

CRANBOURNE LANDFILL
Environmental Noise Assessment
Rp 001 2012351ML

10 May 2013



Project: **CRANBOURNE LANDFILL**

Prepared for: **SBI Cranbourne Quarries
950 Ballarto Road
Cranbourne VIC 3977**

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Report No.: **Rp 001 2012351ML**

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Document control

Status:	Rev:	Comments	Date:	Author:	Reviewer:
Draft			9 May 2013	BM	NH
Final issue		Issued to client with no changes	10 May 2013	BM	

EXECUTIVE SUMMARY

SBI Cranbourne Quarries currently operate a rock quarry at 950 Ballarto Road, Cranbourne, and it is proposed to use the existing quarry site for a landfill.

Marshall Day Acoustics (MDA) has been engaged to assess the potential noise emissions from the proposed landfill site.

Two scenarios have been modelled for the site:

- Stage 3 – filling of the southwest section of the pit and
- Stage 4 – filling of the northeast to the south-east section of the pit.

These scenarios represent the worst-case scenarios for noise emissions at the site as the landfill operations are concentrated closest to the noise sensitive receivers.

The predicted noise levels show compliance with the SEPP N-1 noise limits for Stage 3 of the operation without any specific noise mitigation. For Stage 4 of the operation, a 3m high earth mound is required between the site and the closest receiver to the east of the site to enable compliance with the noise limits to be achieved. With the proposed earth mound in place, the predicted noise levels comply with the relevant criteria at all existing noise sensitive receivers.

Land to the west and north of the site may have residences built on it in the future. Noise levels at future residences to the west comply with the relevant criteria. Noise levels at future residences to the north may exceed the relevant criteria. Options for mitigation of noise to these residences are discussed.

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1.0 INTRODUCTION

SBI Cranbourne Quarries currently operates a rock quarry at 950 Ballarto Road, Cranbourne. It is proposed to use the existing quarry site for a landfill. An environmental noise assessment is required to form part of a development application submission. This report covers the following:

- Description of the proposed development
- Determination of appropriate noise criteria
- Predicted noise levels at the most critical receivers and potential future receivers, and
- Recommended noise control options for the development to enable the noise criteria to be achieved.

A glossary of acoustic terminology used in this document is summarised in Appendix A.

2.0 SITE AND ACTIVITY DESCRIPTION

2.1 Site description

The existing quarry site is located on Ballarto Road, Cranbourne South, Victoria.

The site is bound by the following:

- Undeveloped residential-zoned land to the north, with existing residences beyond
- A single residence to the east, with the Royal Botanic Gardens beyond
- A golf course and existing residences to the south and
- A single residential dwelling to west.

The current zoning of the site is Farming Zone (FZ2). The areas surrounding the site include Farming Zone (FZ2), Low Density Residential Zones (LDRZ) and Public Use Zone (PUZ1). A planning map is provided in Appendix B.

The client has informed MDA that the land to the west of the quarry site (currently zoned Farming) may in the future be rezoned Residential. Therefore, the potential noise impact from the landfill operation has been assessed at the boundary of the proposed residential zone.

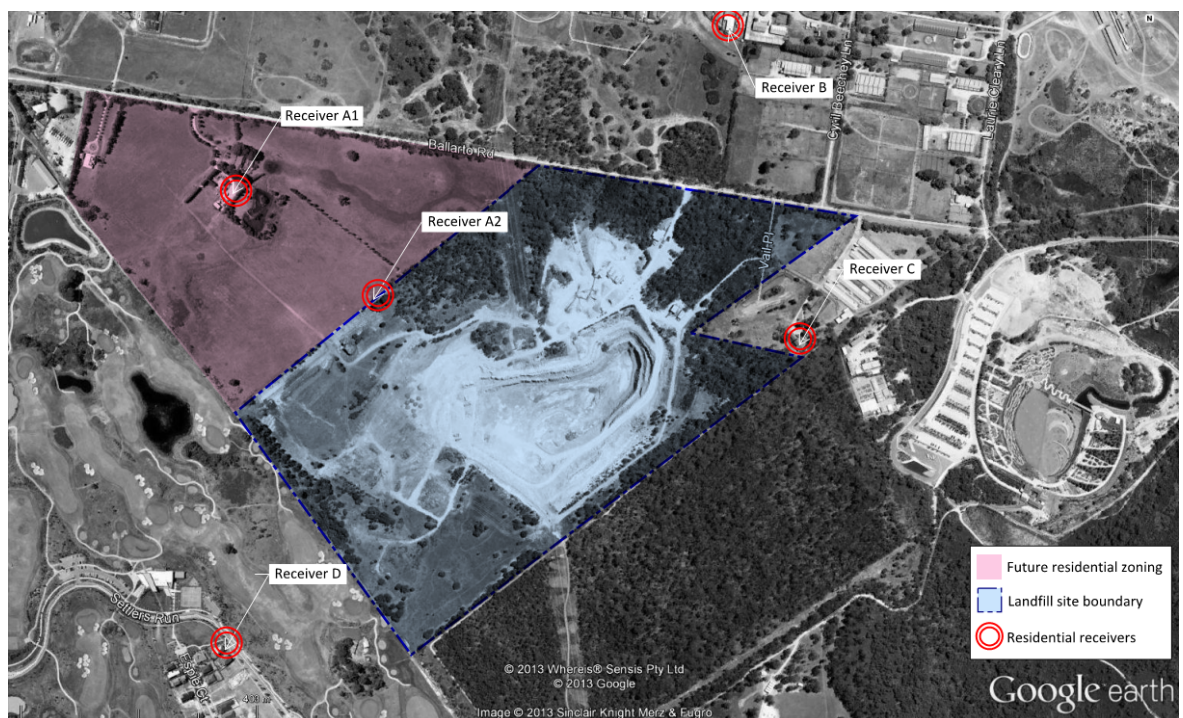
The nearest noise sensitive residences are located to the west and east of the site. The following receivers detailed in Table 1 below have been chosen as being representative for the purpose of our assessment.

Table 1: Nearest residential receivers

Receiver	Location	Description
A1	860 Ballarto Road	Existing residential dwelling located west of the site
A2	860 Ballarto Road east boundary	Eastern boundary of 860 Ballarto Road site. Location has been selected to represent land that may potentially be rezoned land as residential
B	12 Lytham Court	Existing residential dwelling located north of the site
C	980 Ballarto Road (North)	Existing residential dwelling associate with chicken farm located to the east of the site
D	51 Settlers Run	Existing residential dwelling located south-west of site

Figure 1 shows the site in relation to the nearest residential receivers.

Figure 1: Aerial photograph of subject site and surrounding residences



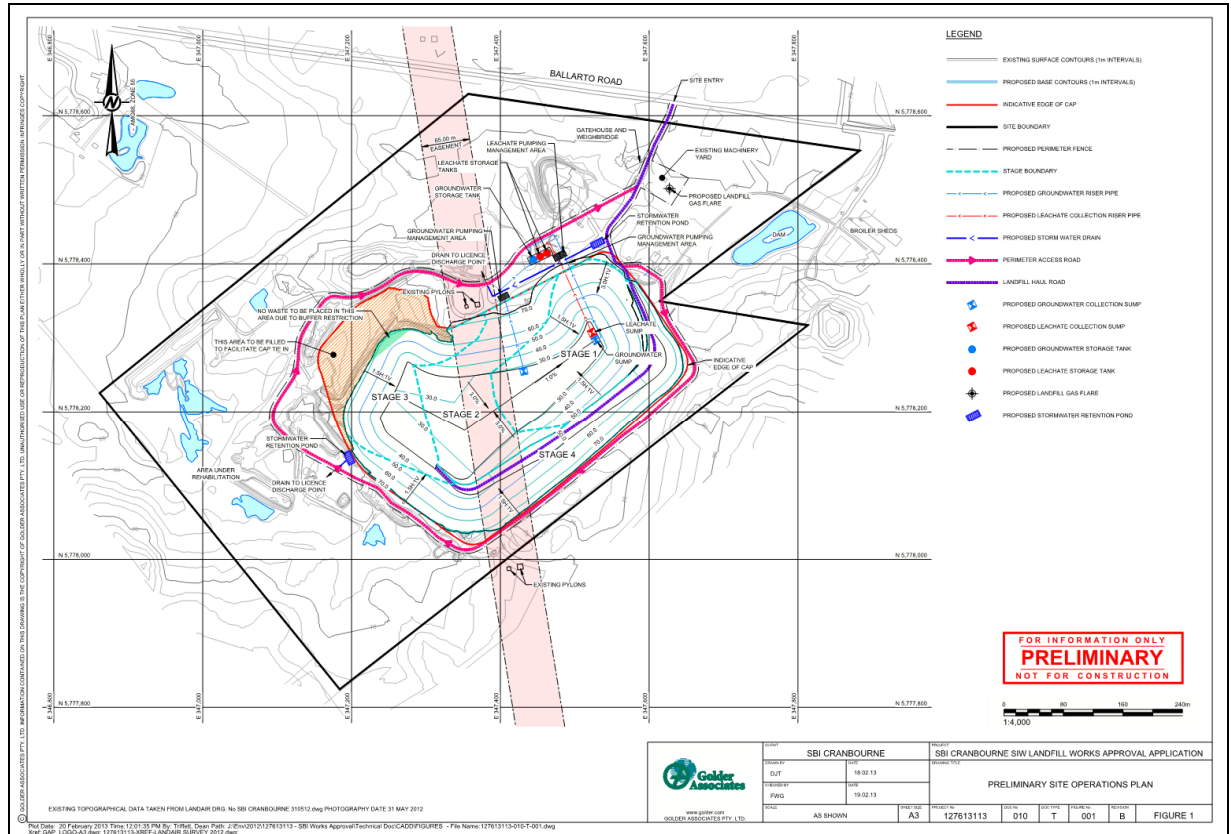
2.2 Project description

It is proposed that the existing quarry site be used for a landfill. The quarry pit will be filled in four stages:

- Stage 1 – filling of the north section of the pit
- Stage 2 – filling of the central section of the pit
- Stage 3 – filling of the south-west section of the pit and

Stage 4 – filling of the north-east to the south-east section of the pit. Final capping of the site will occur at the conclusion of Stage 4. The existing on-site roads will be used to access the site. A plan of the proposed site staging is provided in Figure 2.

Figure 2: Proposed landfill staging



We understand there will be items of mobile plant on the site including loaders, excavators and compactors, and trucks will deliver refuse to the site.

The proposed operating hours of the Cranbourne Landfill are as follows:

- Monday to Friday 0700hrs - 1700hrs
- Saturday 0700hrs - 1300hrs

3.0 ENVIRONMENTAL NOISE SURVEY

Noise monitoring was conducted at selected residential locations around the Cranbourne landfill site to determine baseline ambient noise conditions. Two noise loggers were set up west and north of the existing site to capture ambient noise levels from 15 September to 28 September 2012. The noise monitoring locations are shown in Figure 3. Monitoring was undertaken using Rion NL-31 noise monitors. Accurate calibration of the equipment was confirmed before and after the measurement period. The results of the noise monitoring were used to assist with determining the noise criteria for the site.

Figure 3: Environmental noise logger locations



4.0 NOISE CONTROL LEGISLATION AND GUIDELINES

In Victoria, there are primarily two documents which provide guidance on industrial and commercial noise control, *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1* (SEPP N-1) and *Noise from industry in regional Victoria: Recommended maximum noise levels from commerce, industry and trade premises in regional Victoria* (NIRV). SEPP N-1 applies to Melbourne and the greater metropolitan area, whereas NIRV applies for areas not covered by the SEPP N-1, particularly regional Victoria.

EPA Victoria provides the boundaries where the SEPP N-1 and NIRV apply (refer to Appendix C for the SEPP N-1 boundaries for the land surrounding Cranbourne). The proposed Cranbourne landfill site is atypical as the defined boundary for where SEPP N-1 applies passes through the middle of the site. The map shows SEPP N-1 is applicable for the land to the north, west and southwest of the site. For the land to the east and southeast of the site, NIRV applies.

Part of the subject site and areas to the east and southeast of the site are located in an area which is considered to be a 'major urban area' as defined in NIRV. The NIRV guidelines state that for 'major urban areas', the recommended noise limits should be determined following the procedures in SEPP N-1.

Therefore, SEPP N-1 criteria should be applied to all noise sensitive receivers near the site.

The objective of SEPP N-1 is to protect residential areas from noise generated by commercial, industrial or trade premises. Compliance is achieved if the effective noise level (L_{eff}) at any residence affected by noise from the facility is below the noise limit. The

effective noise level is determined by measuring or predicting the L_{Aeq} noise level and applying corrections for such characteristics as duration, intermittency, tonality and impulsiveness.

The assessment of noise emissions under SEPP N-1 is based on the calculation of a noise limit at a receiver position, taking into account a zoning noise level derived from the land-use in the surrounding area and the measured background noise level.

The measured noise levels, SEPP N-1 time periods, zoning levels and noise limits are detailed in Table 2. As the landfill will only operate during the daytime period, we have only presented the daytime noise levels.

Table 2: Noise level criteria determined in accordance with SEPP N-1

Period	Day of week	Time period	Measured background level, dB L_{A90}		Zoning level		Noise limit, dB L_{eff}	
			Logger 1 (West)	Logger 2 (North)	West	North	West	North
Day	Mon - Fri	0700-1800hrs	40	45	50	50	50	51
	Sat	0700-1300hrs						

Although the noise limit determined for the receivers north of the site is 51dB L_{eff} , we have taken a conservative approach and applied a daytime noise criterion of 50dB L_{eff} for all noise sensitive receivers.

5.0 PREDICTED NOISE LEVELS

5.1 Methodology

A computer noise model of the site has been developed to represent the proposed landfill operations at key project stages. The noise model considers noise emissions from mobile plant and truck movements. Locations and operational patterns of key items of plant have been provided by the client.

The noise model has been prepared using SoundPLAN proprietary noise mapping software which enables the calculation of noise levels over a wide area, and accounts for key considerations including reflected noise, terrain conditions at the site, location of sources, and traffic speed and composition. The noise model calculates noise levels at noise sensitive receivers in accordance with ISO 9613:1996 *Attenuation of sound during propagation outdoors*.

Table 3 summarises the key aspects of the noise model.

Table 3: Noise model inputs

Feature	Description
Site terrain data	Provided by the client in digital format for final stage of the project (capping of the site)
Environmental ground conditions	The site and surrounding areas were assumed to be 50% 'hard ground'.
Site development plan	Provided by the client
Noise calculation method	ISO9613:1996
Description of proposed activities on site	Provided by the client

5.2 Modelled scenarios

We have modelled two scenarios, late filling of Stage 3 and late filling and final capping of Stage 4 as these represent the scenarios with the potential for the highest noise emissions at receivers.

Stage 3 represents the worst case scenario for receivers to the west of the site as the majority of the activity is centred close to the west boundary and activity is occurring at grade.

Stage 4 presents the worst case scenario for receivers to the north and east of the site as the majority of the activity is centred in the northeast section of the site and activity is occurring at grade.

Achieving compliance for both the Stage 3 and Stage 4 scenarios indicates compliance will be achieved for all stages of the development.

We understand the following equipment could be used during a "worst-case" half hour period during late land-filling:

- Compactor
- Tracked loader
- Water cart
- Excavator and
- A maximum of 12 truck movements (6 onto the site, 6 off the site).

Table 4 summarises the sound power levels used in the model for each of the items of equipment listed above.

Table 4: Octave Band Noise Level Results

Source	Octave Band Centre Frequency (Hz)							dBA
	63	125	250	500	1000	2000	4000	
Compactor	103	107	94	100	102	96	89	105
Tracked loader	106	106	98	99	94	93	86	101
Water cart	109	111	106	101	99	98	97	106
Excavator	115	108	101	103	98	96	91	104
Road truck	109	111	106	101	99	98	97	106

5.3 Predicted noise levels

5.3.1 Baseline predicted noise level

Based on the information outlined in section 5.1 and the provided operational information, we have predicted the expected noise level from Stage 3 and Stage 4 of the landfill operation.

The predicted noise levels are summarised in Table 5. The noise contour plots for Stage 3 and Stage 4 are given in Appendix D.

Table 5: Predicted noise levels (dB L_{eff})

Receiver	Stage 3	Criteria	Achieved?	Stage 4	Criteria	Achieved?
A1	39	50	✓	34	50	✓
A2	47	50	✓	37	50	✓
B	41	50	✓	44	50	✓
C	47	50	✓	53	50	✗
D	38	50	✓	33	50	✓

For Stage 3 of the landfill operation, the predicted noise levels comply with the SEPP N-1 noise limits at all receivers without any specific noise mitigation. For Stage 4, the predicted noise levels comply with the criteria with the exception of Receiver C, which is located east of the site.

5.3.2 Predicted noise levels with noise mitigation

To enable compliance with the noise criteria, we propose the following noise mitigation measures:

- 3m high earth mound located between the most northern section of the Stage 4 filling and Receiver C.

The proposed location and extent of the earth mound is shown in Figure 4.

Figure 4: Proposed noise mitigation for Stage 4



The predicted noise levels for Stage 4 including the proposed earth mound are summarised in Table 5. The noise contour plots for Stage 4 with noise mitigation are given in Appendix D.

Table 6: Predicted noise levels (dB L_{Aeff})

Receiver	Stage 4	Criteria	Achieved?
A1	34	50	✓
A2	37	50	✓
B	42	50	✓
C	49	50	✓
D	33	50	✓

With the proposed noise mitigation in place, the predicted noise emissions for Stage 4 of the landfill operation achieve compliance with the relevant noise criteria at all noise sensitive receivers.

5.3.3 Final capping of the site

During final capping of the site, we understand equipment similar to that described in section 5.2. Therefore, we expect noise emissions from the capping of Stage 1,2 and 3 to

comply with the SEPP N-1 criterion. For Stage 4, the predicted noise levels indicate the compliance with SEPP N-1 criteria will be achieved with the exception of the removal of the earth mound. The removal of the earth mound will be of limited duration.

6.0 DISCUSSION

While the predicted noise levels for the Cranbourne landfill (as presented in section 5.0) show compliance with the noise criteria can be achieved at the closest existing noise sensitive receivers, we believe further discussion with regard to potential future receivers to the north and west of the site is required.

6.1 Potential rezoning of the land west of the site

As previously outlined, we understand there is the potential for the land located to the west of the landfill site to be rezoned from Farming to Residential in the future. As requested by the client, we have predicted the expected noise levels for this section of land and presented the results in section 5.3 of this report.

The calculations show the noise emissions from the proposed Cranbourne landfill comply with the relevant daytime noise criteria for the Stage 3 operating scenario without the need for noise mitigation.

However, we note the terrain data provided by the client indicate there is a natural rise and fall in the terrain which acts as an earth mound located between the landfill site and receivers A1 and A2. The predicted noise levels include the screening provided by the existing earth mound.

While the terrain data provided by the client indicate the earth mound will remain intact for the duration of the project, if the effectiveness of existing earth mound is reduced due to earthworks or similar activities on the site, additional noise mitigation measures may be required to achieve compliance with the criteria. For example, a 3m high earth mound along the west boundary of the landfill site is likely to be sufficient to enable compliance with the residential zone noise criterion should the existing mound be removed.

6.2 Residential zoned land to the north of the site

The land directly north of the site on Ballarto Road is currently undeveloped, however the land is zoned residential and therefore, there is the potential for residential development in the future.

For a small section of land directly opposite where the trucks enter and exit the site, the predicted noise levels exceed the 50dB L_{eff} daytime criteria for a worst case half hour period. The predicted exceedance is a result of the noise emissions from truck movements on and off the site.

To enable compliance with the criteria, there are a number of noise mitigation options that can be investigated if development does occur in the future including:

- Implementing a separate entry and exit point to the site

- Changing the access road to include an S-bend and use of an earth mound to screen some of the on-site road from receivers
- Limiting the number of vehicles that can enter the site in any given half hour period.

While there are no noise sensitive receivers in this section of land, no noise mitigation measures are required. The measures listed above are provided to for illustrate that there are options for noise mitigation in the future if required.

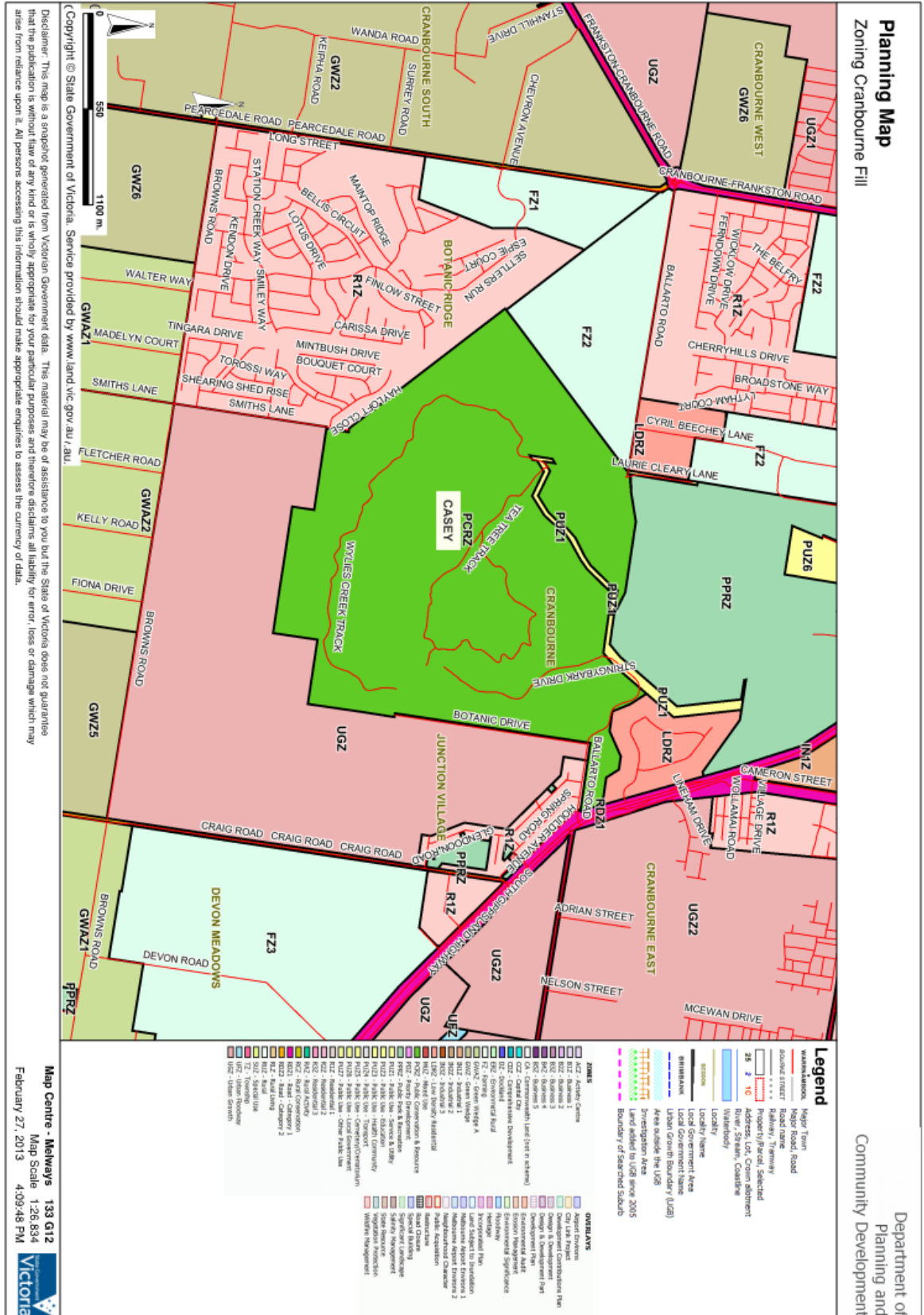
7.0 SUMMARY

- Noise levels for Stage 3 and Stage 4 of the proposed Cranbourne landfill operation have been modelled
- With the inclusion of an earth mound on a section of the northern boundary of the site (refer to Figure 4 for extent and location), the predicted noise levels comply with the SEPP N-1 criteria at all noise sensitive receivers
- If earthworks are required near the west boundary of the landfill site, consideration should be given to ensuring the effectiveness of the existing earth mound on the site is maintained
- When the land directly north of the site is developed, noise mitigation measures may be required to ensure compliance with the criteria. Detailed design of mitigation options is only required in the event of residential development directly north of the vehicle entry/exit point of the site.

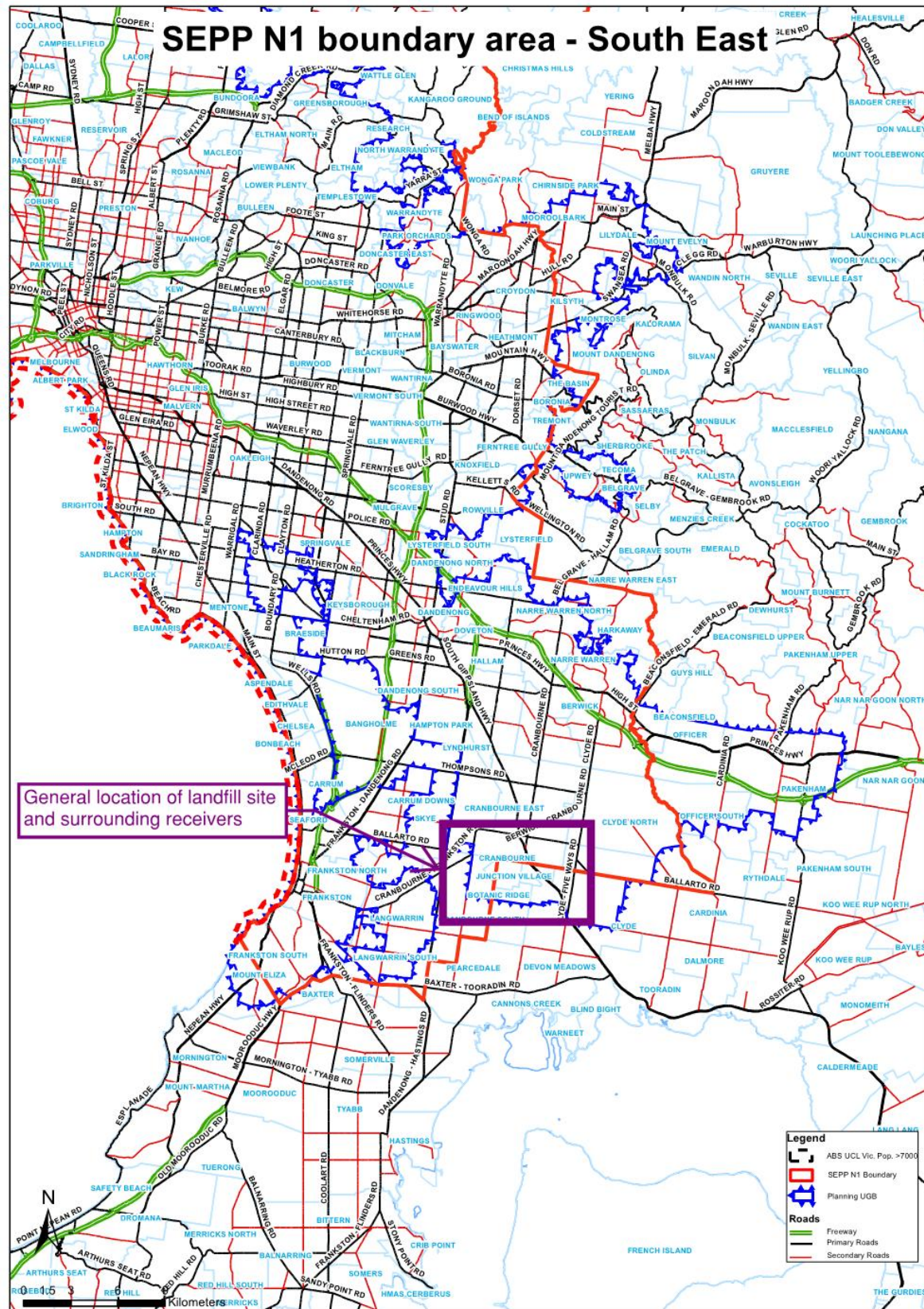
APPENDIX A GLOSSARY OF TERMINOLOGY

Ambient	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
dB	<u>Decibel</u> The unit of sound level. Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of $P_r=20 \mu\text{Pa}$ i.e. $\text{dB} = 20 \times \log(P/P_r)$
dBA	The unit of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to more closely approximate the frequency bias of the human ear.
L_{Aeq}	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.
L_{A90}	The A-weighted noise level equalled or exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.
Sound Power Level (L_w)	A logarithmic ratio of the acoustic power output of a source relative to 10^{-12} watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels.

APPENDIX B PLANNING MAP



APPENDIX C SEPP N1 BOUNDARY AREA MAP



APPENDIX D NOISE CONTOUR PLOTS

(see following page)