ARUP

City of Casey

Hampton Park Transfer Station

Noise Impact Assessment

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1. Introduction

Arup Australia Pty Ltd (Arup) was engaged by City of Casey to provide support for the Development Plan for the parcel of land in Hampton Park which comprises the SUEZ Hampton Park Outlook Transfer Station (Subject Site), a concrete batching plant and landfill area. This includes undertaking an independent environmental noise assessment to the nearest noise sensitive receivers.

1.1 Project background

The existing landfill project at the 310 Hallam Road site will reach capacity by 2025 and a new site, adjacent, has been nominated for use at 290 Hallam Road, Hampton Park.

Strategic planners at City of Casey are preparing a Development Plan and a Planning Scheme Amendment for the parcel of land in Hampton Park which comprises the SUEZ Hampton Park Outlook Transfer Station. The parcel of land is predominantly zoned Special Use Zone, with a small area of General Residential 1 Zone.

The land includes The SUEZ Hampton Park Outlook Transfer Station, a concrete batching plant and the landfill area which is close to capacity.

As part of this assessment, a peer review of the previously-submitted Golder Associates assessment report (commissioned by SUEZ) was undertaken. In addition, an independent analysis of noise impact and air quality was undertaken to support the Developments. This report presents the noise measurements, modelling and assessment of the facility at 290 Hallam Road, Hampton Park.

1.2 Scope of this report

This environmental noise assessment involves:

- Outlining applicable noise standards, policies and guidelines, and nominating project targets.
- Quantifying noise levels of plant and equipment at the existing Transfer Station and landfill area for the proposed upgrade, by undertaking noise measurements on existing operational site and liaison with operators of the existing and proposed site.
- Measurement and assessment of background noise levels.
- Modelling and predicting noise levels for the proposed transfer station considering in-principle mitigation where relevant.
- Assessment of noise levels against the applicable noise criteria and provision of acoustic advice

2. Site Description

2.1 Site context and sensitive receivers

The Subject Site is located within Special Use Zone (SUZ1). The nearest sensitive receivers are the residential areas located to the north and west of the site, zoned General Residential 1 Zone (GRZ1).

The Subject Site is bound by the following:

- To the north: Lyndpark Garden Supplies (including concrete batching plant) zoned Special Use Zone (SUZ1), and residential premises (GRZ1) and some unoccupied land which is also zoned General Residential.
- To the east: Hallam Road, followed by Residential premises zoned General Residential (GRZ1)
- To the south: further SUEZ land and a Nursery and Garden Centre (zoned SUZ1), followed by South Gippsland Highway, followed by further residential premises at least 1300 metres from the Subject Site.
- To the west: further SUEZ land (zoned SUZ1), followed by Urban Flood Zone (UFZ) followed by Langbourne Drive and residential premises approximately 1300 metres to the west.

The location and context of the Subject Site is shown below in Figure 1.

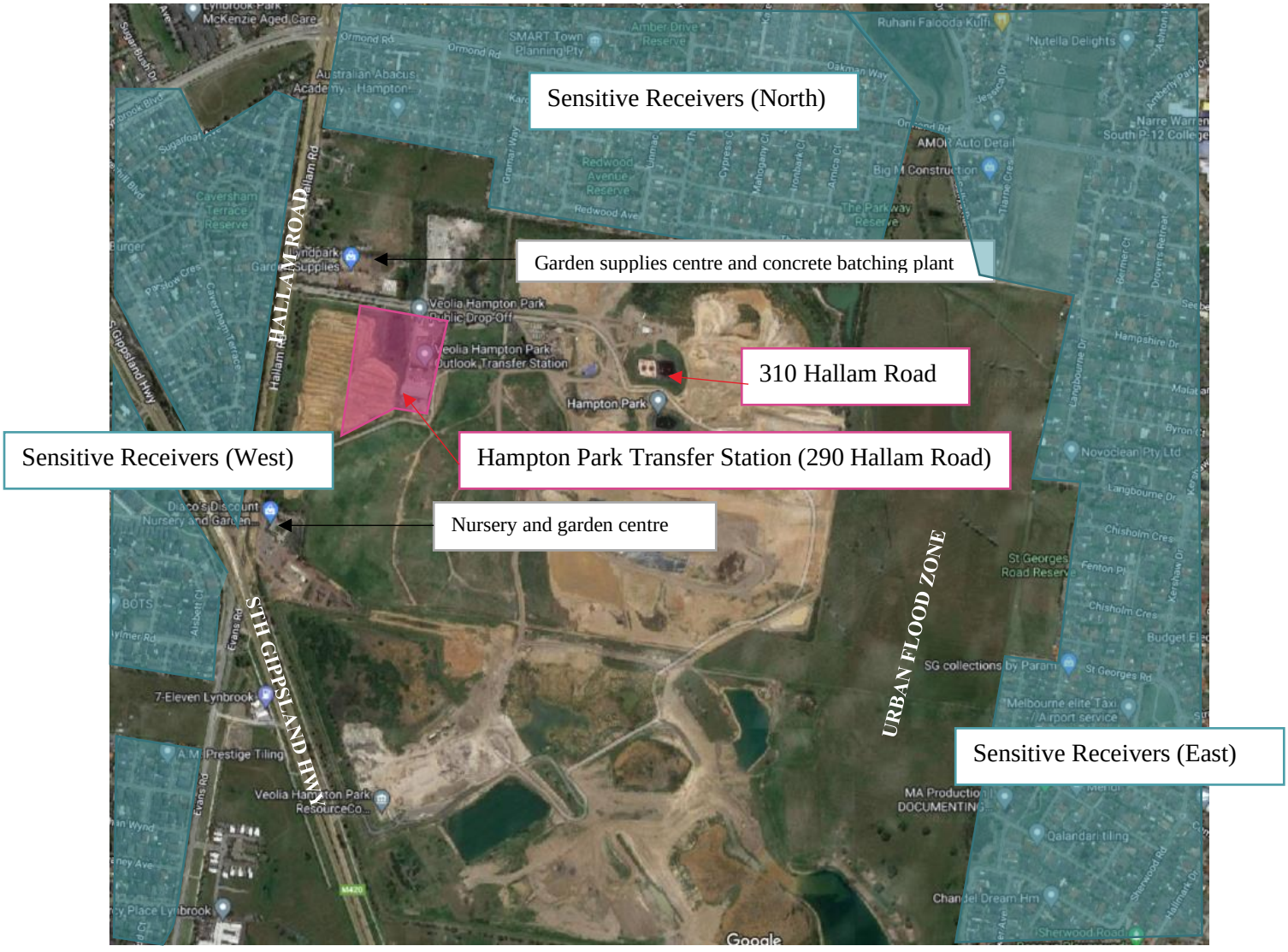


Figure 1 - Site location and context. Image sourced from Google Maps.

2.2 Proposed site operation

The Subject Site is planned to accept approximately 550,000 tonnes per annum of municipal, commercial and industrial waste. It will operate at a maximum capacity of 18 hours a day (12:00am to 06:00pm), 6 days a week (Monday to Saturday).

The site comprises truck routes along the west for waste delivery trucks to drop off waste, and trailer-truck routes for picking up containers of compressed waste.

In the WTS tipping hall, waste trucks enter the facility and unload waste; front-end loaders will sort and move the waste to the compactor hall areas where it shall be compacted into containers. The filled containers will be collected and transported to another facility for processing.

The Outlook Transfer Station comprises public drop off area; sorting area with mobile equipment such as excavators and forklifts; and shops, offices and amenities.

The plan shown in Figure 2 shows the proposed site layout. The following Table outlines sources and operation assumptions.

Table 1 – Sources and operation assumptions for noise assessment

Item	Item	Day 07:00am to 06:00pm	Evening 06:00pm to 10:00pm	Night 10:00pm to 06:00am	Night shoulder period 06:00am to 07:00am
Trucks route	Trailer trucks (A-doubles) 2 per 30-minute period	Y	No operation	N	N
	Waste delivery trucks 13 per 30-minute period	Y		Y	Y
	Truck wash 1 event per 30-minute period	Y		N	N
Outlook	Forklifts 2 forklifts, each operating 50% of the time	Y		N	N
	Excavator 2 operating continuously	Y		N	N
	Front end loader 1 operating 50% of the time	Y		N	N
	Metal dropping event 1 event per 30-minute period	Y		N	N
WTS Building	Ventilation exhaust	Y		Y	Y
	Exhaust fan motor	Y		Y	Y
	Front end loader 2 FELs each operating 60% of the time	Y		Y	Y
	Garbage dumps 13 events per 30-minute period	Y		Y	Y
	Waste compactor 3 operating continuously	Y		N	Y

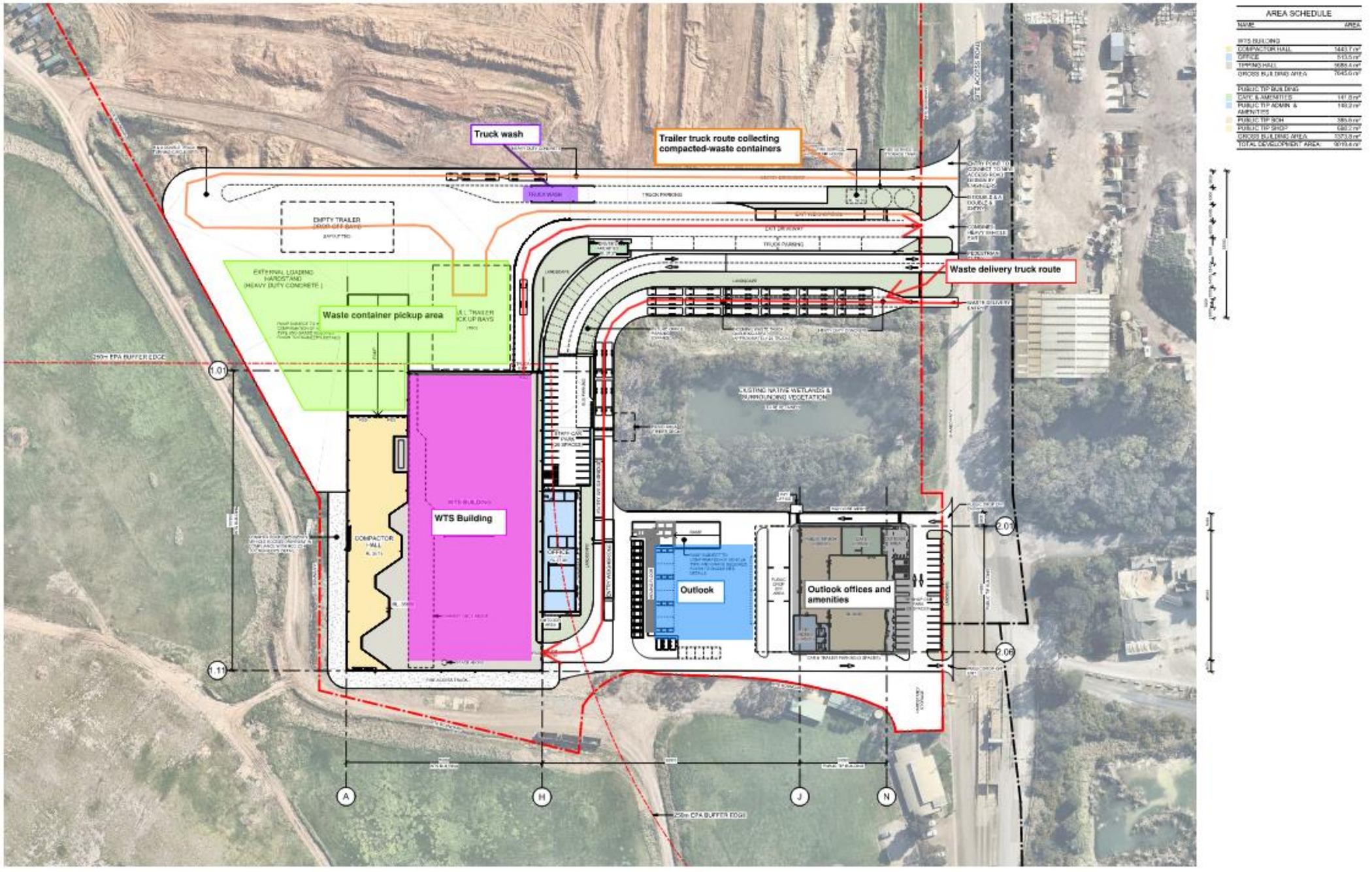


Figure 2 - Subject site plan, received from SUEZ on 22 March 2022

3. Noise measurements

3.1 Operational noise measurements

Noise measurements were undertaken on site on 2 March 2022 between 9:00am and 12:00pm to quantify the noise sources associated with the operation at the existing site as many of these sources will continue to be used at the proposed upgraded site.

At the time of the site visit, weather conditions were fine and clear and did not influence the noise measurements.

The measured plant, equipment and activities are provided in Table 2 below and details are provided in Appendix C

Table 2 – Operational noise measurements

Measurement event	Result dBL_{Aeq}
Excavator tracking (rolling)	75 dB(A) Measured at 10 metres
Excavator dropping metal into empty bin	98 dB(A) Measured at 15 metres
Forklift dropping small metal bin into larger metal bin	84 dB(A) Measured at 15 metres
Forklift moving palettes	65 dB(A) Measured at 10 metres
Front end loader passby	79 dB(A) Measured at 5 metres
Front end loader - scraping	80 dB(A) Measured at 15 metres
Public drop off	69 dB(A) Measured at 10 metres
Dozer	86 dB(A) Measured at 5 metres
Waste trucks	76 dB(A) Measured at 5 metres
Trucks on entry road	66 dB(A) Measured at 5 metres

3.2 Background noise measurements

To quantify the existing background noise levels in the vicinity of the site, and therefore determine the applicable EPA noise limits, attended noise measurements were undertaken during each EPA time period. Results are shown in Table 2.

Measurements representing the west residences were undertaken behind the first row of residences that face Hallam Road, as they will experience lower traffic noise levels from Hallam Road, yet similar operational noise levels from the Subject Site, and present a more conservative assessment.

The measured background levels were compared to the background noise measurements provided in the Golder & Associates Report and in each instance the lowest measured background level was used.

At the proposed site some equipment will operate from 6:00am, which is technically classified as Night period. Often the Night-time period between 6:00am and 7:00am is considered a 'shoulder' period and applying the Night period noise criteria (which is based on quieter backgrounds such as those measured at midnight) can be considered too stringent. For this assessment, background levels were measured specifically during this 'shoulder' period to identify noise limits that would apply between 06:00am and 07:00am where background levels would be increasing.

Table 3 – Attended background noise measurements

Time period	Measurement date and time	Measured Result	Note
North residential area (Domino Way)			
Day 07:00am to 06:00pm	16 March 11:00am to 1:00pm	39	
Evening 06:00pm to 10:00pm	6 March 05:00pm to 06:00pm	49	
Night 10:00pm to 06:00am	16 March 11:00pm to 01:00am:	38	Post measurement analysis was undertaken to remove tonal cricket noise from the measurement
Night (shoulder period 06:00am to 07:00am)	16 March 05:00am to 06:00am	41	Post measurement analysis was undertaken to remove tonal cricket noise from the measurement
West residential area (Cobbler Grange)			
Day 07:00am to 06:00pm	16 March 11:00am to 1:00pm	40	
Evening 06:00pm to 10:00pm	6 March 05:00pm to 06:00pm	49	
Night 10:00pm to 06:00am	16 March 11:00pm to 01:00am:	39	Post measurement analysis was undertaken to remove tonal cricket noise from the measurement.
Night (shoulder period 06:00am to 07:00am)	16 March 05:00am to 06:00am	41	Post measurement analysis was undertaken to remove tonal cricket noise from the measurement

4. Criteria

4.1 EPA Policies

On July 1, 2021 the new EPA environmental protection legislation, the *Environment Protection Act 2017* as amended by the *Environment Protection Amendment Act 2018,* superseded the State Environment Protection Policy No. N-1 (SEPP N-1).

The new Act introduces and describes the *General Environmental Duty* (GED). The GED requires Victorians to understand and minimise their risks of harm to human health and the environment from pollution and waste (including noise). The relevant section of the Act for noise commences from *Section 166 – Unreasonable noise*, to provide a legislative control for any noise emitted from a place or premises.

Under the GED, anyone who is engaging in an activity that poses risk of harm to human health and the environment, from pollution or waste, must manage that risk. Noise and vibration are covered under this definition. Risks are required to be eliminated or reduced *as far as reasonably practicable*, by implementing appropriate controls.

The Act and GED refers to specific noise requirements in the *EP Regulations 2021* (The Regulations). The Regulations give effect to the Act and provide further detail for obligations and exemptions. For noise, the Regulations refer to Publication 1826.4 (the Noise Protocol) which describes specific noise requirements including noise limits.

The industrial noise limits for the Project have been calculated in accordance with the procedure described in Part 1:A of the Noise Protocol using the urban area method (for areas within the Urban Growth Boundary for Greater Melbourne).

The noise limits are dependent on:

- Zoning levels, based on land zoning within 70 m and 200 m of the noise sensitive area
- The time of day, i.e. different limits apply at different times of the day
- The background noise level (dBL_{A90}) in the noise sensitive area, in the absence of noise due to commercial, industrial or trade operations

Under the Noise Protocol, noise from the source under consideration is measured to determine its impact over a continuous 30-minute period. Adjustments to the measured noise level are then applied, to account for the effects of duration, tonality, intermittency and impulsiveness. The adjusted 'effective noise level', L_{eff}, is compared against the noise limit to assess compliance with the Noise Protocol.

The policy sets noise limits for the day, evening and night periods as described in Table 4.

Table 4 – Time periods for noise assessment

Period	Day of week	Time period
Day	Monday – Saturday	0700-1800hrs
Evening	Monday – Saturday	1800-2200hrs
	Sunday, Public Holidays	0700-2200hrs
Night	Monday – Sunday	2200-0700hrs

4.2 Applicable noise limits

Using planning scheme, Zoning Levels were calculated for the residential areas in accordance with Noise Protocol. Using the calculated zoning levels and the background noise levels identified in Section 3.2 , EPA noise limits for each time period were determined and are presented in the following Table.

Table 5 - Applicable noise limits

Period	Background Noise Level, dBL_{A90}	Zoning Noise Limit, dBL_{Aeq}	Noise Limit , dBL_{Aeq}
Location 1 (representing North Residences)			
Day	39	51	**51**
Evening	45 (Note 1)	45	**48**
Night (6am to 7am)	41	40	**44**
Night (10:00pm to 06:00am)	38 (Note 1)	40	**41**
Location 1 (representing West Residences)			
Day	40	54	**52**
Evening	38(Note 1)	47	**47**
Night (6am to 7am)	41	42	**44**
Night (10:00pm to 06:00am)	35 (Note 1)	42	**42**
Note 1: Background noise levels measured as part of the Golder assessment were used as they present a more conservative assessment (i.e., a lower noise level was measured)			

4.3 Effective noise level

Under the Noise Protocol, noise from the source under consideration is measured to determine its impact over a continuous 30-minute period. If noise levels are predicted, this includes duration adjustments to account for sources or events that do not occur over the whole continuous 30-miute period.

Adjustments to the measured (or predicted) noise level are then applied to account for the effects of duration, tonality, intermittency and impulsiveness, as follows:

Tonality

When the noise is tonal in character then an adjustment is made based on observations of the noise. The following adjustments apply:

a. when the tonal character of the noise is just detectable then A_{tone} = +2 dB;

b. when the tonal character of the noise is prominent then A_{tone} = +5 dB.

Impulsivity

When the noise is impulsive in character the following adjustments apply:

a. when the impulsive character of the noise is just detectable then A_{imp} = +2 dB.

b. when the impulsive character of the noise is prominent then A_{imp} = +5 dB.

When determining the duration adjustment for noise that is impulsive in character, any impulse noise emission is deemed to be audible for 10 seconds after the occurrence of the emission.

Intermittency

An intermittency adjustment applies when the noise:

a. increases in level rapidly, and by at least 5 dB, on at least two occasions during a 30-minute period; and

b. maintains the higher level for at least a one-minute duration.

The intermittency adjustment is determined using the following Table:

Table 6 – Intermittency adjustments (from Table 5 of Noise Protocol)

Period	Increase in level	Adjustment
Day period	>10 dB	+ 3 dB
Evening period	5-10 B	+ 3 dB
Or Night period	> 10 dB	+ 5 dB

5. Assessment methodology

5.1 Modelling methodology

The airborne noise impact assessment has been undertaken using a 3D computer acoustic modelling software SoundPLAN 8.2. The model was developed based on the geometry of the site and the nearby sensitive receivers. noise sources based on the activities measured at the Subject Site where possible.

Noise levels were predicted at the nearest noise sensitive receivers.

- Specific noise sources, operation times and positions were confirmed by SUEZ.
- An acoustic model was developed using the environmental noise modelling software package SoundPLAN including the following inputs:
  - Topography
  - Building structures
  - Noise sources
  - Noise sensitive receivers
  - Ground and air absorption
- ISO 9613-2:1996[1] was used to predict construction noise levels at the receivers for typical scenarios of construction activity.

5.2 Assumptions and Inputs

Plant, vehicles and equipment were modelled as separate point and line noise sources as appropriate. The input noise levels are based on measured noise levels where possible and the Department for Environment, Food and Rural Affairs (DEFRA) noise emission database.

Plant, vehicle and equipment noise levels used for the airborne noise impact assessment are shown in Table 7 below. Positions and descriptions are shown on a layout in Appendix D.

- Noise source Sound Power Levels were based on measurements undertaken at the existing site where possible. For plant and equipment that were not present on site during measurements, conservative assumptions were made using BS5228-1: *Code of practice for noise and vibration on construction and open sites – Part 1: Noise.*
- Buildings and the Digital Ground Model are based on internal Project reference library. All building facades are treated as including a 1 dB reflection loss.
- Partially soft ground effect (G=0.7) was assumed for the landfill areas surrounding the proposed facility. Hard ground effect (G=0) has been assumed to other areas.
- All noise maps are calculated at a height of 1.5m relative to the ground level.
- Stationary activities and mobile sources operating in small areas have been modelled as fixed-point sources.
- Plant for each scenario is operating concurrently throughout the modelling period, as described.
- Receivers are located 1.5m above ground level

[1]ISO ISO9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.*

Table 7 – SoundPLAN input noise source levels

Sound Source	Sound Power Level, dBL Octave band centre frequency (Hz)								Total dBA	Resource
	63	125	250	500	1k	2k	4k	8k		
Truck movements										
Trailer trucks (A doubles) Levels are dB / m	89	77	73	75	68	63	61	56	75	BS5228-1, 29t Road Lorry (empty) Converted to line source (Note 1,2)
Waste delivery trucks Levels are dB / m	81	70	66	68	68	66	60	52	72	Measurement on site
Truck wash	93	93	80	76	73	72	66	58	81	BS5228-1, Table 3, Water jet pump
Outlook transfer station equipment										
Forklifts	95	89	89	90	85	87	85	73	93	Measurement on site
Excavators	106	107	110	111	110	107	101	95	114	Measurement on site
Front End Loader	105	103	98	94	93	92	88	81	98	Measurement on site
Metal Dropping Event	70	77	80	81	78	78	78	72	85	Measurement on site
WTS Building equipment										
Ventilation Exhaust				103						Taken from Golder report at SUEZ direction
Exhaust fan motor				123						Taken from Golder report at SUEZ direction
Front End Loader	109	107	101	98	97	96	92	85	103	Measurement on site
Garbage Dumps	103	101	97	100	93	92	89	87	101	Measurement on site
Waste Compactor	109	113	101	105	108	100	97	97	110	Measurement on site

Note 1: BS5228-1 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise

Note 2: Point source Sound Power Level converted to a line source with Sound Power Level per metre using methodology in BS5228.

5.3 Modelled Scenarios

Different areas of the facility are proposed to operate for different time periods throughout the day. In addition, different noise limits apply at different time periods throughout the day. Therefore a worst-case operational scenario was developed for each time period and is assessed against appropriate EPA noise limits.

The operational scenarios are for a typical worst-case 30-minute period during the:

- Day (07:00am to 06:00pm)
- Evening (06:00pm to 10:00pm
- Night (10:00pm to 06:00am)
- Night shoulder period (6:00am to 07:00am).

6. Results and Assessment

The following Tables outline the noise modelling results, assessment against criteria and discussion of in-principle noise mitigation.

Table 8 below shows initial modelling with noise sources operating as discussed in Section 5.

Table 8 – Predicted noise levels at receivers – no noise mitigation

Period	Noise Limit , dBL_{Aeq}	Predicted noise level (no mitigation)	Comment
Location 1 (representing North residences)			
Day	**51**	54 (Note 1)	Dominated by WTS building ventilation
Evening	**48**	-	No operations
Night (6am to 7am)	**44**	36	
Night (10:00pm to 06:00am)	**41**	36	
Location 2 (representing West residences)			
Day	**52**	65 (Note1)	Dominated by WTS ventilation and truck routes
Evening	**47**	-	No operations
Night (6am to 7am)	**44**	60	Dominated by WTS ventilation and truck routes
Night (10:00pm to 06:00am)	**42**	60	
Note 1: Penalty of 5 for 'prominent' impulsiveness for metal dropping into bin event			

The results in Table 8 show that with no acoustic mitigation at the facility there will be exceedances at both West and North residences. Analysis of the noise source contributions a the most-affected residences shows that the following sources are dominating the cumulative noise at the residences and controlling these sources could enable compliance:

- Limiting the Sound Power Level of each of 'ventilation exhaust' and 'exhaust fan motor'. This would potentially require acoustic attenuators, an enclosed fan room inside or outside the building, or acoustic louvres. Redesign or relocation of this plant could alternatively control noise to the nearby residences.
- Providing acoustic shielding for dominant noise sources, such as Outlook plant areas or truck routes, using a noise wall or other structures.

We also consider that truck volumes during the Night period may not be at peak volume in reality, however further analysis by a traffic engineer should be undertaken to confirm this.

Table 9 shows the predicted noise levels at the nearest residences with the following mitigation in place:

- Sound Power Level of each of 'ventilation exhaust' and 'exhaust fan motor' limited to 90 dB(A).
- An acoustic screen close to the outdoor Outlook plant and equipment that breaks line-of-sight to the residences.

Table 9 – Predicted noise levels at receivers – some mitigation

Period	Noise Limit , dBL_{Aeq}	Predicted noise level (no mitigation)	Comment
Location 1 (representing North residences)			
Day	**51**	47 (Note 1)	Dominated by Outlook plant and truck routes
Evening	**48**	-	No operations
Night (6am to 7am)	**44**	32	
Night (10:00pm to 06:00am)	**41**	32	
Location 2 (representing West residences)			
Day	**52**	52 (Note1)	Dominated by Outlook plant and truck routes
Evening	**47**	-	No operations
Night (6am to 7am)	**44**	40	Dominated by truck routes
Night (10:00pm to 06:00am)	**42**	40	Dominated by truck routes
Note 1: Penalty of 5 for 'prominent' impulsiveness for metal dropping into bin event			

7. Summary

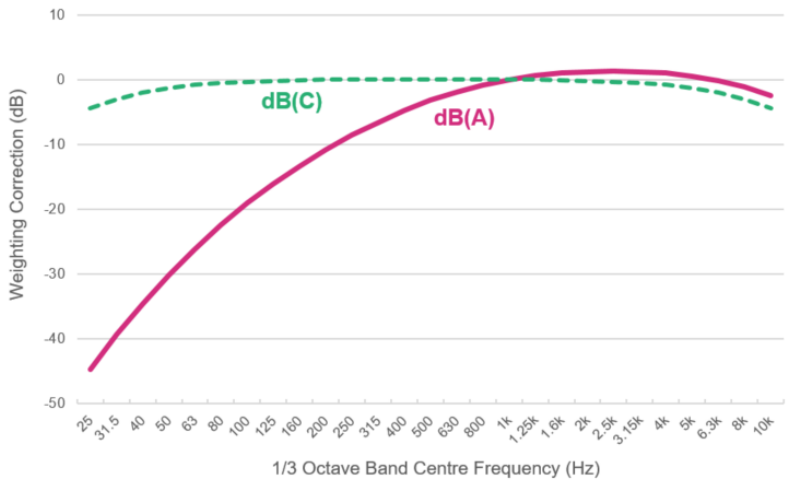
This independent environmental noise assessment of the SUEZ Hampton Park Outlook Transfer Station (Subject Site), to the nearest noise sensitive receivers supports the Development Plan and Planning Scheme Amendment for City of Casey. The following items were investigated and outcomes were achieved:

- Project targets were nominated using the EPA Noise Protocol policy.
- Noise sources and events were quantified using measurements and investigations at the existing site, and acoustically modelled to predict noise levels at the nearest sensitive receivers.
- Initial modelling shows that with no acoustic mitigation at the facility there will be exceedances at both West and North residences.
- Analysis of the modelling results identified main contributing noise sources, and in-principle noise mitigation examples were presented that would enable compliance.
- Warehousing that acts as acoustic shielding to the north of the 'garden supplies and concrete batching plant' was considered, and would reduce noise levels at the residences to the northwest. While beneficial to the north-west residences, acoustic mitigation would still be required overall as the most-affected residences to the Subject Site are those to the west.

Appendix A

Glossary

Term	Definition
Ambient noise level	The ambient noise level is the overall noise level measured at a location from multiple noise sources. When assessing noise from a particular development, the ambient noise level is defined as the remaining noise level in the absence of the specific noise source being investigated. For example, if a fan located on a building is being investigated, the ambient noise level is the noise level from all other sources without the fan operating, such as traffic, birds, people talking and other noise from other buildings.
Background noise level	The background noise level is the noise level that is generally present at a location at all or most times. Although the background noise may change over the course of a day, over shorter time periods (e.g. 15 minutes) the background noise is almost-constant. Examples of background noise sources include steady traffic (e.g. motorways or arterial roads), constant mechanical or electrical plant and some natural noise sources such as wind, foliage, water and insects.
Rating Background Level (RBL / min$L_{A90,1hour}$)	A single-number figure used to characterise the background noise levels from a complete noise survey. The RBL for a day, evening or night time period for the overall survey is calculated from the individual Assessment Background Levels (ABL) for each day of the measurement period, and is numerically equal to the median (middle value) of the ABL values for the days in the noise survey.
Decibel (dB)	The logarithmic scale used to measure sound and vibration levels. Human hearing is not linear and involves hearing over a large range of sound pressures, which would be unwieldy if presented on a linear scale. Use of a logarithmic scale allows all sound levels to be expressed based on how loud they are relative to a reference sound (typically 20 µPa, which is the approximate human threshold of hearing). For sound in other media (e.g. underwater noise) a different reference level (1 µPa) is used instead. An increase of approximately 10 dB corresponds to a subjective doubling of the loudness of a noise. The minimum increase or decrease in noise level that can be noticed is typically 2 to 3 dB.
dB weighting curves	The frequency of a sound affects its perceived loudness and human hearing is less sensitive at low and very high frequencies. When seeking to represent the summation of sound pressure levels across the frequency range of human hearing into a single number, weighting is typically applied. Most commonly, A-weighting, denoted as dB(A), is used for environmental noise assessment. This is often supplemented by the linear or C-weighting curves, where there is the potential for excess low-frequency sound at higher sound pressure levels.



dB(A)

dB(A) denotes a single-number sound pressure level that includes a frequency weighting ('A-weighting') to reflect the subjective loudness of the sound level.

The frequency of a sound affects its perceived loudness. Human hearing is less sensitive at low and very high frequencies, and so the A-weighting is used to account for this effect. An A-weighted decibel level is written as dB(A).

Some typical dB(A) levels are shown below.

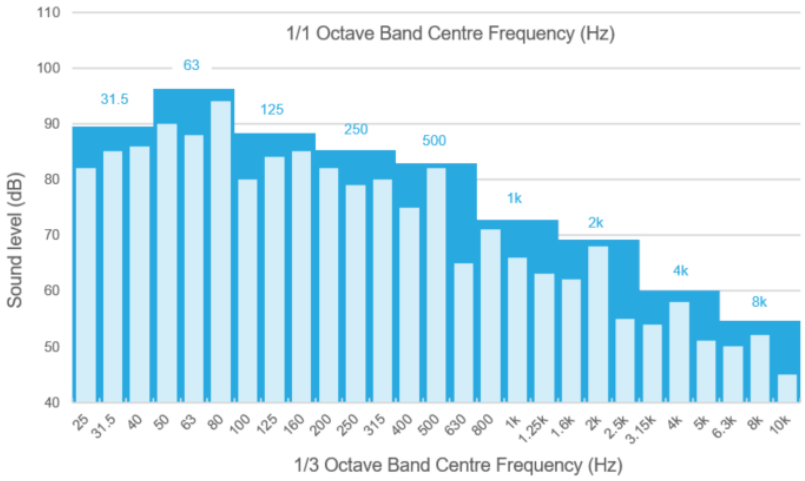
Sound Pressure Level dB(A)	Example
130	Human threshold of pain
120	Jet aircraft take-off at 100 m
110	Chain saw at 1 m
100	Inside nightclub
90	Heavy trucks at 5 m
80	Kerbside of busy street
70	Loud stereo in living room
60	Office or restaurant with people present
50	Domestic fan heater at 1m
40	Living room (without TV, stereo, etc)
30	Background noise in a theatre
20	Remote rural area on still night
10	Acoustic laboratory test chamber
0	Threshold of hearing

Frequency

Frequency is the number of cycles per second of a sound or vibration wave. In musical terms, frequency is described as 'pitch'. Sounds towards the lower end of the human hearing frequency range are perceived as "bass" or 'low-pitched' and sounds with a higher frequency are perceived as 'treble' or 'high pitched'.

The unit of frequency is the hertz (Hz), which is identical to cycles per second. A thousand Hz is generally denoted as kHz. Human hearing ranges approximately from 20 Hz to 20 kHz.

While single weighted sound pressure levels simplify the assessment and evaluation of sound levels, frequency analysis is often undertaken. 'Octave bands', either 1/1 or 1/3 octave bands are most commonly utilised and are referred to by the nominal centre frequency of the band (e.g. 31.5 Hz), while being the summation of all frequencies between a defined lower and upper frequency.



$L_{90(period)}$

The sound level exceeded for 90% of the measurement period.

	The L_{90} is often defined as the 'average minimum' or 'background' noise level for a period of measurement. For example, 45 $dBL_{A90,15min}$ indicates that the sound level is higher than 45 dB(A) for 90% of the 15-minute measurement period.
$L_{eq(period)}$	The equivalent ('eq') continuous sound level, used to describe the level of a time-varying sound or vibration measurement. The L_{eq} is often defined as the 'average' level, and mathematically, is the energy-average level over a measurement period – i.e. the level of a constant sound that contains the same sound energy as the measured sound.
L_{max}	The L_{max} is the 'absolute maximum' level of a sound or vibration recorded over the measurement period. As the L_{max} is often caused by an instantaneous event, it can vary significantly between measurements.
Sound Power and Sound Pressure	The sound power level (L_w) of a source is a measure of the total acoustic power radiated by a source. The sound pressure level (L_p) varies as a function of the environment and distance from a source. The sound power level is an intrinsic characteristic of a source (analogous to its mass), which is not affected by the environment within which the source is located.
Structureborne noise	The transmission of noise energy as vibration of building elements. The energy may then be re-radiated as airborne noise. Structureborne noise is controlled by structural discontinuities, i.e. expansion joints and floating floors.

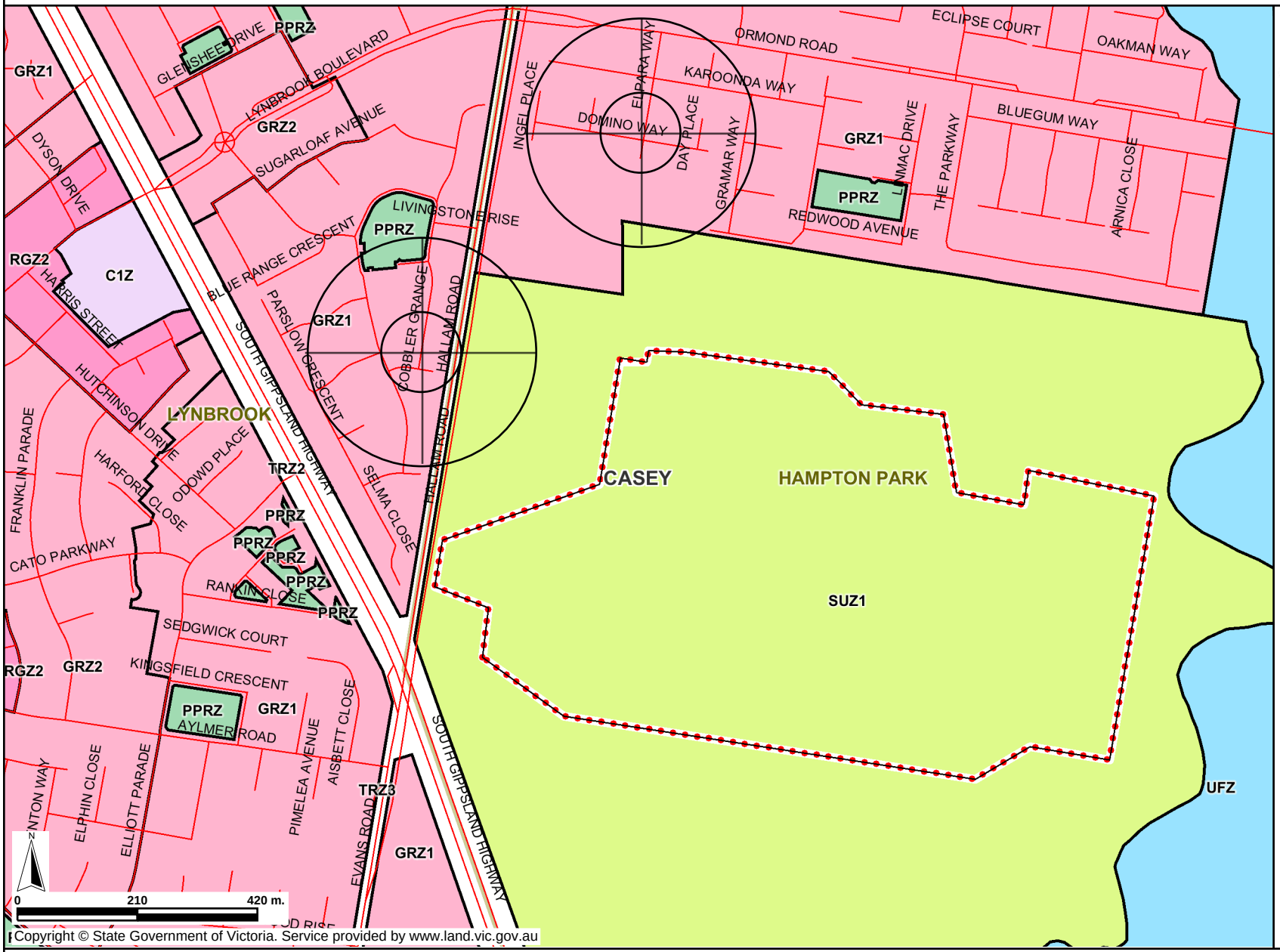
Appendix B

Zoning Map

Planning Map

Hampton Park Zoning Map

Department of Environment, Land Water and Planning



Legend

- WARRNAMBOOL — Major Town
- Major Road, Road
- BOURKE STREET — Road name
- Railway, Tramway
- Property/Parcel, Selected
- 25 2 1C — Address, Lot, Crown allotment
- River, Stream, Coastline
- Waterbody
- Locality
- SEDDON — Locality Name
- Local Government Area
- BRIMBANK — Local Government Name
- Urban Growth Boundary (UGB)
- Area outside the UGB
- Investigation Area
- Land added to UGB since 2005
- Boundary of Searched Suburb

ZONES

- ACZ - Activity Centre
- B1Z - Commercial 1
- B2Z - Commercial 1
- B3Z - Commercial 2
- B4Z - Commercial 2
- B5Z - Commercial 1
- C1Z - Commercial 1
- C2Z - Commercial 2
- CA - Commonwealth Land
- CCZ - Capital City
- CDZ - Comprehensive Development
- DZ - Dockland
- ERZ - Environmental Rural
- FZ - Farming
- GRZ - General Residential
- GWAZ - Green Wedge A
- GWZ - Green Wedge
- IN1Z - Industrial 1
- IN2Z - Industrial 2
- IN3Z - Industrial 3
- LDRZ - Low Density Residential
- MUZ - Mixed Use
- NRZ - Neighbourhood Residential
- PCRZ - Public Conservation & Resource
- PDZ - Priority Development
- PPRZ - Public Park & Recreation
- PUZ1 - Public Use - Service & Utility
- PUZ2 - Public Use - Education
- PUZ3 - Public Use - Health Community
- PUZ4 - Public Use - Transport
- PUZ5 - Public Use - Cemetery/Crematorium
- PUZ6 - Public Use - Local Government
- PUZ7 - Public Use - Other Public Use
- PZ - Port
- R1Z - General Residential
- R2Z - General Residential
- R3Z - General Residential
- RAZ - Rural Activity
- RCZ - Rural Conservation
- RDZ1 - Road - Category 1
- RDZ2 - Road - Category 2
- RGZ - Residential Growth
- RLZ - Rural Living
- RUZ - Rural
- SUZ - Special Use
- TZ - Township
- UFZ - Urban Floodway
- UGZ - Urban Growth

OVERLAYS

- AEO - Airport Environs
- BMO - Bushfire Management
- CLPO - City Link Project
- DCPO - Development Contributions Plan
- DDO - Design & Development
- DDOPT - Design & Development Part
- DPO - Development Plan
- EAO - Environmental Audit
- EMO - Erosion Management
- ESO - Environmental Significance
- FO - Floodway
- HO - Heritage
- ICPO - Infrastructure Contributions Plan
- IPO - Incorporated Plan
- LSIO - Land Subject to Inundation
- MAEO1 - Melbourne Airport Environs 1
- MAEO2 - Melbourne Airport Environs 2
- NCO - Neighbourhood Character
- PO - Parking
- PAO - Public Acquisition
- RO - Restructure
- RCO - Road Closure
- SBO - Special Building
- SLO - Significant Landscape
- SMO - Salinity Management
- SRO - State Resource
- VPO - Vegetation Protection

Map Centre - Melways 129 F2

Map Scale 1:10,000

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VICTORIA State Government | Environment, Land, Water and Planning

Appendix C

Detailed noise measurements

Item	Measurement event	Result dBL_{Aeq}
Excavator 	Sorting scrap, measured at 10 metres	75 dB(A)
	Rolling on tracks, measured at 10 metres	78 – 86 dB(A)
	Dumping scrap metal into [half full] metal bin, measured at 15 metres	78 dB(A)
	Dumping scrap metal into [empty] metal bin, measured at 15 metres	98 dB(A)
Forklift 	Forklifts lifting and dumping small metal bin into large container, measured at 10-15 metres	84 dB(A)
	Moving pallettes (reverse beeps included), measured at 10-15 metres	65 dB(A)

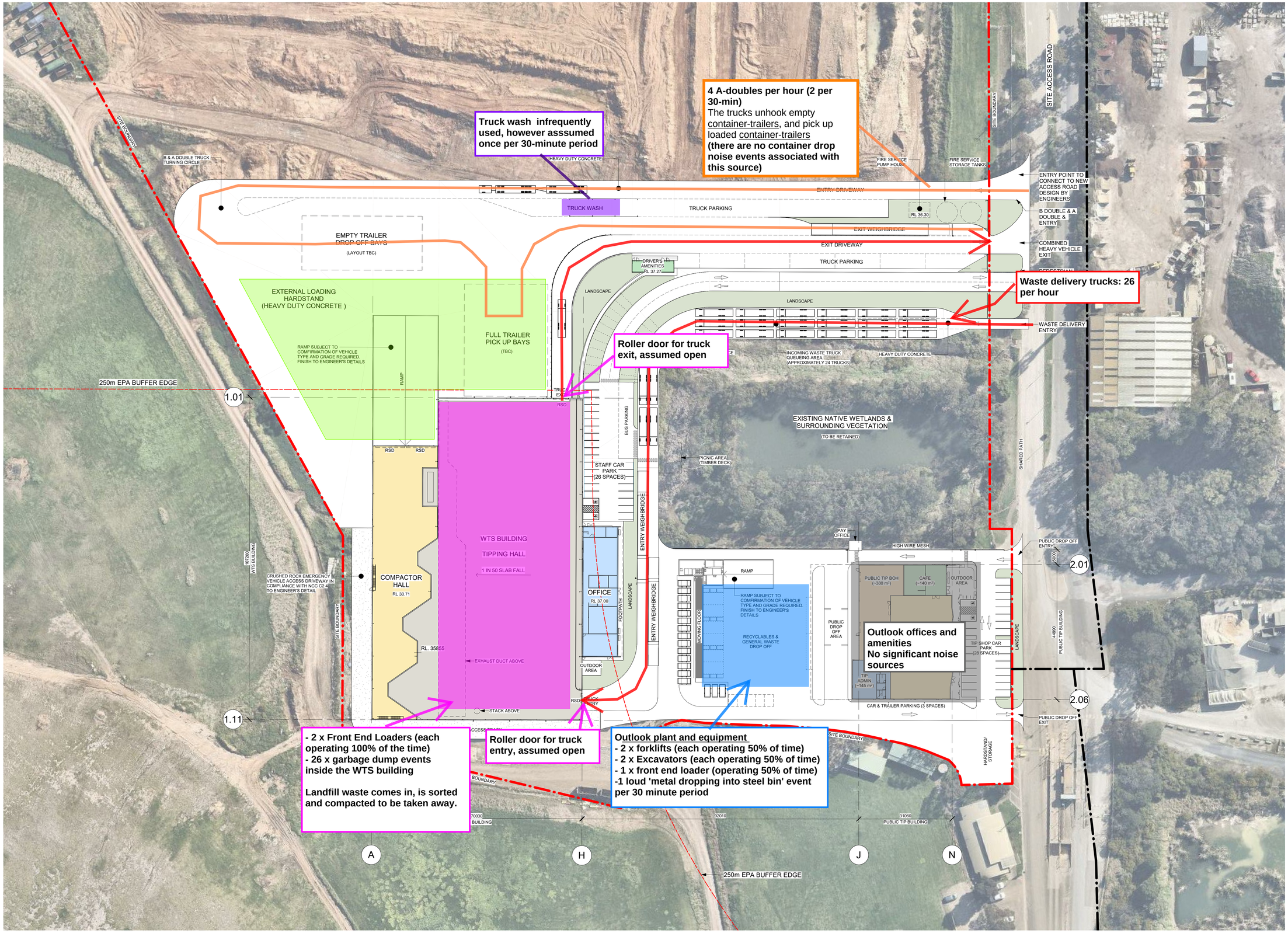
Item	Measurement event	Result dBL_{Aeq}
Front end loader 	Passby, measured at 5 metres	79 dB(A)
	Rolling and scraping in the waste bay	80 dB(A)
Public drop off 	Public drop-off: offloading rubble, measured at 10 metres	69 db(A)
Dozer	Passby, measured at 5 metres	86 dB(A)

Item	Measurement event	Result dBL_{Aeq}
	(not used in future site)	
Waste trucks  	Waste trucks (various) dumping at edge of landfill, measured at 5 metres	75 – 76 dB(A)
Trucks on entry road	Trucks (various) passby, measured at 20 metres	65 - 66 dB(A)

Item	Measurement event	Result dBL_{Aeq}
		

Appendix D

Proposed site layout



AREA SCHEDULE

NAME	AREA
WTS BUILDING	
COMPACTOR HALL	1443.7 m²
OFFICE	513.5 m²
TIPPING HALL	5688.4 m²
GROSS BUILDING AREA:	7645.6 m²
PUBLIC TIP BUILDING	
CAFE & AMENITIES	141.8 m²
PUBLIC TIP ADMIN & AMENITIES	148.2 m²
PUBLIC TIP BOH	385.6 m²
PUBLIC TIP SHOP	698.2 m²
GROSS BUILDING AREA:	1373.8 m²
TOTAL DEVELOPMENT AREA:	9019.4 m²

REV:	DETAILS	DATE	BY
P14	DESIGN REVISIONS	16/12/19	IO
P15	PUBLIC AREA REVISIONS	24/02/20	AD
P16	PRELIMINARY ISSUE	17/06/20	IO
P17	PRELIMINARY ISSUE	09/12/21	MC
P18	TOWN PLANNING ISSUE	17/12/21	MC
P19	FOR REVIEW - PUBLIC DROP OFF	10/03/22	MC

PROJECT: HAMPTON PARK TRANSFER STATION
PROJECT NUMBER: 1811
DRAWING NUMBER: A111
REVISION: P19
CLIENT: SUEZ RECYCLING & RECOVERY AUSTRALIA & NEW ZEALAND
DRAWING NAME: DETAIL SITE PLAN
DRAWING STATUS: PRELIMINARY
NOT FOR CONSTRUCTION
SCALE: 1 : 500 @ B1
DATE: 17/06/20
DRAWN: MC/IO

ALL WORKS TO FOLLOW WRITTEN DIMENSIONS, DO NOT SCALE DIMENSIONS UNDER ANY CIRCUMSTANCES.
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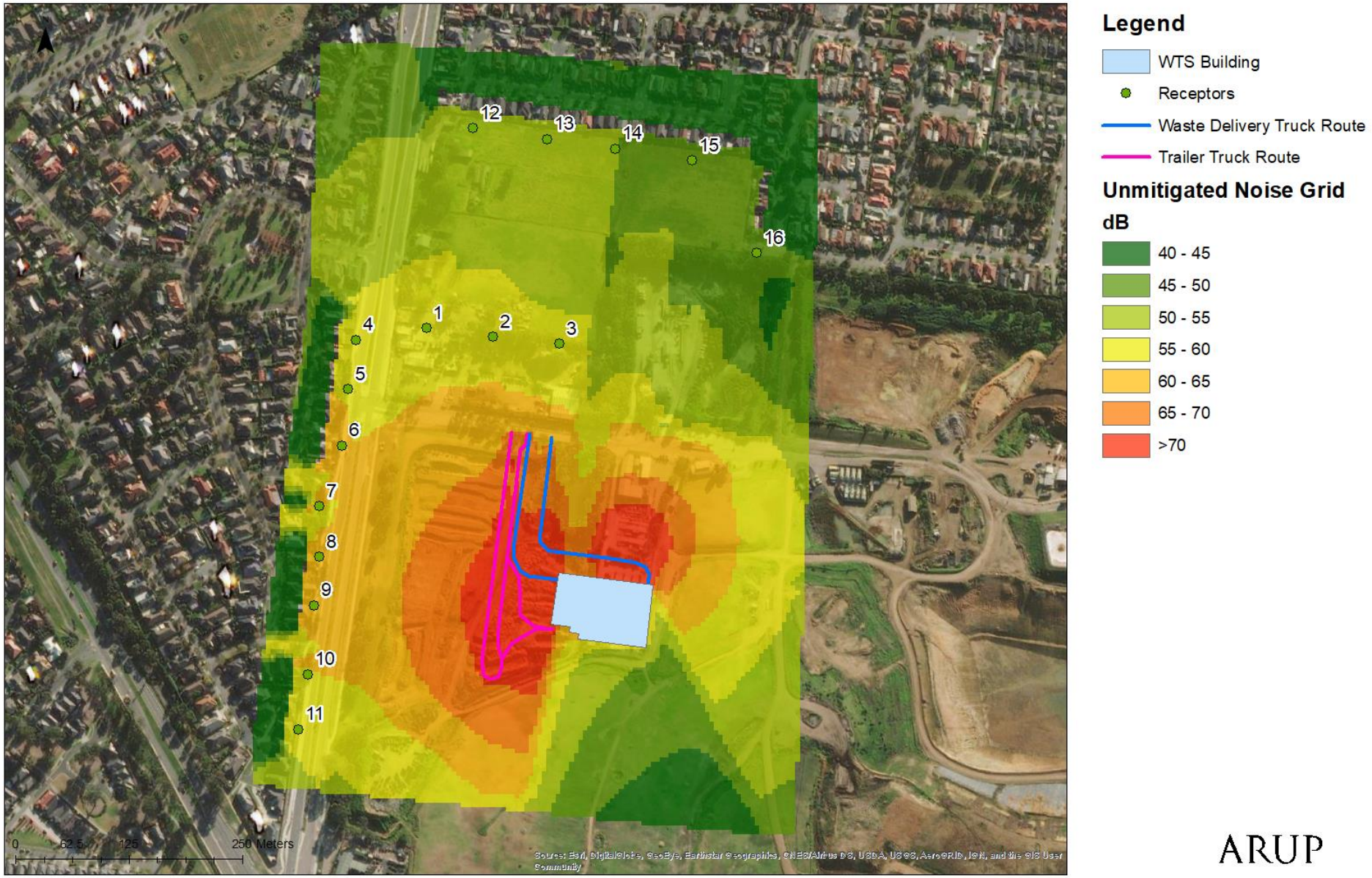
2/70 Kerr Street Fitzroy 3065
0415 12 57 56
ABN 29 600 077 487
ARBV Registration 51488
NSW Nominated Architect
Andrew Davidson 9345

Appendix E

Noise contour maps


Legend
WTS Building
Receptors
Waste Delivery Truck Route
Trailer Truck Route
Unmitigated Noise Grid
dB
40 - 45
45 - 50
50 - 55
55 - 60
60 - 65
65 - 70
>70
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
0
62.5
125
250 Meters
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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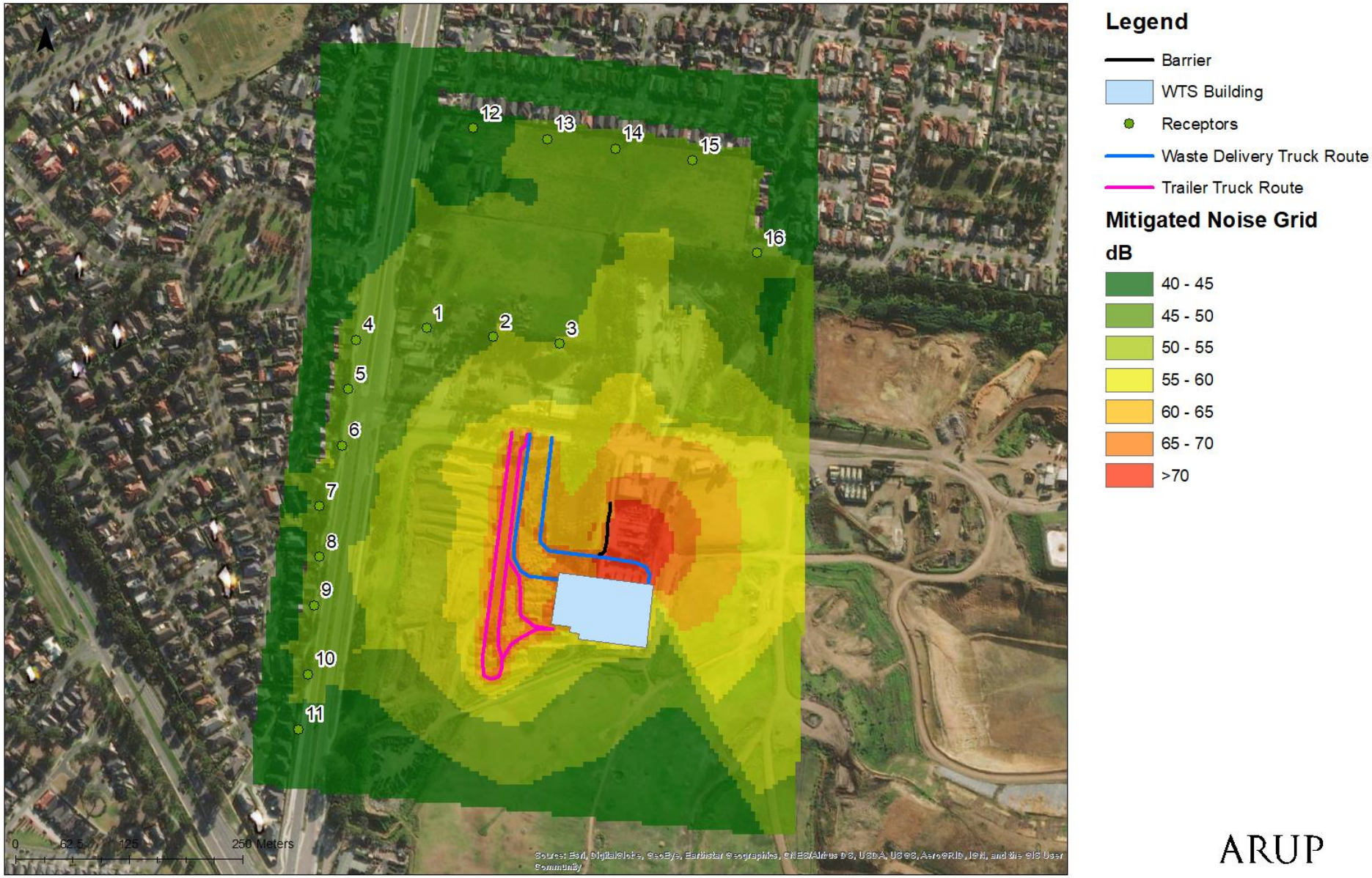
Legend
Barrier
WTS Building
Receptors
Waste Delivery Truck Route
Trailer Truck Route
Mitigated Noise Grid
dB
40 - 45
45 - 50
50 - 55
55 - 60
60 - 65
65 - 70
>70
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
0
62.5
125
250 Meters
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

ARUP