



APPENDIX K

Noise Assessment

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MELBOURNE REGIONAL LANDFILL

NOISE ASSESSMENT

Rp 003 2015252ML | 10 February 2016

Project: **Melbourne Regional Landfill**

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Report No.: **RP 003 2015252ML**

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EXECUTIVE SUMMARY

Cleanaway Waste Management Ltd (Cleanaway) proposes to extend current landfilling operations at the Melbourne Regional Landfill onto adjoining land. A noise assessment of the proposed operations has been undertaken by Marshall Day Acoustics Pty Ltd (MDA) to support the works approval application for the proposed expansion.

The proposed landfill activities span over an extensive time period (currently estimated period of 30 years). The primary purpose of the noise assessment provided herein is to demonstrate the viability of the project in the context of current noise regulations. The noise mitigation measures recommended in this report are based on the current operational assumptions provided by Cleanaway. Detailed measures would be updated during the lifecycle of the project as site operations are confirmed.

Three 'worst-case' scenarios were represented in 3D noise models to predict the highest expected noise levels at nearby residential locations for different periods of the proposal. The assessment has accounted for:

- Derived noise data obtained to represent future activity on the extended site based on manufacturer data and current Australian and British standards
- Noise data for the operation of the existing Boral quarry site adjacent to the landfill site
- Changing topographical heights over the course of the project
- Multiple mitigation strategies that have been developed in conjunction with Cleanaway.

Mitigation measures to enable compliance with the SEPP N-1 criteria to be achieved include:

- Equipment based noise mitigation such as exhaust and intake attenuators for various moving plant
- All moving plant and trucks operated by Cleanaway to be fitted with broadband reverse alarms
- Managerial control over the customer trucks during certain time periods and restricting the use of tonal reversing alarms in favour of broadband reverse alarms
- Construction of up to 4m high earth berms to provide screening to residential receivers located south west of the site.
- Restricting the type of mobile plant that can operate on-site during the night-time period.

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1.0 INTRODUCTION

Cleanaway Waste Management Ltd (Cleanaway) proposes to extend current landfilling operations at the Melbourne Regional Landfill (1154-1198 Christies Road, Ravenhall) onto adjoining land at 408-546 Hopkins Road, Truganina and 1154-1198 Christies Road, Ravenhall.

A noise assessment of proposed operations has been undertaken by Marshall Day Acoustics Pty Ltd (MDA) to support the works approval application and planning permit application process for the MRL extension.

This report provides a description of the proposed operations, a summary of the noise criteria applicable to the site, predicted noise levels from the proposed extension and a list of mitigation measures for the proposed development to achieve compliance with the relevant environmental noise criteria.

A glossary of acoustic terminology used in this report is provided in Appendix A.

2.0 ASSESSMENT PURPOSE

The proposed landfill activities span over an extensive time period (currently estimated period of 30 years). The primary purpose of the noise assessment provided herein is to demonstrate the viability of the project in the context of current noise regulations. The noise mitigation measures recommended in this report are based on the current operational assumptions provided by Cleanaway.

It is recommended that noise assessments be undertaken prior to commencement of works for each step described in the staging plan to provide detailed noise control treatments accounting for current operational constraints at the time of each assessment.

3.0 LANDFILL DESCRIPTION AND OPERATIONS

3.1 Site area

Melbourne Regional Landfill is located at 1154-1198 Christies Road, Ravenhall. It is proposed to extend the landfill onto adjoining land at 408-546 Hopkins Road, Truganina and 1154-1198 Christies Road, Ravenhall.

3.2 Noise sensitive receivers

The closest noise sensitive receivers to the Landfill site are listed in Table 1 .

Table 1: Closest noise-sensitive receivers to Melbourne Regional Landfill site

Address	Location
522 Middle Rd, Truganina	Approximately 500m south-west
548 Middle Rd, Truganina	Approximately 880m south-west
619 Hopkins Road, Truganina	Approximately 1400m south-west
655 Hopkins Road, Truganina	Approximately 1400m south-west
687 Hopkins Road, Truganina	Approximately 1600m south-west
27 Sheahan Road, Rockbank	Approximately 260m north
129 Greigs Road, Truganina	Approximately 2000m north-west
1315 Western Highway, Ravenhall	Approximately 1000m north-east
106 Riding Boundary Rd, Ravenhall	Approximately 2180m east
Dame Phyllis Frost Centre Riding Boundary Rd, Ravenhall	Approximately 1600m east (With a 5m high perimeter wall around the entire site)

An aerial photograph of site is contained in Figure 1, showing the location of the nearest residential receivers.

Figure 1: Site and surrounding residential receivers



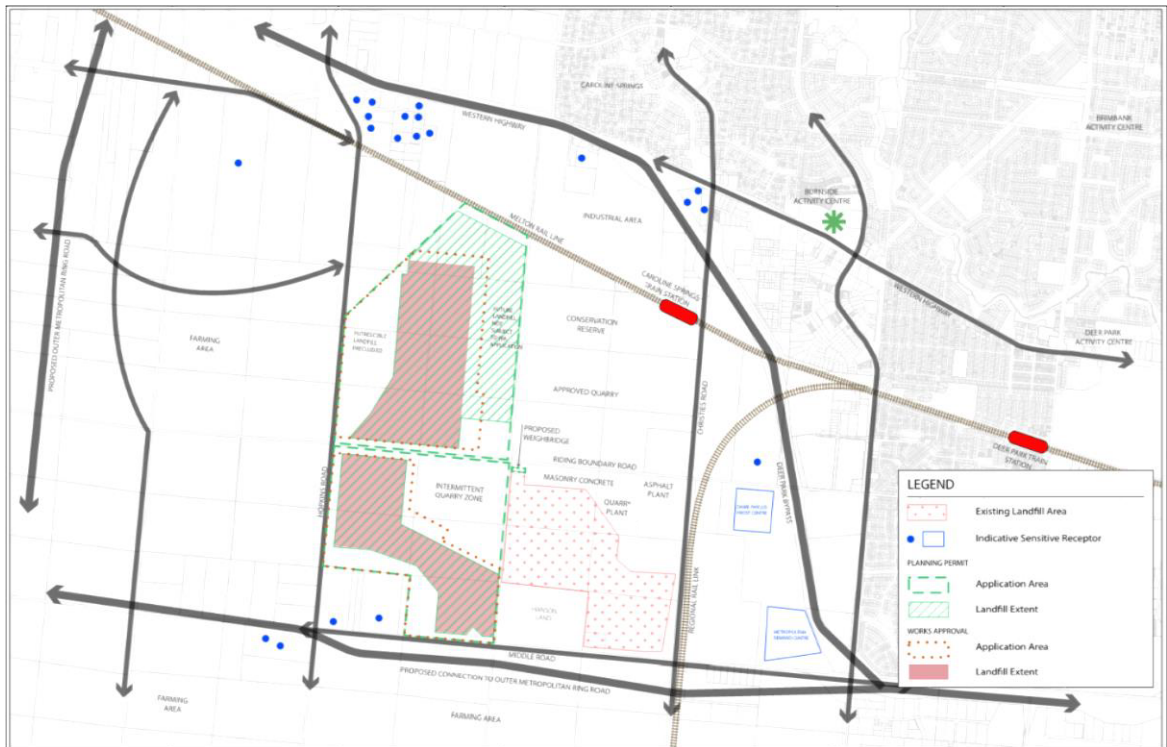
The subject site is located in a Special Use Zone and the surrounding dwellings include a mix of residential and farming land uses.

A planning map showing local zoning around the site is provided in Appendix B.

3.3 Proposed landfill expansion

Figure 2 shows the location of the existing landfill and proposed extension to the landfill in relation to the existing Boral quarry site.

Figure 2: Site context plan



The stages in the life cycle of a typical landfill cell are:

- Lining: The base of the cell is lined to prevent leachate soaking into the groundwater
- Landfilling: The cell is filled to a height just below the final capped height
- Capping: The surface of the cell is lined with clay and topsoil and then planted out.

3.4 Operating hours and operational variations

The existing landfill is consented to operate 24 hours a day, 7 days a week.

Operations associated with the landfill extension are expected to be most comprehensive during the day.

Operations during the evening and night time periods are expected to be similar with the exception of customer truck volumes accessing the site. Generally fewer customer trucks will access the site during the evening time period. Furthermore, operations during the evening and night-time period are understood to be significantly lower than the day time period with only two operators present on-site to operate equipment.

Details of plant types and operation have been detailed in Appendix C based on information provided by Cleanaway.

3.5 Other commercial noise sources

Boral currently operate a quarry, asphalt batching plant and concrete batching plant adjacent to the MRL Landfill site. MDA has previously assessed noise impacts from Boral operations at the site the findings of which are detailed in MDA report *Rp001 r03 2014549ML Deer Park Quarry Plant Replacement* (Boral quarry report) dated 15 May 2015. The noise levels detailed in the Boral quarry report have been used to assess the cumulative noise impact from the Boral quarry site and the proposed landfill extension.

3.6 Additional information considered

In addition to the information provided by CLEANAWAY regarding the proposed operations, our assessment also considers the following information:

- Cell Sequencing and the location of plant has been based on the Concept Sequence of Waste Filling, Construction and Rehabilitation Plans prepared by Golder Associates dated 4 February 2016
- Haul routes have been based on the mock up haul route plan provided by Pacific Environment (provided to MDA via email on 20 August 2015)
- Customer truck volumes have been provided by GTA Consultants (via document *160204xls-Waste Vol Calculations – GTA Instructions for Marshall Day.XLSX* dated 04 February 2016) and confirmed by Cleanaway.

4.0 EXISTING CONDITIONS

4.1 Ambient noise monitoring

Ambient noise monitoring was previously conducted by MDA at selected locations around the Project site to determine baseline ambient noise conditions and identify noise sources that dominate the noise environment at each location. During this time, the Boral Deer Park site (including the landfill) was operational continuously except for the Asphalt Batching plant which was not in operation. Noise sources within the Asphalt batching plant were captured separately.

Short-term attended noise measurements were undertaken during each time period in the vicinity of four residential locations representative of the nearest noise-sensitive receptor locations to the Cleanaway Landfill site in each direction. Measurements were undertaken using Brüel & Kjær precision integrating sound level meters. The measurements were obtained using the 'Fast' response time and A-weighting frequency network. The equipment was checked before and after the survey and no significant calibration drifts were observed.

The results of the short-term attended ambient noise monitoring expressed in terms of L_{A90} (background noise levels) are provided in Table 2. These results have been used to determine environmental noise criteria for the project, as discussed in Section 4.0.

Table 2: Short-term attended noise monitoring results summary

Address	Direction from Landfill site	Measured background noise level, dB L_{A90}		
		Day	Evening	Night
106 Riding Boundary Rd, Truganina	East	44	47	42
1315 Western Highway, Ravenhall	North	58	51	49
48-54 Sheahan Rd, Rockbank	North-west	47	51	51
522 Middle Rd, Truganina	South-west	42	62	43

Note: Day, evening and night periods as defined in SEPP N-1 legislation (see Appendix E for details)

5.0 NOISE CRITERIA

Within the Melbourne metropolitan area, noise from commercial premises is governed by *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1* (SEPP N-1).

Compliance with SEPP N-1 is mandatory for all commercial premises in the Melbourne metropolitan area under section 46 of the *Environment Protection Act 1970* (Act).

A detailed description of SEPP N-1 including the derivation of noise limits is provided in Appendix D.

The SEPP N-1 derived noise limits for the closest noise-sensitive receivers are shown in Table 3.

Table 3: Summary of derived SEPP N-1 noise limits at each residential area

Address	Direction from Landfill site	SEPP N-1 noise limit, L_{eff} dB		
		Day	Evening	Night
522 Middle Rd, Truganina	Southwest	50	44	40
548 Middle Rd, Truganina	Southwest	50	44	40
619 Hopkins Road, Truganina	Southwest	50	44	40
655 Hopkins Road, Truganina	Southwest	50	44	40
687 Hopkins Road, Truganina	Southwest	50	44	40
27 Sheahan Road, Rockbank	North	53	54	54
129 Greigs Road, Truganina	Northwest	53	54	54
1315 Western Highway, Ravenhall	Northeast	59	54	52
106 Riding Boundary Rd, Ravenhall	East	50	50	45
Dame Phyllis Frost Centre Riding Boundary Rd, Ravenhall	East	56	53	48

SEPP N-1 Clause 13 states:

The effective noise level shall not exceed the derived noise limit.

SEPP N-1 Clause 18 states:

Where two or more premises contribute to the effective noise level in a noise sensitive area, each shall be controlled so that the contribution from each of the premises, when combined, will meet the noise limit at the noise sensitive area.

Therefore, the cumulative noise from the proposed landfill assessment and the operation of the Boral quarry has been assessed in accordance with SEPP N-1 Clause 18. It is noted that the predictions for both quarry and landfill activities are based on assumptions regarding future quarrying and landfilling operations which have the potential to change as the projects progresses. As discussed in Section 2.0, detailed measures would be updated during the lifecycle of the project as site operations are confirmed.

6.0 NOISE MODELLING METHODOLOGY

The noise model considers the following critical inputs:

- Topographical data to represent the future landfill landform and surrounding footprint
- Location of all plant and equipment producing noise during the key stages. Equipment and plant has been located as per typical operations indicated by the client
- Meteorological conditions that consider downwind propagation (i.e. wind blows from source to receiver in all cases- a conservative assumption).

The noise model has been prepared using SoundPlan v7.4 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 and location of sources. The model calculates noise levels at key receptor locations in accordance with the standard ISO 9613-2:1996 *Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (ISO 9613-2). The ISO 9613-2 propagation model is a general purpose noise propagation method that has become established as the primary international standard for calculation of industrial noise into the environment.

6.1 Noise model inputs

6.1.1 Landfill equipment

Sound power levels for landfill equipment have been derived from a number of sources, giving preference for manufacturer data where available. Other data reviewed included current Australian and British standards and measurements undertaken by MDA and others for similar-sized items of plant.

The following standards were referenced to review the validity of derived sound power levels for each equipment item:

- Australian Standard AS 2436:2010 *Guide to noise and vibration control on construction, demolition and maintenance sites* (AS 2436:2010)
- British Standard BS 5228–1:2009 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise* (BS 5228-1:2009)

In each case, the derived sound power level was found to be at the upper range quoted by AS 2436:2010 and BS 5228-1:2009, representing a cautious assessment.

6.1.2 Quarry related sources

Sound power levels for quarry related noise sources including quarry plant, concrete batching plant, trammel equipment and asphalt batching plant, have been sourced from the Boral quarry report.

6.1.3 Detailed noise model inputs

Key assumptions regarding model inputs are detailed in Appendix E and sources of data used in the noise model are detailed in Appendix F.

Limitations to the accuracy of noise predictions are discussed in Appendix G.

6.2 Noise modelling scenarios

Operating locations will vary significantly as the landfill progresses. In addition, the topography of the site changes with quarrying, landfilling and capping activities, affecting screening to nearby residential locations. Due to these effects, periods of higher noise levels will affect different areas at different times. The noise assessment aims to assess the periods of higher noise levels at the nearest residential receivers.

Cleanaway has provided a cell sequencing plan (prepared by Golder Associates) describing concurrent operations within specific cells for the lifetime of the landfill expansion. The proposed staging plan was examined to identify key 'worst-case' periods that were identified by the presence of the following noise risk factors:

- Minimal distance between source and residential locations
- Minimal screening available to residential locations from site equipment (e.g. when equipment operating at elevated position compared to dwelling).

Based on the Concept Sequence of Waste Filling, Construction and Rehabilitation plans prepared by Golder Associates dated 4 February 2016, Steps 4 and 5 have been identified as 'worst-case' scenarios for all existing receivers located south west of the site. Step 11 has been identified as the worst case scenario for receivers located to the north and east of the site. These 'worst-case' scenarios have been used to form the basis of the noise assessment. For each cell/stage, the nominated equipment is located in the position which will typically produce the highest noise levels at the nearest residential dwelling. This results in equipment being modelled at a location within the landfill cell which is closest to the worst affected residential dwelling or if there is topographic shielding, the location which produces the highest noise levels may be the highest position within the landfill cell.

It is understood that interim capping and capping will not occur simultaneously, and therefore only the worst case of the capping or the interim capping has been included in our assessment.

A description of each stage is provided below.

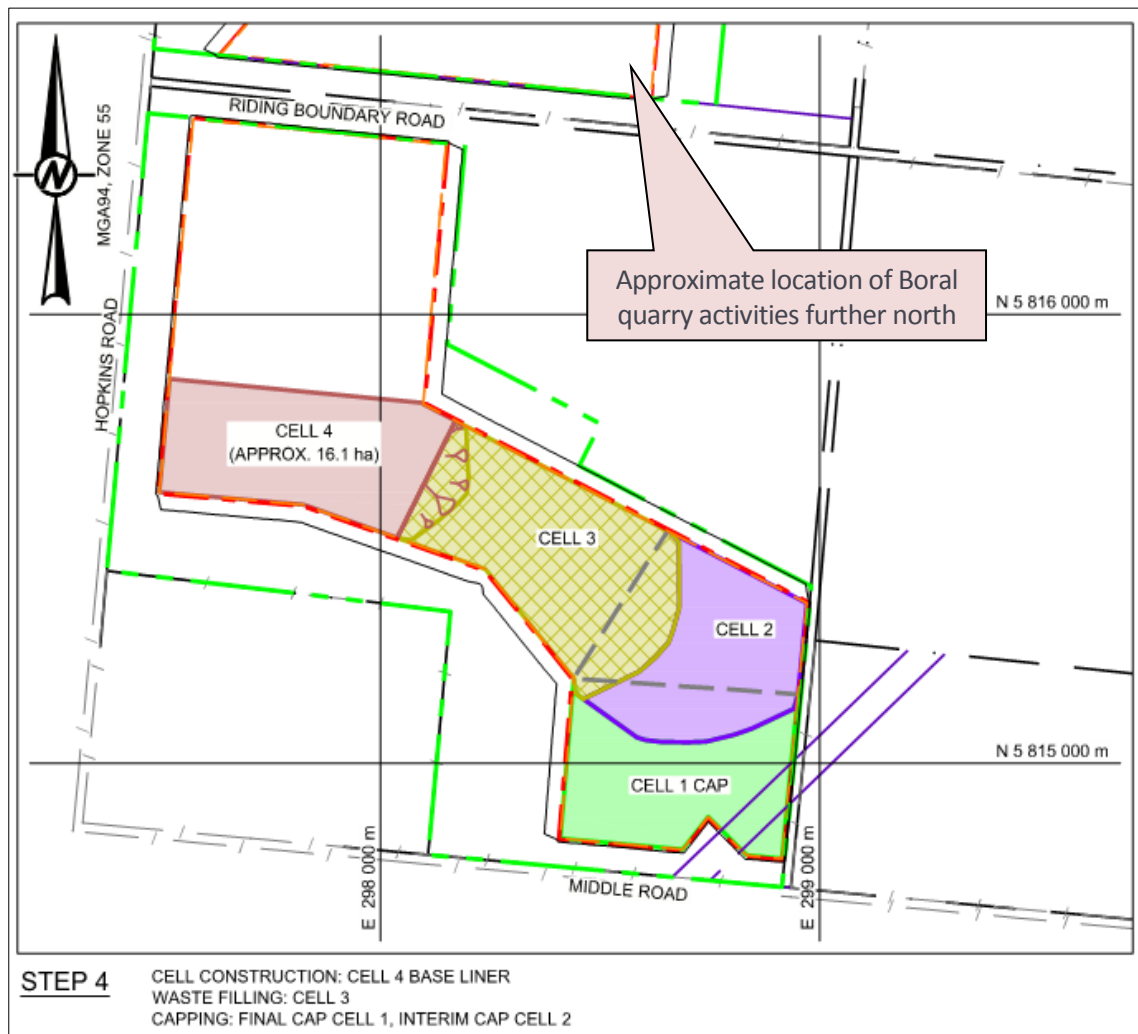
6.2.1 Cell Sequencing Step 4

As detailed in Figure 3, Step 4 involves Cell Construction in Cell 4, Filling in Cell 3 and Capping in Cell 1. During this time, it is understood that Boral quarrying operations will take place north of Riding Boundary Road (in Cell 14).

Table 4: Step 4 Worst-case operational model scenario description

Description of activity	Location	Operational height
Capping	Cell 1	40m above natural ground level
Filling	Cell 3	30m above natural ground level
Construction/Cell preparation	Cell 4	10m below natural ground level
Boral Quarrying	North of Landfill activity (Cell 14)	10m below natural ground level
Other Boral site activities (Asphalt Batching Plant, Concrete Batching Plant, Quarry processing)	Existing fixed location	At natural ground level

Figure 3: Cell Sequencing Step 4



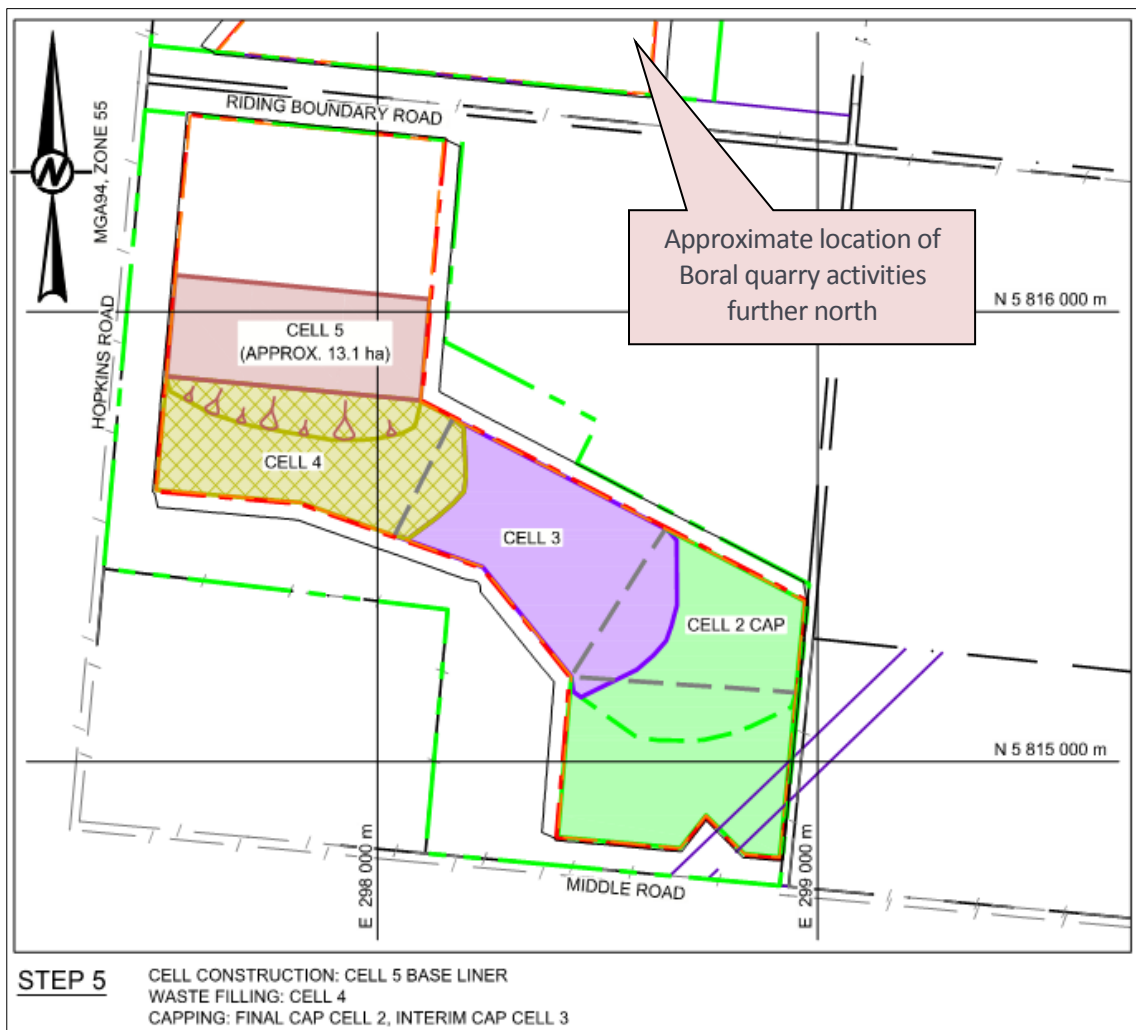
6.2.2 Cell Sequencing Step 5

As detailed in Figure 5 below, Step 5 involves Cell Construction in Cell 5, Filling in Cell 4 and Capping in Cell 2. During this time, it is understood that Boral quarrying operations will take place north of Riding Boundary Road (in Cell 14).

Table 5: Step 5 Worst-case operational model scenario description

Description of activity	Location	Operational height
Capping	Cell 2	40m above natural ground level
Filling	Cell 4	30m above natural ground level
Construction/Cell preparation	Cell 5	10m below natural ground level
Boral Quarrying	North of Landfill activity (Cell 14)	10m below natural ground level
Other Boral site activities (Asphalt Batching Plant, Concrete Batching Plant, Quarry processing)	Existing fixed location	At natural ground level

Figure 4: Cell Sequencing Step 5



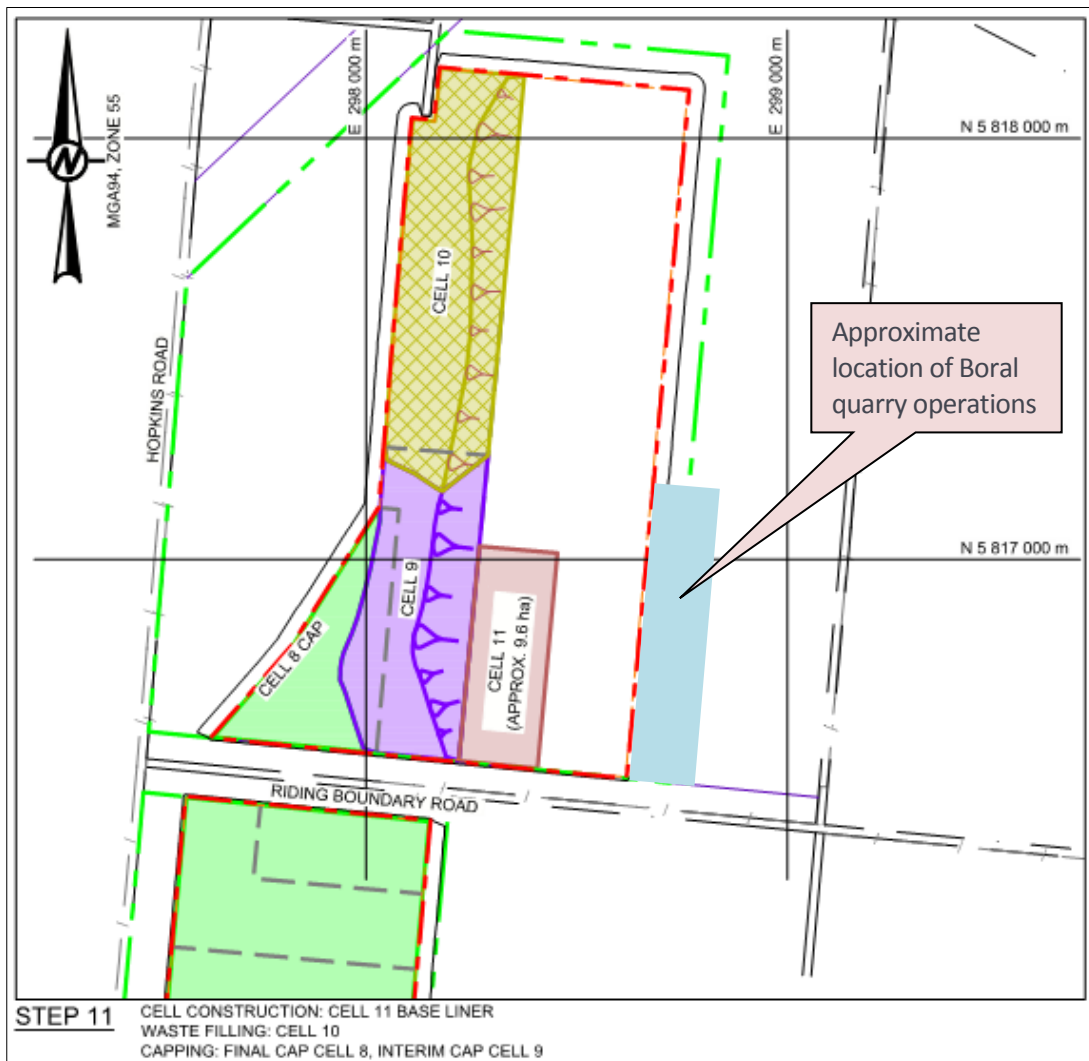
6.2.3 Cell Sequencing Step 11

As detailed in Figure 5 below, Step 11 involves Cell Construction in Cell 11, Filling in Cell 10 and Capping in Cell 9. During this time, it is understood that Boral quarrying operations will take place north of Riding Boundary Road (east of Cells 14 and 15).

Table 6: Step 11 Worst-case operational model scenario description

Description of activity	Location	Operational height
Interim Capping	Cell 9	40m above natural ground level
Filling	Cell 10	30m above natural ground level
Construction/Cell preparation	Cell 11	10m below natural ground level
Boral Quarrying	East of Cell 14 and 15	10m below natural ground level
Other Boral site activities (Asphalt Batching Plant, Concrete Batching Plant, Quarry processing)	Existing fixed location	At natural ground level

Figure 5: Cell Sequencing Step 11



6.3 Noise character penalties

According to SEPP N-1 guidance, character adjustments are added to noise sources under specific circumstances to account for annoying aspects of the noise. For major premises (as relevant in this case), SEPP N-1 prescribes penalties for the duration, intermittency and tonality of noise sources.

The duration of noise sources refers to the percentage of time a particular item of equipment would be in operation in any given 30-minute assessment period. Information regarding operational durations for mobile plant has been supplied by the client. Most items of plant have been assumed to operate continuously, unless otherwise informed by the client. Site trucks have been assumed to travel continuously on haul routes and within pit areas, stopping only for loading and unloading activities. Based on the haul routes provided, haul trucks on-site are able to complete 1-2 loops of the site in a 30 minute period. Third-party trucks arriving at the site to unload waste or load product have been assigned duration penalties according to the number of trucks arriving per half hour period, as provided by the client.

A tonality correction of +2dB has been added to the predicted noise level for noise sources that could attract tonality penalties, such as customer trucks with reverse beepers. It is understood that all Cleanaway mobile plant and haul trucks will be fitted with broadband reverse alarms, which eliminate the tonal characteristics of the noise.

7.0 NOISE MITIGATION MEASURES

Noise mitigation measures to achieve compliance with the SEPP N-1 noise limits are detailed in the following sections. Subject to the proximity of the plant, some noise mitigation measures will only need to be implemented for certain stages of the proposal.

7.1 Overall site mitigation

The following noise mitigation has been applied for all assessed steps:

- Customer trucks with tonal reverse alarms will not be accepted on-site during the night-time period. All third party trucks accessing the site during the night-time will be fitted with broadband reverse alarms.
- Cat D8 and D9 dozers will only be used during the day time period. Operations will need to be controlled to ensure that only Leibherr PR736 dozers¹ are used during the evening and night-time period.
- Additional silencing of mobile plant will be carried out by selecting equipment based mitigation packages to provide the following reduction as a minimum:

Table 7: Anticipated reduction value of equipment based mitigation

Item	Equipment based mitigation package	Anticipated reduction value
Haul trucks (does not include customer trucks travelling along haul route)	Exhaust/intake attenuation	-5dB
Water trucks	Exhaust/intake attenuation	-5dB
Dozers	Exhaust/intake attenuation	-4dB
Excavators	Exhaust/intake attenuation	-4dB
Compactor	Sound panels and additional exhaust attenuation	-5dB

¹ Dozer plant with equivalent sound power levels can be used during the evening and night-time period operations.

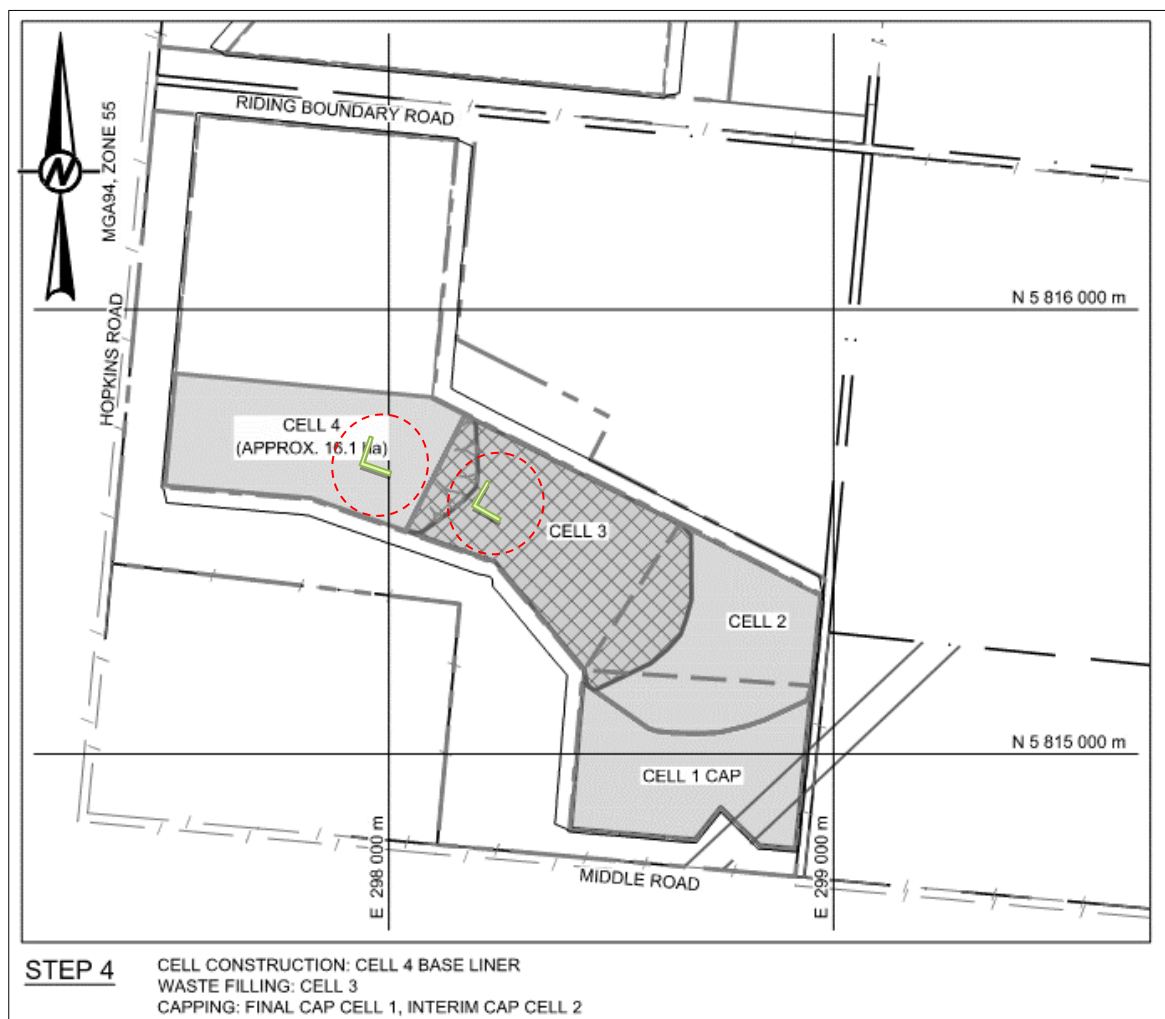
7.2 Additional mitigation

7.2.1 Step 4

During Step 4 of the landfill operations, in addition to the mitigation measures listed in Section 7.1, the following additional mitigation will need to be incorporated:

- 4m high localised earth berms will need to be constructed in the vicinity of filling and cell construction plant. The indicative location and extent of the earth berms are presented in Figure 6 below.

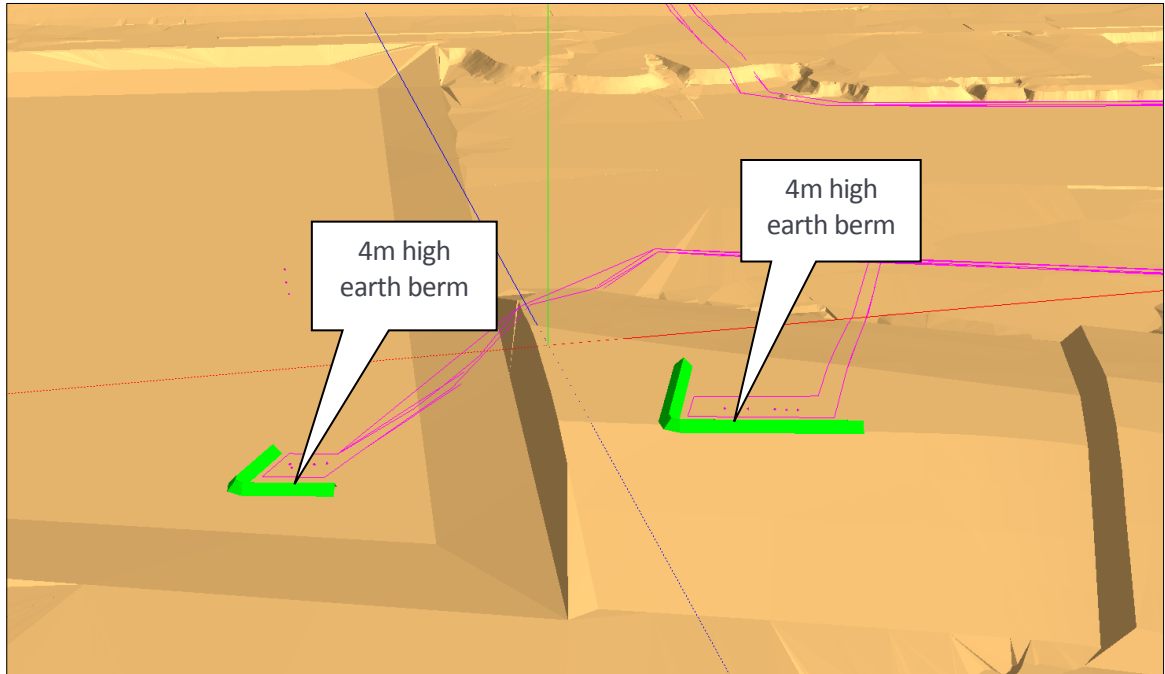
Figure 6: Location of 4m high earth berms during Step 4



The location and extent shown in Figure 6 for the earth berm is only indicative. The exact location and length of the earth berm will need to be determined based on where mobile plant is operating on the site.

The height of the earth berms will need to be at least 4m. A 3-D representation of the earth berm as modelled by MDA is presented in Figure 7 below for reference.

Figure 7: 4m high earth berms in vicinity of cell construction and filling plant

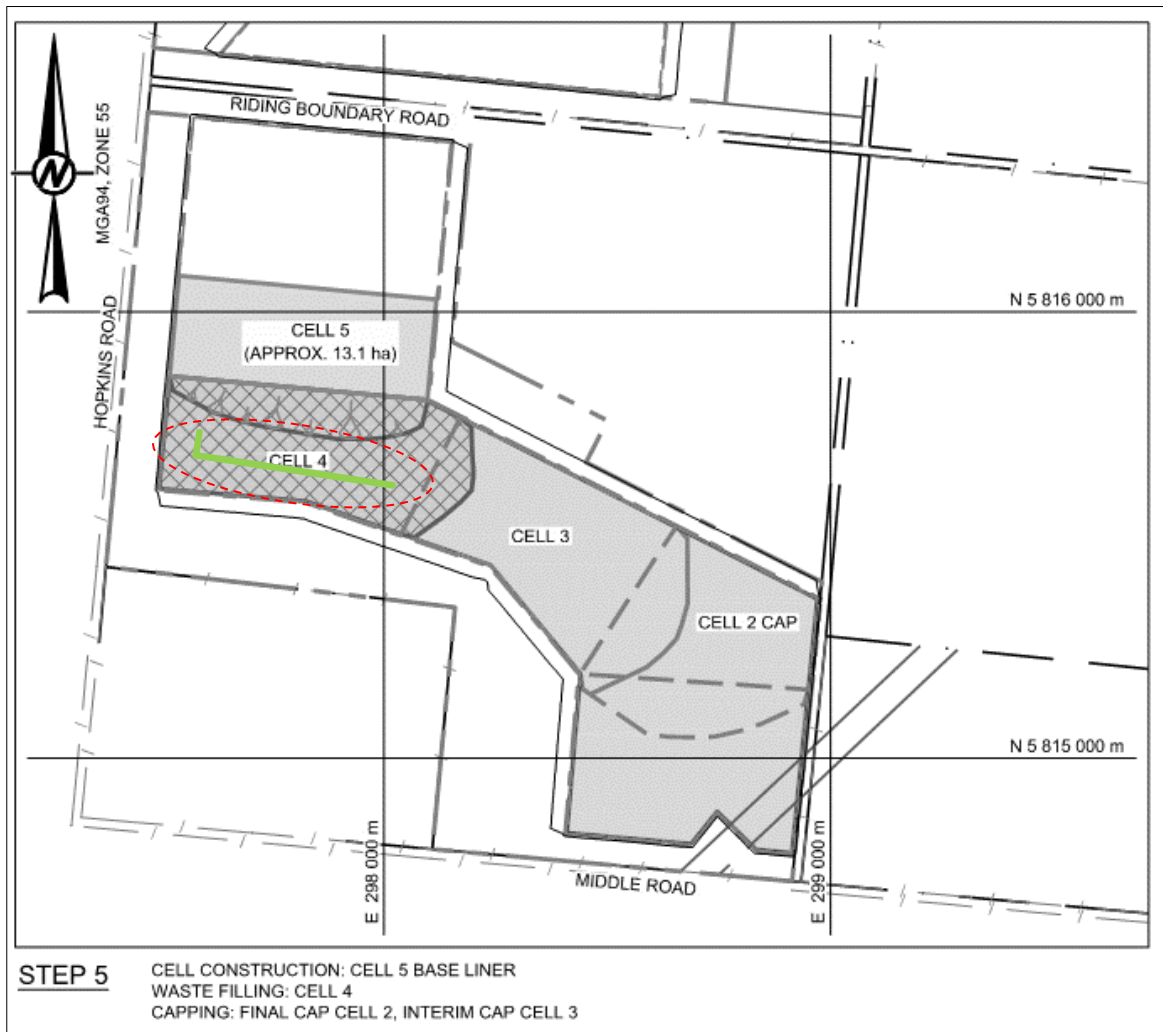


7.2.2 Step 5

During Step 5 of the landfill operations, in addition to the mitigation measures listed in Section 7.1, the following additional mitigation will need to be incorporated:

- A 4m high earth berm will need to be constructed in Cell 4. The indicative location and extent of the earth berm is presented in Figure 8 below.

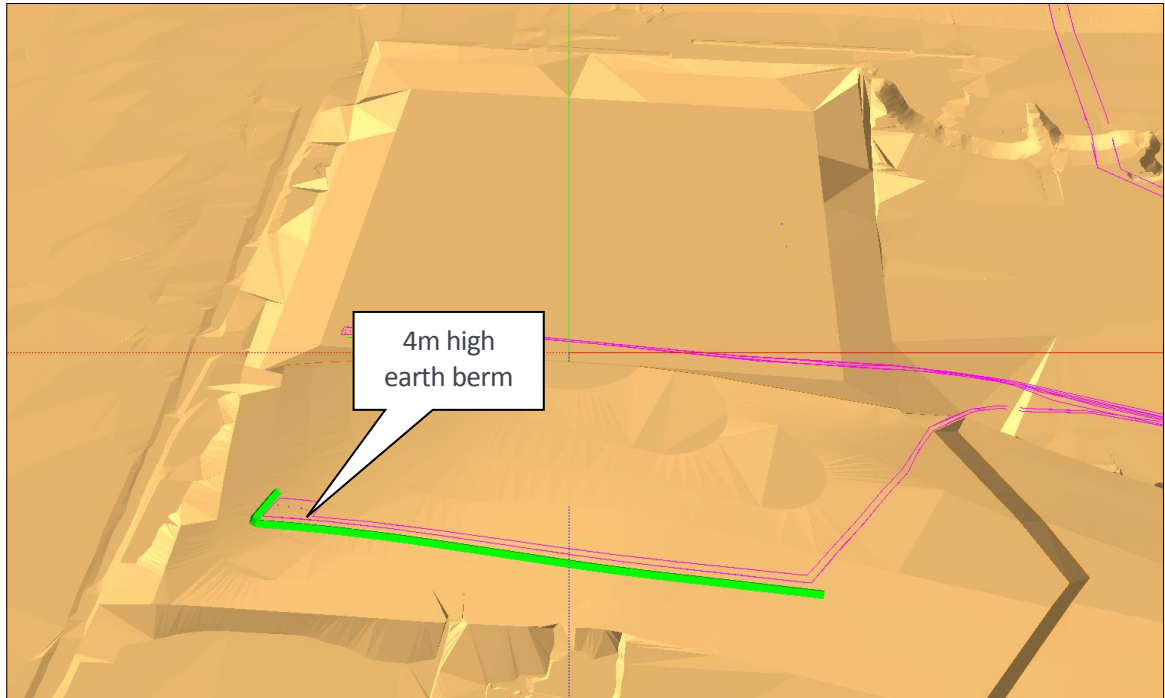
Figure 8: Location of 4m high earth berm during Step 5



The location and extent shown in Figure 8 for the earth berm is only indicative. The exact location and length of the earth berm will need to be determined based on where plant is operating on the site and on the haul routes when filling takes place in Cell 4. At this stage the approximate (modelled) length of the earth berm is 480m. The berm will need to have a minimum height of 4m.

A 3-D representation of the earth berm as modelled by MDA is presented in Figure 9 below for reference.

Figure 9: 4m high earth berm in Cell 4



7.2.3 Step 11

For Step 11, general mitigation options listed in Section 7.1 will be sufficient to achieve compliance with the noise limits at the nearest affected receivers.

8.0 PREDICTED NOISE LEVELS

Based on the above modelling assumptions and the mitigation measures detailed, the predicted noise levels at the nearest affected receivers are provided below. For each Step of the Cell Sequencing Plan that has been considered, noise levels have been predicted at the worst affected receivers. Compliance at the worst affected receivers will result in compliance being achieved at other receivers which are located further away from the proposed operations.

The noise levels predicted for landfill activity include a +2dB tonality correction to day and evening time levels to account for reversing beepers of trucks that are not owned and operated by Cleanaway. The tonality correction has not been added to predicted noise levels for the night-time operations as it is understood that Cleanaway will not accept trucks with tonal reverse alarms during the night-time period.

8.1 Step 4

Predicted noise levels from proposed day-time operation during Step 4 of the proposal are presented in Table 8 below.

Table 8: Step 4 Predicted day-time noise level, dB L_{eff}

Receiver location	MRL Landfill operations	Boral Quarry operations	Cumulative noise level ¹	Noise limit	Comment
522 Middle Rd	46	39	49	50	Compliant
548 Middle Rd	43	38	47	50	Compliant
619 Hopkins Rd	39	36	43	50	Compliant
655 Hopkins Rd	39	36	43	50	Compliant
687 Hopkins Rd	38	35	42	50	Compliant

¹ Includes +2dB tonality correction

Predicted noise levels from proposed evening-time operation during Step 4 of the proposal are presented in Table 9 below.

Table 9: Step 4 Predicted evening-time noise level, dB L_{eff}

Receiver location	MRL Landfill operations	Boral Quarry operations	Cumulative noise level ¹	Noise limit	Comment
522 Middle Rd	31	39	42	44	Compliant
548 Middle Rd	35	38	42	44	Compliant
619 Hopkins Rd	31	36	39	44	Compliant
655 Hopkins Rd	31	35	39	44	Compliant
687 Hopkins Rd	30	35	38	44	Compliant

¹ Includes +2dB tonality correction

Predicted noise levels from proposed night-time operation during Step 4 of the proposal are presented in Table 10 below.

Table 10: Step 4 Predicted night-time noise level, dB L_{eff}

Receiver location	MRL Landfill operations	Boral Quarry operations	Cumulative noise level	Noise limit	Comment
522 Middle Rd	30	39	39	40	Compliant
548 Middle Rd	34	38	40	40	Compliant
619 Hopkins Rd	30	36	37	40	Compliant
655 Hopkins Rd	30	35	37	40	Compliant
687 Hopkins Rd	28	35	36	40	Compliant

Based on the operational details provided by Cleanaway, and the mitigation measures detailed in Section 7.0 above, compliance with SEPP N-1 can be achieved during all time periods at the worst affected receivers located on Hopkins Road and Middle Road.

8.2 Step 5

Predicted noise levels from proposed day-time operations during Step 5 of the proposal are presented in Table 11 below.

Table 11: Step 5 Predicted day-time noise level, dB L_{eff}

Receiver location	MRL Landfill operations	Boral Quarry operations	Cumulative noise level ¹	Noise limit	Comment
522 Middle Rd	47	40	50	50	Compliant
548 Middle Rd	45	38	47	50	Compliant
619 Hopkins Rd	41	35	44	50	Compliant
655 Hopkins Rd	40	35	44	50	Compliant
687 Hopkins Rd	38	34	42	50	Compliant

¹ Includes +2dB tonality correction

Predicted noise levels from proposed evening-time operation during Step 5 of the proposal are presented in Table 12 below.

Table 12: Step 5 Predicted evening-time noise level, dB L_{eff}

Receiver location	MRL Landfill operations	Boral Quarry operations	Cumulative noise level ¹	Noise limit	Comment
522 Middle Rd	31	39	42	44	Compliant
548 Middle Rd	38	38	43	44	Compliant
619 Hopkins Rd	35	35	40	44	Compliant
655 Hopkins Rd	34	35	40	44	Compliant
687 Hopkins Rd	31	34	38	44	Compliant

¹ Includes +2dB tonality correction

Predicted noise levels from proposed night-time operation during Step 5 of the proposal are presented in Table 13 below.

Table 13: Step 5 Predicted night-time noise level, dB L_{eff}

Receiver location	MRL Landfill operations	Boral Quarry operations	Cumulative noise level	Noise limit	Comment
522 Middle Rd	30	39	40	40	Compliant
548 Middle Rd	37	38	40	40	Compliant
619 Hopkins Rd	34	35	38	40	Compliant
655 Hopkins Rd	33	35	37	40	Compliant
687 Hopkins Rd	34	31	36	40	Compliant

Based on the operational details provided by Cleanaway, and the mitigation measures detailed in Section 7.0 above, compliance with SEPP N-1 can be achieved during all time periods at the worst affected existing receivers located on Hopkins Road and Middle Road.

8.3 Step 11

Predicted noise levels from proposed day-time operation during Step 11 of the proposal are presented in Table 14 below.

Table 14: Step 11 Predicted day-time noise level, dB L_{eff}

Receiver location	MRL Landfill operations	Boral Quarry operations	Cumulative noise level ¹	Noise limit	Comment
522 Middle Rd	36	40	43	50	Compliant
106 Riding Boundary Rd	33	45	48	50	Compliant
1315 Western Highway	39	35	42	59	Compliant
27 Sheahan Road	39	33	42	53	Compliant
129 Greigs Road	35	31	39	53	Compliant
Dame Phyllis Frost Centre	31	45	47	56	Compliant

¹ Includes +2dB tonality correction

Predicted noise levels from proposed evening-time operation during Step 11 of the proposal are presented in Table 15 below.

Table 15: Step 11 Predicted evening-time noise level, dB L_{eff}

Receiver location	MRL Landfill operations	Boral Quarry operations	Cumulative noise level ¹	Noise limit	Comment
522 Middle Rd	27	39	42	44	Compliant
106 Riding Boundary Rd	28	45	47	50	Compliant
1315 Western Highway	35	35	40	54	Compliant
27 Sheahan Road	35	33	42	54	Compliant
129 Greigs Road	30	31	36	54	Compliant
Dame Phyllis Frost Centre	27	45	47	53	Compliant

¹ Includes +2dB tonality correction

Predicted noise levels from proposed night-time operation during Step 11 of the proposal are presented in Table 16 below.

Table 16: Step 11 Predicted night-time noise level, dB L_{eff}

Receiver location	MRL Landfill operations	Boral Quarry operations	Cumulative noise level	Noise limit	Comment
522 Middle Rd	26	39	40	40	Compliant
106 Riding Boundary Rd	26	45	45	45	Compliant
1315 Western Highway	34	35	38	52	Compliant
27 Sheahan Road	33	33	36	54	Compliant
129 Greigs Road	28	31	33	54	Compliant
Dame Phyllis Frost Centre	25	45	45	48	Compliant

Based on the operational details provided by Cleanaway, and the mitigation measures detailed in Section 7.0 above, compliance with SEPP N-1 can be achieved during all time periods at all the nearest affected noise sensitive receivers.

8.4 Noise contour maps

Noise contour maps for Steps 4, 5 and 11 are provided in Appendix H.

9.0 CONCLUSION

Cleanaway has commissioned a noise assessment for the extension to its landfill site in Ravenhall.

The noise assessment accounts for the following:

- Noise data obtained to represent future equipment operation at the site based on manufacturer data, on-site measurements and current Australian and British standards
- Noise data for the operation of the existing Boral quarry site adjacent to the landfill site
- Changing topographical heights over the course of the proposal

Noise criteria for the project have been determined in accordance with the SEPP N-1, the applicable guideline document for industrial noise sources in metropolitan Victoria.

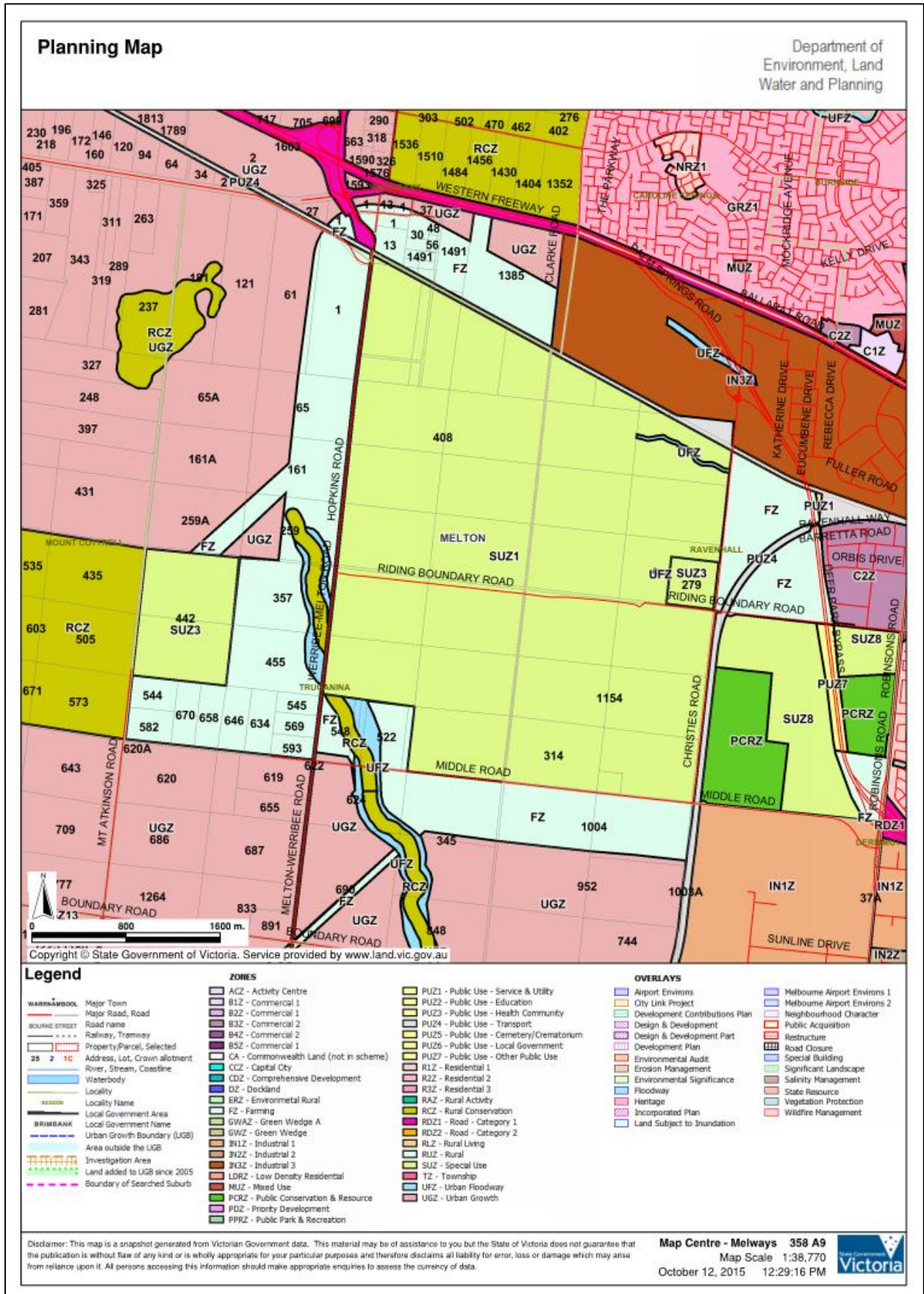
Multiple mitigation strategies have been developed to mitigate noise from the site during the various stages of the proposal.

With the recommended mitigation measures incorporated into the design, effective noise levels during the worst case operating scenarios of Step 4, Step 5 and Step 11 for the day, evening and night-time periods are predicted to comply with the noise limits at the nearest noise sensitive receivers.

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.
Frequency	The number of pressure fluctuation cycles per second of a sound wave. Measured in units of Hertz (Hz).
Hertz (Hz)	Hertz is the unit of frequency. One hertz is one cycle per second. One thousand hertz is a kilohertz (kHz).
dB	Decibel. The unit of sound level.
L_{A90}	The noise level exceeded for 90% of the measurement period, measured in dB. This is commonly referred to as the background noise level.
L_{Aeq}	The equivalent continuous sound level, measured in dB. This is commonly referred to as the average noise level.
L_{eff}	The effective noise level of commercial or industrial noise determined in accordance with <i>State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1</i> (SEPP N-1). This is the L _{Aeq} noise level over a half-hour period, adjusted for the character of the noise, measured in dB. Adjustments are made for tonality, intermittency and impulsiveness.
L_w (or SWL)	Sound Power Level. The level of total sound power radiated by a sound source.
Octave band	Sound, which can occur over a range of frequencies, may be divided into octave bands for analysis. The audible frequency range is generally divided into 7 octave bands. The octave band frequencies are 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz and 4kHz.

APPENDIX B PLANNING MAP



APPENDIX C EQUIPMENT SCHEDULE

Table C1: Proposed equipment for operations during the SEPP N-1 day time period

Description of activities	Mobile plant type	Manufacturer/ model	Number operating	Operating height	Operational Comment
Waste placement	Compactor	Cat 836K	1	2.5m	
	Compactor	Cat 836H	1	2.5m	
	Bulldozer	Cat D8	1	2.5m	
	Bulldozer	Cat D9	1	2.5m	
	Haul Trucks	-	3	2m	
	Front End Loader	-	1	2m	Operating at stockpile only
	Excavator	-	2	2.5m	One operating at tip face, one operating at stockpile
	Third-party trucks	Various	31 trucks per half hour during Steps 4 32 trucks per half hour during Step 5 34 trucks per half hour during Step 11	2m	
Cell construction	Bulldozer	Leibherr PR736	1	2.5m	
	Grader	-	1	2m	
	Haul Truck	Volvo A40	1	2m	
	Haul Truck	Volvo A35	1	2m	
	Front End Loader	966	1	2m	
	Flat Drum Roller	-	1	2m	
	Pad Foot Roller	-	1	2m	
	Water Cart	-	1	2m	
	Tele-handler	-	1	2m	Not working in conjunction with rollers or water cart
	36T Excavator	-	1	2.5m	

Description of activities	Mobile plant type	Manufacturer/ model	Number operating	Operating height	Operational Comment
Capping	36T Excavator	-	1	2.5m	
	40 T Articulated Dump Truck	-	2	2m	Not operated in conjunction with scrapers
	Bulldozer	Leibherr PR736	1	2.5m	
	Grader	-	1		Not operated in conjunction with scrapers
	Water Cart	-	1		
	Scraper	Cat 627	2	2.5m	Not operated in conjunction with grader/haul trucks/excavator/d ozer.

Table C2: Proposed equipment for operations during the SEPP N-1 evening period

Description of activities	Mobile plant type	Manufacturer/ model	Number operating	Operating height	Operational Comment
Waste placement	Compactor	Cat 836K	1	2.5m	
	Bulldozer	Leibherr PR736	1	2.5m	
	Haul Trucks	-	3	2m	
	Third-party trucks	Various	10 trucks per half hour during Steps 4 and 5 11 trucks per half hour during Step 11	2m	

Table C3: Proposed equipment for operations during the SEPP N-1 night period

Description of activities	Mobile plant type	Manufacturer/ model	Number operating	Operating height	Operational Comment
Waste placement	Compactor	Cat 836K	1	2.5m	
	Bulldozer	Leibherr PR736	1	2.5m	
	Third-party trucks	Various	20 trucks per half hour during Steps 4 and 5 22 trucks per half hour during Step 11	2m	

APPENDIX D SEPP N-1 POLICY FRAMEWORK

D1 Application

State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (SEPP N-1) sets noise limits that apply to commercial, industrial and trade premises within the Melbourne metropolitan region. Compliance with SEPP N-1 is mandatory under section 46 of the *Environment Protection Act 1970* (Act).

SEPP N-1 defines a 'commercial, industrial and trade premises' as:

any premises except:

- (a) residential premises as defined in section 48A of the [Environment Protection] Act;*
- (b) a street or road, including every carriageway, footpath, reservation and traffic island on any street or road;*
- (c) a tram, light rail or railway line not being a siding, marshalling yard or maintenance depot of any tram, light rail or railway line; and*
- (d) [land situated at Luna Park, St Kilda].*

Section 48A of the Act defines residential premises as:

any building or part of a building used as or for the purposes of a private residence or residential flat.

D2 Assessment methodology

SEPP N-1 is a policy and technical document. The Policy prescribes the methodology and measurement procedure used to determine applicable noise limits and assessment of compliance.

The Policy requires that proposed commercial premises be designed to comply with SEPP N-1 noise limits. Clause 16 of the Policy states:

Where it is planned to develop new commercial, industrial or trade premises, the premises shall be designed so that the noise emissions do not exceed the noise limits

Further, the occupier of commercial, industrial or trade premises has an ongoing obligation to meet the SEPP N-1 noise limits. Clause 15 of the Policy states:

where noise emissions from existing commercial, industrial or trade premises exceed the requirements set out in the Policy, steps shall be taken by the occupier to reduce the level of these noise emissions to, or below, the relevant Policy noise limits.

SEPP N-1 defines a 'noise sensitive area' as an area of land within 10m outside the external walls of:

- *a dwelling or residential building*
- *a dormitory, ward or bedroom of a caretaker's house, hospital, hotel, institutional home, motel, reformatory institution, tourist establishment or work release hostel.*

The assessment of noise from the subject site 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 zoning types in the surrounding area and the background noise level.

Once a noise limit is established, the noise level (L_{Aeq}) due to the commercial premises is measured or predicted. If necessary, the L_{Aeq} noise level is adjusted for noise character and duration to give the effective noise level (L_{eff}). If the L_{eff} level exceeds the noise limit, then remedial action is required.

SEPP N-1 defines the time periods provided in Table E1.

Table D1: SEPP N-1 time periods

Period	Day	Time
Day	Monday-Friday	0700-1800hours
	Saturday	0700-1300hours
Evening	Monday-Friday	1800-2200hours
	Saturday	1300-2200hours
	Sunday/Public Holidays	0700-2200hours
Night	Monday-Sunday/Public Holidays	2200-0700hours

D3 Calculation of noise limits

SEPP N-1 noise limits are calculated taking into account land 'zoning types' within a 70m and 200m radius of a noise sensitive building. Zoning types are categorised as type 1, 2 or 3.² A prescribed formula is used to calculate a corresponding Zoning Level. In general, zone type designations are as follows.

- areas such as residential, rural and open space are type 1;
- areas such as commercial, business and light industry are type 2; and
- areas such as general industry and major roads are type 3.

Greater areas of type 2 and 3 land within a 200m radius of a noise sensitive site result in higher Zoning Levels than a site with respectively larger areas of type 1 land.

The SEPP N-1 Noise Limit is equal to the 'zoning level' unless the background level at the noise sensitive site is categorised as low or high according to Clause B3 of the Policy. If the background level is low or high, the Noise Limit is calculated from a formula taking into account the Zoning Level and the Background Level. For the calculation of SEPP N-1 limits for this assessment, the following zones which are not currently designated a zone type by the EPA would be Type 1: Farming Zone (FZ), Urban Growth Zone (UGZ), Rural Conservation Zone (RCZ) and Urban Floodway Zone (UFZ).

Noise limits for the project have been derived for four different locations, due to the relatively large distance between residential receivers, and subsequent variation in local zoning and background noise conditions at each receiver surrounding the Cleanaway site.

² EPA Publication no.: 316a, 17 February 2000, *Designation of Types of Zones and Reservations in the Metropolitan Region Planning Schemes for the Purposes of State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1* <<http://www.epa.vic.gov.au/our-work/publications/publication/2000/february/316a>>

SEPP N-1 noise limits have been derived for the following receivers:

- 522 Middle Rd, Truganina, to the southwest of the site
- 548 Middle Rd, Truganina, to the southwest of the site
- 619 Hopkins Rd, Truganina, to the southwest of the site
- 655 Hopkins Rd, Truganina, to the southwest of the site
- 687 Hopkins Rd, Truganina, to the southwest of the site
- 27 Sheahan Road, Rockbank, to the north of the site
- 1315 Western Highway, Ravenhall, to the northeast of the site
- 129 Greigs Road, Truganina, to the northwest of the site
- 106 Riding Boundary Rd, Ravenhall, to the east of the site
- Dame Phyllis Frost Centre, Riding Boundary Road, Ravenhall, to the east of the site (also features a 5m high perimeter wall around the entire site).

The derived SEPP N-1 noise limits are shown in Tables D2-D6.

Table D2: SEPP N-1 derived noise limits, dB – East residences

Time period	Zoning level	Background noise level, LA90	Noise limit, Leff
Day	50	44	50
Evening	44	47	50
Night	39	42	45

Table D3: SEPP N-1 derived noise limits, dB – Dame Phyllis Frost Centre (East of site)

Time period	Zoning level	Background noise level, LA90	Noise limit, Leff
Day	59	44	56
Evening	53	47	53
Night	48	42	48

Table D4: SEPP N-1 derived noise limits, dB – Northeast residences

Time period	Zoning level	Background noise level, LA90	Noise limit, Leff
Day	59	47	59
Evening	53	51*	54
Night	48	49	52

*No evening attended measurement data was captured at the North residential location, therefore the evening noise limit was calculated using the evening attended measurement from the North-west residential location.

Table D5: SEPP N-1 derived noise limits, dB – North and north-west residences

Time period	Zoning level	Background noise level, L_{A90}	Noise limit, L_{eff}
Day	51	47	53
Evening	45	51	54
Night	40	51	54

Table D6: SEPP N-1 derived noise limits, dB – Southwest residences

Time period	Zoning level	Background noise level, L_{A90}	Noise limit, L_{eff}
Day	50	41*	50
Evening	44	40*	44
Night	39	37*	40

* Background noise levels at the South-west location were taken from the automated noise logger, rather than the short-term attended measurements (see Table C4, Appendix D). This is due to the lower background noise levels that were captured by the logger over a full week logging period, resulting in a more conservative noise limit.

APPENDIX E NOISE MODEL INPUT DATA AND ASSUMPTIONS

Feature	Description
Site terrain data (existing)	General area data sourced from VicMaps
Site terrain data (ultimate)	Finished levels provided by the client in digital format
Site terrain data (operational levels)	Operating terrain levels for modelled scenarios developed by MDA based on ground height data provided by the client
Environmental ground conditions	The site and surrounding ground is assumed to be 50% 'hard ground', accounting for light vegetation and earthen terrain.
Site development plan	Supplied by the client
Equipment schedule	Supplied by the client
Dwelling heights	Assumed to be single storey
Receiver heights	1.5m above ground
Noise calculation method	Noise propagation calculated according to ISO 9613-2:1996
Description of proposed activities on site	Provided by the client
Noise mitigation measures	Discussed with Cleanaway and implemented in 3D model by MDA
Noise data for all landfill equipment	Selected from a review of data from equipment manufacturers, on-site measurements and current Australian and International standards and measurements to represent the typical upper range of noise levels described for each item of equipment
Noise data for Boral site equipment	Sourced from <i>Rp 001 r03 2015252ML Melbourne Regional Landfill</i> dated 15 May 2015
Truck speed (associated with landfill)	All haul trucks at 10km/h. Customer trucks at 20 km/h.
Third party truck schedules	<p>Step 4:</p> <p>31 trucks per half hour during the SEPP N-1 day period (see Table E1)</p> <p>10 trucks per half hour during SEPP N-1 evening period (see Table E1)</p> <p>20 trucks per half hour during SEPP N-1 night period (see Table E1)</p> <p>Step 5:</p> <p>32 trucks per half hour during the SEPP N-1 day period (see Table E1)</p> <p>10 trucks per half hour during SEPP N-1 evening period (see Table E1)</p> <p>20 trucks per half hour during SEPP N-1 night period (see Table E1)</p> <p>Step 11:</p> <p>35 trucks per half hour during the SEPP N-1 day period (see Table E1)</p> <p>11 trucks per half hour during SEPP N-1 evening period (see Table E1)</p> <p>22 trucks per half hour during SEPP N-1 night period (see Table E1)</p>

E1 Additional Modelling assumptions and operational variations

- It is understood that the Front End Loader and Excavator used for capping will not operate simultaneously. Therefore, for filling activities, only 1 excavator at stockpile location has been considered in our typical worst case 30 minute period assessment
- The telehandler will not operate at the same time as the rollers for Cell Construction. Therefore, it has been excluded from the typical worst case 30 minute period assessment
- It is understood that 2 CAT 627 Scrapers will also be used for Capping. However, they are not expected to be used at the same time as the haul trucks and have therefore not been included in the typical worst case 30 minute period assessment. Furthermore, it is understood that the water cart will not operate at the same time as other plant. Therefore, for the purpose of our modelling, we have assumed that the grader and water cart will not operate simultaneously and will only operate for half the time each in a 30 minute period
- A 2dB tonality penalty has been added to the predicted noise levels for the day time and evening operations for customer trucks with tonal reverse alarms.
- The CAT D8 and D9 dozers will not be used for evening and night-time operations. Only the Leibherr PR736 dozer (or plant with equivalent sound power level) will be used for evening and night-time operations.
- Noise from quarrying operations (Boral) has been included in the assessment based on the report provided to MDA. This includes quarry processing plant, concrete batching plant and asphalt batching plant. Fixed plant associated with the quarry is assumed to remain in its existing location. The following quarrying schedule is considered for the purpose of modelling moving plant associated with the Boral quarry.

MRL Operation	Boral Quarry Activity locations
Step 4	North of Riding Boundary Road (Cell 14)
Step 5	North of Riding Boundary Road (Cell 14)
Step 11	North of Riding Boundary Road (East of Cell 14 and 15)

APPENDIX F EQUIPMENT SOUND POWER DATA

Table F1: Octave band sound power levels used in noise model, dB

Source	Plant number/ Quantity	Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	A
<i>Landfill – Waste Placement</i>										
Compactor CAT 836H 60T	CLEANAWAY618	99	107	109	105	106	100	97	93	109
Compactor CAT 836H 60T	CLEANAWAY618	99	107	109	105	106	100	97	93	109
Bulldozer CAT D8T	CLEANAWAY779	122	122	116	114	113	111	105	100	118
Bulldozer CAT D9T	CLEANAWAY724	122	122	116	114	113	111	105	100	118
Haul Trucks	-	123	120	115	112	109	107	102	-	115
Front End Loader	-	115	111	108	101	100	99	93	87	106
Excavator	-	111	114	107	108	105	102	98	93	110
Third party trucks	-	118	107	104	101	101	98	92	-	105
<i>Landfill – Cell Construction</i>										
Dozer Leibherr PR736		115	115	109	107	106	104	98	93	111
Grader CAT 120G	CLEANAWAY737	111	110	106	102	107	101	97	88	110
Dump Trucks Volvo A40D	-	123	123	115	112	110	107	101	95	115
Dump Trucks Volvo A35D	-	123	123	115	112	110	107	101	95	115
Front End Loader CAT 966	CLEANAWAY811	115	111	108	101	100	99	93	87	106

Source	Plant number/ Quantity	Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	A
Flat Drum Roller	CLEANAWAY743	122	117	111	108	105	101	97	94	111
Water Cart	CLEANAWAY753	116	116	108	105	103	100	94	-	109
Tele Handler	-	119	112	102	101	104	98	91	83	107
Excavator 30T	CLEANAWAY850	109	114	107	105	102	99	95	89	108
Pad Foot Roller	-	122	117	111	108	105	101	97	94	111
Landfill – Capping										
36T Excavator CAT	-	109	114	107	105	102	99	95	89	108
Articulated Dump Truck 40T	-	123	123	115	112	110	107	101	-	116
Bulldozer Leibherr PR736		115	115	109	107	106	104	98	93	111
Grader	-	111	110	106	102	107	101	97	88	110
Water Cart	-	116	116	108	105	103	100	94	-	109

Source	Plant number/ Quantity	Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	A
Quarry Equipment										
Drill Rigs Boral DR3057/DR3059	1	120	115	107	105	102	106	100	97	111
Dump Truck CAT 777F*	2	114	116	109	108	108	105	99	-	112
Dump Truck CAT HD465-5*	1	123	123	115	112	110	107	101	-	116
Wheel Loader CAT 992G	1	113	116	111	110	110	107	103	95	114
Grader CAT 140G*	1	111	110	106	102	107	101	97	-	110
Water Cart Komatsu HD405-6*	1	116	116	108	105	103	100	94	-	109
Wheeled loader Volvo L220F	3	115	111	108	101	100	99	93	87	106
Wheeled loader Volvo L250G	1	115	111	108	101	100	99	93	87	106
Wheeled loader CAT 980G	1	115	111	108	101	100	99	93	87	106
Dump truck CAT 730 Moxy*	2	124	124	116	113	111	108	102	-	117
Dump truck Freightliner*	1	121	121	113	110	108	105	99	93	114
On road trucks	350 per day	126	126	118	115	113	110	104	98	119
Fixed Screening Plant	1	116	111	113	114	115	113	109	-	119
Secondary Crusher	1	106	107	107	108	107	104	99	-	111

Source	Plant number/ Quantity	Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	A
Primary Crusher	1	114	114	115	114	111	105	97	-	115
Tertiary Crusher	1	115	114	112	113	113	112	108	-	118
<i>Trommel equipment</i>										
Articulated truck Bell B50D	1	94	94	86	83	81	78	72	66	87
Excavator CAT 365	1	110	112	105	104	101	99	95	90	107
Trommel mobile screen	1	113	108	101	98	89	85	79	74	99
<i>Concrete batching plant</i>										
Wheeled loader CAT 926E	1	115	111	108	101	100	99	93	87	106
Concrete Loader	1	95	97	96	101	99	96	99	-	105
Wash Bay	1	97	97	98	101	95	93	91	-	102
Conveyor (Concrete batch)	1	94	90	89	84	80	76	73	-	86
Wheeled Loader Komatsu WA300	1	115	111	108	101	100	99	93	87	106
Concrete Agitator Trucks**	2	80	71	64	70	69	74	65	54	77

Source	Plant number/ Quantity	Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	A
<i>Asphalt Batching Plant</i>										
Asphalt Burner	1	104	105	100	89	82	78	74	67	95
Asphalt Slat Conveyor	1	110	107	106	105	100	97	93	87	106
Wheel Loader	1	115	111	108	101	100	99	93	87	106

* Sound power modelled as a line source

** Sound power per metre of line source

APPENDIX G LIMITATIONS TO THE ACCURACY OF NOISE PREDICTION

The ISO 9613-2 propagation model is specified to be validated for a maximum source height of 30 metres, and a maximum source-receiver distance of 1000 metres. Within these bounds, the stated accuracy of the model is +/-3dB. Use beyond these parameters is not precluded, but no statement of error bounds is provided in this case.

Uncertainty in the noise predictions comes from variables in model inputs such as weather conditions, sound power levels for noise sources, the ground surface model and attenuation due to obstacles between the source and receiver. In response to the inherent uncertainties associated with the noise prediction, a conservative approach has been taken to enable a cautious assessment. Conservative aspects of the model are discussed in further detail below.

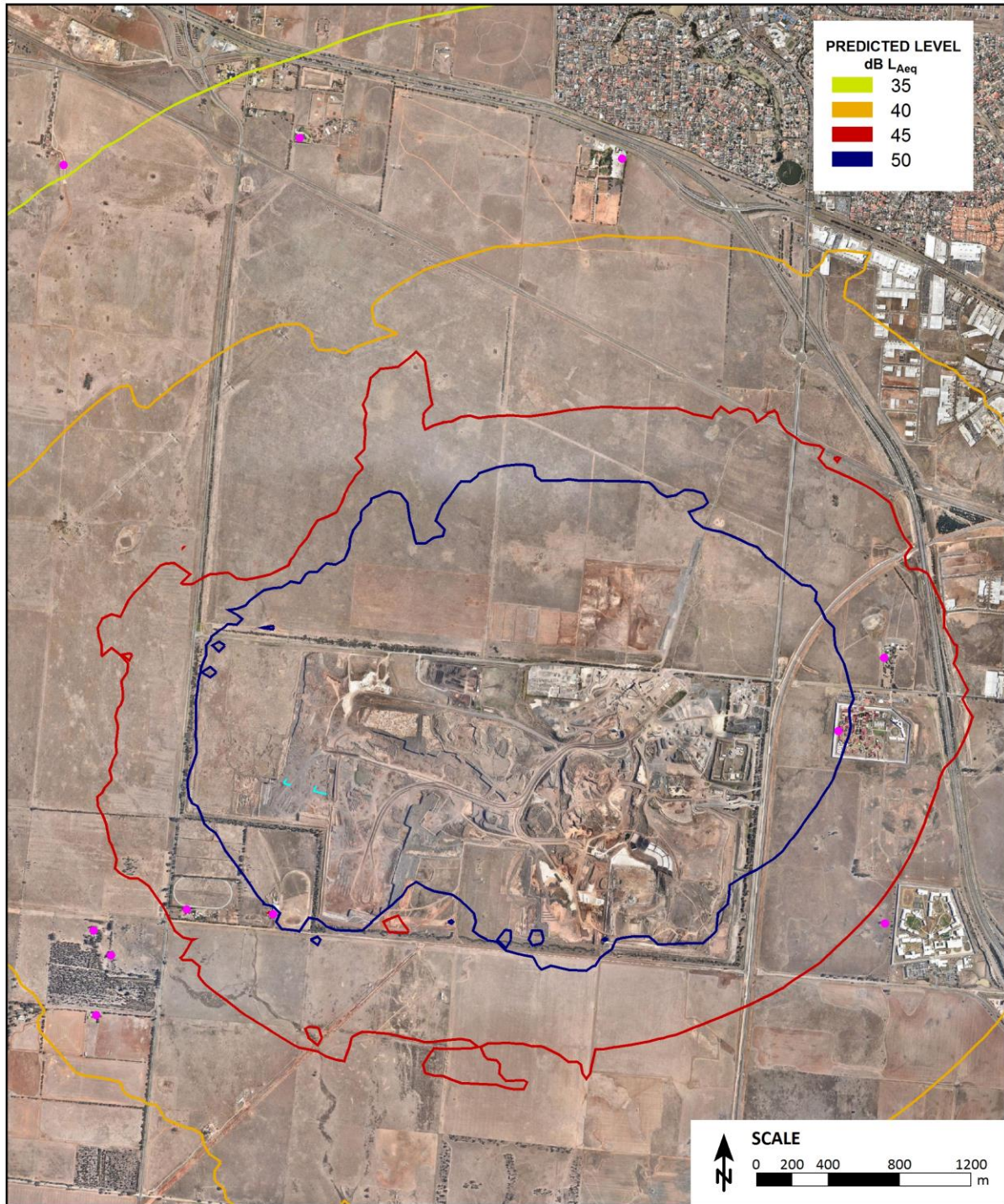
As noted above, ISO 9613-2 predictions assume that receivers are generally downwind from each source. In the context of this assessment, this implies that each receiver location is exposed to the same wind conditions at the same time. In practical terms, such assumptions are pragmatic and appropriate for the purposes of an engineering assessment intended to provide a reliable representation of the upper noise levels expected in practice.

In practice, alternative weather conditions, such as wind blowing from the receiver to the source, or warmer temperatures, would likely result in lower noise levels than those reported.

Sound power data for equipment in the model has been selected from manufacturer data and current standards to represent the upper (higher) range of quoted operating noise levels, when manufacturer data has not been available.

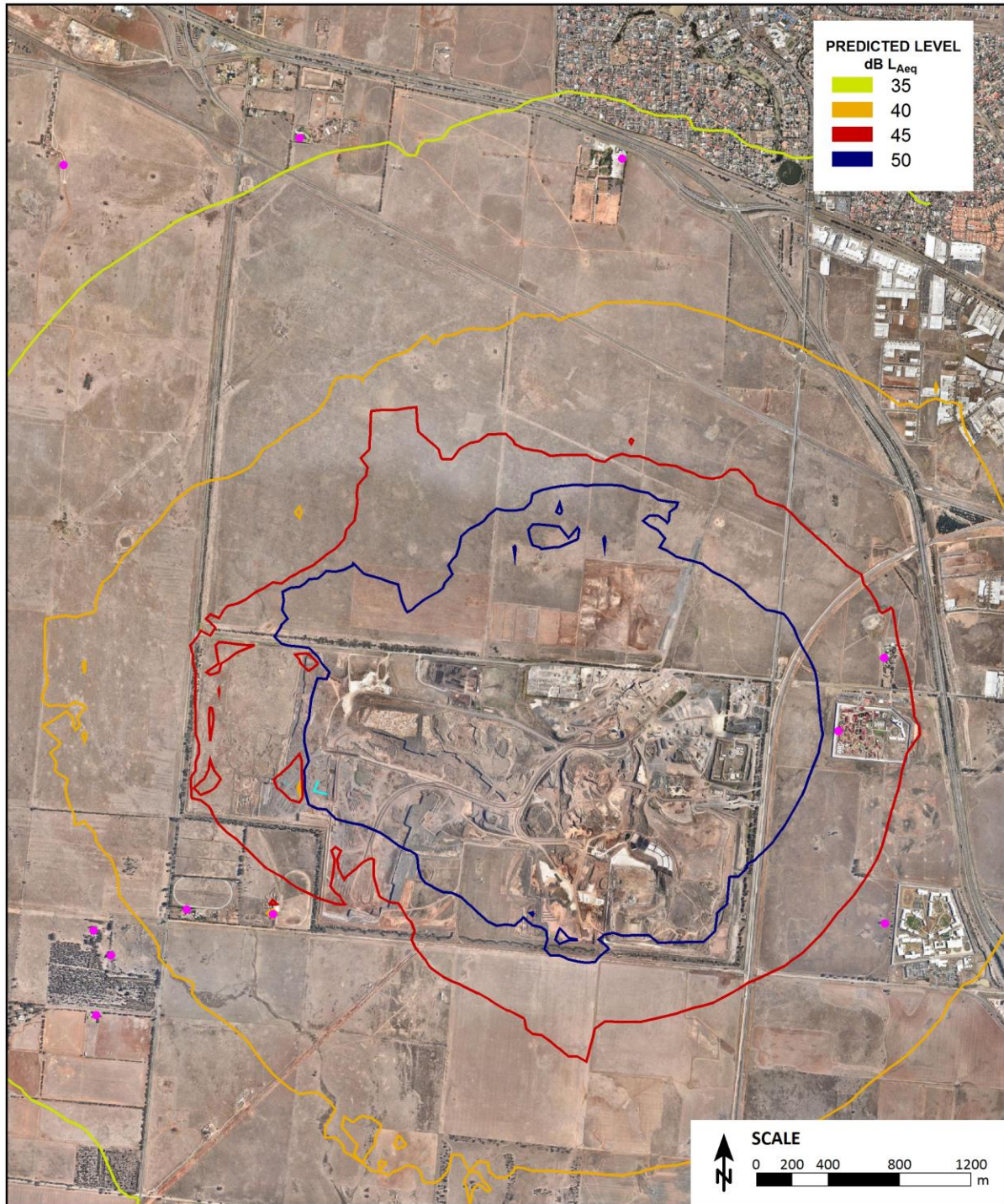
APPENDIX H NOISE CONTOUR MAPS

H1 Step 4 – Day time operations



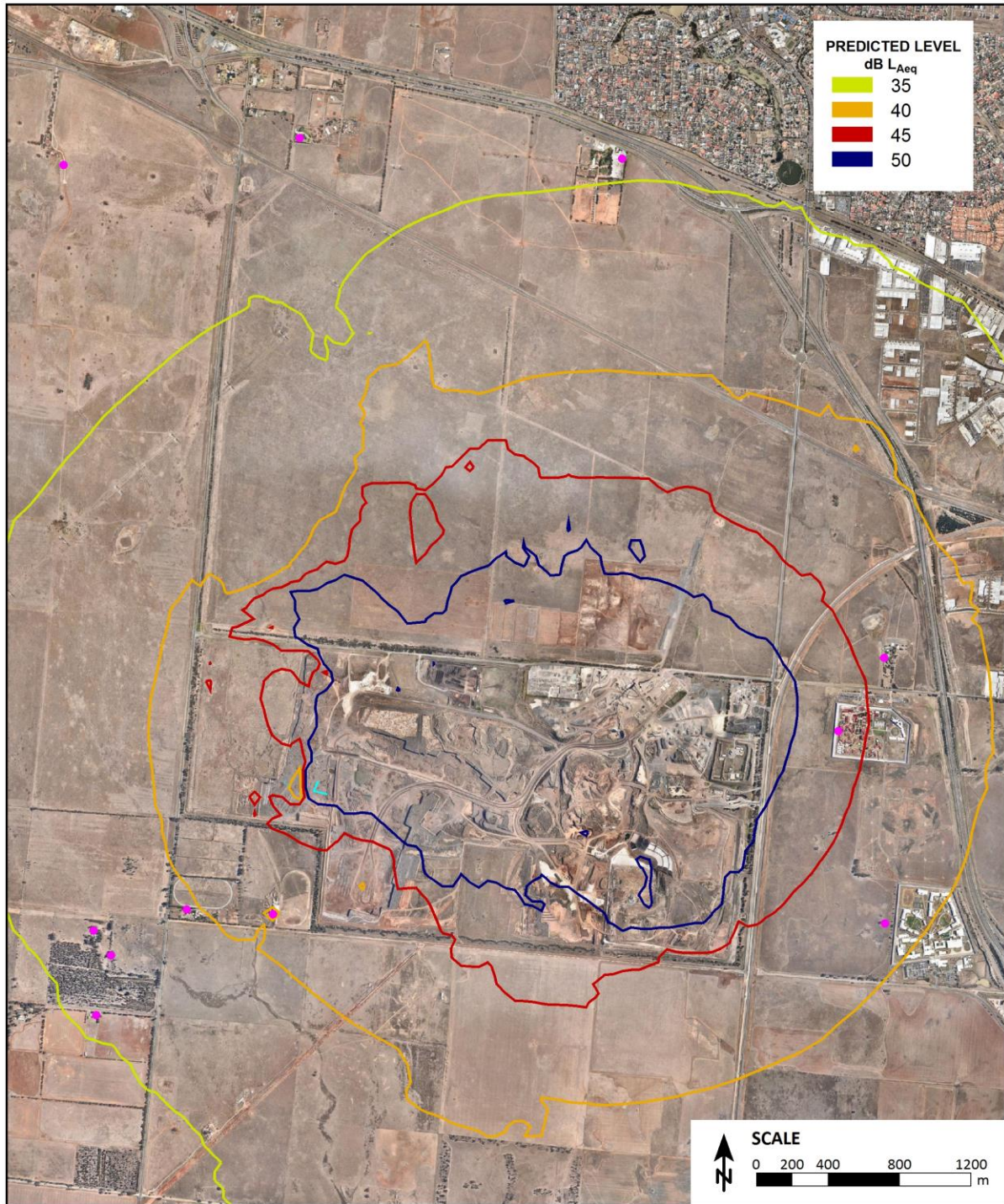
<p>LEGEND</p> <ul style="list-style-type: none"> ● Receivers Earth berm 	<p>Project: MRL EXTENSION STEP 4</p> <p>Project number: 2015252ML</p> <p>Client name: CLEANAWAY</p> <p>Version: SoundPLAN 7.4</p> <p>Prediction method: ISO9613-2:1996</p> <p>Model ref: MDL 15</p> <p>Run number: 50</p> <p>File: Step 4 - Day</p> <p>Prediction Height: 1.5m</p>	<p>MELBOURNE REGIONAL LANDFILL EXTENSION</p> <p>Step 4 - Day time operations</p>
	<p>MARSHALL DAY Acoustics</p>	

H2 Step 4 – Evening time operations



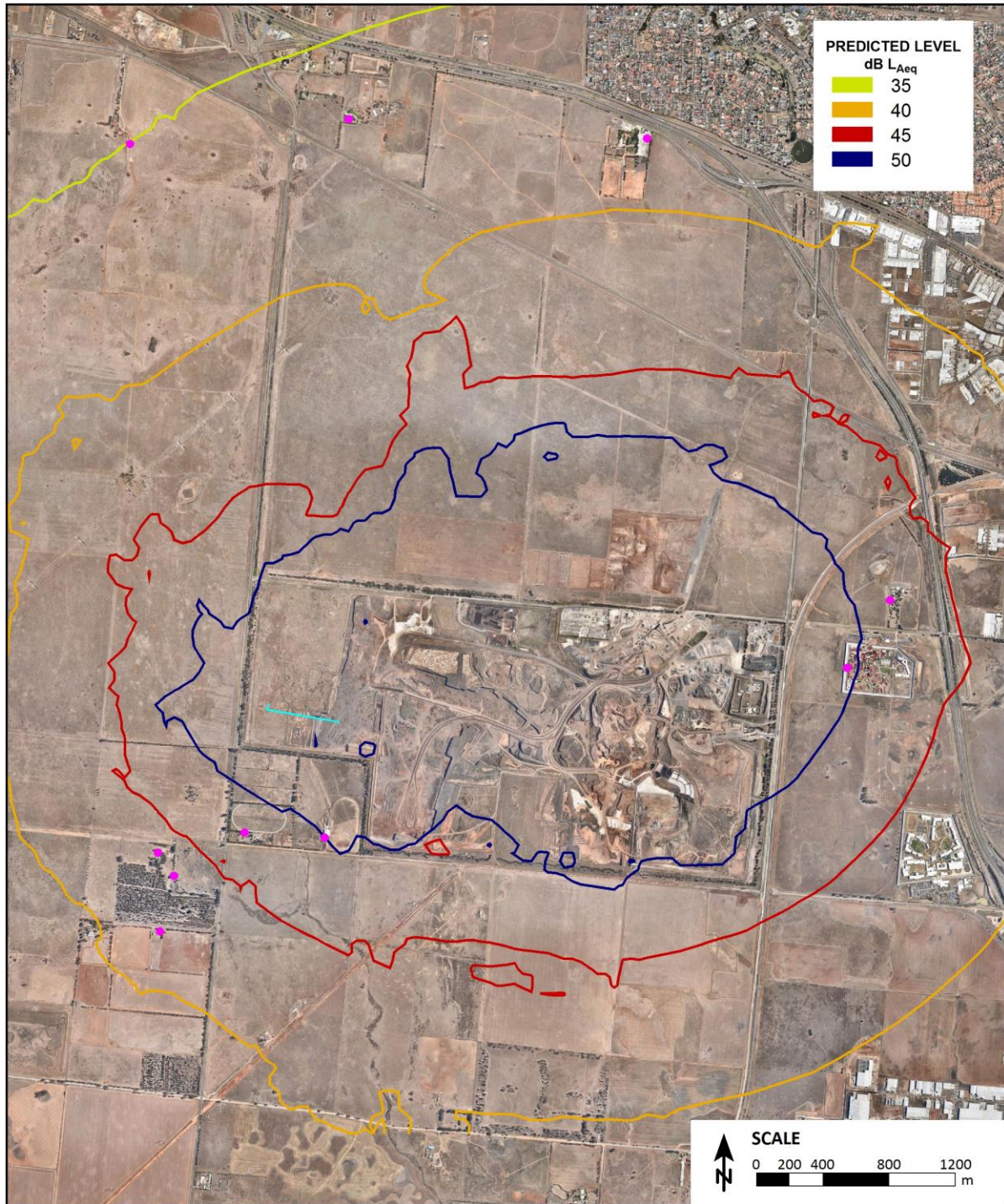
<p>LEGEND</p> <ul style="list-style-type: none"> ● Receivers Earth berm 	Project: MRL EXTENSION STEP 4	<p>MELBOURNE REGIONAL LANDFILL EXTENSION</p> <p>Step 4 - Evening operations</p> <p>MARSHALL DAY Acoustics</p>
	Project number: 2015252ML	
	Client name: CLEANAWAY	
	Version: SoundPLAN 7.4	
	Prediction method: ISO9613-2:1996	
	Model ref: MDL 15	
	Run number: 51	
	File: Step 4 - Evening	
	Prediction Height: 1.5m	

H3 Step 4 – Night time operations



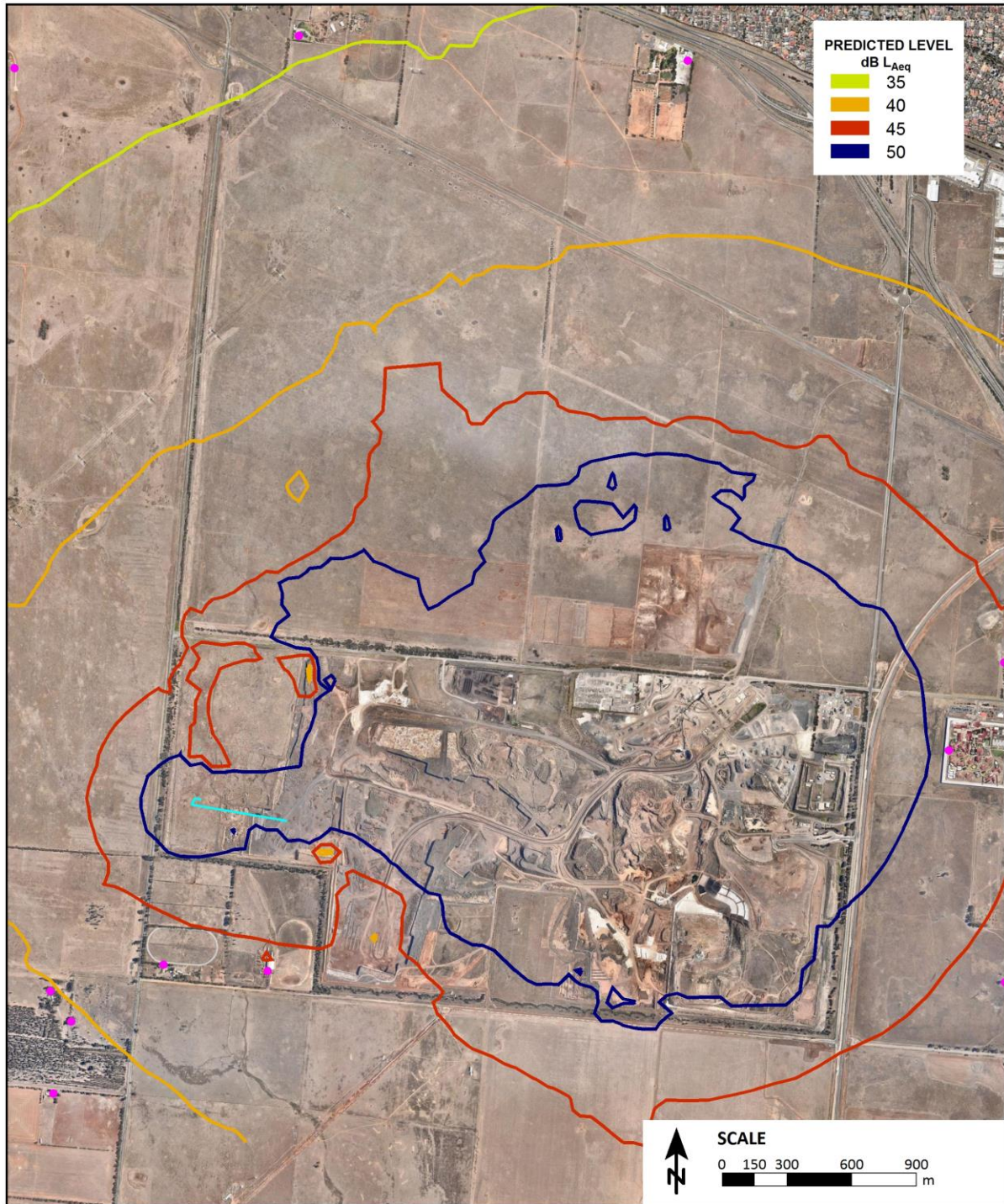
<p>LEGEND</p> <ul style="list-style-type: none"> ● Receivers Earth berm 	<p>Project: MRL EXTENSION STEP 4</p> <p>Project number: 2015252ML</p> <p>Client name: CLEANAWAY</p> <p>Version: SoundPLAN 7.4</p> <p>Prediction method: ISO9613-2:1996</p> <p>Model ref: MDL 15</p> <p>Run number: 52</p> <p>File: Step 4 - Night</p> <p>Prediction Height: 1.5m</p>	<p>MELBOURNE REGIONAL LANDFILL EXTENSION</p> <p>Step 4 - Night time operations</p>
	<p>MARSHALL DAY Acoustics</p>	

H4 Step 5 – Day time operations



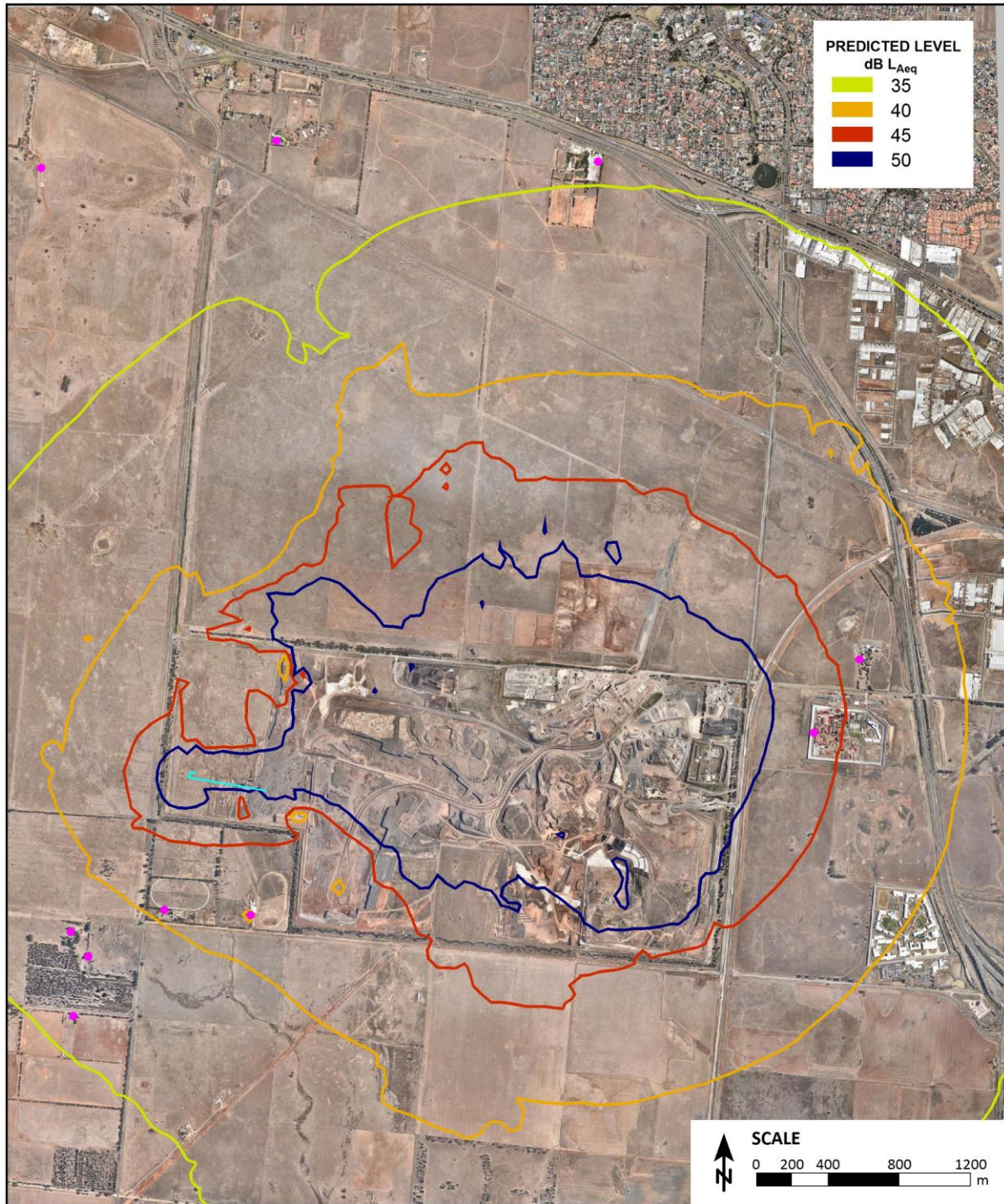
<p>LEGEND</p> <ul style="list-style-type: none"> ● Receivers ▬ Earth berm 	Project: MRL EXTENSION STEP 5	<p>MELBOURNE REGIONAL LANDFILL EXTENSION Step 5 - Day time operations</p> <p>MARSHALL DAY Acoustics</p>
	Project number: 2015252ML	
	Client name: CLEANAWAY	
	Version: SoundPLAN 7.4	
	Prediction method: ISO9613-2:1996	
	Model ref: MDL 14	
	Run number: 60	
	File: Step 5 - Day ops	
	Prediction Height: 1.5m	

H5 Step 5 – Evening time operations



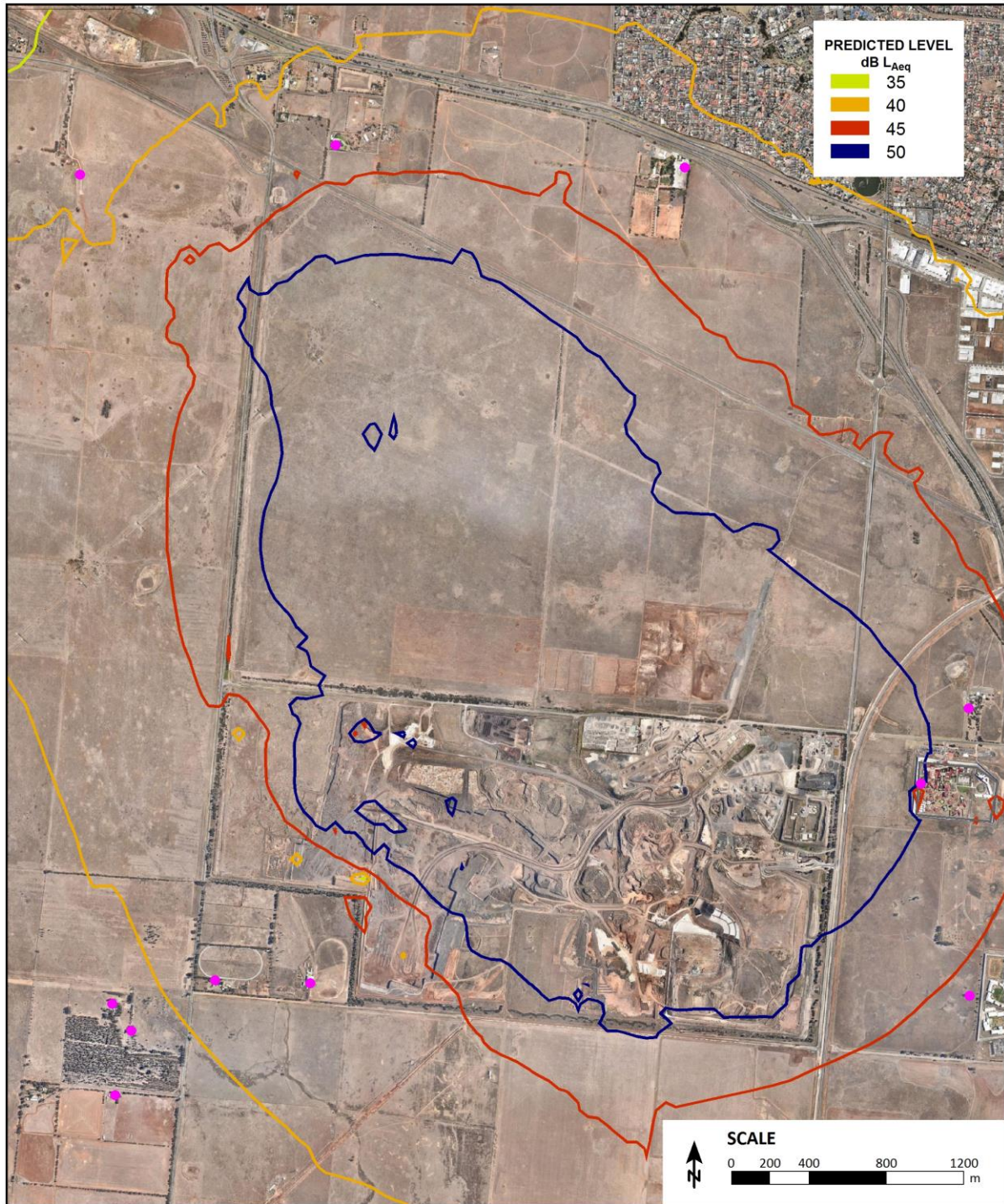
<p>LEGEND</p> <ul style="list-style-type: none"> ● Receivers — Berm 	<p>Project: MRL EXTENSION STEP 5</p> <p>Project number: 2015252ML</p> <p>Client name: CLEANAWAY</p> <p>Version: SoundPLAN 7.4</p> <p>Prediction method: ISO9613-2:1996</p> <p>Model ref: 17</p> <p>Run number: 61</p> <p>File: Step 5 Evening</p> <p>Prediction Height: 1.5m</p>	<p>MELBOURNE REGIONAL LANDFILL EXTENSION</p> <p>Step 5 - Evening time operations</p>
	<p>MARSHALL DAY Acoustics</p>	

H6 Step 5 – Night time operations



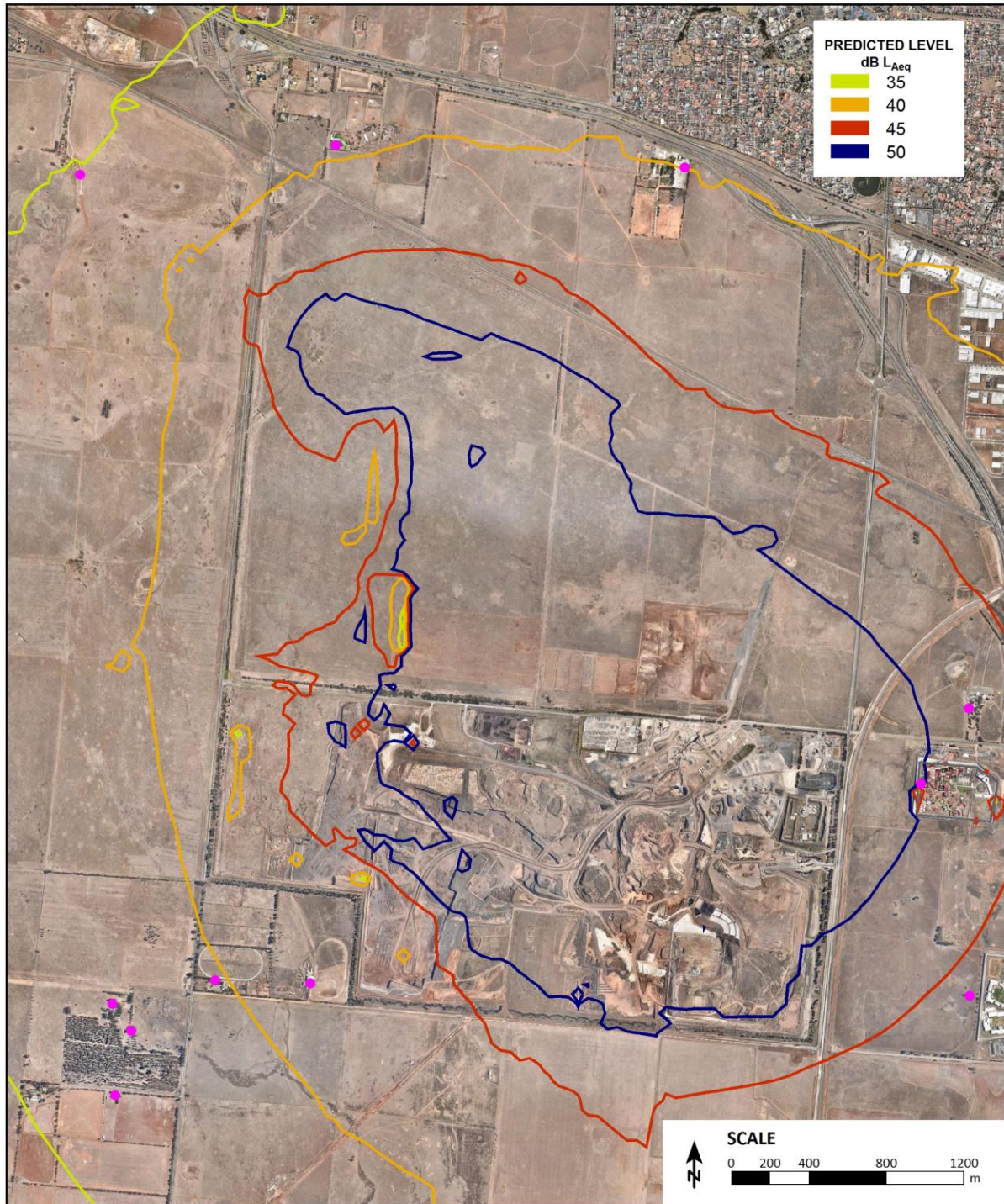
LEGEND	Project: MRL EXTENSION STEP 5	MELBOURNE REGIONAL LANDFILL EXTENSION
	Project number: 2015252ML	
● Receivers	Client name: CLEANAWAY	Step 5 - Night time operations
■ Earth berm	Version: SoundPLAN 7.4	
	Prediction method: ISO9613-2:1996	
	Model ref: MDL 14	
	Run number: 62	
	File: Step 5 - Night time ops	
	Prediction Height: 1.5 m	

H7 Step 11 – Day time operations



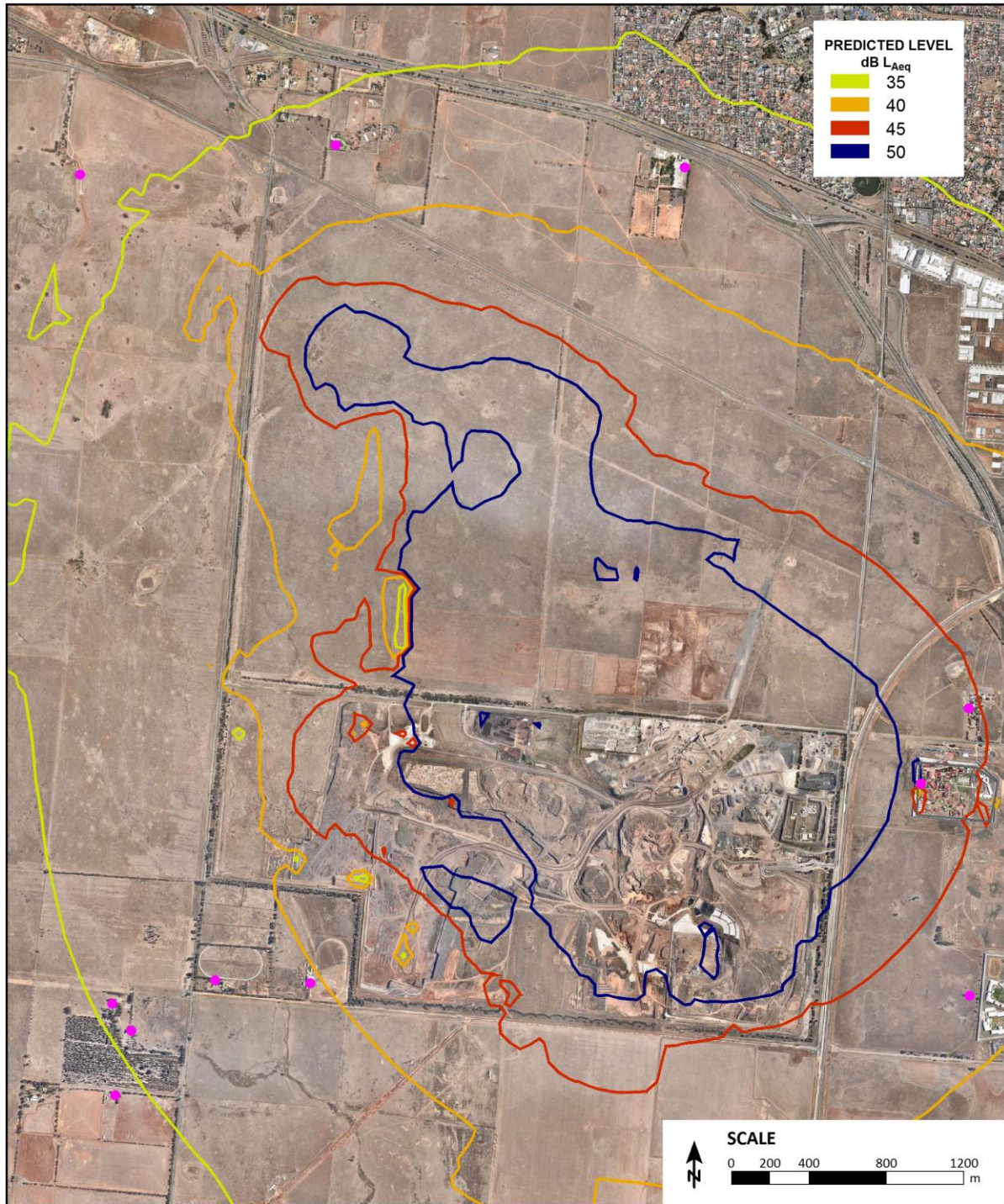
LEGEND	Project: MRL EXTENSION STEP 11	MELBOURNE REGIONAL LANDFILL EXTENSION
	Project number: 2015252ML	
● Receivers	Client name: CLEANAWAY	Step 11 - Day time operations
	Version: SoundPLAN 7.4	
	Prediction method: ISO9613-2:1996	
	Model ref: MDL 16	
	Run number: 70	
	File: Step 11 - Day	
	Prediction Height: 1.5m	

H8 Step 11 – Evening time operations



LEGEND	Project: MRL EXTENSION STEP 11	MELBOURNE REGIONAL LANDFILL EXTENSION
	Project number: 2015252ML	
● Receivers	Client name: CLEANAWAY	Step 11 - Evening operations
	Version: SoundPLAN 7.4	
	Prediction method: ISO9613-2:1996	
	Model ref: MDL 16	
	Run number: 71	
	File: Step 11 - Evening	
	Prediction Height: 1.5m	

H9 Step 11 – Night time operations



<p>LEGEND</p> <p>● Receivers</p>	Project: MRL EXTENSION STEP 11	<p>MELBOURNE REGIONAL LANDFILL EXTENSION</p> <p>Step 11 - Night time operations</p> <p>MARSHALL DAY Acoustics</p>
	Project number: 2015252ML	
	Client name: CLEANAWAY	
	Version: SoundPLAN 7.4	
	Prediction method: ISO9613-2:1996	
	Model ref: MDL 16	
	Run number: 72	
	File: Step 11 - Night	
	Prediction Height: 1.5 m	