ACOUSTIC REPORT

FOR

Armadale Landfill and Recycling Facility

26 February 2025

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EXECUTIVE SUMMARY

The Armadale Landfill and Recycling Facility (ALRF) operates 7 day a week between 8am and 4:45pm at 145 Hopkinson Road Hilbert. Acoustic Engineering Solutions (AES) has been commissioned by the City of Armadale to undertake an environmental noise impact assessment to determine whether or not the ALRF opereations would comply with the Environmental Protection (Noise) Regulations 1997 (the Regulations).

Site measurements were undertaken on Monday 20th January 2025 to assess the noise emissions from the individual items of fixed plant and mobile equipment operating on the ALRF site.

An acoustic model has been created and four operational scenarios are modelled:

Scenario 1: represents the worst-case daily operation onsite.
Scenario 2: represents a short activity of bricks loading into a truck at the brick stockpile.
Scenario 3: represent the worst-case impact noise emission from the site.
Scenario 4: represents short events for closing a vehicle door onsite.

Six closest residential receivers are selected for the detailed assessments of noise impact. Noise levels are predicted for the worst-case meteorological conditions. The predicted worst-case noise levels are adjusted to account for their dominant characteristics and then assessed against the criteria set by the Regulations. The compliance assessment concludes:

- For scenario 1, non-compliance is predicted.
- For scenario 2, compliance is achieved on Monday to Saturday but exceedance is predicted for Sunday and public holidays.
- For scenario 3, compliance is achieved during the day-time operations but exceedance is predicted during the night (between 8am to 9am on Sunday and public holidays).
- For scenario 4, full compliance is achieved.

To minimise the noise emissions and/or achieve compliance with the Regulations, the following noise control options are proposed:

- The dozer and the Tana compactor should not operate simultaneously in the Waste Landfill.
- If the Tana compactor operates in the Waste Landfill, the dozer is replaced with a loader.
- Either the dozer or the Tana compactor should not operate in the Waste Landfill during Sunday and public holidays.
- No equipment operates onsite between 8am and 9am (the "night") on Sunday and public holidays.
- The brick stockpile is relocated to the west of Transfer Station if feasible.

TABLE OF CONTENTS

1.0 INTRODUCTION

Acoustic Engineering Solutions (AES) has been commissioned by the City of Armadale to undertake an environmental noise impact assessment of the Armadale Landfill and Recycling Facility (ALRF). The aim of this assessment is to determine whether or not the ALRF operations would comply with the Environmental Protection (Noise) Regulations 1997.

1.1 THE ARMADALE LANDFILL AND RECYCLING FACILITY

The Armadale Landfill and Recycling Facility operates 7 day a week between 8am and 4:45pm at 145 Hopkinson Road Hilbert. Figure 1 in APPENDIX A presents an aerial view of the ALRF site and surrounding area.

The Armadale Landfill and Recycling Facility operates the following fixed plant and mobile equipment:

- 1 X Ploystyrene Compactor and 1 X BOGE Compressor inside the workshop;
- 1 X Waste Oil Tank located inside a small shed;
- 1 X Cardboard Compactor outdoors;
- 2 X Loaders;
- 1 X Epic Spray;
- 1 X Forklift;
- 1 X Tana Compactor;
- 1 X Dozer;
- 1 X Hooklift Truck; and
- 1 X Watercart.

Customer vehicles drive in/out the site for waste disposal. Last financial (2023-2024) year data indicates that on average 128 vehicles with trailers visited the ALRF site in one day.

Figure 2 in APPENDIX A presents a zoomed view of the ALRF site. The ALRF site can be divided into three areas:

- Office and workshop area including car parks.
- Transfer Station; which is located to the north of office and workshop area.
- Waste Landfill.

The ALRF site is accessed from Hopkinson Road. Most of the onsite roads are one-way driving roads. The onsite driving speed limit is 20km/hour.

Vehicle/truck parking areas are available onsite. No solid fences are installed along the ALRF site boundaries.

2.0 NOISE CRITERIA

Noise management in Western Australia is implemented through the Environmental Protection (Noise) Regulations 1997 (the Regulations). The Regulations set noise limits which are the highest noise levels that can be received at noise-sensitive (residential), commercial and industrial premises. These noise limits are defined as 'assigned noise levels' at receiver locations. Regulation 7 requires that "noise emitted from any premises or public place when received at other premises must not cause, or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind".

Table 2-1presents the assigned noise levels at various premises.

Table 2-1: Assigned noise levels in dB(A)

Type of Premises Receiving Noise	Time of Day	Assigned Noise Levels in dB(A) [1]		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area	0700 to1900 hours Monday to Saturday	45 + Influencing factor	55 + Influencing factor	65 + Influencing factor
	0900 to1900 hours Sunday and public holidays	40 + Influencing factor	50 + Influencing factor	65 + Influencing factor
	1900 to 2200 hours all days	40 + Influencing factor	50 + Influencing factor	55 + Influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35 + Influencing factor	45 + Influencing factor	55 + Influencing factor
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises other than those in the Kwinana Industrial Area	All hours	65	80	90

For highly noise sensitive premises, an "influencing factor" is incorporated into the assigned noise levels. The influencing factor depends on road classification and land use zonings within circles of 100 metres and 450 metres radius from the noise receiver locations.

[1] Assigned level L_{A1} is the A-weighted noise level not to be exceeded for 1% of a delegated assessment period.
Assigned level L_{A10} is the A-weighted noise level not to be exceeded for 10% of a delegated assessment period.
Assigned level L_{Amax} is the A-weighted noise level not to be exceeded at any time.

2.1 CORRECTIONS FORCHARACTERISTICSOF NOISE

Regulation 7 requires that that "noise emitted from any premises or public place when received at other premises must be free of:

(i) tonality;
(ii) impulsiveness; and
(iii) modulation.

when assessed under Regulation 9".

If the noise exhibits intrusive or dominant characteristics, i.e. if the noise is impulsive, tonal, or modulating, noise levels at noise-sensitive premises must be adjusted. Table 2-2 presents the adjustments incurred for noise exhibiting dominant characteristics. That is, if the noise is assessed as having tonal, modulating or impulsive characteristics, the measured or predicted noise levels have to be adjusted by the amounts given in Table 2-2. Then the adjusted noise levels must comply with the assigned noise levels. Regulation 9 sets out objective tests to assess whether the noise is taken to be free of these characteristics.

Table 2-2: Adjustments for dominant noise characteristics

Adjustment where noise emission is not music. These adjustments are cumulative to a maximum of 15 dB.			Adjustment where noise emission is music	
Where tonality is present	Where Modulation is present	Where Impulsiveness is present	Where Impulsiveness is not present	Where Impulsiveness is present
+5 dB	+5 dB	+10 dB	+10 dB	+15 dB

2.2 INFLUENCING FACTOR

Six closest residential receivers are selected for the detailed assessments of noise impacts, as shown in Figure 1 in APPENDIX A.

Influencing factor varies from residence to residence depending on the surrounding land use. According to the traffic flow data published in Main Roads traffic map, the closer section of Tonkin Hwy is classified as the major road. R1, R5 and R6 are more than 100m away but less than 450m from Tonkin Hwy while R2 to R4 are more than 450m away from Tonkin Hwy. Therefore, transport factor is 2 dB for R1, R5 and R6 but zero for R2 to R4.

The ALRF site is classified as an industrial site. No commercial area is present within 450m of the selected residences. Table 2-3 presents the calculation of influencing factors while Table 2-4 presents the calculated assigned noise levels for the selected receivers.

Table 2-3: Calculation of influencing factors.

Closest Residents	Transport Factor in dB	Industrial Land		Influencing Factor in d(B)
		Within 100m Radius	Within 450m Radius	
R1	2	0	2.6%	2
R2	0	12.0%	18.7%	3
R3	0	1.7%	12.4%	1
R4	0	0	10.3%	1
R5	2	0	4.5%	2
R6	2	0	1.4%	2

Table 2-4: Day-time assigned noise levels in dB(A).

Receivers	Day-time Assigned Noise Levels in dB(A) for Monday to Saturday		
	L_{A10}	L_{A1}	L_{AMax}
Day of Monday to Saturday[2]			
R1, R5 and R6	47	57	67
R2	48	58	68
R3 and R4	46	56	66
Day of Sunday and Public Holidays[3]			
R1, R5 and R6	42	52	67
R2	43	53	68
R3 and R4	41	51	66

[2] 0700 to 1900 hours for Monday to Saturday.
[3] 0900 to 1900 hours for Sunday and public holidays.

Receivers	Day-time Assigned Noise Levels in dB(A) for Monday to Saturday		
	L_{A10}	L_{A1}	L_{AMax}
Night[4]			
R1, R5 and R6	37	47	57
R2	38	48	58
R3 and R4	36	46	56

[4] 2200 to 0700 hours for Monday to Saturday but to 0900 hours for Sunday and public holidays.

3.0 NOISE MEASUREMENTS

Site noise measurements were undertaken in the morning of Monday 20th January 2025, when it was clam sunny day with temperature of up to 41^{0}C.

Noise levels were recorded using a Nor139 Type 1 Sound Level Meter (SLM). The SLM was calibrated using a SV33A Class 1 Sound Calibrator immediately before and after the measurements. Level difference of 0.1dB was observed between the two calibrations.

3.1 SOUND POWER LEVELS

Table 3-1 presents the measured sound power levels. To eliminate the impact from other sources, the equipment or fixed plant operated individually to simulate the "worst-case" operation during measurements. No background noise correction was made during the calculation of sound power levels because background levels were much lower than the operational noise levels.

Table 3-1: Measured sound power levels in dB(A).

Equipment	Octave Frequency Band Sound Power Levels in dB(A)								Overall
	63	125	250	500	1k	2k	4k	8k	dB(A)
	L_{Aeq}								
Polystyrene Compactor	58.4	63.4	70.9	75.9	76.6	72.9	67.9	56.5	**81.0**
BOGE Compressor	57.3	62.3	73.1	81.7	93.6	94.0	103.6	97.4	**105.2**
Cardboard Compactor Motor	54.9	60.6	82.0	77.6	76.1	83.6	73.9	73.2	**87.3**
EPIC Spray Unit without Spray	77.6	88.4	92.2	97.4	97.1	96.2	90.3	83.9	**102.7**
Operating Tana Compactor	78.5	95.6	102.9	98.6	98.8	97.8	94.5	91.1	**106.8**
Loader at High Idling	73.9	89.7	86.4	88.6	91.3	90.8	85.3	77.2	**97.1**
Loading and Unloading Loader at Brick Stockpile	91.3	91.1	96.9	104.3	106.7	105.8	101.4	93.9	**111.3**
Driving Dozer	77.6	95.0	99.4	101.2	103.1	102.3	97.9	89.9	**108.4**
Driving Hooklift	72.1	84.5	92.4	94.7	96.8	96.7	92.0	83.5	**102.1**
Hooklift at Tipping	77.3	83.9	92.0	105.9	111.9	105.2	102.3	88.6	**113.9**

Equipment	Octave Frequency Band Sound Power Levels in dB(A)								Overall
	63	125	250	500	1k	2k	4k	8k	dB(A)
Driving HiNo Watercart at Watering	78.5	86.8	92.4	93.4	94.1	94.3	88.1	81.5	**100.2**
Grendia Forklift	65.9	72.9	82.2	92.9	90.6	89.2	83.7	74.3	**96.4**
L_{AMax}									
Truck Door Closing L_{Amax}	72.2	77.6	81.6	83.6	85.7	80.4	76.7	67.6	**89.9**
Driving Dozer L_{AMax}	83.6	97.2	103.8	106.5	108.2	107.3	105.2	96.5	**113.7**
Hooklift L_{AMax}	92.1	101.8	102.5	113.4	113.6	110.6	103.5	90.2	**117.9**

Table 3-1 shows that the Hooklift truck generates much higher noise emission during its tipping than during its driving. The tipping also generates high impact noise.

The noise from a loader un/loading at a brick-stockpile is much higher than the noise of a loader under the high idling condition, and is much dominated by the noise generated by the loading and dropping bricks.

3.2 NOISE LEVEL

The Waste Oil Tank is located inside a small shed. Table 3-2 presents the measured noise level inside the shed.

Table 3-2: Measured noise level in dB(A).

Equipment	Octave Frequency Band Noise Levels in dB(A)								Overall
	63	125	250	500	1k	2k	4k	8k	dB(A)
Waste Oil Tank Shed	46.4	48.7	55.2	61.0	66.2	70.5	74.0	70.9	**77.4**

4.0 NOISE MODELLING

4.1 METHODOLOGY

An acoustic model has been developed using SoundPlan v8.0 program, and the CONCAWE[5,6] prediction algorithms are selected for this study. The acoustic model is used to predict noise levels at the selected receiver locations and generate noise level contours for the area surrounding the ALRF site.

The acoustic model does not include noise emissions from any sources other than from the ALRF site. Therefore, noise emissions from road traffic, aircraft, birds, etc are excluded from the modelling.

4.2 INPUT DATA

4.2.1 Topography

The 1m ground elevation contours of the ALRF site is provided by the City of Armadale while the 5m ground elevation contours of surrounding area (outside the ALRF site) are obtained from the intramaps of the City of Armadale. The car parking areas and the customer unloading area are assumed to be reflective while the surrounding area has an absorptive ground.

The existing buildings and sheds onsite are digitised into the acoustic model. No other buildings and fences are considered.

4.2.2 Noise Sensitive Premises

Six closest residences are selected for the detailed assessment of noise impacts, as shown in Figure 1 in APPENDIX A. All of the selected residences are the ground receivers at 1.5m above the ground.

4.2.3 Source Sound Power Levels

The sound power levels of plant and equipment operating within the ALRF site were measured and presented in Table 3-1 and Table 3-2.

Some of the noise sources were unable to be measured during the site visit. Table 4-1 presents their sound power levels. These sound power levels are obtained from the AES database measured for similar equipment.

[5] CONCAWE (Conservation of Clean Air and Water in Europe) was established in 1963 by a group of oil companies to carry out research on environmental issues relevant to the oil industry.

[6] The propagation of noise from petroleum and petrochemical complexes to neighbouring communities, CONCAWE Report 4/81, 1981.

Table 4-1: Sound power levels

Equipment	Sound Power Level in dB(A)
Slowly Driving Vehicle with a Trailer	88
Cardoor Close L_{AMax}	87

4.3 METEOROLOGY

SoundPlan calculates noise levels for defined meteorological conditions. In particular, temperature, relative humidity, wind speed and direction data are required as input to the model. For this study the worst-case day-time meteorological conditions[7] are assumed, as shown in Table 4-2.

Table 4-2: Worst-case day-time meteorological conditions.

Time of day	Temperature Celsius	Relative Humidity	Wind speed	Pasquill Stability Category
Day (0700 --- 1900)	20° Celsius	50%	4 m/s	E

4.4 NOISE MODELLING SCENARIOS

The City of Armadale advised:

- The ALRF operates 7 days a week between 8am to 4.45pm.
- During the operational hours, the three roller doors in the workshop and the single/roller doors in the Waste Oil Tank shed are generally open.
- The fixed plant (Waste Oil Tank, Cardboard Compactor, Ploystyrene Compactor and Compressor) operate as required.
- Both the workshop and the Waste Oil Tank shed have colorbond walls and roofs.
- Tana Compactor and Dozer may operate simultaneously in the waste field.
- A loader may load and unload bricks at the brick stockpile for short times as required.
- On average 128 vehicles with trailers visit the ALRF site every day.
- Driving speed limit of 20km/hour is imposed on the ALRF site.

Based on the provided information, four worst-case operational scenarios are modelled:

Scenario 1: The following fixed plant and mobile equipment operate simultaneously:

[7] Guideline: Assessment of Environmental Noise Emissions, Draft for Consultation, May 2021.

- The Waste Oil Tank inside a small shed with both the single and roller door open;
- The Ploystyrene Compactor and the BOGE Compressor inside the workshop with the three roller door open;
- The Cardboard Compactor in the west of Transfer Station;
- The Forklift in the front of workshop;
- 1 X Tana Compactor, 1 X Dozer and 1 X Watercart in the Waste Landfill;
- 1 X Hooklift Truck driving towards the Waste Landfill;
- Two loaders operating in the Transfer Station; and
- Two vehicles with trailers driving onsite between the Transfer Station and the entry/exit gates.

Scenario 2: Scenario 1 but one (instead of two) loader operating in the Transfer Station and one loader loading bricks to a truck at the brick stockpile.

Scenario 3: The Hooklift Truck dumps waste in the Landfill.

Scenario 4: A vehicle door is closed in the Transfer Station.

Scenario 1 represents the worst-case "daily" operation. All of the fixed plant and mobile equipment are assumed to be operating simultaneously. The operating locations of mobile equipment are assumed, as shown in Figure 3 in APPENDIX A. Scenario 1 may rarely occur in practice but it gives the possible highest noise emission from the ALRF site.

Scenario 1 also includes the noise emission from driving customers' vehicles between the Transfer Station and the entry/exit gates. On average 128 vehicles with trailers visit the ALRF site every day. This means that one vehicle with a trailer visits the ALRF site in every 4-minite interval. The driving distance from entering the site gate to the transfer station and then exiting the site gate is about 1,030m, which takes 185 seconds to drive under the site speed limit of 20km/hour. This means that on average less than one vehicle with a trailer drives on the ALRF site. For the worst-case operation, however, two vehicles with trailers are assumed to simultaneously drive onsite slowly (under the site speed limit of 20km/hour). Soundplan cannot model a moving source. The two driving trucks are modelled as a line source and the predicted noise level is the averaged noise level during the driving period.

Scenario 2 represents a short activity of bricks loading into a truck at the brick stockpile. As advised, each brick loading may take less than 10 minutes and this activity should happen in less than 10% time of any 4-hour periods.

Scenario 3 represents the short events for the Hooklift truck to empty waste in the Waste Landfill. The action of emptying waste generates impact noise, which was measured in L_{AMax}. In the ALRF operation, two machines generate impact noises: driving dozer and Hooklift truck during its emptying waste. Table 3-1 shows that the Hooklift truck generates much high impact noise than the driving dozer. Scenario 2 models the L_{AMax} for Hooklift truck to empty waste and represents the worst-case impulsive noise emission from the ALRF site.

Scenario 4 represents the short events for closing vehicle doors onsite. Vehicle-door closing is modelled as a point source. The barrier effect of vehicle body is not considered in the acoustic model and the predicted noise level will be higher than the actual level in the vehicle body shadow areas.

5.0 MODELLING RESULTS

5.1 POINT MODELLING RESULTS

Table 5-1 presents the predicted worst-case day-time noise levels in dB(A). For scenarios 3 and 4, the predicted noise levels are L_{AMax}. The highest noise level is predicted at:

- R1 for scenario 3; but
- R2 for the other scenarios.

Table 5-1: Predicted worst-case day-time noise levels in dB(A).

Receivers	Scenario 1	Scenario 2	Scenario 3	Scenario 4
R1	44.2	45.3	52.1	15.9
R2	45.9	50.9	50.0	26.3
R3	42.5	48.5	46.5	22.8
R4	41.9	48.3	46.9	21.6
R5	39.3	41.9	46.8	13.8
R6	37.8	39.7	47.0	12.8

5.2 NOISE CONTOURS

Figure 4 to Figure 7 in APPENDIX B present the worst-case noise level contours at 1.5m above the ground. These noise contours represent the worst-case noise propagation envelopes, i.e., worst-case propagation in all directions simultaneously.

Figure 6 and Figure 7 present the worst-case noise level L_{AMax} contours.

6.0 COMPLIANCE ASSESSMENT

6.1 TONALITY ADJUSTMENT

According to Table 2-2, the predicted noise levels shown in Table 5-1 should be adjusted by:

- 5 dB if the noise received exhibits tonality; or
- 10 dB if the noise received exhibits impulsiveness.

Noises from the fixed plant, mobile equipment and driving vehicles contain tonal components. Therefore, a 5dB tonality adjustment applies to the predicted noise levels for scenarios 1 and 2.

Noises for scenarios 3 and 4 are in L_{AMax} and exhibit impulsiveness, and then a 10dB impulsiveness adjustment applies to the predicted noise levels for scenarios 3 and 4.

Table 6-1 presents the adjusted worst-case A-weighted noise levels.

Table 6-1: Adjusted worst-case noise levels in dB(A).

Receivers	Scenario 1	Scenario 2	Scenario 3	Scenario 4
R1	49.2	50.3	62.1	25.9
R2	50.9	55.9	60.0	36.3
R3	47.5	53.5	56.5	32.8
R4	46.9	53.3	56.9	31.6
R5	44.3	46.9	56.8	23.8
R6	42.8	44.7	57.0	22.8

6.2 COMPLIANCE ASSESSMENT

Scenario 1 generates continuous noise emission and its noise emission should be assessed against the assigned noise levels L_{A10}. Brick loading happens in less than 10% time of any 4-hour period and scenario 2 is assessed against the assigned noise levels L_{A1}. Scenarios 3 and 4 represent noise L_{Amax} emissions and they are assessed against the assigned noise levels L_{Amax}.

The ALRF does not operate during the evening. Therefore, the evening-time compliance assessment is not required.

6.2.1 Monday to Saturday

Table 6-2 presents the day-time compliance assessment on Monday to Saturday. The noise levels above the assigned noise levels are expressed in ***bold italic***. It is shown that:

- Full compliance is achieved for scenarios 2 to 4.
- For scenario 1, compliance is achieved at R5 and R6 but exceedance of upto 2.9 dB is predicted at R1 to R4. The exceedance results from the tonality adjustment.

Table 6-2: Day-time compliance assessment on Monday to Saturday.

Receivers	Assigned Levels L_{A10} in dB(A)	Adjusted in dB(A)	Assigned Levels L_{A1} in dB(A)	Adjusted in dB(A)	Assigned Levels L_{Amax} in dB(A)	Adjusted L_{Amax} in dB(A)	
		Scenario 1		Scenario 2		Scenario 3	Scenario 4
R1	47	***49.2***	57	50.3	67	62.1	25.9
R2	48	***50.9***	58	55.9	68	60.0	36.3
R3	46	***47.5***	56	53.5	66	56.5	32.8
R4	46	***46.9***	56	53.3	66	56.9	31.6
R5	47	44.3	57	46.9	67	56.8	23.8
R6	47	42.8	57	44.7	67	57.0	22.8

6.2.2 Sunday and Public Holiday

Table 6-3 presents the day-time compliance assessment on Sunday and public holidays. The noise levels above the assigned noise levels are expressed in ***bold italic***. It is shown that:

- Full compliance is achieved for scenarios 3 and 4.
- For scenario 2, compliance is achieved at R1, R5 and R6 but exceedance is predicted at R2 to R4.
- For scenario 1, compliance is achieved at R6 but exceedance is predicted at the other closest residences.

Table 6-3: Day-time compliance assessment for Sunday.

Receivers	Assigned Levels L_{A10} in dB(A)	Adjusted in dB(A)	Assigned Levels L_{A1} in dB(A)	Adjusted in dB(A)	Assigned Levels L_{Amax} in dB(A)	Adjusted L_{Amax} in dB(A)	
		Scenario 1		Scenario 2		Scenario 3	Scenario 4
R1	42	***49.2***	52	50.3	67	62.1	25.9
R2	43	***50.9***	53	***55.9***	68	60.0	36.3
R3	41	***47.5***	51	***53.5***	66	56.5	32.8
R4	41	***46.9***	51	***53.3***	66	56.9	31.6
R5	42	***44.3***	52	46.9	67	56.8	23.8
R6	43	42.8	52	44.7	67	57.0	22.8

6.2.3 The Night

The Regulations classifies the time period between 8am to 9am on Sunday and public holidays as the night. Table 6-4 presents the night-time compliance assessment for the time period between 8am to 9am on Sunday and public holidays. It is shown that:

- Full compliance is achieved for scenario 4.
- Non-compliance is predicted for scenarios 1 to 3.

Table 6-4: Night-time compliance assessment.

Receivers	Assigned Levels L_{A10} in dB(A)	Adjusted in dB(A)	Assigned Levels L_{A1} in dB(A)	Adjusted in dB(A)	Assigned Levels L_{Amax} in dB(A)	Adjusted L_{Amax} in dB(A)	
		Scenario 1		Scenario 2		Scenario 3	Scenario 4
R1	37	***49.2***	47	***50.3***	57	***62.1***	25.9
R2	38	***50.9***	48	***55.9***	58	***60.0***	36.3
R3	36	***47.5***	46	***53.5***	56	***56.5***	32.8

Receivers	Assigned Levels L_{A10} in dB(A)	Adjusted in dB(A)	Assigned Levels L_{A1} in dB(A)	Adjusted in dB(A)	Assigned Levels L_{Amax} in dB(A)	Adjusted L_{Amax} in dB(A)	
		Scenario 1		Scenario 2		Scenario 3	Scenario 4
R4	36	***46.9***	46	***53.3***	56	***56.9***	31.6
R5	37	***44.3***	47	46.9	57	56.8	23.8
R6	38	***42.8***	47	44.7	57	57.0	22.8

7.0 NOISE CONTROL OPTIONS

Exceedance is predicted for the "worst-case" ALRF operations. To minimise the noise emissions or achieve compliance with the Regulations, the following noise control options are proposed:

- The dozer and the Tana compactor should not operate simultaneously in the Waste Landfill.
- If the Tana compactor operates in the Waste Landfill, the dozer is replaced with a loader.
- Either the dozer or the Tana compactor should not operate in the Waste Landfill during Sunday and public holidays.
- No equipment operates onsite between 8am and 9am (the "night") on Sunday and public holidays.
- The brick stockpile is relocated to the area in the west of Transfer Station if feasible.

For example, if the dozer is replaced by a loader in scenario 1, the predicted and adjusted noise levels are shown in Table 7-1 below and Figure 8 in APPENDIX C presents the predicted noise contours. The noise emission from the ALRF site is reduced and only one marginal exceedance (of 0.7dB) is predicted at R2.

Table 7-1: Predicted and adjusted noise levels in dB(A).

Receivers	Scenario 1	Scenario 2
R1	41.4	46.4
R2	43.7	***48.7***
R3	40.5	45.5
R4	39.6	44.6
R5	37.5	42.5
R6	36.8	41.8

APPENDIX A AERIAL VIEW

Figure 1: Aerial view of ALRF site and surrounding area.

Figure 2: ALRF Site layout.

Figure 3: Assumed source locations for scenario 1 (and 2).

APPENDIX B NOISE CONTOURS

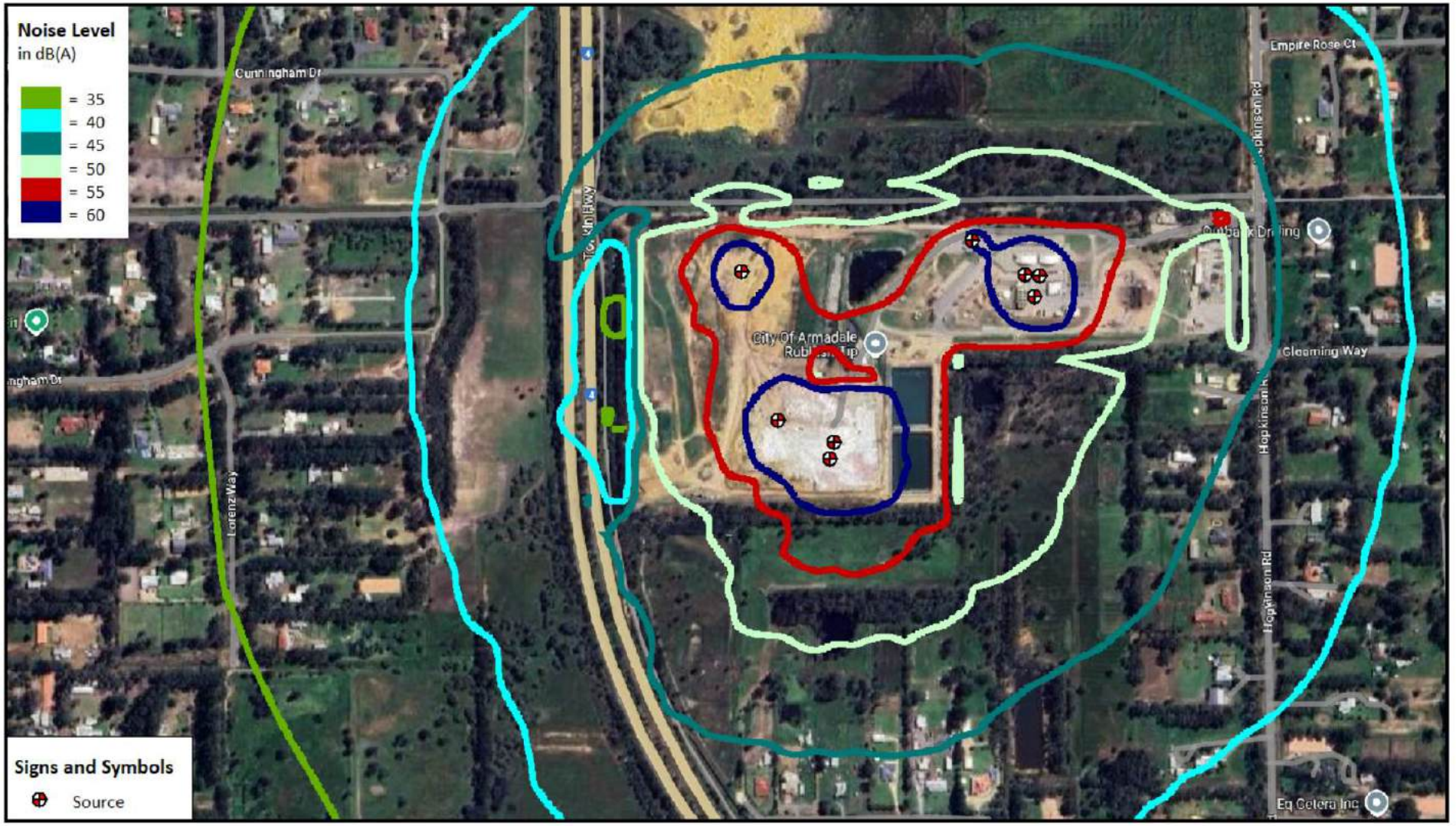

Figure 4: Worst-case noise level contours for scenario 1.

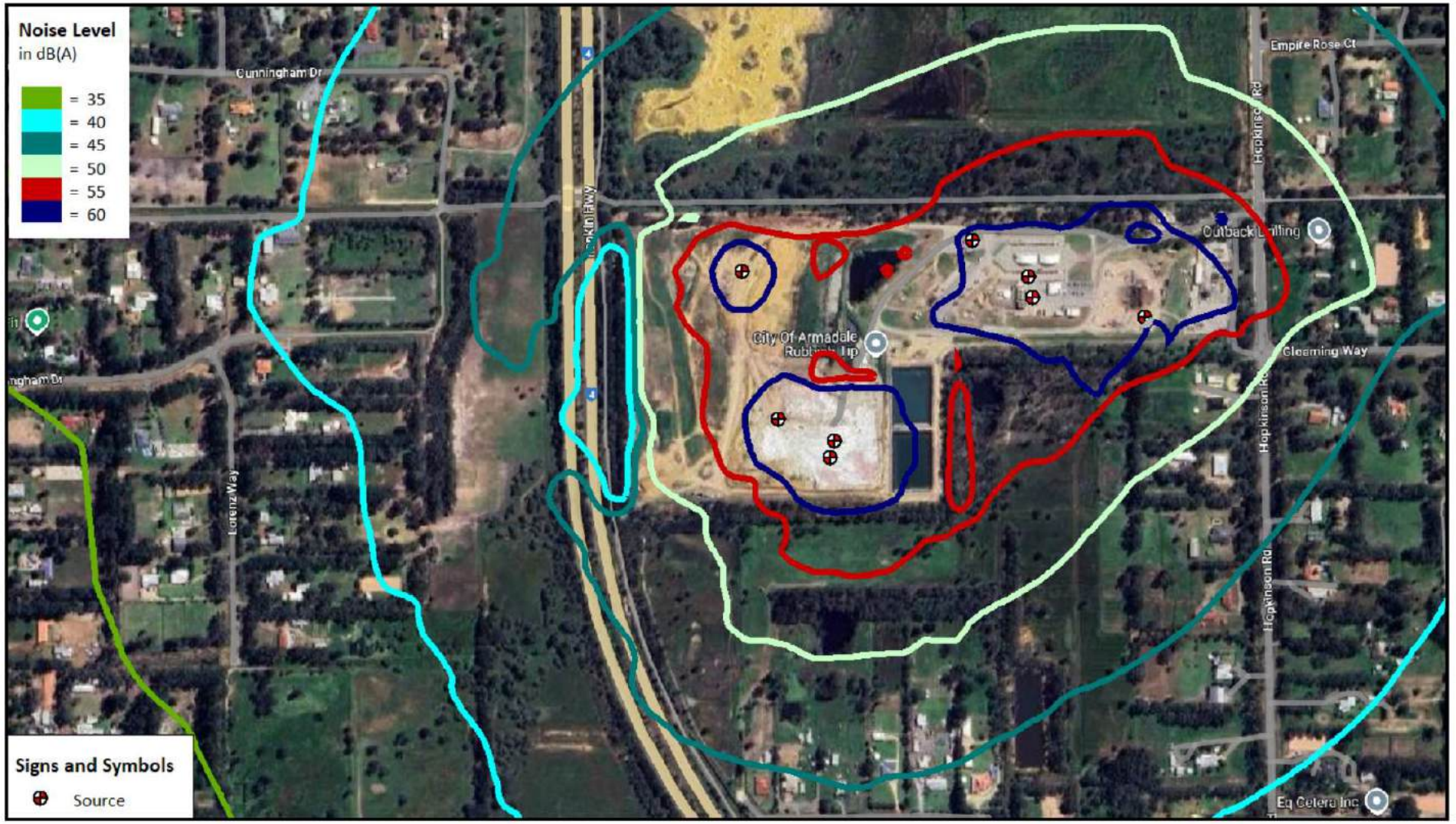

Figure 5: Worst-case noise level contours for scenario 2.

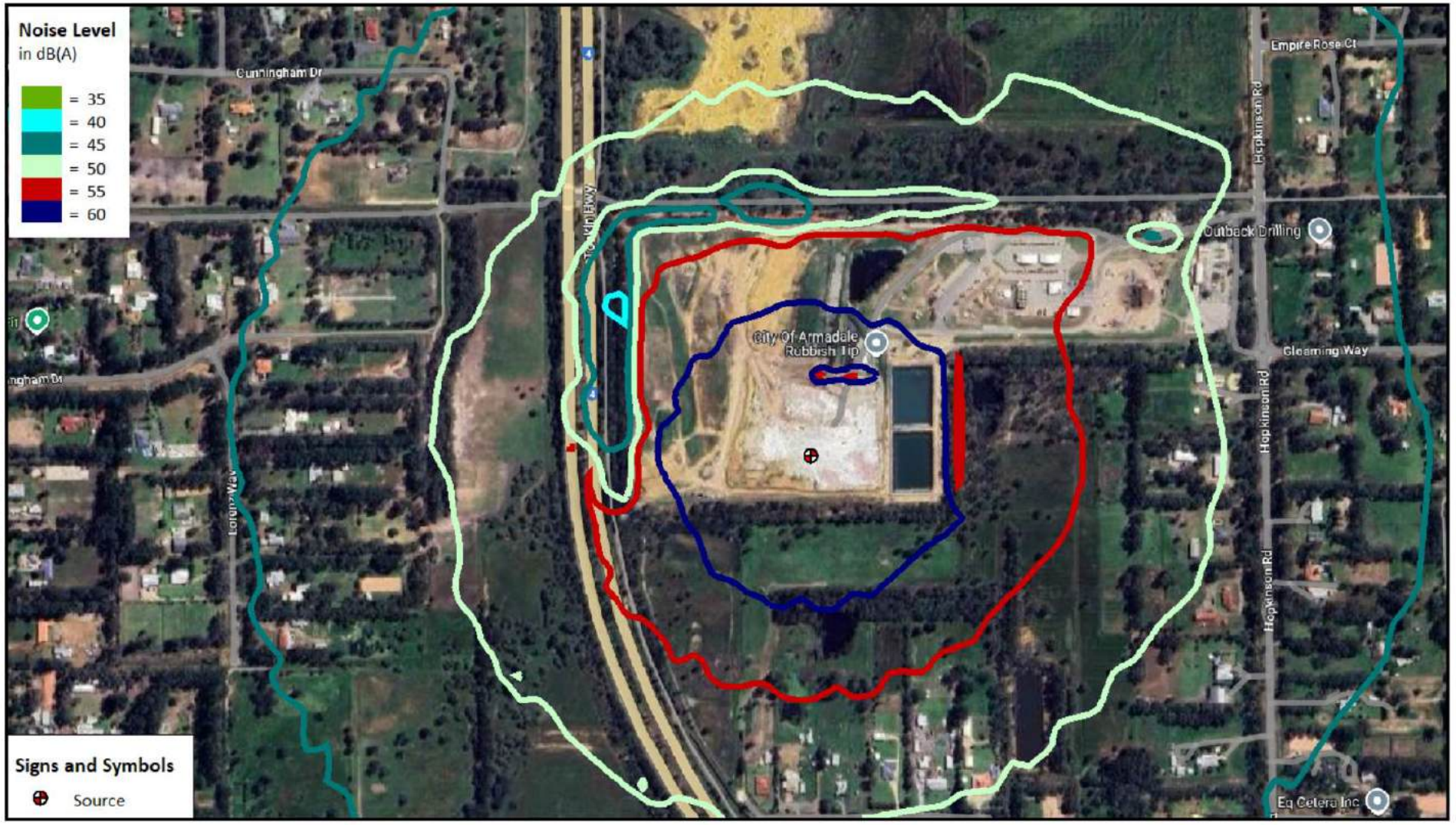

Figure 6: Worst-case noise level L_{AMax} contours for scenario 3.

Figure 7: Worst-case noise level L_{AMax} contours for scenario 4.

APPENDIX C NOISE CONTROL

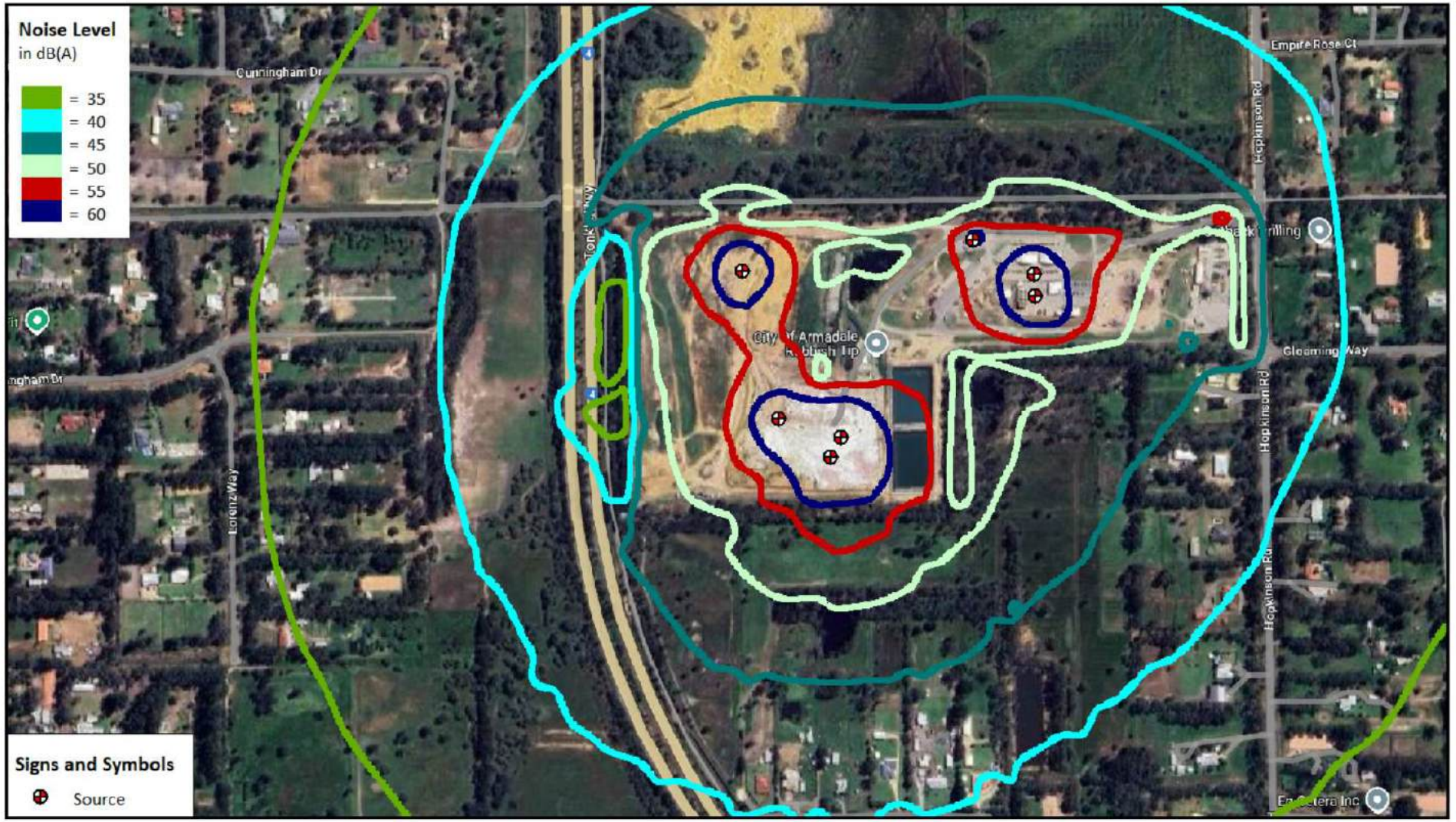

Figure 8: Worst-case noise level contours for the dozer replaced by a loader in scenario 1.