



HEGGIES

REPORT 30-1938 -R1

Revision 0

Lynwood Quarry Minor Modification Noise Impact Assessment

PREPARED FOR

**Umwelt (Australia) Pty Ltd
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TORONTO NSW 2283**

1 SEPTEMBER 2010

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Lynwood Quarry Minor Modification Noise Impact Assessment

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DOCUMENT CONTROL

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EXECUTIVE SUMMARY

Introduction

Heggies Pty Ltd (Heggies) has been commissioned by Umwelt (Australia) Pty Limited (Umwelt) on behalf of Holcim (Australia) Pty Ltd (Holcim) to prepare a noise impact assessment (NIA) for proposed minor modifications to the approved Lynwood Quarry Project. The proposed modification includes the reconfiguration of the rail loop to a rail spur, which has allows for greater flexibility in locating the components of the processing and loading out facilities, including the main access road. The quarry is to be located on land to the west of Marulan in the Southern Tablelands region of NSW.

The approved Quarry is intended to provide a long-term supply of high quality construction material into the Sydney, regional and local markets and will replace Holcim's current production from the Penrith Lakes Scheme which is approaching closure. The approved Quarry will produce up to 5 million tonnes per annum (Mtpa) of saleable product.

Plant and Equipment

The sound power level of acoustically significant items of plant and equipment proposed to be used on the Project Area has been obtained from a Heggies noise source database. Sound power level information is contained in **Section 2.1** of this report, with detailed octave band spectra contained in **Appendix A**.

Operation

The Quarry is approved to produce approximately 5 Mtpa, operating on a 24 hour per day seven day per week basis. Operations have been scheduled to occur at times that would limit the potential for disturbance to neighbouring residences.

Assessment of Noise Impacts

Operational Noise Modelling

A computer model was used to predict the noise emissions from the Project Area using the Environmental Noise Model (ENM). Noise levels were predicted at 14 locations, 11 of which are existing residences, and the remaining three being possible future residential locations, consistent with the original noise assessment.

Three representative operational scenarios were chosen for the noise modelling. These include the following conceptual Quarry plans:

- Year 5 Quarry plan.
- Year 10 Quarry plan.
- Year 30 Quarry plan.

Noise Mitigation and Management

Several mitigation methods have been investigated in order to minimise noise at the surrounding receiver locations. While the mitigation options specified in this report will allow the Quarry to achieve the predicted noise levels, Holcim reserve the right to alter or refine these methods if superior mitigation techniques or improvements in technology become available. Mitigation in the form of engineering or management controls, which have been adopted and included in the noise modelling process, are as follows:



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Engineering Controls

- All crushing and screening facilities are enclosed by buildings, including the primary crusher.
- The pug mill is enclosed by a building.
- The scalps screen has a rubber screen deck.
- Train and truck loading bins are lined on the base to reduce impact noise when bins are being loaded from empty.
- Trucks dumping the leading row of overburden on the eastern overburden emplacement area will have attenuation to a maximum sound power level of 111 dBA when dumping.

Management Controls

- The grader will operate during the daytime only.
- The overburden removal and emplacement fleet will operate during the daytime only.
- When operating on the eastern emplacement areas, the majority of operations occurring on the top of the emplacement areas will occur behind an earth mound created by the first row of dumping.
- No dumping will occur on the leading edge of either the eastern overburden emplacement area or the eastern excess product emplacement area while the dozer is operating on the leading face.
- The load and haul fleet will operate during the daytime and evening only.
- Drilling will only occur during the daytime period.
- The CAT 988 stockpile loader and dump truck will only operate during the daytime period.
- The pugmill will only operate during the daytime and evening period.
- The primary crusher will only operate during the daytime and evening period.
- Only one sales loader will operate during the night-time period.
- The rough terrain forklift will only operate during the daytime period.
- The number of finished product trucks at night will be limited to 32 movements per hour.

Results of Operational Noise Modelling

Predicted noise levels for plant operations for both calm and prevailing weather conditions are shown in **Table 10** through to **Table 11**.

Noise modelling results indicate that noise emissions from Lynwood Quarry, including the proposed modifications, are predicted to meet the noise consent criteria for operation during daytime, evening and night-time at all sensitive residential locations under both calm and prevailing weather conditions with appropriate noise controls in place.

Noise modelling was conducted for sleep disturbance using the L_{Amax} noise level of a truck loading and train loading from each of the loading bins. Modelling was conducted for acoustically adverse weather conditions, including temperature inversion and relevant drainage flow winds. Maximum noise levels are predicted to be below sleep disturbance consent conditions for night-time operation of the quarry. This being the case, sleep disturbance is unlikely to occur at residential locations surrounding the proposed quarry.



EXECUTIVE SUMMARY

A comparison of the predicted noise levels associated with the proposed modifications indicates that the predicted noise levels are generally similar to the predicted noise levels of the approved Quarry. Although noise levels at certain assessment locations do increase, these levels do not exceed the noise limits specified in the development consent conditions

Construction Noise Modelling

Earthworks and foundation works require the largest amount of plant and equipment to be used during the construction phase, and the noise assessment has concentrated on these construction activities. The worst case scenarios for both earthworks and foundation works have been modelled and are contained in **Table 13** and **Table 14**. Noise levels for earthworks and foundation works are predicted to meet the construction noise goals at all sensitive receiver locations.

Cumulative Impact Assessment

During the previous noise assessment the only location where significant existing industrial noise was evident was noise monitoring Location N4. Noise from existing industrial sources (fertiliser handling facility) at this location was measured during the daytime at $L_{Aeq}(15\text{minute})$ of 51 dBA, with no contribution during the evening or night-time periods. The fertiliser handling facility has now closed and so cumulative noise impact at this location is now not applicable.

Since the approval of Lynwood Quarry in 2005 an additional quarry, Gunlake Quarry, has been approved in the surrounding area. The closest noise sensitive receiver location to the Gunlake Quarry is Location 2.

The cumulative noise impact of the operation of Lynwood Quarry and Gunlake Quarry is predicted to comply with the amenity criteria for sensitive receiver locations surrounding the Lynwood Quarry.



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1 INTRODUCTION

Heggies Pty Ltd (Heggies) has been commissioned by Umwelt (Australia) Pty Limited (Umwelt) on behalf of Holcim (Australia) Pty Ltd (Holcim) to prepare a noise impact assessment (NIA) for proposed modifications to the approved Lynwood Quarry Project. The proposed modification includes the reconfiguration of the rail loop to a rail spur, which allows for greater flexibility in locating the components of the processing and loading out facilities, including the main access road. The Quarry is located on land to the west of Marulan in the Southern Tablelands region of NSW.

The approved Quarry is intended to provide a long-term supply of high quality construction material into the Sydney, regional and local markets and will replace Holcim's current production from the Penrith Lakes Scheme which is approaching closure. The approved Quarry will produce up to 5 million tonnes per annum (Mtpa) of saleable product.

Broadly, the objective of this noise assessment was to identify the potential impacts of noise from the proposed modifications, including construction and operation stages and associated on-site rail and vehicle movements, and to provide advice with regard to effective mitigation strategies where necessary. As there are no changes as a result of the modification to road and rail movements to or from the project site or to blasting these will not form part of this NIA. Although there will be a slight change in average daily train movements (from 4 to 4.5 trains per day) due to the potential use of shorter trains, the noise assessment for the approved project was based on a maximum of six trains per day and therefore there will be no change to the assessed noise impacts of train movements and train movements do not require further assessment.

The noise assessment has been prepared in accordance with Australian Standard AS 1055-1997 "*Description and Measurement of Environmental Noise*" Part 1, 2 and 3 and with reference to the NSW Industrial Noise Policy (INP), Environmental Noise Control Manual (ENCM) and Interim Construction Noise Guideline.

Heggies also prepared the noise impact assessment for the original development application (refer Heggies Report 10-3142-R1 *Lynwood Quarry Noise and Blasting Impact Assessment* dated 2005).



2 DESCRIPTION OF THE PROJECT

Holcim is proposing to modify its development consent (DA 128-5-2005) for the Lynwood Quarry. As part of the detailed design process for the Quarry, Holcim Australia has identified opportunities to improve the plant set up and optimise the site layout. As a result of this detailed review changes are proposed that are primarily aimed at obtaining operational efficiencies and product quality benefits, but will also result in cost savings, both operational & capital.

The overall nature, components and approved production rate of 5 million tonnes per annum (Mtpa) remains unchanged, including the extent of the approved 30 year Quarry pit. The key minor changes proposed as part of this project include:

- Reconfiguration of the rail line from a balloon loop to a rail spur.
- Change from a mobile to fixed in-pit primary crusher for the early years of the project.
- Relocation of the secondary crusher and associated elements to the southern side of the Main Southern Railway.
- Change in initial quarry pit development as a result of the fixed in-pit primary crusher being utilised for the early years of the project.
- Relocation of the office and amenities away from the operational areas of the Quarry.
- A slight change to the western excess product emplacement area to allow for the relocated offices and amenities.
- Realignment of the access road to eliminate the need for a bridge over the rail siding.

As a result of the proposed reconfiguration of the rail line and the associated changes to the Quarry infrastructure layout, a small increase to the approved disturbance footprint for the Quarry of approximately 10.5 hectares will be required, although the proposed area is within the approved Project Area for the Lynwood Quarry.

2.1 Plant and Equipment

The sound power level of acoustically significant items of plant and equipment proposed to be used on the Project Area has been obtained from a Heggies noise source database. The LAeq sound power levels of this plant and equipment are given in **Table 1** (fixed plant) and **Table 2** (mobile plant and equipment). The details of the octave band levels, including the spectral component (used to determine character of the noise) used in the noise modelling process are included in **Appendix A**.



Table 1 Fixed Plant Equipment List - Typical Noise Levels

Equipment Description	Number Required	Sound Power Level
Primary Crusher	1	118 dBA
Primary Screen	1	117 dBA
Secondary/Tertiary Crushers	4	113 dBA
Secondary Screen	1	115 dBA each
Scalping Station Screens	2	115 dBA each
Surge Bin for Secondary/Tertiary Crushers	4	107 dBA each
Product Screen	4	109 dBA each
Train Loading Bin - lined	2	100 dBA
Truck Loading Bin - lined	8	100 dBA
Stackers	8	99 dBA each
Pre Coat Plant	1	99 dBA
Pug Mill	1	116 dBA

Table 2 Conceptual Mobile Plant Equipment List

Indicative Equipment Description (equipment listed or alternatives with similar sound power level will be used)	Number to be used	Sound Power Level
Drilling Hydraulic Rock Drill	3	118 dBA
Load and Haul Fleet CAT 992 Loader	2	119 dBA
CAT 777 Dump Hauling Dumping	6	111 dBA 118 dBA
Other Items CAT 773 Water Cart	2	116 dBA
CAT 345B Excavator with Hydraulic Hammer	1	118 dBA
CAT 140H Grader	1	113 dBA
Sales Fleet CAT 980G Sales Loader	2	110 dBA
Cat 988 Stockpile Loader	1	116 dBA
CAT 773 Dump Truck	1	118 dBA
Miscellaneous Items Rough Terrain Forklift	1	110 dBA
Bobcat	1	101 dBA
Diesel Pump	3	83 dBA
Overburden Removal and Emplacement Fleet CAT 990 Loader	1	116 dBA
CAT 777 Dump Truck Hauling Dumping	3	111 dBA 118 dBA
CAT D10 Bulldozer		109 dBA
Product Despatch Road Registered Trucks	As required	110 dBA
Road Registered Trucks Entering/Departing		107 dBA
Rail Despatch loading train		100 dBA
locomotives	2	100 dBA
wagon bunching		95 dBA



2.2 Hours of Operation

The Quarry is approved to produce approximately 5 Mtpa and to operate on a 24 hour per day seven day per week basis. To limit the potential for disturbance to neighbouring residences, operations have been scheduled to occur as outlined in **Table 3**.

Table 3 Hours of Operation

Operation	Proposed Hours
Overburden removal and emplacement	7.00 am to 6.00 pm seven days per week
Drilling	7.00 am to 6.00 pm seven days per week
Extraction	7.00 am to 10.00 pm seven days per week
Sales and Transport Operations	24 hours per day, seven days per week
Processing Operations	24 hours per day, seven days per week



3 NOISE EMISSION CRITERIA

3.1 Project Specific Noise Criteria

Noise levels have been assessed at 14 assessment locations, which are representative of 11 residences and three (3) potential residential locations refer to **Figure 1**. These included locations at, or near the seven previous noise monitoring locations. The noise assessment locations are consistent with the noise assessment locations used for the original EIS.

Project specific noise criteria were determined as part of Heggies previous noise assessment (refer Heggies Report 10-3142-R1 *Lynwood Quarry Noise and Blasting Impact Assessment* dated 2005). These are reproduced in **Table 4**. The noise limits issued in development consent DA 128-5-2005 (Schedule 3, Condition 3) are outlined in **Section 3.2**.

Figure 1 Noise Sensitive Receiver Locations

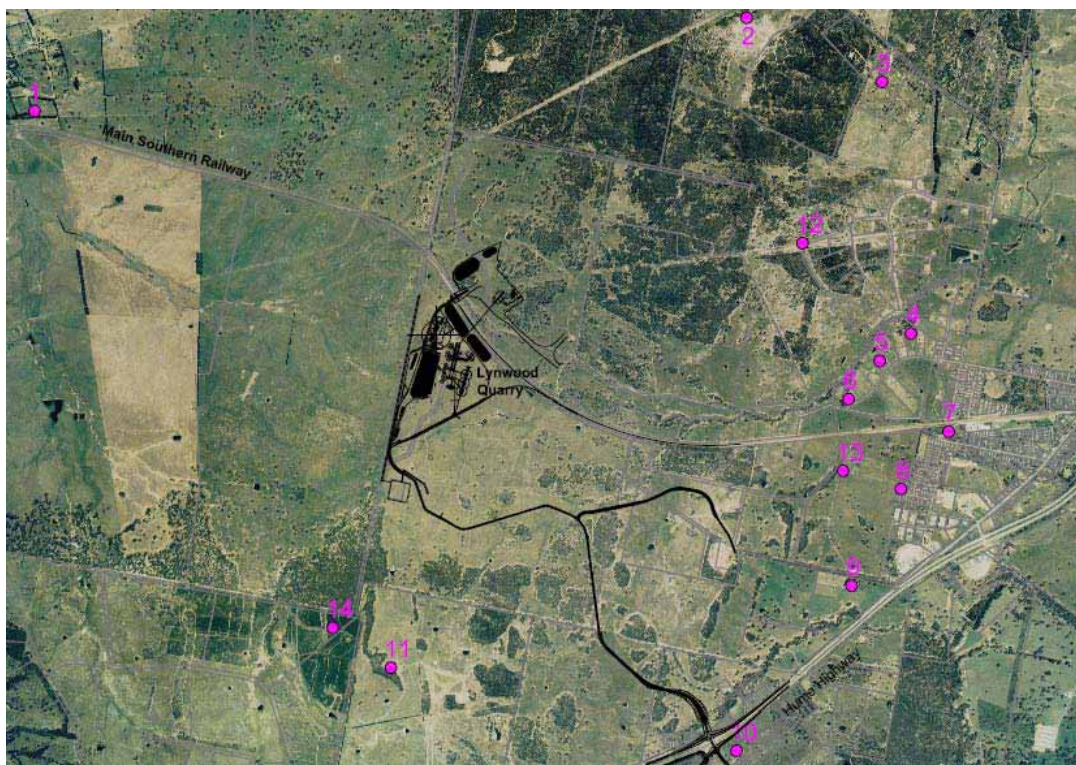




Table 4 Project Specific Operational Noise Criteria for Noise Assessment Locations

Location	Description	Criterion LAeq(15minute) dBA	Sleep Disturbance Criterion LA1(1 minute) dBA
Location 1	Daytime	35	N/A
	Evening	35	N/A
	Night	35	45
Location 2	Daytime	42	N/A
	Evening	38	N/A
	Night	38	48
Location 3	Daytime	42	N/A
	Evening	38	N/A
	Night	38	48
Location 4	Daytime	35	N/A
	Evening	37	N/A
	Night	36	46
Location 5	Daytime	35	N/A
	Evening	37	N/A
	Night	36	46
Location 6	Daytime	35	N/A
	Evening	37	N/A
	Night	36	46
Location 7	Daytime	45	N/A
	Evening	45*	N/A
	Night	41*	55
Location 8	Daytime	45	N/A
	Evening	45*	N/A
	Night	41*	55
Location 9	Daytime	48	N/A
	Evening	47*	N/A
	Night	46	56
Location 10	Daytime	47	N/A
	Evening	45*	N/A
	Night	40*	53
Location 11	Daytime	39	N/A
	Evening	38	N/A
	Night	37	47
Location 12	Daytime	42	N/A
	Evening	38	N/A
	Night	38	48
Location 13	Daytime	42	N/A
	Evening	38	N/A
	Night	38	48
Location 14	Daytime	39	N/A
	Evening	38	N/A
	Night	37	47

Note: * Derived from the amenity criteria.



3.2 Consent Conditions

The development consent conditions that relate to noise issued as part of DA 128-5-2005, Condition 3 of Schedule 3, are as follows:

NOISE

Noise Limits

3. *The applicant shall ensure that the noise generated by the operation of the development does not exceed the sound pressure level (noise) limits specified in Table 1.*

Noise Assessment Location	Day	Evening	Night	
	LAeq(15minutes)	LAeq (15 minutes)	LAeq(15 minutes)	LA1(1 minute)
Location 1	35	35	35	45
Location 2	35	35	35	45
Location 3	35	35	35	45
Location 4	35	37	35	46
Location 5	35	35	35	46
Location 6	35	37	36	46
Location 7	38	38	35	55
Location 8	39	38	36	55
Location 9	39	39	37	56
Location 10	42	42	40	53
Location 11	35	35	35	47
Location 12	37	37	36	47
Location 13	40	38	37	47
Location 14	35	35	35	47

Table 1: Operational Noise Limits

Notes:

- For more information on the noise impact assessment locations see appendix 3
- Noise from the development is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of a dwelling where the dwelling is more than 30 metres from the boundary, to determine compliance with the noise limits in Table 1 unless otherwise stated.
- However, noise from the development is to be measured a 1 m from the dwelling façade to determine compliance with LA1(1 minute) in Table 1.
- Where it can be demonstrated that direct measurement of noise from the development is impractical, the DECC may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy).
- The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.
- The noise limits in Table 1 apply under the following meteorological condition:
 - wind speed up to 3m/s at 10 m above the ground level; or
 - temperature inversion conditions of up to 3^oC/100 m and wind speed up to 2 m/s at 10 m above ground level.

Noise Mitigation Measures

4. *During the development, the Applicant shall:*
- Investigate ways to reduce the noise generated by the development*
 - Implement all reasonable and feasible noise mitigation measures on the site; and*
 - Report to the Director-General each year on these investigations and the implementation of any new noise mitigation measures on the site in the AEMR.*



Operating Hours

The Applicant should comply with the operating hours in Table 2:

Activity	Day	Time
<i>Construction works</i>	<i>Monday –Friday</i>	<i>7am to 6pm</i>
	<i>Saturday</i>	<i>8am to 1pm</i>
	<i>Sunday and Public Holidays</i>	<i>None</i>
<i>Topsoil/overburden removal/emplacment; drilling</i>	<i>Any day</i>	<i>7am to 6pm</i>
<i>Blasting</i>	<i>Monday – Saturday</i>	<i>9am to 5pm</i>
	<i>Sunday and Public Holidays</i>	<i>None</i>
<i>Extraction</i>	<i>Any day</i>	<i>7am to 10pm</i>
<i>Processing (Crushing, screening, stockpiling); loading delivery and distribution; maintenance</i>	<i>Any day</i>	<i>Anytime</i>

Table 2: Operating hours

Notes:

Table 2 only relates to construction works that are audible at any residential receivers on privately owned land. Construction works that are audible at any residential receiver may be carried out at any time.

Construction works with the Hume Highway reserve may be undertaken outside the hours specified in Table 2 with the written approval of the RTA



3.3 Construction Noise Design Goals

The Department of Environment, Climate Change and Water (DECCW) released the Interim Construction Noise Guideline (ICNG) in July 2009.

The guideline sets out noise management levels, in relation to construction type activities, for residential receivers and how they are to be applied. The guideline suggests restriction to the hours of construction that apply to activities that generate noise at residences above the 'highly affected' noise management level. A summary of the noise management levels from the Guideline is contained in **Table 5** and **Table 6**.

Table 5 Interim Construction Noise Guideline Noise at residences

Time of day	Management level LAeq(15minute)	How to apply
Recommended standard hours Monday to Friday 7am to 6pm Saturday 8am to 1pm No work Sundays or public holidays	Noise Affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. <ul style="list-style-type: none"> Where the predicted or measured LAeq (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. <ul style="list-style-type: none"> Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: <ol style="list-style-type: none"> times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise Affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. <ul style="list-style-type: none"> The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.



Table 6 Noise at Sensitive Land Uses (other than residences)

Land Use	Management level LAeq(15minute) (applies when properties are being used)
Classrooms at schools and other educational institutions	Internal noise level 45 dBA
Hospital wards and operating theatres	Internal noise level 45 dBA
Places of worship	Internal noise level 45 dBA
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External noise level 65 dBA
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External noise level 60 dBA
Community centres	Depends on the intended use of the centre. Refer to the recommended 'maximum' internal levels in AS2107 for specific uses.

The construction noise emission design goals have been set with reference to the ICNG.

Table 7 contains the project specific construction noise design limits.

Table 7 Project Specific Construction Noise Goals

Location	Construction Noise Goal (LAeq(15minute)) ¹	
	Noise affected	Highly Noise Affected
Location 1	40	75
Location 2	47	75
Location 3	47	75
Location 4	40	75
Location 5	40	75
Location 6	40	75
Location 7	50	75
Location 8	50	75
Location 9	53	75
Location 10	52	75
Location 11	44	75
Location 12	47	75
Location 13	47	75
Location 14	44	75

¹ Applicable between the hours of 7.00 am and 6.00 pm Monday to Friday, and 8.00 am to 1.00 pm Saturdays.

Construction noise level goals are applicable between the hours of 7.00 am and 6.00 pm Monday to Friday, and 8.00 am to 1.00 pm Saturdays. For all other times construction noise must be inaudible at the receivers except for construction works in the Hume Highway reserve as outlined in Condition 3 of development consent DA 128-5-2005. No audible construction work is planned to take place on Sundays or Public Holidays.



4 ASSESSMENT OF NOISE IMPACTS

4.1 Operational Noise Modelling

A computer model was used to predict the noise emissions from the Project Area using the Environmental Noise Model (ENM) software which was produced in conjunction with the DECCW. A digital map giving all relevant topographic information was entered into the model. The model used this map, together with the noise source data, ground cover, shielding by barriers and/or adjacent buildings and atmospheric information to predict noise levels for both construction and operation of the Quarry. Noise levels were predicted at 11 residences and three (3) potential residential locations which represent the nearest, most potentially affected, residential receiver locations as shown in **Appendix B**. Noise levels under calm atmospheric conditions and prevailing weather conditions were modelled. All quarry plans and topographic data used in the ENM was supplied by Umwelt.

Noise from all sources that contribute to the total noise at the site have been examined to identify characteristics that may cause greater annoyance (for example tonality, impulsiveness etc). The appropriate modifying factors, as outlined in the INP, have been applied where these characteristics are considered to be present. The noise model does not consider noise likely to emanate from reversing alarms, horns or other warning devices. In the event that these items are likely to pose a problem, consideration should be given to investigating alternative warning options as appropriate. Careful selection of alternatives is important so that safety is not compromised. Alternatives to reversing alarms may include warning lights, reversing sensors on vehicles, reversing cameras on vehicles, a combination of these, or diligent choice of the type and level of reversing alarms so that they only alert the immediate area around the vehicle.

Noise Modelling Parameters

The predicted noise emission levels for operation of the quarry at potentially affected receivers have been calculated with the meteorological parameters shown in **Table 8**.

Table 8 Noise Modelling Parameters

Assessment Condition	Temperature °C	Wind Speed Direction (m/s)	Relative Humidity (%)	Temperature Gradient °C/100m
Calm	20	Calm	65	0
Evening Prevailing Westerly Wind	10	2.5 m/s	80	0
Night Prevailing Westerly Wind	4	2.5 m/s	90	0
Temperature Inversion	4	Calm	90	3
Temperature Inversion and Drainage Flow from the South East	4	2.0 m/s	90	3
Temperature Inversion and Drainage Flow from the North West	4	2.0 m/s	90	3

Under conditions of temperature inversion drainage flow was considered to occur from the Project Area either to the south-east or to the north-west as dictated by the surrounding topography.



Three representative operational scenarios were chosen for the noise modelling. These include the following conceptual quarry plans:

- Year 5 quarry plan.
- Year 10 quarry plan.
- Year 30 quarry plan.

4.2 Noise Mitigation and Management

Several mitigation methods have been investigated in order to minimise noise at the surrounding receiver locations. While the mitigation options specified in this report will allow the Quarry to achieve the predicted noise levels, Holcim reserve the right to alter or refine these methods if superior mitigation techniques or improvements in technology become available. Mitigation in the form of engineering or management controls, which have been adopted and included in the noise modelling process, is as follows:

4.2.1 Engineering Controls

- All crushing and screening facilities are enclosed by buildings, including the primary crusher.
- The pug mill is enclosed by a building.
- The scalps screen has a rubber screen deck.
- Train and truck loading bins are lined on the base to reduce impact noise when bins are being loaded from empty.
- Trucks dumping the leading row of overburden on the eastern overburden emplacement area will have attenuation to a maximum sound power level of 111 dBA when dumping.

4.2.2 Management Controls

- The grader will operate during the daytime only.
- The overburden removal and emplacement fleet will operate during the daytime only.
- When operating on the eastern emplacement areas, the majority of operations occurring on the top of the emplacement areas will occur behind an earth mound created by the first row of dumping.
- No dumping will occur on the leading edge of either the eastern overburden emplacement area or the eastern excess product emplacement area while the dozer is operating on the leading face.
- The load and haul fleet will operate during the daytime and evening only.
- Drilling will only occur during the daytime period.
- The CAT 988 stockpile loader and dump truck will only operate during the daytime period.
- The pugmill will only operate during the daytime and evening period.
- The primary crusher will only operate during the daytime and evening period.
- Only one sales loader will operate during the night-time period
- The rough terrain forklift will only operate during the daytime period.
- The number of finished product trucks at night will be limited to 32 movements per hour.



4.3 Noise Modelling Results

Predicted noise levels for plant operations for both calm and prevailing weather conditions are shown in **Table 9** through to **Table 11**. Predicted noise levels shown in these tables under temperature inversion represent temperature inversion conditions with drainage flow where appropriate. Noise contour plots have been produced for the representative scenarios which relate to worst case situations for day, evening and night periods and are attached as **Appendix C**. It should be noted that noise contours are indicative of the noise emissions surrounding the quarry and that single point calculations provided in the report should be used for accurately interpreting noise levels at sensitive receiver locations.



Table 9 Operational Noise Modelling Results for Year 5

Location	Period	Predicted Noise Level LAeq(15minute) (dBA)			Noise Consent Criteria LAeq(15minute) (dBA)
		Calm	Prevailing Wind	Temperature Inversion	
Location 1	Daytime	<30	N/A	N/A	35
	Evening	<30	<30	N/A	35
	Night	<30	<30	<30	35
Location 2	Daytime	<30	N/A	N/A	35
	Evening	<30	<30	N/A	35
	Night	<30	<30	<30	35
Location 3	Daytime	<30	N/A	N/A	35
	Evening	<30	<30	N/A	35
	Night	<30	<30	<30	35
Location 4	Daytime	30	N/A	N/A	35
	Evening	<30	35	N/A	37
	Night	<30	<30	<30	35
Location 5	Daytime	32	N/A	N/A	35
	Evening	<30	35	N/A	35
	Night	<30	30	31	35
Location 6	Daytime	34	N/A	N/A	35
	Evening	<30	35	N/A	37
	Night	<30	31	32	36
Location 7	Daytime	31	N/A	N/A	38
	Evening	<30	38	N/A	38
	Night	<30	<30	30	35
Location 8	Daytime	34	N/A	N/A	39
	Evening	<30	37	N/A	38
	Night	<30	30	31	36
Location 9	Daytime	31	N/A	N/A	39
	Evening	<30	38	N/A	39
	Night	<30	30	33	37
Location 10	Daytime	38	N/A	N/A	42
	Evening	38	41	N/A	42
	Night	37	40	39	40
Location 11	Daytime	35	N/A	N/A	35
	Evening	35	35	N/A	35
	Night	30	<30	35	35
Location 12	Daytime	34	N/A	N/A	37
	Evening	<30	37	N/A	37
	Night	<30	<30	<30	36
Location 13	Daytime	37	N/A	N/A	40
	Evening	<30	37	N/A	38
	Night	<30	32	34	37
Location 14	Daytime	<30	N/A	N/A	35
	Evening	<30	<30	N/A	35
	Night	<30	<30	31	35

Notes For Monday to Saturday, Daytime 7.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 7.00 am.
On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.



Table 10 Operational Noise Modelling Results for Year 10

Location	Period	Predicted Noise Level LAeq(15minute) (dBA)			Noise Consent Criteria LAeq(15minute) (dBA)
		Calm	Prevailing Wind	Temperature Inversion	
Location 1	Daytime	<30	N/A	N/A	35
	Evening	<30	<30	N/A	35
	Night	<30	<30	<30	35
Location 2	Daytime	<30	N/A	N/A	35
	Evening	<30	<30	N/A	35
	Night	<30	<30	<30	35
Location 3	Daytime	<30	N/A	N/A	35
	Evening	<30	<30	N/A	35
	Night	<30	<30	<30	35
Location 4	Daytime	30	N/A	N/A	35
	Evening	<30	35	N/A	37
	Night	<30	<30	30	35
Location 5	Daytime	32	N/A	N/A	35
	Evening	<30	35	N/A	35
	Night	<30	30	31	35
Location 6	Daytime	35	N/A	N/A	35
	Evening	<30	35	N/A	37
	Night	<30	31	32	36
Location 7	Daytime	33	N/A	N/A	38
	Evening	<30	38	N/A	38
	Night	<30	<30	30	35
Location 8	Daytime	34	N/A	N/A	39
	Evening	<30	38	N/A	38
	Night	<30	<30	31	36
Location 9	Daytime	31	N/A	N/A	39
	Evening	<30	37	N/A	39
	Night	<30	<30	33	37
Location 10	Daytime	38	N/A	N/A	42
	Evening	38	41	N/A	42
	Night	37	40	39	40
Location 11	Daytime	35	N/A	N/A	35
	Evening	35	35	N/A	35
	Night	30	<30	35	35
Location 12	Daytime	34	N/A	N/A	37
	Evening	<30	37	N/A	37
	Night	<30	<30	<30	36
Location 13	Daytime	38	N/A	N/A	40
	Evening	<30	38	N/A	38
	Night	<30	32	34	37
Location 14	Daytime	<30	N/A	N/A	35
	Evening	<30	<30	N/A	35
	Night	<30	<30	31	35

Notes For Monday to Saturday, Daytime 7.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 7.00 am.
On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.



Table 11 Operational Noise Modelling Results for Year 30

Location	Period	Predicted Noise Level LAeq(15minute) dBA			Noise Consent Criteria LAeq(15minute) dBA
		Calm	Prevailing Wind	Temperature Inversion	
Location 1	Daytime	<30	N/A	N/A	35
	Evening	<30	<30	N/A	35
	Night	<30	<30	<30	35
Location 2	Daytime	<30	N/A	N/A	35
	Evening	<30	<30	N/A	35
	Night	<30	<30	<30	35
Location 3	Daytime	<30	N/A	N/A	35
	Evening	<30	<30	N/A	35
	Night	<30	<30	<30	35
Location 4	Daytime	<30	N/A	N/A	35
	Evening	<30	33	N/A	37
	Night	<30	<30	30	35
Location 5	Daytime	<30	N/A	N/A	35
	Evening	<30	34	N/A	35
	Night	<30	30	31	35
Location 6	Daytime	<30	N/A	N/A	35
	Evening	<30	35	N/A	37
	Night	<30	31	32	36
Location 7	Daytime	<30	N/A	N/A	38
	Evening	<30	34	N/A	38
	Night	<30	<30	30	35
Location 8	Daytime	<30	N/A	N/A	39
	Evening	<30	35	N/A	38
	Night	<30	30	31	36
Location 9	Daytime	<30	N/A	N/A	39
	Evening	<30	33	N/A	39
	Night	<30	30	33	37
Location 10	Daytime	38	N/A	N/A	42
	Evening	38	40	N/A	42
	Night	37	40	39	40
Location 11	Daytime	35	N/A	N/A	35
	Evening	34	34	N/A	35
	Night	<30	<30	35	35
Location 12	Daytime	<30	N/A	N/A	37
	Evening	<30	36	N/A	37
	Night	<30	<30	<30	36
Location 13	Daytime	<30	N/A	N/A	40
	Evening	<30	37	N/A	38
	Night	<30	32	34	37
Location 14	Daytime	<30	N/A	N/A	35
	Evening	<30	<30	N/A	35
	Night	<30	<30	31	35

Notes For Monday to Saturday, Daytime 7.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 7.00 am.
On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.



Noise modelling results indicate that noise emissions from Lynwood Quarry incorporating the proposed modifications is predicted to meet the noise consent criteria for operations during daytime, evening and night-time at all residential locations under both calm and prevailing weather conditions with appropriate noise controls in place.

4.3.1 Sleep Disturbance

Noise modelling was conducted for sleep disturbance using an LA1 noise level of a truck loading and train loading from each of the loading bins. The loading of trucks and the rail loading bins was considered to have the most potential to cause sleep disturbance impacts. Modelling was conducted for acoustically adverse weather conditions, including temperature inversion and relevant drainage flow winds. Ground contours for the year five scenario have been used in the noise model. This is considered to be the worst-case sleep disturbance situation. The highest of all predicted noise levels has been reported in **Table 12**.

Table 12 Sleep Disturbance Noise Modelling Results

Location	Period	Predicted Noise Level LA1(1minute) (dBA)	Noise Consent Criteria LA1(1minute) (dBA)
Location 1	Night	39	45
Location 2	Night	<30	45
Location 3	Night	<30	45
Location 4	Night	40	46
Location 5	Night	42	46
Location 6	Night	45	46
Location 7	Night	42	55
Location 8	Night	44	55
Location 9	Night	45	56
Location 10	Night	44	53
Location 11	Night	44	47
Location 12	Night	42	47
Location 13	Night	44	47
Location 14	Night	44	47

LA1(1minute) noise levels are predicted to be below project specific sleep disturbance consent conditions for night-time operation of the Quarry. This being the case, sleep disturbance is unlikely to occur at residential locations surrounding the Quarry.

4.3.2 Comparison with Approved Project

A comparison of the predicted noise levels associated with the proposed modifications has been made with the predicted noise levels outlined in the SEE (Umwelt, 2009) for the approved Lynwood Quarry. This comparison indicates that the noise levels predicted for the operational scenarios modelled at the 14 assessment locations are generally similar to the predicted noise levels of the approved Quarry. Predicted noise levels have decreased at certain assessment locations and increased at others, although the noise levels at these locations do not exceed the noise limits specified in the development consent conditions as outlined in **Table 9** to **Table 11**.



4.4 Construction Noise Modelling

There will be ten (10) primary stages to the construction works. These include:

- Highway Intersection.
- Bridge over Rail Line.
- Earthworks.
- Foundations.
- Structures.
- Building Fitout.
- Mechanical Works.
- Electrical Installation.
- Plumbing Services.
- Rail Track and Signalling.

While the highway intersection forms part of the construction process, the construction activities take place predominantly on the highway road corridor. This being the case, the interchange construction would be classed as a road upgrade, which would be assessed in accordance with *Environmental Criteria for Road Traffic Noise* (ECRTN). This assessment will occur during the detailed design stage, and may be undertaken by the roadworks contractor prior to construction activities commencing.

Earthworks and foundation work require the largest amount of plant and equipment to be used on the Project Area, and these two operations have therefore been concentrated on for the construction noise assessment. Noise levels used in the construction noise model are contained in **Appendix A**.

The worst case scenario for earthworks has been modelled. This involves the equipment operating at the proposed location of the quarry processing plant and rail spur to level and prepare the project area for foundations.

Similarly, the worst case scenario for foundation work has also been modelled. This will occur when foundations are being created for the easternmost buildings.

Table 13 contains the results for earthworks, and **Table 14** contains the results for foundations.



Table 13 Predicted Construction Noise Levels - Earthworks

Location	Predicted Noise Level ($L_{Aeq}(15\text{minute})$)	Construction Noise Goal ($L_{Aeq}(15\text{minute})$) ¹	
		Noise affected	Highly Noise Affected
Location 1	<30	40	75
Location 2	<30	47	75
Location 3	<30	47	75
Location 4	<30	40	75
Location 5	34	40	75
Location 6	35	40	75
Location 7	31	50	75
Location 8	30	50	75
Location 9	<30	53	75
Location 10	<30	52	75
Location 11	39	44	75
Location 12	<30	47	75
Location 13	31	47	75
Location 14	39	44	75

Noise levels for earthworks construction are predicted to meet all construction noise goals at all sensitive receiver locations.

Table 14 Predicted Construction Noise Levels - Foundation Works

Location	Predicted Noise Level ($L_{Aeq}(15\text{minute})$)	Construction Noise Goal ($L_{Aeq}(15\text{minute})$) ¹	
		Noise affected	Highly Noise Affected
Location 1	<30	40	75
Location 2	<30	47	75
Location 3	<30	47	75
Location 4	<30	40	75
Location 5	<30	40	75
Location 6	<30	40	75
Location 7	<30	50	75
Location 8	<30	50	75
Location 9	<30	53	75
Location 10	<30	52	75
Location 11	33	44	75
Location 12	<30	47	75
Location 13	<30	47	75
Location 14	33	44	75

Noise levels for foundation construction are predicted to meet all construction noise goals at all sensitive receiver locations.



4.5 Cumulative Impact Assessment

The INP prescribes detailed calculation routines for establishing “project specific” $L_{Aeq(15\text{minute})}$ intrusive criteria and $L_{Aeq(\text{Period})}$ amenity criteria at potentially affected receivers for a development (in isolation).

Potential cumulative noise impacts from existing and successive developments are embraced by the INP procedures by ensuring that the appropriate noise emission criteria (and consent limits) are established with a view to maintaining acceptable noise *amenity* levels for sensitive receivers.

Therefore, the cumulative impact of the Project Area with existing industrial noise sources has been assessed in the determination of the amenity levels.

During the previous noise assessment the only location where significant existing industrial noise was evident was noise monitoring Location N4. Noise from existing industrial sources (fertiliser handling facility) at this location was measured during the daytime at $L_{Aeq(15\text{minute})}$ 51 dBA, with no contribution during the evening or night-time periods. The fertiliser handling facility has now closed and so cumulative noise impact at this location is no longer applicable.

Since the approval of Lynwood Quarry in 2005 an additional quarry, Gunlake Quarry, has been approved in the surrounding area. The closest noise sensitive receiver location to the Gunlake Quarry is Location 2.

Noise levels predicted at Location 2 for the operation of the Lynwood Quarry are below 30 dBA for all stages of development. The Environmental Assessment for Gunlake Quarry indicates that noise levels in the vicinity of Location 2 would be below 35 dBA. Therefore, the cumulative impact of the operation of Lynwood Quarry and Gunlake Quarry is predicted to comply with the amenity criteria for sensitive receiver locations surrounding the Lynwood Quarry.



5 CONCLUSION

Heggies has conducted a noise impact assessment for proposed minor modifications to the approved Lynwood Quarry project, located to the west of Marulan in the Southern Tablelands region of NSW.

To determine the contribution of the Quarry, during both the construction phase, and the operational phase of the development to the existing ambient noise environment, noise modelling was undertaken for calm and prevailing weather conditions.

Construction

The noise modelling results indicate that the construction of Lynwood Quarry is predicted to meet all project specific construction noise level goals at all sensitive receiver locations.

Operation

The noise modelling results indicate that the operation of Lynwood Quarry with the proposed modifications is predicted to meet the existing consent conditions for operation during daytime, evening and night-time at all sensitive receiver locations under both calm and prevailing weather conditions with appropriate noise controls in place.

LA1(1minute) noise levels are predicted to be below the existing sleep disturbance consent conditions for night-time operation of the quarry. This being the case, sleep disturbance is unlikely to occur at residential locations surrounding the proposed quarry.

Comparison with Approved Project

A comparison of the predicted noise levels associated with the proposed modifications indicates that the predicted noise levels are generally similar to the predicted noise levels of the approved Quarry. Although noise levels at certain assessment locations do increase, these levels do not exceed the noise limits specified in the development consent conditions.

Cumulative Impacts

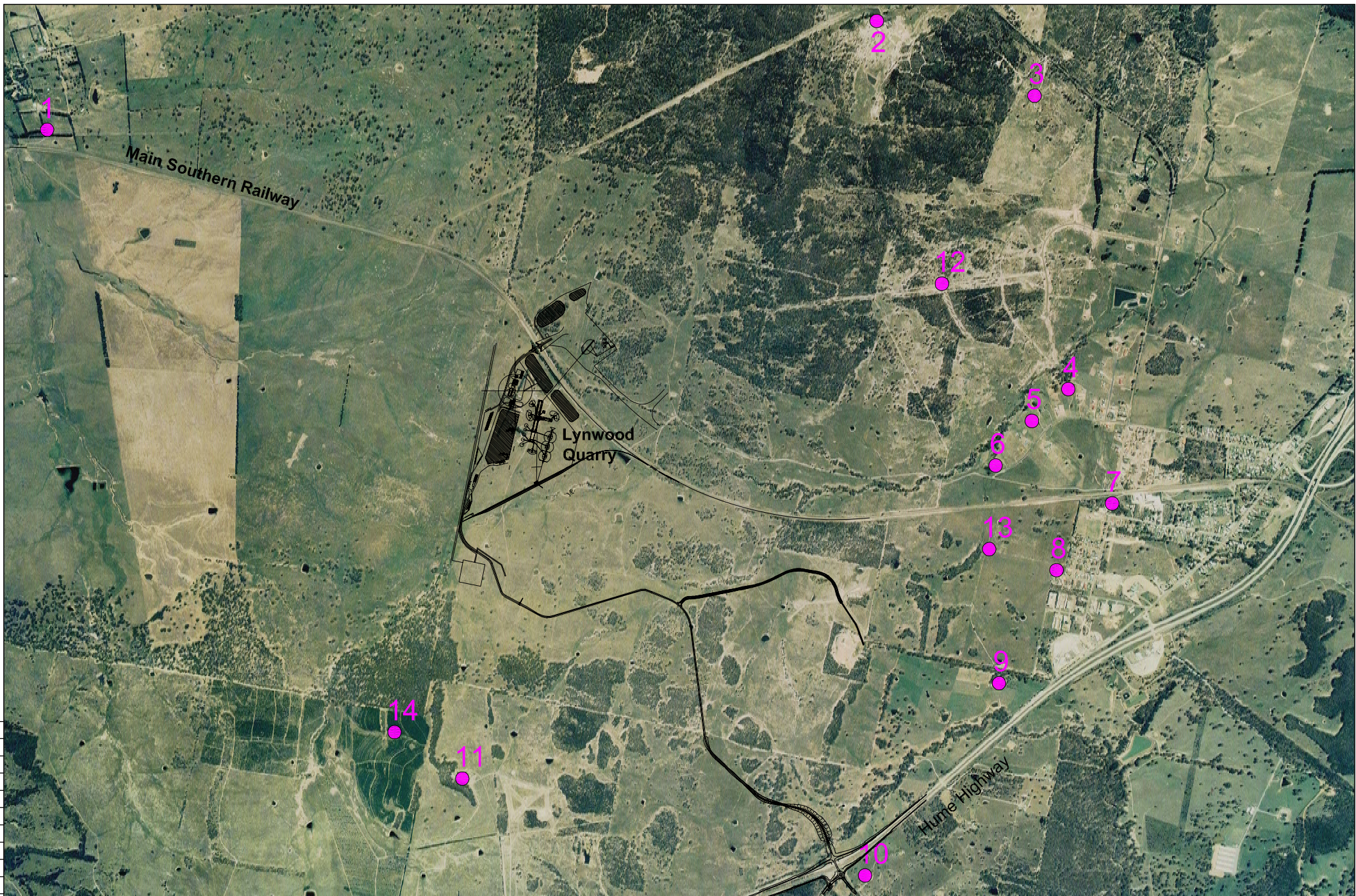
During the previous noise assessment the only location where significant existing industrial noise was evident was noise monitoring Location N4. Noise from existing industrial sources (fertiliser handling facility) at this location was measured during the daytime at LAeq(15minute) of 51 dBA, with no contribution during the evening or night-time periods. The fertiliser handling facility has now closed and so cumulative noise impact at this location is no longer applicable.

Since the approval of Lynwood Quarry in 2005 an additional quarry, Gunlake Quarry, has been approved in the surrounding area. The closest noise sensitive receiver location to the Gunlake Quarry is Location 2.

The cumulative noise impact of the operation of Lynwood Quarry and Gunlake Quarry is predicted to comply with the amenity criteria for sensitive receiver locations surrounding the Lynwood Quarry.

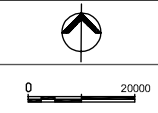
Source	Equipment Description	Octave Band Centre Frequency (Hz) - dBL re 1pW										dB Lin	dBA
No.		32	63	125	250	500	1k	2k	4k	8k	16K	Overall	Overall
1	Primary Jaw Crusher	108.0	112.0	109.0	111.0	113.0	113.0	111.0	108.0	103.0	96.0	120.2 dB	117.6 dBA
2	Primary Screen	103.0	102.0	103.0	105.0	110.0	111.0	112.0	107.0	100.0	92.0	117.3 dB	116.6 dBA
3	Scalping Station Screen x 2	108.0	105.0	106.0	106.0	109.0	112.0	114.0	108.0	101.0	89.0	118.7 dB	117.9 dBA
4	Secondary Screen	105.0	102.0	103.0	103.0	106.0	109.0	111.0	105.0	98.0	86.0	115.7 dB	114.9 dBA
5	Secondary/TertiaryCrusher 1	106.0	111.0	112.0	110.0	110.0	109.0	106.0	99.0	89.0	80.0	118.1 dB	113.2 dBA
6	Secondary/Tertiary Crusher 2	106.0	111.0	112.0	110.0	110.0	109.0	106.0	99.0	89.0	80.0	118.1 dB	113.2 dBA
7	Secondary/Tertiary Cone Crusher 3	106.0	111.0	112.0	110.0	110.0	109.0	106.0	99.0	89.0	80.0	118.1 dB	113.2 dBA
8	Secondary /Tertiary Crusher 4	106.0	111.0	112.0	110.0	110.0	109.0	106.0	99.0	89.0	80.0	118.1 dB	113.2 dBA
9	Surge Bin for Tertiary Crusher 1	113.0	112.0	111.0	106.0	105.0	102.0	96.0	89.0	79.0	79.0	117.6 dB	106.7 dBA
10	Surge Bin for Tertiary Crusher 2	113.0	112.0	111.0	106.0	105.0	102.0	96.0	89.0	79.0	79.0	117.6 dB	106.7 dBA
11	Surge Bin for Tertiary Crusher 3	113.0	112.0	111.0	106.0	105.0	102.0	96.0	89.0	79.0	79.0	117.6 dB	106.7 dBA
12	Surge Bin for Tertiary Crusher 4	113.0	112.0	111.0	106.0	105.0	102.0	96.0	89.0	79.0	79.0	117.6 dB	106.7 dBA
13	Tertiary #1 Product Screen 1	105.0	104.0	101.0	98.0	99.0	101.0	104.0	102.0	95.0	75.0	111.5 dB	108.6 dBA
14	Tertiary #1 Product Screen 2	105.0	104.0	101.0	98.0	99.0	101.0	104.0	102.0	95.0	75.0	111.5 dB	108.6 dBA
15	Tertiary #2 Product Screen 1	105.0	104.0	101.0	98.0	99.0	101.0	104.0	102.0	95.0	75.0	111.5 dB	108.6 dBA
16	Tertiary #2 Product Screen 2	108.0	107.0	104.0	101.0	102.0	104.0	107.0	105.0	98.0	78.0	114.5 dB	111.6 dBA
17	Stacker conveyor south	110.8	110.6	110.1	97.8	96.7	92.0	86.4	76.6	71.8	71.8	115.4 dB	99.1 dBA
18	Live stockpile 1 stacker	110.8	110.6	110.1	97.8	96.7	92.0	86.4	76.6	71.8	71.8	115.4 dB	99.1 dBA
19	Live stockpile 2 stacker	110.8	110.6	110.1	97.8	96.7	92.0	86.4	76.6	71.8	71.8	115.4 dB	99.1 dBA
20	Live stockpile 3 stacker	110.8	110.6	110.1	97.8	96.7	92.0	86.4	76.6	71.8	71.8	115.4 dB	99.1 dBA
21	Stacker conveyor (west)	110.8	110.6	110.1	97.8	96.7	92.0	86.4	76.6	71.8	71.8	115.4 dB	99.1 dBA
22	Train Loading Bin	106.0	105.0	104.0	99.0	98.0	95.0	89.0	82.0	72.0	72.0	110.6 dB	99.7 dBA
23	Locomotives	114.0	115.0	105.0	96.0	95.0	95.0	94.0	86.0	80.0	80.0	117.9 dB	100.3 dBA
24	Locomotives	114.0	115.0	105.0	96.0	95.0	95.0	94.0	86.0	80.0	80.0	117.9 dB	100.3 dBA
25	Wagon Bunching	99.0	101.0	101.0	91.0	89.0	89.0	88.0	84.0	80.0	80.0	105.7 dB	94.7 dBA
26	Wagon Bunching	99.0	101.0	101.0	91.0	89.0	89.0	88.0	84.0	80.0	80.0	105.7 dB	94.7 dBA
27	Pre-coat plant	110.8	110.6	110.1	97.8	96.7	92.0	86.4	76.6	71.8	71.8	115.4 dB	99.1 dBA
28	Pug Mill	113.0	119.0	117.0	107.0	111.0	112.0	108.0	103.0	98.0	98.0	122.8 dB	115.5 dBA
29	Stacker truck loadout	110.8	110.6	110.1	97.8	96.7	92.0	86.4	76.6	71.8	71.8	115.4 dB	99.1 dBA
30	Truck loading at truck loadout (3/15)	100.0	114.0	105.0	104.0	100.0	102.0	105.0	103.0	100.0	100.0	116.2 dB	110.1 dBA
31	Truck loading at pug mill (3/15)	100.0	114.0	105.0	104.0	100.0	102.0	105.0	103.0	100.0	100.0	116.2 dB	110.1 dBA
32	Truck Loading at pre-coat plant (3/15)	100.0	114.0	105.0	104.0	100.0	102.0	105.0	103.0	100.0	100.0	116.2 dB	110.1 dBA
33	Truck drive off at weigh bridge	113.0	115.0	104.0	100.0	102.0	104.0	101.0	93.0	85.0	85.0	117.8 dB	107.4 dBA
34	Truck drive off at pug mill	113.0	115.0	104.0	100.0	102.0	104.0	101.0	93.0	85.0	85.0	117.8 dB	107.4 dBA
35	Truck drive off at pre-coat plant	113.0	115.0	104.0	100.0	102.0	104.0	101.0	93.0	85.0	85.0	117.8 dB	107.4 dBA
36	Bobcat Plant Area	108.0	111.0	106.0	98.0	96.0	97.0	94.0	86.0	82.0	82.0	113.9 dB	101.2 dBA
37	Product truck on haul road	113.0	115.0	104.0	100.0	102.0	104.0	101.0	93.0	85.0	85.0	117.8 dB	107.4 dBA
38	Rough terrain forklift plant area	104.0	105.0	116.0	110.0	108.0	104.0	101.0	93.0	87.0	87.0	118.2 dB	109.9 dBA
39	Stacker conveyor(nth)	110.8	110.6	110.1	97.8	96.7	92.0	86.4	76.6	71.8	71.8	115.4 dB	99.1 dBA
40	Stacker conveyor(east)	110.8	110.6	110.1	97.8	96.7	92.0	86.4	76.6	71.8	71.8	115.4 dB	99.1 dBA
41	Stacker primary	110.8	110.6	110.1	97.8	96.7	92.0	86.4	76.6	71.8	71.8	115.4 dB	99.1 dBA
42	CAT980G Stockpile east	114.0	112.0	108.0	106.0	103.0	103.0	103.0	104.0	100.0	89.0	117.8 dB	110.1 dBA
43	CAT980G Stockpile west	114.0	112.0	108.0	106.0	103.0	103.0	103.0	104.0	100.0	89.0	117.8 dB	110.1 dBA
44	Cat 988 Stockpile loader	112.0	109.0	114.0	112.0	105.0	114.0	104.0	109.0	95.0	95.0	120.2 dB	116.3 dBA
45	CAT773 Watercart near plant	116.0	116.0	113.0	115.0	112.0	110.0	109.0	102.0	97.0	97.0	122.2 dB	115.5 dBA
46	Diesel Pump near truck loading point	70.0	72.0	79.0	80.0	81.0	81.0	74.0	67.0	58.0	58.0	86.9 dB	83.8 dBA
47	CAT773 Stockpile Dump Truck	112.0	112.0	109.0	111.0	108.0	106.0	105.0	98.0	93.0	93.0	118.2 dB	111.5 dBA

Source	Equipment Description	Octave Band Centre Frequency (Hz) - dBL re 1pW										dB Lin	dBA
No.		32	63	125	250	500	1k	2k	4k	8k	16K	Overall	Overall
60	CAT140H Grader	97	100	109	104	108	109	106	103	103	103	115.6 dB	113.3 dBA
61	CAT345B with hammer	117	112	114	111	110	115	110	110	101	101	122.2 dB	118.2 dBA
62	CAT777 hauling to crusher 1	112.0	112.0	109.0	111.0	108.0	106.0	105.0	98.0	93.0	93.0	118.2 dB	111.5 dBA
63	CAT777 hauling to crusher 2	112.0	112.0	109.0	111.0	108.0	106.0	105.0	98.0	93.0	93.0	118.2 dB	111.5 dBA
64	CAT777 being loaded in pit 1	112.0	112.0	109.0	111.0	108.0	106.0	105.0	98.0	93.0	93.0	118.2 dB	111.5 dBA
65	CAT777 being loaded in pit 2	112.0	112.0	109.0	111.0	108.0	106.0	105.0	98.0	93.0	93.0	118.2 dB	111.5 dBA
66	CAT777 dumping EOE A	117.0	120.0	121.0	116.0	117.0	112.0	110.0	102.0	98.0	98.0	126.0 dB	118.1 dBA
67	CAT777 stripping being loaded (Bench 1)	112.0	112.0	109.0	111.0	108.0	106.0	105.0	98.0	93.0	93.0	118.2 dB	111.5 dBA
68	CAT992 Loader in Pit 2	115.0	112.0	117.0	115.0	108.0	117.0	107.0	112.0	98.0	98.0	123.2 dB	119.3 dBA
69	CAT990 loader stripping (Bench 1)	112.0	109.0	114.0	112.0	105.0	114.0	104.0	109.0	95.0	95.0	120.2 dB	116.3 dBA
70	CAT992 Loader in Pit 1	115.0	112.0	117.0	115.0	108.0	117.0	107.0	112.0	98.0	98.0	123.2 dB	119.3 dBA
71	CATD10 Contractor Dozer EOE A	114.0	115.0	114.0	101.0	105.0	104.0	102.0	94.0	88.0	88.0	119.6 dB	108.7 dBA
72	Diesel Pump in pit	70.0	72.0	79.0	80.0	81.0	81.0	74.0	67.0	58.0	58.0	86.9 dB	83.8 dBA
73	Hydraulic Rock Drill Bench 1	107.0	117.0	106.0	101.0	107.0	109.0	111.0	113.0	110.0	110.0	121.0 dB	118.0 dBA
74	Hydraulic Rock Drill upper Bench (West)	107.0	117.0	106.0	101.0	107.0	109.0	111.0	113.0	110.0	110.0	121.0 dB	118.0 dBA
75	Hydraulic Rock Drill upper Bench (East)	107.0	117.0	106.0	101.0	107.0	109.0	111.0	113.0	110.0	110.0	121.0 dB	118.0 dBA
76	CAT777 dumping into crusher	117.0	120.0	121.0	116.0	117.0	112.0	110.0	102.0	98.0	98.0	126.0 dB	118.1 dBA
77	CAT777 EOE A Haul Road (middle)	112.0	112.0	109.0	111.0	108.0	106.0	105.0	98.0	93.0	93.0	118.2 dB	111.5 dBA
78	CAT773 Watercart EOE A Haul Road	116.0	116.0	113.0	115.0	112.0	110.0	109.0	102.0	97.0	97.0	122.2 dB	115.5 dBA
79	CAT773 Watercart in pit	116.0	116.0	113.0	115.0	112.0	110.0	109.0	102.0	97.0	97.0	122.2 dB	115.5 dBA



75 mm ON ORIGINAL

0	17/06/11				
REV.	DATE	AMENDMENT / ISSUE DESCRIPTION	PREPARED	CHECKED	



Legend
 ● Receiver Location

Heggies Ply Ltd
 Level 1, 14 Watt Street
 PO Box 1788
 Newcastle NSW 2300
 Email address newcastle@heggies.com.au
 Telephone 02 4908 4500. Facsimile 02 4908 4501

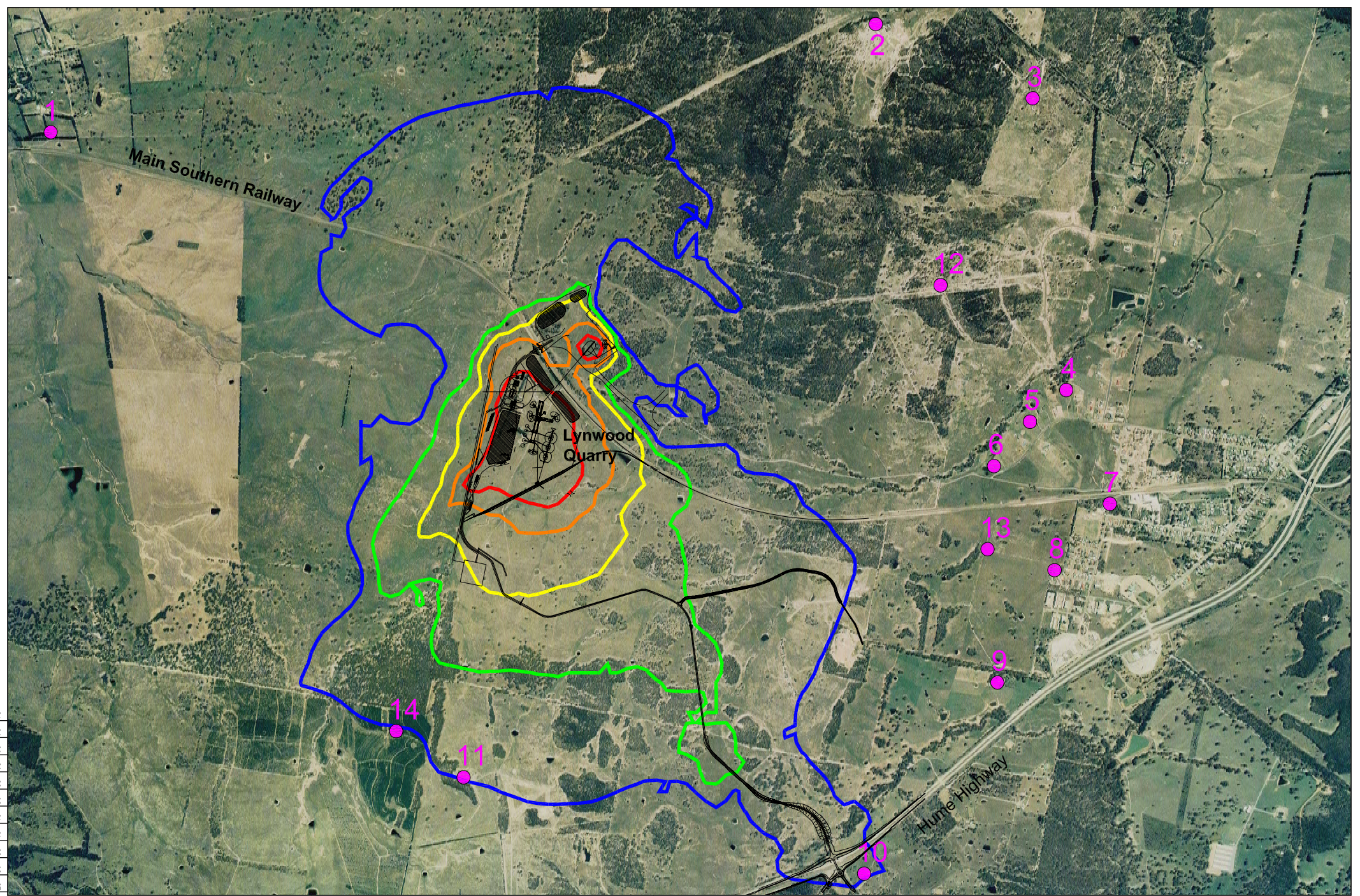
30-1938 Lynwood Quarry Modification
 Appendix B - Receiver Locations

FILE NAME
 30-1938 Contours 20100813.dwg

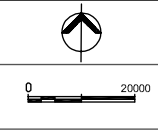
DRAWING No.
 30-1938 Lynwood Quarry Modification Appendix B

REVISION
 0

75 mm ON ORIGINAL



0	17/06/11				
REV.	DATE	AMENDMENT / ISSUE DESCRIPTION	PREPARED	CHECKED	

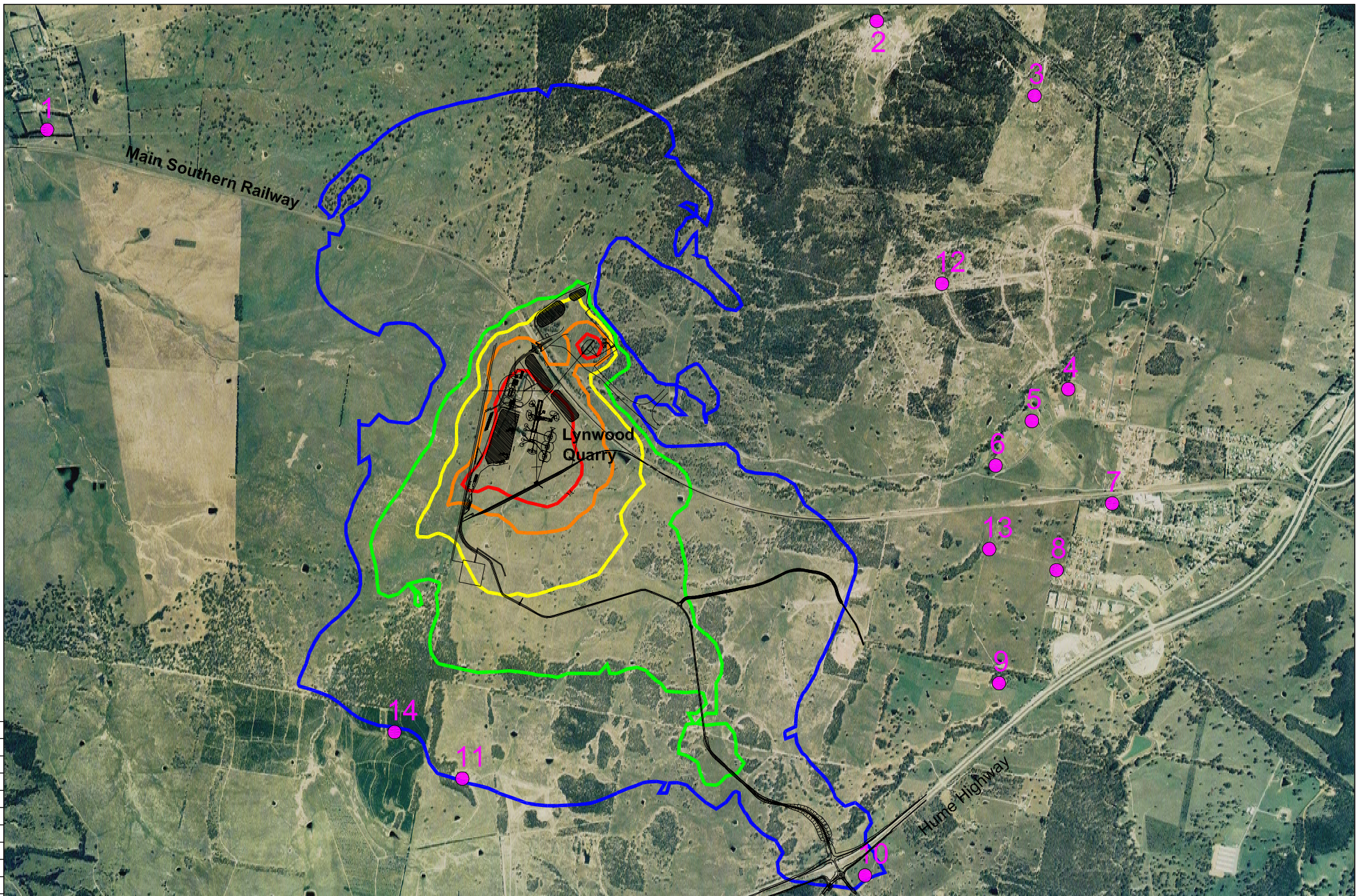


Legend	
—	L _{Aeq} (15minute) 55dBA
—	L _{Aeq} (15minute) 50dBA
—	L _{Aeq} (15minute) 45dBA
—	L _{Aeq} (15minute) 40dBA
—	L _{Aeq} (15minute) 35dBA
●	Receiver Location


Heggies Ply Ltd
 Level 1, 14 Watt Street
 PO Box 1788
 Newcastle NSW 2300
 Email address newcastle@heggies.com.au
 Telephone 02 4908 4500. Facsimile 02 4908 4501

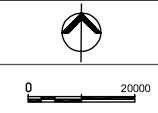
30-1938 Lynwood Quarry Modification Scenario - Year 5 Calm L _{Aeq} (15minute) Noise Contour	DRAWING No. 30-1938 Lynwood Quarry Modification 1	REVISION 0
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FILE NAME
30-1938 Contours 20100813.dwg



75 mm ON ORIGINAL

0	17/06/11				
REV.	DATE	AMENDMENT / ISSUE DESCRIPTION	PREPARED	CHECKED	



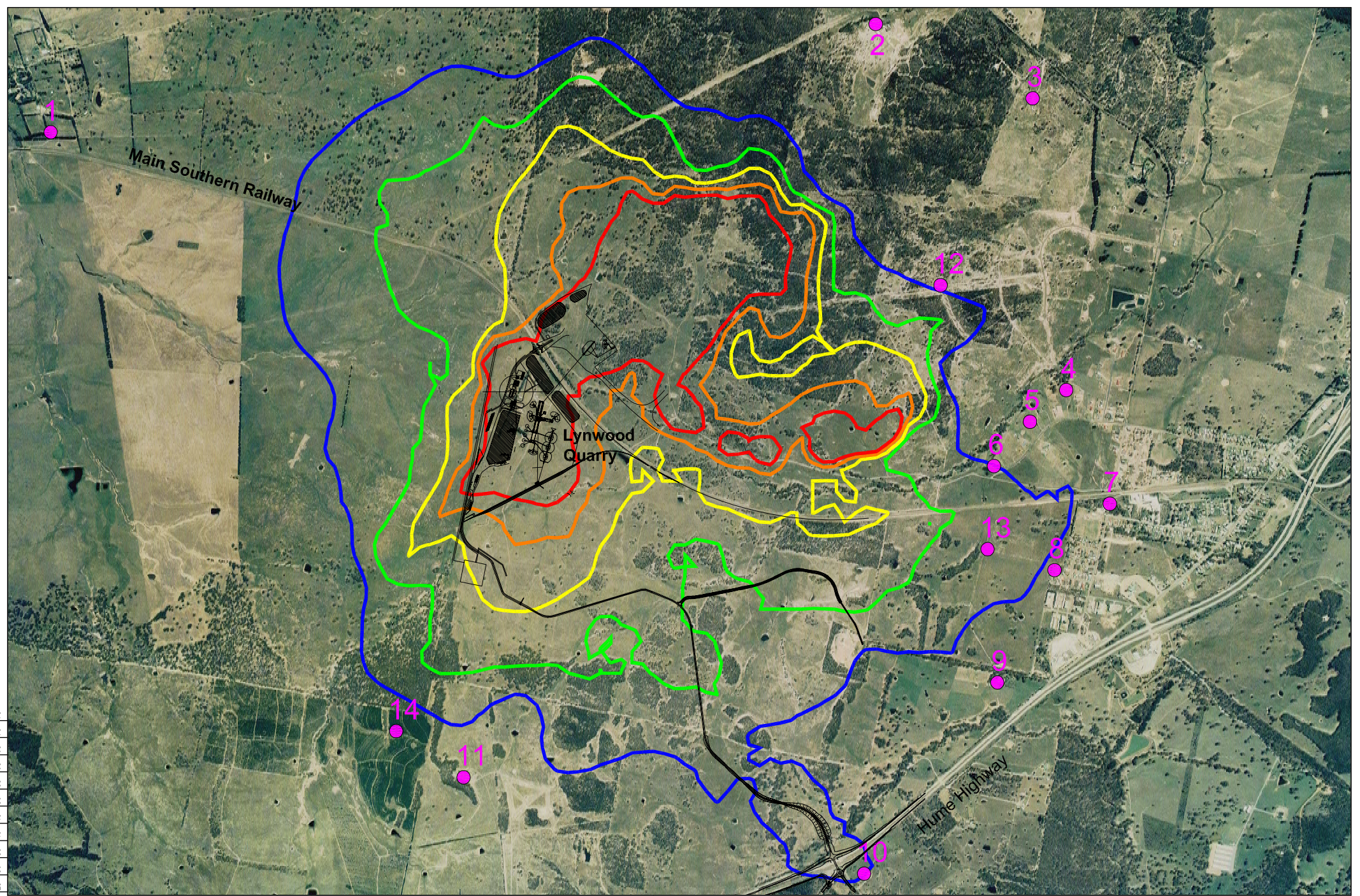
Legend	
—	L _{Aeq} (15minute) 55dBA
—	L _{Aeq} (15minute) 50dBA
—	L _{Aeq} (15minute) 45dBA
—	L _{Aeq} (15minute) 40dBA
—	L _{Aeq} (15minute) 35dBA
●	Receiver Location


Heggies Ply Ltd
 Level 1, 14 Watt Street
 PO Box 1788
 Newcastle NSW 2300
 Email address newcastle@heggies.com.au
 Telephone 02 4908 4500. Facsimile 02 4908 4501

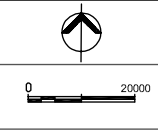
30-1938 Lynwood Quarry Modification
 Scenario - Year 5 Temperature Inversion
 L_{Aeq}(15minute) Noise Contour

FILE NAME 30-1938 Contours 20100813.dwg	DRAWING No. 30-1938 Lynwood Quarry Modification 4	REVISION 0
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75 mm ON ORIGINAL



0	17/06/11				
REV.	DATE	AMENDMENT / ISSUE DESCRIPTION	PREPARED	CHECKED	

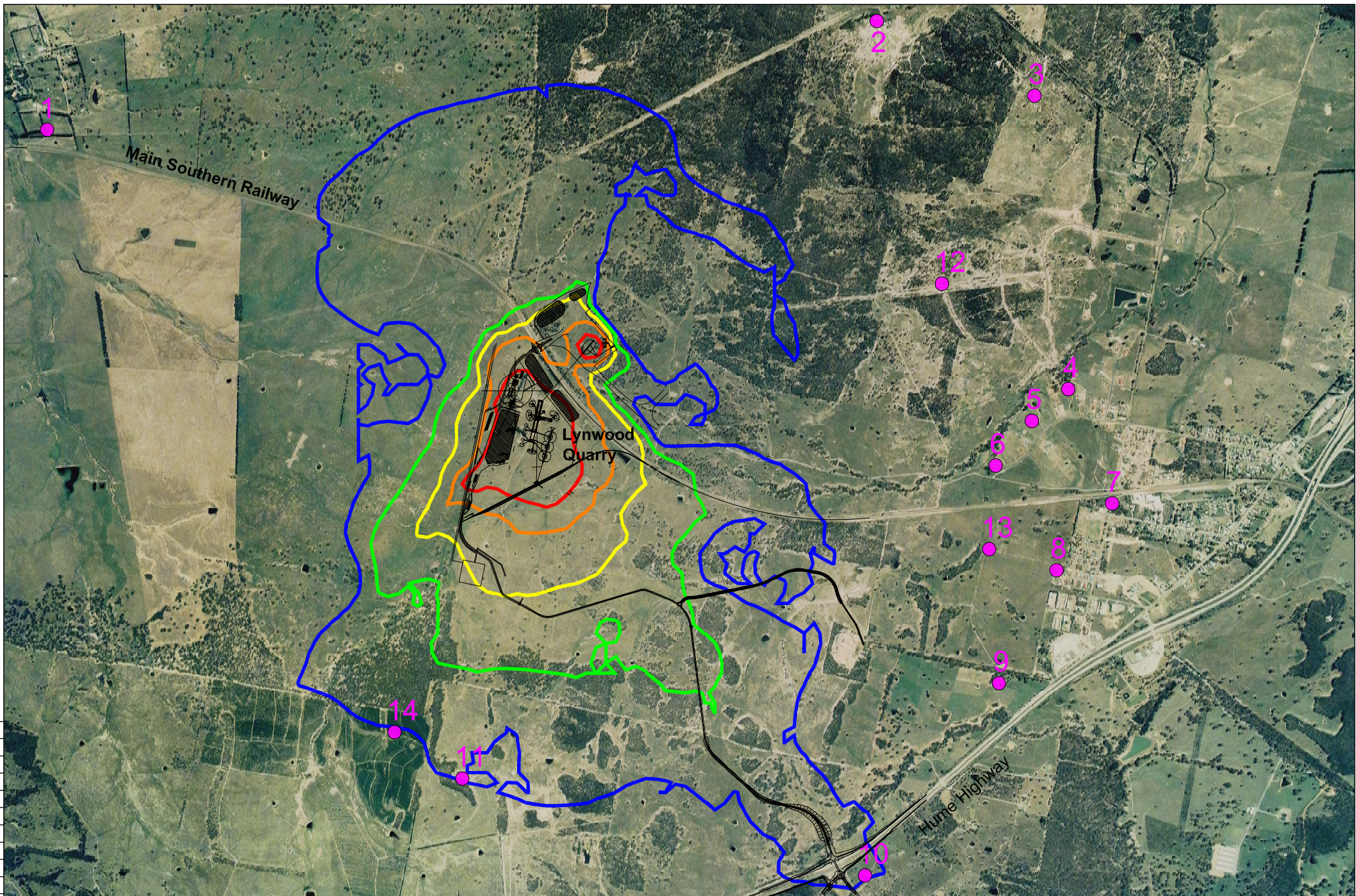


Legend	
—	LAeq(15minute) 55dBA
—	LAeq(15minute) 50dBA
—	LAeq(15minute) 45dBA
—	LAeq(15minute) 40dBA
—	LAeq(15minute) 35dBA
●	Receiver Location


Heggies Ply Ltd
 Level 1, 14 Watt Street
 PO Box 1788
 Newcastle NSW 2300
 Email address newcastle@heggies.com.au
 Telephone 02 4908 4500. Facsimile 02 4908 4501

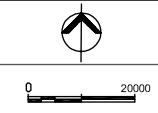
30-1938 Lynwood Quarry Modification Scenario - Year 10 Calm LAeq(15minute) Noise Contour	DRAWING No. 30-1938 Lynwood Quarry Modification 2	REVISION 0
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FILE NAME
30-1938 Contours 20100813.dwg



75 mm ON ORIGINAL

0	17/06/11				
REV.	DATE	AMENDMENT / ISSUE DESCRIPTION	PREPARED	CHECKED	



- Legend**
- LAeq(15minute) 55dBA
 - LAeq(15minute) 50dBA
 - LAeq(15minute) 45dBA
 - LAeq(15minute) 40dBA
 - LAeq(15minute) 35dBA
 - Receiver Location

Heggies Ply Ltd
 Level 1, 14 Watt Street
 PO Box 1788
 Newcastle NSW 2300
 Email address newcastle@heggies.com.au
 Telephone 02 4908 4500. Facsimile 02 4908 4501

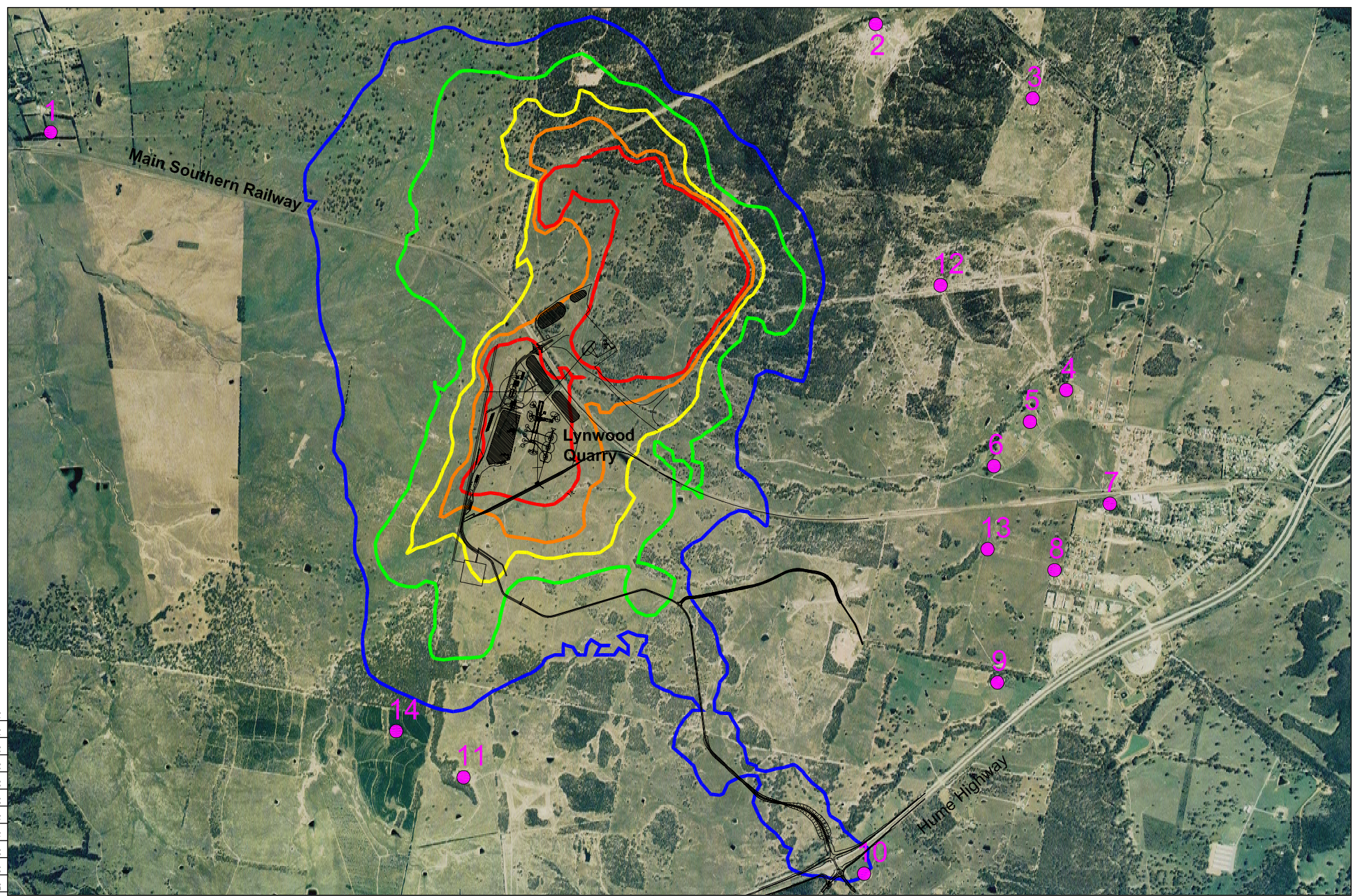
30-1938 Lynwood Quarry Modification
 Scenario - Year 10 Temperature Inversion
 LAeq(15minute) Noise Contour

FILE NAME
30-1938 Contours 20100813.dwg

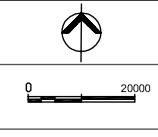
DRAWING No.
30-1938 Lynwood Quarry Modification 5

REVISION
0

75 mm ON ORIGINAL



0	17/06/11				
REV.	DATE	AMENDMENT / ISSUE DESCRIPTION	PREPARED	CHECKED	

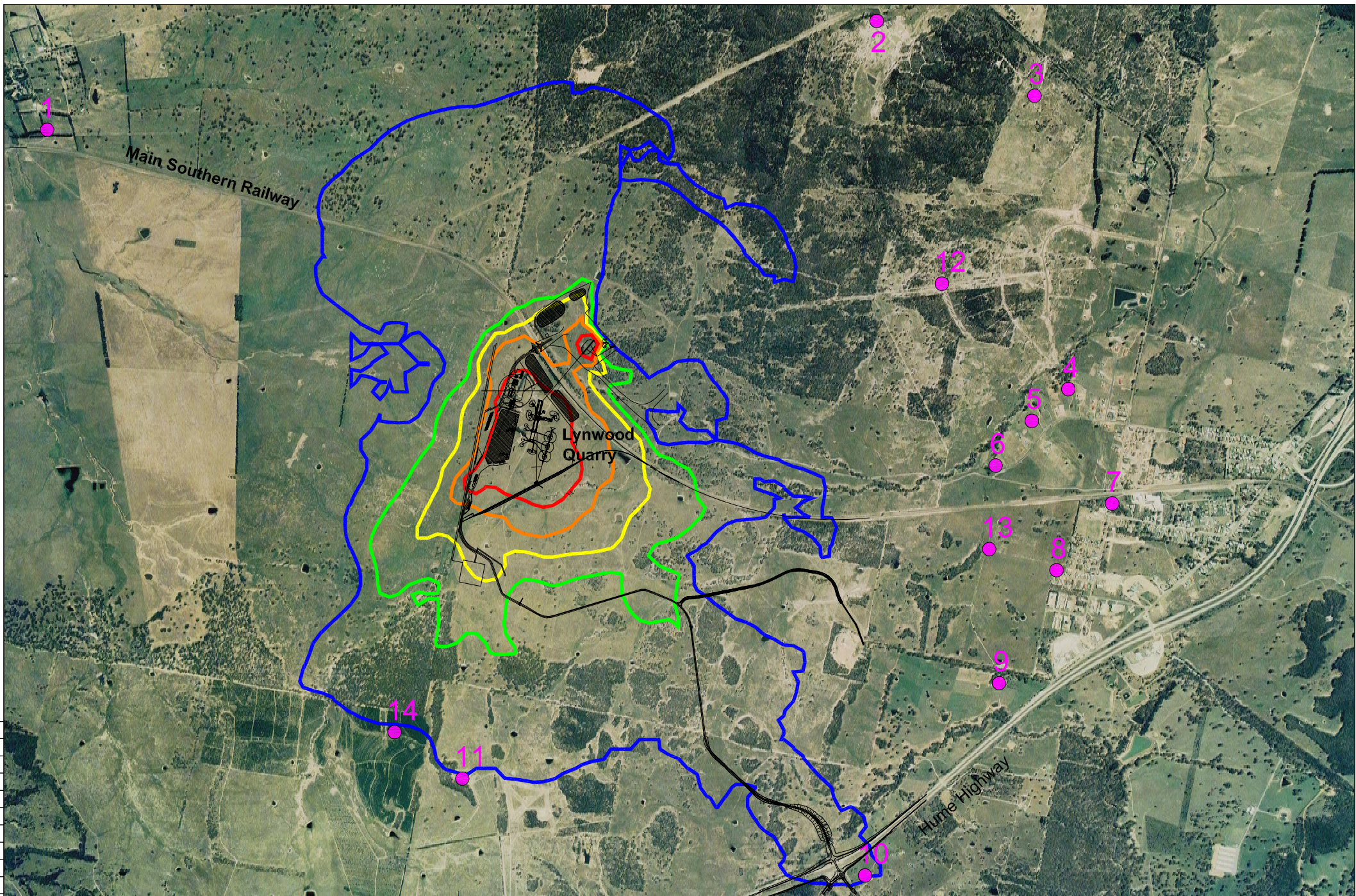


Legend	
Red line	L _{Aeq} (15minute) 55dBA
Orange line	L _{Aeq} (15minute) 50dBA
Yellow line	L _{Aeq} (15minute) 45dBA
Green line	L _{Aeq} (15minute) 40dBA
Blue line	L _{Aeq} (15minute) 35dBA
Pink dot	Receiver Location


Heggies Ply Ltd
 Level 1, 14 Watt Street
 PO Box 1788
 Newcastle NSW 2300
 Email address newcastle@heggies.com.au
 Telephone 02 4908 4500. Facsimile 02 4908 4501

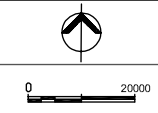
30-1938 Lynwood Quarry Modification Scenario - Year 30 Calm L _{Aeq} (15minute) Noise Contour	DRAWING No. 30-1938 Lynwood Quarry Modification 3	REVISION 0
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FILE NAME
30-1938 Contours 20100813.dwg



75 mm ON ORIGINAL

0	17/06/11				
REV.	DATE	AMENDMENT / ISSUE DESCRIPTION	PREPARED	CHECKED	



Legend	
—	L _{Aeq} (15minute) 55dBA
—	L _{Aeq} (15minute) 50dBA
—	L _{Aeq} (15minute) 45dBA
—	L _{Aeq} (15minute) 40dBA
—	L _{Aeq} (15minute) 35dBA
●	Receiver Location


Heggies Ply Ltd
 Level 1, 14 Watt Street
 PO Box 1788
 Newcastle NSW 2300
 Email address newcastle@heggies.com.au
 Telephone 02 4908 4500. Facsimile 02 4908 4501

30-1938 Lynwood Quarry Modification
 Scenario - Year 30 Temperature Inversion
 L_{Aeq}(15minute) Noise Contour

FILE NAME
30-1938 Contours 20100813.dwg

DRAWING No.
30-1938 Lynwood Quarry Modification 6

REVISION
0