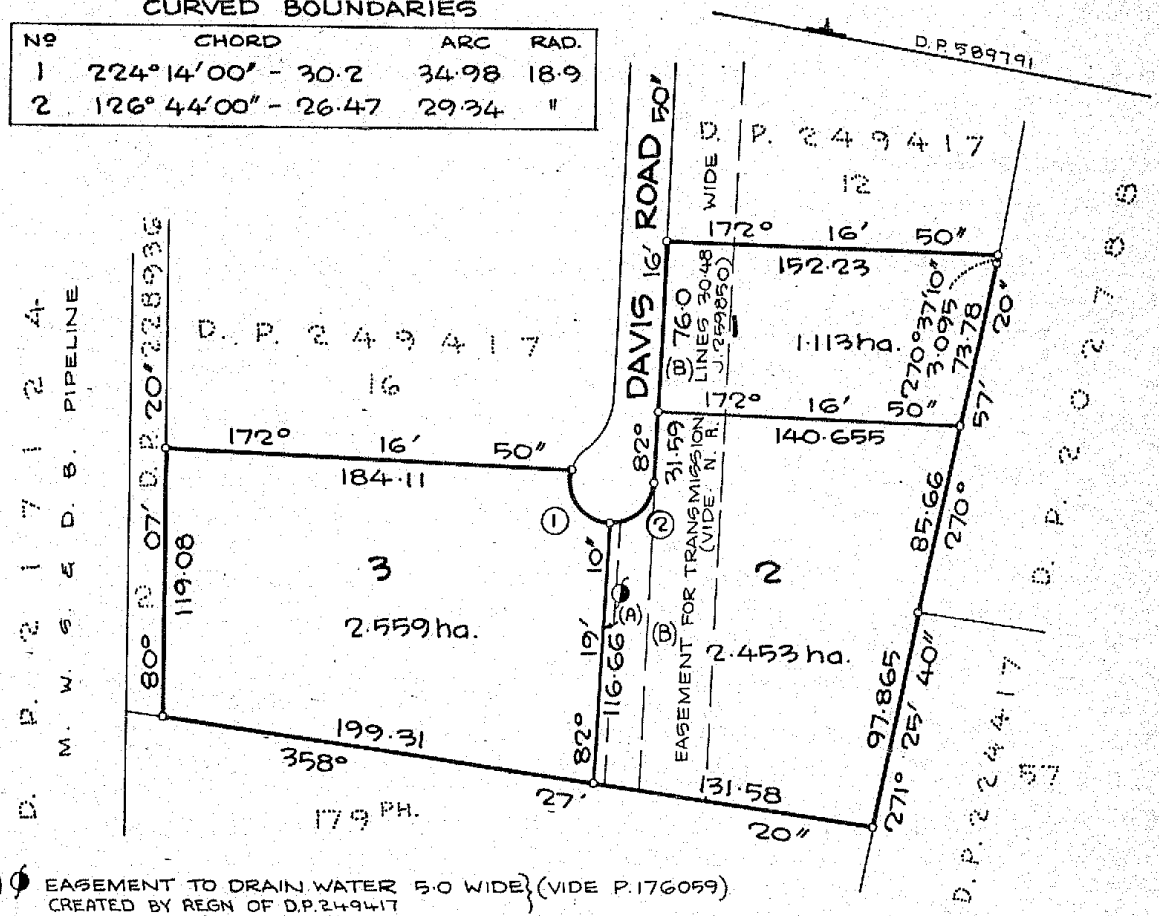
PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES

CANCELLED

CURVED BOUNDARIES

No	CHORD	ARC	RAD.
1	224° 14' 00" - 30.2	34.98	18.9
2	126° 44' 00" - 26.47	29.34	"



ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 2 in Deposited Plan 589791 at Wetherill Park in the Municipality of Fairfield Parish of Prospect and County of Cumberland being part of Portion 67 granted to Thomas Hyland on 31-12-1834.

FIRST SCHEDULE

M.J.DAVIS INDUSTRIAL PTY. LIMITED.
~~M.J.DAVIS INDUSTRIAL PTY.LIMITED~~.

Reg. Gen'l 4-7-1977

SECOND SCHEDULE

1. Reservations and conditions, if any, contained in the Crown Grant above referred to.
2. J259850 Easement for Transmission Line affecting the part of the land designated (B) in the plan hereon.
3. Restriction as to user created by the registration of Deposited Plan 249417. See P176059.
4. Easement to Drain Water affecting the part of the land above described 5 metres wide designated (A) in the plan hereon created by the registration of Deposited Plan 249417. See P176059.
5. ~~Q193344 Caveat by Beneficial Finance Corporation Limited~~. Withdrawn Q212899.

Vol. 13348 Fol. 124

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	ENTERED	Signature of Registrar General

NEW CERTIFICATE(S) OF TITLE ISSUING ON DP603454
NO DEALING TO BE REGISTERED WITHOUT REFERENCE TO SURVEY & MAPPING BRANCH

Q212899L
-900
CT 1-5-7?
DP602673
RESECTED
R250091D
92 M
DP603454
DP 604212
CT-25.9.79.

SECOND SCHEDULE (continued)

INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	PARTICULARS	ENTERED	Signature of Registrar General	CANCELLATION		
~~Mortgage~~	~~Q212900~~	~~------~~	~~to Beneficial Finance Corporation Limited.~~	~~4-7-1977.~~		Discharged	R250091	
Mortgage	R250092	------	to Commonwealth Trading Bank of Australia.	25-6-1979.				

This deed is cancelled as to Whole.
New certificates of Title have issued on 8.1.80.
for lots in Deposited Plan No. 603454 as follows:-
Lots 401 & 402 Vol. 14032 Fol. 19 & 20 respectively.

REGISTRAR GENERAL

(Page 2 of 2 pages)

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

[redacted]ICATE OF TITLE

NEW SOUTH WALES — [redacted] PROPERTY ACT, 1900

Appln. No. 7860

Prior Title Vol.7200 Fol.180

Vol. 12743 Fol 219

Edition issued 26-3-1975.

(Page 1) Vol. 12743 Fol. 219

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

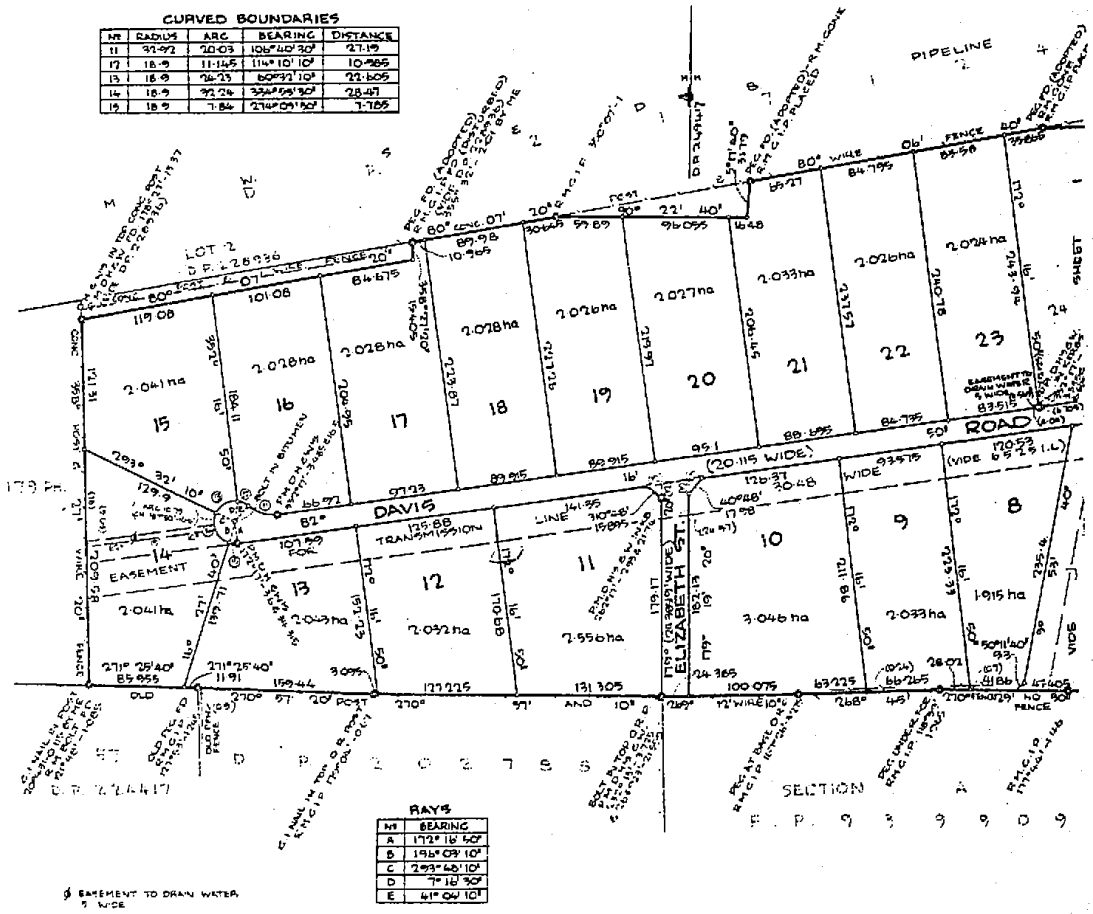
Registrar General.

PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES

CURVED BOUNDARIES

Nº	RADIUS	ARC	BEARING	DISTANCE
11	33.92	20.03	106°40'30"	27.19
12	18.9	11.145	114°10'10"	10.985
13	18.9	24.73	60°32'10"	22.605
14	18.9	32.24	338°59'30"	28.47
15	18.9	7.84	274°09'30"	7.785



RAYS

Nº	BEARING
A	172° 16' 40"
B	196° 09' 10"
C	293° 40' 10"
D	7° 16' 30"
E	41° 06' 10"

ϕ EASEMENT TO DRAIN WATER 5 WIDE

ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 14 in Deposited Plan 249417 at Wetherill Park in the Municipality of Fairfield Parish of Prospect and County of Cumberland being part of Portion 67 granted to Thomas Hyland on 31-12-1834.

FIRST SCHEDULE

~~JUMAL INDUSTRIES PTY. LIMITED.~~

SECOND SCHEDULE

1. Reservations and conditions, if any, contained in the Crown Grant above referred to.
2. Easement for Transmission Line created by Resumption No. J259850 affecting the part of the land above described 30.48 metres wide shown in the plan hereon.
3. ~~Mortgage No. N968504 to Beneficial Finance Corporation Limited. Entered 17-12-1974.~~ Discharged Q193345
4. Restriction as to user created by the registration of Deposited Plan 249417. See P176059.
5. Easement to Drain Water affecting the part of the land above described 5 metres wide shown in plan hereon created by the registration of Deposited Plan 249417 See P176059.

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED.

Vol. 12743 Fol. 219

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	ENTERED	Signature of Registrar General
M.J. Davis Industrial Pty. Limited	Transfer	Q193346	------	11-5-1977	

This deed is cancelled as to whole
New Certificates of Title have issued on 15.6.77
for lots in Deposited Plan No. 589791 as follows:-
Lots 103 Vol. 13348 Fol. 123 & 125 respectively.

REGISTRAR GENERAL

NEW CERTIFICATE(S) OF TITLE ISSUING ON DP 589791
NO DEALING TO BE REGISTERED WITHOUT REFERENCE TO SURVEY DRAFTING BRANCH

Q193346 - 65 Pt
DP589791
16.5.77
Q212899 WX - 98 Pt
Q221767 - 65 Pt
2 & 3 DP555

SECOND SCHEDULE (continued)

INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	PARTICULARS	ENTERED	Signature of Registrar General	CANCELLATION		
Caveat	Q193344	------	By Beneficial Finance Corporation Limited	11-5-1977				

(Page 2 of 2 pages)

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

[redacted]ICATE OF TITLE

NEW SOUTH WALES — [redacted] PROPERTY ACT, 1900

Appln. No. 7860

Prior Title Vol.7200 Fol.180

Vol. 12743 Fol 219

Edition issued 26-3-1975.

(Page 1) Vol. 12743 Fol. 219

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

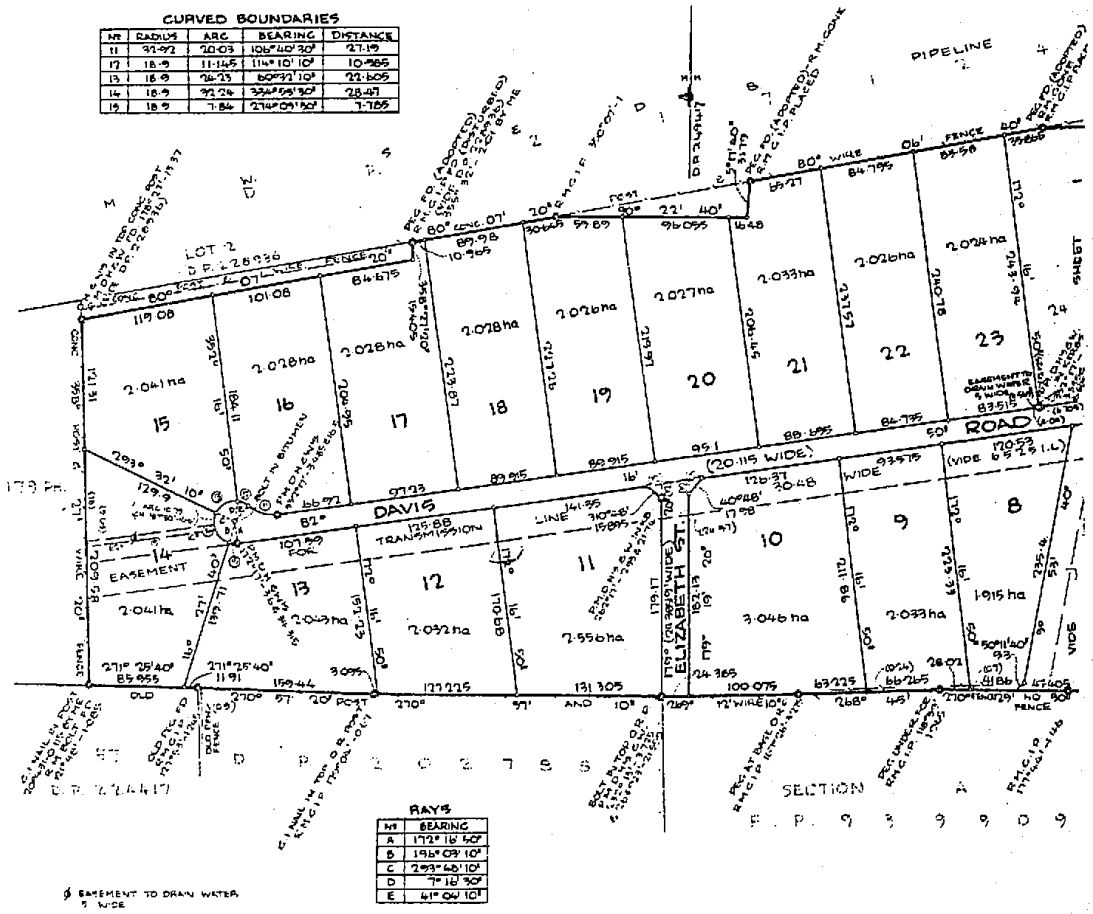
Registrar General.

PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES

CURVED BOUNDARIES

Nº	RADIUS	ARC	BEARING	DISTANCE
11	33.92	20.03	106°40'30"	27.19
12	18.9	11.145	114°10'10"	10.985
13	18.9	24.73	60°32'10"	22.605
14	18.9	32.24	338°59'30"	28.47
15	18.9	7.84	274°09'30"	7.785



RAYS

Nº	BEARING
A	172° 16' 40"
B	196° 09' 10"
C	293° 40' 10"
D	7° 16' 30"
E	41° 06' 10"

ϕ EASEMENT TO DRAIN WATER 5 WIDE

ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 14 in Deposited Plan 249417 at Wetherill Park in the Municipality of Fairfield Parish of Prospect and County of Cumberland being part of Portion 67 granted to Thomas Hyland on 31-12-1834.

FIRST SCHEDULE

~~JUMAL INDUSTRIES PTY. LIMITED.~~

SECOND SCHEDULE

1. Reservations and conditions, if any, contained in the Crown Grant above referred to.
2. Easement for Transmission Line created by Resumption No. J259850 affecting the part of the land above described 30.48 metres wide shown in the plan hereon.
3. ~~Mortgage No. N968504 to Beneficial Finance Corporation Limited. Entered 17-12-1974.~~ Discharged Q193345
4. Restriction as to user created by the registration of Deposited Plan 249417. See P176059.
5. Easement to Drain Water affecting the part of the land above described 5 metres wide shown in plan hereon created by the registration of Deposited Plan 249417 See P176059.

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED.

203

New South Wales.

[CERTIFICATE OF TITLE.]

CANCELLED

Joint Tenancy

REGISTER BOOK.

VOL. 5081 FOL. 202

Nos of applications 7860 / 13310
Previous to last Certificate
Vol 3861 Fol 106
" 3940 Fols 237 & 238 ✓
" 4127 Fol 70

Pauline Olive McMahon wife of James Nicholson of Wetherill Park Carpenter and Charles Millhouse Marsh of Sydney Solicitor Transferees under Instrument of Transfer No C 822284 are now the proprietors of an estate in fee simple as joint tenants Subject nevertheless to the reservations and conditions if any contained in the Grants hereinafter referred to and also subject to such encumbrances liens and interests as are notified hereon in Firstly:- Those pieces of land situated partly in the Municipality of Fairfield and partly in the Municipality of Liverpool Parish of Prospect and County of Cumberland containing One hundred and ninety three acres thirty six perches or thereabouts being the land originally granted as 30 acres (Portion 45 of Parish) to James Castle by Crown Grant dated the 22nd day of February 1792 (Waves (Portion 141 of Parish) originally granted to Thomas Gardner by Crown Grant dated the 12th day of March 1800 part of 95 acres (Portion 147 of Parish) originally granted to John Turlington by Crown grant dated the 1st day of January 1810 and the land originally the Driftway five chains wide separating the said 95 acres (Portion 147 of Parish) and the said 30 acres (Portion 146 of Parish) granted to John Turlington and Thomas Gardner respectively from the said 30 acres (Portion 45 of Parish) and 30 acres (Portion 141 of Parish) granted to James Castle and John Brown respectively and also part of the land originally a Driftway about two chains wide separating the said 30 acres (Portion 45 of Parish) granted to James Castle from a road of variable width

Secondly:- That piece of land situated in the Municipality of Liverpool Parish and County aforesaid containing Eighty five acres one rood twenty one and one quarter perches or thereabouts being 30 acres (Portion 148 of Parish) originally granted to Hannah Taylor by Crown Grant dated the 1st day of January 1810 part of 60 acres (Portion 147 of Parish) originally granted to Elizabeth Turner Hines by Crown Grant dated the 1st day of January 1810 and also part of 700 acres (Portion 198 of Parish) originally granted to Charles Wootton by Crown Grant dated the 13th day of January 1818

Thirdly:- That piece of land situated as firstly aforesaid containing Two hundred and four acres three roods thirty nine perches or thereabouts being part of 50 acres (Portion 63 of Parish) originally granted to John Williams by Crown Grant dated the 22nd day of February 1792 50 acres (Portion 66 of Parish) originally granted to John Cumberland by Crown Grant dated the 29th day of September 1792 part of 50 acres (Portion 44 of Parish) originally granted to John Brown by Crown Grant dated the 2nd day of November 1792 the whole of 30 acres (Portion 66 of Parish) originally granted to Abraham Wootton by Crown Grant dated the 20th day of February 1794 the whole of 50 acres (Portion 67 of Parish) originally granted to Thomas Upland by Crown Grant dated the 31st day of December 1834 and the land being originally the Driftway separating the said 50 acres (Portion 65 of Parish) from the said 50 acres (Portion 62 of Parish) granted to John Williams

Which said pieces of land are shown in the plan hereon and thereon edged red and are also shown in plans lodged with Applications 7860 and 13310

Excepting out of the said pieces of land the lands colored yellow in plan hereon being 3 roods 26½ perches and 1 acre 8½ perches (part of Portion 62 of Parish) resumed under Notice of Resumption No B 228032 and No B 614940 respectively and vested in the Council of the Municipality of Fairfield and 1 acre 3 roods 14½ perches (part of Portion 45 of Parish) 3 acres 33 perches (part of Portion 147 of Parish) 2 acres 3 roods 26¾ perches (part of Portion 147 of Parish) 4 acres 23 perches (part of Portion 67 of Parish) 1 acre 1 rood 17 perches (part of Portion 66 of Parish) and 2 roods 5¾ perches (part of Former Driftway) resumed under Notice of Resumption No C 691004 and vested in The Metropolitan Water Sewerage and Drainage Board the area of which lands colored yellow are not included in the above stated areas of 193 acres 3 roads 8 acres 1 rood 21½ perches and 204 acres 3 roods 39 perches and

Also Excepting the public road colored pink in plan hereon the area of which namely 2 acres 3 roods 28 perches is included in the above stated area of 204 acres 3 roods 39 perches

Together with by way of variation and not of exception such mines and deposits under the 3 roods 26½ perches and 1 acre 8½ perches (part of Portion 62 of Parish) 1 acre 3 roods 14½ perches (part of Portion 45 of Parish) 3 acres 33 perches (part of Portion 147 of Parish) 2 acres 3 roods 26¾ perches (part of Portion 147 of Parish) 4 acres 23 perches (part of Portion 67 of Parish) 1 acre 1 rood 17 perches (part of Portion 66 of Parish) and 2 roods 5¾ perches (part of Former Driftway) colored yellow on said plan hereon as are excepted from Notices of Resumption No B 228032 B 614940 and C 691004 by the operation of Section 141 of the "Public Works Act 1912

In witness whereof I have hereunto signed my name and affixed my seal this Twenty seventh day of September 1927

Signed in the presence of

J H Sedgard

Registrar General

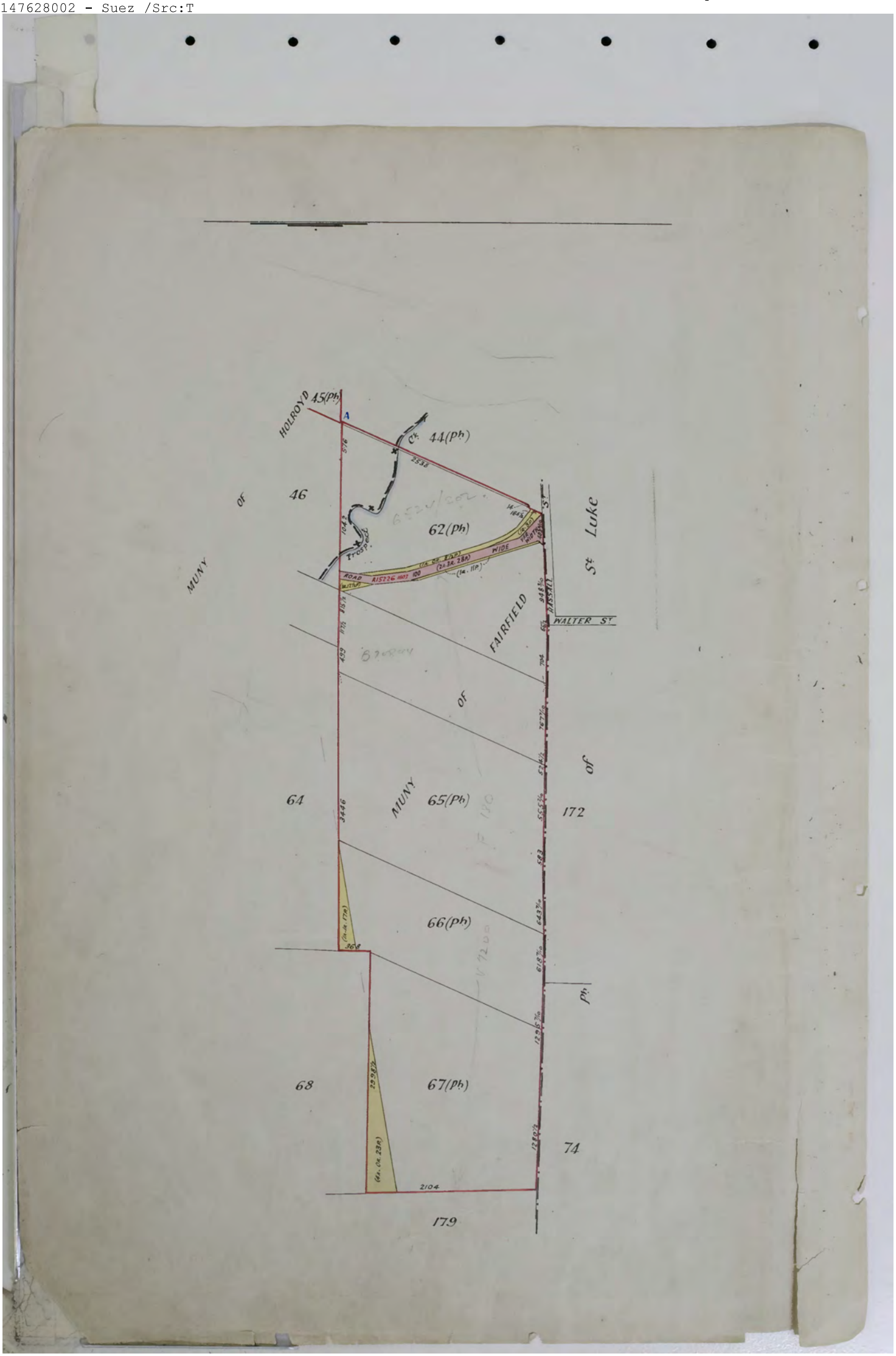
Notification referred to

No A 898263 Caveat stated the 6th day of July 1920 by the Registrar General as regards part of the land above described Lapsed the 6th day of July 1920 and renewed the 12th day of October 1920 as No 6 Book 1 in the Reference

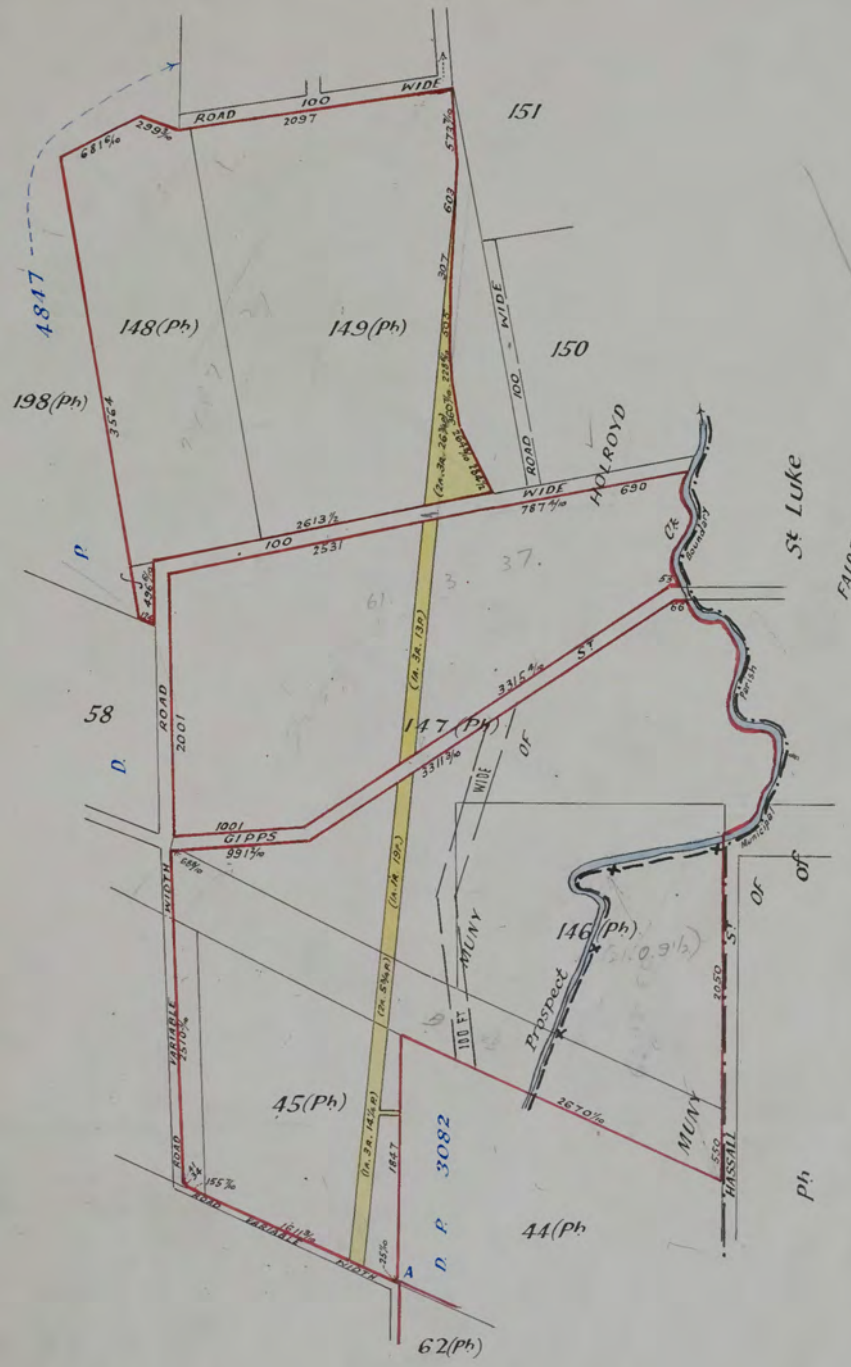
Registrar General

No A 748463 Caveat dated the 29th day of April 1924 by the Registrar General as regards part of the land above described Withdrawn the 29th day of April 1924 and renewed the 16th day of July 1924 as No 6 Book 1 in the Reference

Registrar General


HOLROYD
45(Ph)
A
Ck.
44(Ph)
2538
46
62(Ph)
Trespass
WIDE
ROAD
WALTER ST.
FAIRFIELD
MUNY
OF
St Luke
64
MUNY
65(Ph)
172
66(Ph)
Ph.
68
67(Ph)
74
179
2104
3446

5081 - 202



C822284

Total Area included in Certificate
483A. 2R. 18¼P. This area does not include the areas of the lands colored yellow but is inclusive of the area of the public road colored pink

All lengths shown hereon are in Links

scale 80 lnks to one inch

No. B744444 Caveat dated the 29th day of April 1924 by the Registrar General as regards part of the land above described Produced the 29th day of April 1924 and entered the 11th day of July 1924 at 30 o'clock in the afternoon.

Registrar General

No. C 464777 Lease dated the 30th day of July 1936 from Adelaide Amanda Hyland and Harold John Saunders to John James Oliver of Wilcannia Dairy Farmer of part of the land above described Produced the 31st day of August 1936 and entered the 29th day of September 1936 at 12 o'clock noon.

Registrar General

No. G631305 TRANSFER dated 7th November 1936 to John Robert Dilling of part

of the land within described.

Entered 24th April 1958.
As to land in this transfer this deed is cancelled and new certificate issued
Vol. 7487 Fol. 29

J. Wells
REGISTRAR GENERAL

No. J 259850 NOTICE OF RESUMPTION
ELECTRICITY COMMISSION OF NEW SOUTH WALES is the proprietor of an easement for Transmission Line affecting that part of the land within described shown by broken black lines and notation 100 feet wide on the plan hereon freed from all other interests
Entered 12th June 1964

Jawatson
REGISTRAR GENERAL

No. F840410 TRANSFER dated 15th September 1949 from the said Pauline Olive McMahon and Charles Gilbourne Marsh to Frederick Delfonse of part

of the land within described

Produced 26th September 1949 and entered 28th July 1950 at 12 o'clock in the noon.

As to land in this transfer this Certificate cancelled and new Certificate issued
Vol. 225 Fol. 80

J. Wells
REGISTRAR GENERAL.

No. F559165 TRANSFER dated 24th September 1951 from the said Pauline Olive McMahon and Charles Gilbourne Marsh to Frederick Robert Comber of Wentworthville Butcher of part.

of the land within described

Produced 26th October 1951 and entered 20th June 1952 at 12 o'clock in the noon.

As to land in this transfer this Certificate is cancelled and new Certificate issued
Vol. Fol. 6524 202

J. Wells
REGISTRAR GENERAL

CAVEAT No. J808977 has been withdrawn

See K629508 Entered 20th April 1967

Jawatson
REGISTRAR GENERAL

J808977 Caveat Dated 23rd October 1964
Produced 27th October 1964
As regards the land shown in the plan annexed to J808977 and edged red.
Entered 27th January 1965

Jawatson
Registrar General

Pt X J808977 (part land)

The within Caveat No. B744444 is hereby withdrawn

Dated 3rd October 1956

J. Wells
REGISTRAR GENERAL.

No. G488390 TRANSFER dated 29th November 1955 to Lawrence Alfred Leury ~~of the~~ of part

of the land within described

Entered 3rd October 1956.
As to land in this transfer this deed is cancelled and new certificate issued
Vol. 7209 Fol. 180

J. Wells
REGISTRAR GENERAL.

No. K578853 TRANSFER dated 16th month 1966 to Pauline Olive McMahon of Lots 1 and 2 in D.P. 232228

of the land within described

Entered 20th April 1967
As to land in this transfer this deed is cancelled and new certificate issued
Vol. 10589 Fol. 26 & 27

Jawatson
REGISTRAR GENERAL

The within Caveats No. A589263 & B744843 are hereby withdrawn

Dated 20th April 1967

Jawatson
REGISTRAR GENERAL

W/D K578853

Vol. 12743 Fol. 219

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	ENTERED	Signature of Registrar General
M.J. Davis Industrial Pty. Limited	Transfer	Q193346	------	11-5-1977	

This deed is cancelled as to whole
New Certificates of Title have issued on 15.6.77
for lots in Deposited Plan No. 589791 as follows:-
Lots 103 Vol. 13348 Fol. 123 & 125 respectively.

REGISTRAR GENERAL

NEW CERTIFICATE(S) OF TITLE ISSUING ON DP 589791
NO DEALING TO BE REGISTERED WITHOUT REFERENCE TO SURVEY DRAFTING BRANCH

Q193346 - 65 Pt
DP589791
16.5.77
Q212899 WX - 98 Pt
Q221767 - 65 Pt
2 & 3 DP555

SECOND SCHEDULE (continued)

INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	PARTICULARS	ENTERED	Signature of Registrar General	CANCELLATION		
Caveat	Q193344	------	By Beneficial Finance Corporation Limited	11-5-1977				

(Page 2 of 2 pages)

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

APPENDIX O

Aerial Photographs

2015

2005

1998

1991

1986

1970

1950

c:\users\dfaria\documents\wetherill park\appendices\appendix o - aerial photographs.docx

As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

For more information, visit golder.com

Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 44 1628 851851
North America	+ 1 800 275 3281
South America	+ 56 2 2616 2000

solutions@golder.com
www.golder.com

Golder Associates Pty Ltd
124 Pacific Highway
St. Leonards, New South Wales 2065
Australia
T: +61 2 9478 3900

Golder Associates