Appendix B
Noise and Blasting Impact Assessment

BRIDGES ACOUSTICS

ABN: 73 254 053 305

78 Woodglen Close
P.O. Box 61
PATERSON NSW 2421

Phone : (02) 4938 5866
Fax: (02) 4938 5831
Mobile: (0407) 38 5866
E-mail: bridgesacoustics@bigpond.com

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Ref: J0130-42-L4

Hansen Bailey Pty Ltd
P.O. Box 473
SINGLETON NSW 2330

Attn: Ms. Melissa Walker

Dear Mel,

RE: MUSWELLBROOK COAL MINE
DEVELOPMENT CONSENT MODIFICATION
NOISE AND BLASTING IMPACT ASSESSMENT

Muswellbrook Coal Company (MCC) owns and operates Muswellbrook Coal Mine (MCM) located approximately 1400m north east of Muswellbrook in the Upper Hunter Valley of NSW. This letter presents an assessment of the potential noise and blasting impacts of the proposed Development Consent Modification at MCM. A plan of the site showing the approved and proposed mining areas is included in Appendix A.

1.0 THE MODIFICATION

This assessment forms part of a Statement of Environment Effects (SEE) being prepared by Hansen Bailey to support an application for a modification to Development Consent DA 205/2002 under Section 96(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Modification proposes to extend mining operations to a 28.4 ha area (known as Area C) of which 8.2 ha falls outside of the No. 1 Open Cut Extension Area (the Modification Area). The Modification would result in additional 5.5 Mt of product coal being extracted over the remaining five years of operation. No changes to the approved mining method, production rate, mine life or coal transport arrangements are proposed.

Coal reserves within the Modification Area would continue to be mined via open cut methods using the same equipment fleet and mining practices as are currently approved. MCC would continue to transport product coal by road to the Ravensworth Coal Terminal from where the coal is railed to the Port of Newcastle for sale to the export market. No additional mining equipment, coal processing equipment or staff would be required. Mining operations will continue to be undertaken at the currently approved production rate of up to 2 Mtpa from MCM. The currently approved infrastructure will continue to be utilised for the life of the Project.

2.0 CURRENT NOISE AND BLASTING CRITERIA

The existing DA 205/2002 Development Consent issued by Muswellbrook Shire Council includes a number of conditions to control noise, vibration and other environmental impacts from MCM. Conditions 6.3 and 6.4 are relevant to this assessment and are partly reproduced below.

6.3 Blast Management and Monitoring

6.3.1 Blasting criteria and limits

(a) Time of blasting

Blasting operations on the premises may only take place between 9:00am and 5.00pm Monday to Friday inclusive, unless permission is granted by MSC where special circumstances related to the safety of the mine requires a blast to be initiated outside these hours.

(b) Overpressure

The overpressure level from blasting operations on the premises must not:

(i) Exceed 115dB (Linear Peak) for more than 5% of the total number of blasts over a period of 12 months; and

(ii) Exceed 120dB (Linear Peak) at any time, when measured at any residence or noise sensitive location (such as a school or hospital) that is not owned by the licensee or subject of a private agreement between the owner of the residence or noise sensitive location and the licensee as to an alternative overpressure level.

(c) Ground vibration (ppv)

Ground vibration peak particle velocity from the blasting operations at the premises must not:

(i) Exceed 5mm/s for more than 5% of the total number of blasts over a period of 12 months; and

(ii) Exceed 10mm/s at any time, when measured at any residence or noise sensitive location (such as a school or hospital) that is not owned by the licensee or subject of a private agreement between the owner of the residence or noise sensitive location and the licensee as to an alternative ground vibration level.

(d) Residences

The Applicant shall investigate any vibration problem(s) associated with residential buildings which occur as a result of blasting at the mine in relation to the standards in Condition 6.3.1 (b) and 6.3.1 (c). Should such an investigation be necessary the Applicant shall advise MSC the result of such investigation and any proposed preventive/remedial measures.

6.3.2 Blasting/ Vibration Management

(a) The Applicant shall prepare and implement a Blasting/Vibration Management Plan to the satisfaction of MSC, in consultation with EPA and DMR. This must include, but not be limited to, the following matters:

(i) demonstration of consistency in compliance with blasting criteria at the existing mining operation

(ii) compliance blasting criteria;

(iii) mitigation measures, such as, adverse weather conditions;

(iv) monitoring methods and program in accordance with blast monitoring and inspection conditions;

(v) measures to be undertaken to demonstrate that the Project is achieving best practice in minimising air blast overpressure, ground vibration levels, fumes and odours from blasting activities;

(vi) measures to protect underground utilities (eg: rising mains, subsurface telecommunication and electric cables, irrigation lines) and livestock on non-mine owned land;

(vii) measures to protect surface infrastructure where relevant, such as dams, rail infrastructure and power poles;

(viii) measures to consider the blasting activities from other neighbouring mines. This shall include details of the proposed measures to ensure that cumulative blast related impacts are managed, such as through consultation with the other mines to co-ordinate blasting activities;

(ix) procedures for the investigation of blast related complaints from the Project, in consultation with other mines in the event of cumulative related impacts;

(x) procedures for the notification of occupiers of buildings and residences prior to detonation of each blast; and

(xi) measures to ensure no damage by flyrock to people, property, livestock and powerlines.

(b) The applicant shall, as a minimum, advise occupiers of buildings and residences, unless otherwise requested by the occupier, in the North Muswellbrook, Sandy Creek Road and other areas to the satisfaction of Council of future blasting events through a community information telephone hotline and the advertisement and promotion of the hotline. The hotline shall be at no cost to the caller.

(c) The applicant shall design blasts so as not to exceed 20% of the EPA maximum ground vibration limit of 10mm/s at the nearest residence or equivalent location as approved by the EPA. The maximum charge weight and predicted vibration levels shall be made available on the above mentioned hotline service on the day of the blast. Blast design records shall be retained by the applicant and made available for inspection at his premises upon reasonable request.

(d) The applicant shall respond to complaints on blasting in a timely fashion and in accordance with the Muswellbrook Shire Council Protocol.

6.3.3. Blast Monitoring

(a) The applicant must monitor ground vibration and airblast overpressure of all blasts at locations in accordance with the Blast Management Plan;

(b) Ground vibration or the overpressure must be measured at noise sensitive sites (eg. Residences, hospitals, schools etc), selected in consultation with the EPA.

(c) The Applicant must document the date, wind speed and direction, weather conditions, atmospheric conditions including cloud cover, location of blast and the quantity of explosive used for each blast.

d) The results of the blast monitoring must be submitted to EPA at the end of each reporting period and be summarised and interpreted in the AEMR.

6.4 Noise Control

6.4.1 Noise Criteria

EPA – GTA Noise generated at the premises must not exceed the noise limits presented in Table 6 below:

Table 6 *Noise Limits (dB(A))*

Location	***Day***	***Evening***	***Night***	
	LAeq(15 min)	***LAeq(15 min)***	***LAeq(15 min)***	***LA1(1 min)***
R7 Watts	*36*	*36*	*36*	*44*
R13 McMaster	*40*	*40*	*40*	*51*
R15 Collins	*35*	*35*	*35*	*46*
R16 Tuckey	*35*	*35*	*35*	*46*
R17 Colvin	*35*	*35*	*35*	*46*
R20 Gordon	*38*	*38*	*38*	*48*

Note: *The EPA has advised that in order to prevent exceedences of the project specific noise levels during adverse meteorological conditions, especially at the R13 location, the saddle between the existing overburden dumps on the northern side of the No. 1 open-cut has to increase in height from RL205 to no greater than RL224.*

6.4.2 Noise Acquisition Criteria

The acquisition zone for noise is defined by predicted or demonstrated exceedence of the noise levels shown in Table 7 below:

Table 7 *Acquisition Noise Limits (dB(A))*

Location	***Day***	***Evening***	***Night***
	LAeq(15 minute)	***LAeq(15 minute)***	***LAeq(15 minute)***
R7 Watts	*41*	*41*	*41*
R13 McMaster	*45*	*45*	*45*
R15 Collins	*40*	*40*	*40*
R16 Tuckey	*40*	*40*	*40*
R17 Colvin	*40*	*40*	*40*
R20 Gordon	*43*	*43*	*43*

6.4.3 Interpretation of Noise Levels

(a) For the purposes of condition 6.4.1 and 6.4.2:

- *Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;*
- *Evening is defined as the period from 6pm to 10pm; and*
- *Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays*

(b) Noise from the Project is to be measured within the residential boundary, or within 30m of the dwelling (rural stations) where the dwelling is more than 30m from the boundary to determine compliance with the LAeq(15 minutes) noise limit in Condition 6.4.1. Where it can be demonstrated that direct measurement of noise from the project is impractical, the EPA may accept alternative means of determining compliance. See chapter 11 of the NSW Industrial Noise Policy. The modification factors presented in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise level where practical.

(c) Noise from the project is to be measured at 1m (unless otherwise agreed with the property owner) from the dwelling façade, to determine compliance with the LA1(1 minute) noise limits in Condition 6.4.1.

(d) The noise emission limits identified in Condition 6.4.1 apply under meteorological conditions of:

* *Wind speed up to 3 m/s at 10 metres above ground level*
* *Temperature inversion conditions of up to 3 degreesC/100m.*

(e) The loading of large rocks onto mine trucks is to be undertaken outside the night time period.

3.0 EXISTING NOISE LEVELS

Section 3.10 of the MCC Annual Environmental Management Report (AEMR) to 30 June 2009 includes results from two operator-attended noise surveys completed by Global Acoustics at six representative receiver locations. A plan of the site and surrounds showing the noise and blast monitoring locations is attached as Appendix B and a land ownership plan is attached as Appendix C.

Noise survey results in Table 19 (December 2008 survey) and Table 20 (June 2009 survey) of the AEMR show measured noise levels at each location and, where noise from MCM was audible and measurable over other extraneous sources, the separate noise contribution from MCM.

The AEMR indicates MCM noise levels were within relevant noise criteria on all except one occasion in June 2009, where a noise contribution of 38 LAeq,15min was measured at monitoring location R15 during the evening compared to a criterion of 35 LAeq,15min. Exceedances of the noise criteria on this one occasion are assumed to be related to weather conditions although no information regarding this issue is included in the AEMR.

4.0 APPROVED AND PROPOSED MINING AREAS

The Modification layout figure in Appendix A illustrates the Modification Area and the revised mining sequence as a result of the Modification.

The centre of the Modification Area is located approximately 650m north from the centre of the 2008-09 mining area and approximately 170m north of the currently approved mining area. Machines working within the Modification Area would therefore be an average of 170m closer to receivers located generally to the north than is currently approved. The Modification Area is significantly further from all other receivers located generally west and south of currently approved mining areas.

The natural surface over the Modification Area reaches RL 280 at the eastern corner, which is the same elevation as the adjacent currently approved mining area. The Modification Area is therefore at a similar average and maximum elevation as the approved mining area.

5.0 NOISE ASSESSMENT METHODS

This assessment has been completed in two sections:

- Detailed noise modelling to receivers generally north of the Modification Area, as the Modification Area would be closer to these receivers than the currently approved No. 1 Open Cut mining area; and
- A comparison between the proposed Modification and the currently approved No. 1 Open Cut mining area for all other receivers that are located further from the Modification Area than the currently approved No. 1 Open Cut mining area.

6.0 NOISE MODELLING

The following receivers, all located generally north of the Modification Area, are considered in this section as the Modification Area would be closer than the currently approved mining area to these receivers:

- R7 Watts;
- R21 French;
- R22 Aird;
- R23 Neilson;
- R24 Edwards; and
- R25 Hamson.

The locations of these and other receivers are shown on the area plan in Appendix B.

6.1 Assessment Method

A noise model of the site and surrounds was established based on RTA Technology's Environmental Noise Model (ENM) software. ENM is recognised in NSW as the most appropriate noise assessment method where there are a number of noise sources and receiver locations and where the effect of noise enhancing weather conditions should be considered.

The terrain model was based on supplied 2m interval elevation contours covering land owned by MCC and 10m interval contours digitised from a 1:25000 topographic map for other areas. The terrain model included a representative pit and overburden emplacement area in the northern part of the Modification Area, closest to assessed receivers.

Noise sources including shovels, excavators, dozers, trucks and a drill were placed in the model at appropriate locations, with sound power levels from these items sourced from Appendix B of *Noise and Vibration Assessment - Muswellbrook Coal Company No.1 Open Cut Extension* which was attached as Appendix H to the *Muswellbrook Coal Company No.1 Open Cut Extension Environmental Impact Statement 2002* (HLA Envirosciences 2002) (EIS). Sound power levels listed in the EIS appear appropriate for the types of machines used at MCM and are consistent with equipment sound power levels measured at MCM by Global Acoustics in 2009.

A total of two shovels, two excavators, five dozers, eleven trucks and a drill were included in the model which represents all available machines, except for one dozer which is assumed to be in the workshop and minor items such as water carts and graders, working simultaneously. Results from this assessment are therefore expected to represent a worst case situation.

The EIS considered the following weather conditions were appropriate based on an analysis of site-specific weather data:

- 3°/100m temperature inversion during the night, and
- 3m/s winds from the south east and north west.

As the noise model is only being used to determine noise levels at receivers north of the site, a north westerly wind would result in reduced noise levels to these receivers and has not been considered further.

6.2 Results

Results from the noise model, for three assessed sets of prevailing weather conditions, are shown in Table 1. Predicted noise levels should be compared to the development consent noise criteria for Receiver R7, which is the representative receiver in this group that was assessed in the EIS and listed in the development consent. The development consent criterion for Receiver R7 is 36 LAeq,15min in all time periods.

Table 1: Predicted Received Noise Levels, LAeq,15min.

Receiver Location	Predicted Noise Level LAeq,15min		
	Day Neutral No Wind	Day Prevailing 3m/s SE Wind	Night Prevailing 3°C/100m Inversion
R7 Watts	20	31	32
R21 French	20	32	32
R22 Aird	22	26	27
R23 Neilson	21	33	33
R24 Edwards	22	32	33
R25 Hamson	23	33	33

Table 1 shows a maximum noise level of 33 LAeq,15min under prevailing weather conditions which is 3 dBA below the consent noise criteria at Receiver R7. Noise levels from the Modification Area are therefore expected to be acceptable at all receivers listed in Table 1.

7.0 OTHER RECEIVERS

Receivers that are not located north of the Modification Area are considered in this section and include:

- R13 McMaster and nearby properties;
- R15 Collins and nearby properties in northern Muswellbrook;
- R16 Tuckey and nearby properties in north western Muswellbrook;
- R17 Colvin and nearby properties in western Muswellbrook; and
- R20 Gordon and nearby properties off Muscle Creek Road.

Given the similarities in ground elevation, equipment, production profile and mining methods between the approved mining area and the Modification Area, differences in received noise levels can be quantified by comparing the relative distance to each representative receiver from the Modification Area and from the currently approved mining area.

Compared to the currently approved mining area, the Modification Area is at least:

- 250m further from R13 McMaster;
- 950m further from R15 Collins, R16 Tuckey and R17 Colvin; and
- 700m further from R20 Gordon.

As the Modification Area is located further from receivers to the west and south than the currently approved mining area, no additional noise impacts due to the Modification are anticipated at these receivers.

8.0 BLAST ASSESSMENT

Blast effects including ground vibration and overpressure depend on the Maximum Instantaneous Charge (MIC) per blast, distance from the blast site to each receiver and any shielding due to topography or noise barriers between the blast site and receivers.

Blast monitors are currently installed at four locations as shown in Appendix B. Blast monitoring results from the four locations are included in Appendix 4 of the AEMR and additional data for the period 6 April to 19 May 2010 were also supplied by Hansen Bailey for analysis.

Section 2 indicates the following blast criteria apply to MCM:

- Ground vibration – design 2mm/s, 95% of blasts to meet 5mm/s, all blasts to meet 10mm/s; and
- Overpressure – 95% of blasts to meet 115 dB, all blasts to meet 120 dB.

8.1 B1 Queen Street

Ground vibration levels in the AEMR and during April/May 2010 did not exceed 0.34 mm/s compared to the criterion of 5 mm/s. Overpressure levels reached 114.5 dB with the majority of results less than 110 dB. With the Modification Area located further from this monitoring location than recent blasts, proposed blast effects would be similar or slightly lower than recent effects and would be acceptable.

8.2 B2 School

Ground vibration levels in the AEMR and during April/May 2010 did not exceed 0.48 mm/s compared to the criterion of 5 mm/s. Overpressure levels reached 113.1 dB with the majority of results less than 110 dB. With the Modification Area further from this monitoring location than recent blasts, proposed blast effects would be similar or slightly lower than recent effects and would remain acceptable.

8.3 B3 Queen Street North

Ground vibration levels in the AEMR and during April/May 2010 did not exceed 0.49 mm/s compared to the criterion of 5 mm/s. One overpressure result reached 116.6 dB with all others less than 115 dB and the majority of results less than 110 dB. Exceedances of the 115 dBL criterion are allowed for up to 5% of blasts, with a limit of 120 dBL for all blasts, so results indicate compliance with the Consent and MCC's Environment Protection License (EPL).

With the Modification Area at a similar or greater distance from this monitoring location than recent blasts, proposed blast effects would be similar or slightly lower than recent effects and would remain acceptable.

8.4 B4 Sandy Creek Road

Ground vibration levels in the AEMR and during April/May 2010 did not exceed 3.2 mm/s compared to the criterion of 5 mm/s, with all results over 1mm/s due to blasts within the No.2 Open Cut. One overpressure result reached 115.7 dB (due to a blast within the No.2 Open Cut) with all others less than 115 dB and the majority of results less than 110 dB. Exceedances of the 115 dBL criterion are allowed for up to 5% of blasts, with a limit of 120 dBL for all blasts, so results indicate compliance with the Consent and MCC's Environment Protection License (EPL).

The Modification Area would be approximately 900m closer than recent mining areas within the No.1 Open Cut but would remain at least 600m further away than recent blasts within the No.2 Open Cut. As highest ground vibration and overpressure results were produced by No.2 Open Cut blasts, all blasts within the Modification Area would be further from this monitoring location and are therefore expected to produce acceptable blast effects.

9.0 SLEEP DISTURBANCE

Given the similarities between the currently approved and proposed mining operations and the Modification, no significant increases in maximum noise levels or sleep disturbance effects are expected at any receiver.

10.0 LOW FREQUENCY NOISE

No change to the mining method, infrastructure or Coal Handling and Preparation Plant (CHPP) are proposed as part of the Modification. No change to low frequency noise levels are therefore expected to occur as a result of the Modification.

11.0 ROAD TRAFFIC NOISE

No changes to the production profile or transport arrangements are proposed as part of the Modification. Approved coal truck movements from the mine to the Ravensworth Coal Terminal or other destinations would not change. Similarly, no increase in other mine-related traffic flows is expected as the Modification would not require additional staff so no changes to road traffic noise levels are expected as a result of the Modification.

12.0 CONCLUSION

This assessment has considered the potential environmental noise impacts from the Modification via:

- Detailed noise modelling for receivers located generally north of the Modification Area, as the Modification Area would be closer to these receivers than the currently approved No. 1 Open Cut mining area; and
- A qualitative assessment for all other receivers that are located further from the Modification Area than currently approved mining areas.

The results indicate proposed noise levels due to the Modification would remain very similar to current noise levels and would be acceptable compared to current Development Consent noise criteria. Any exceedances of the Development Consent noise criteria would be minor and occasional in nature, consistent with current mine noise emissions.

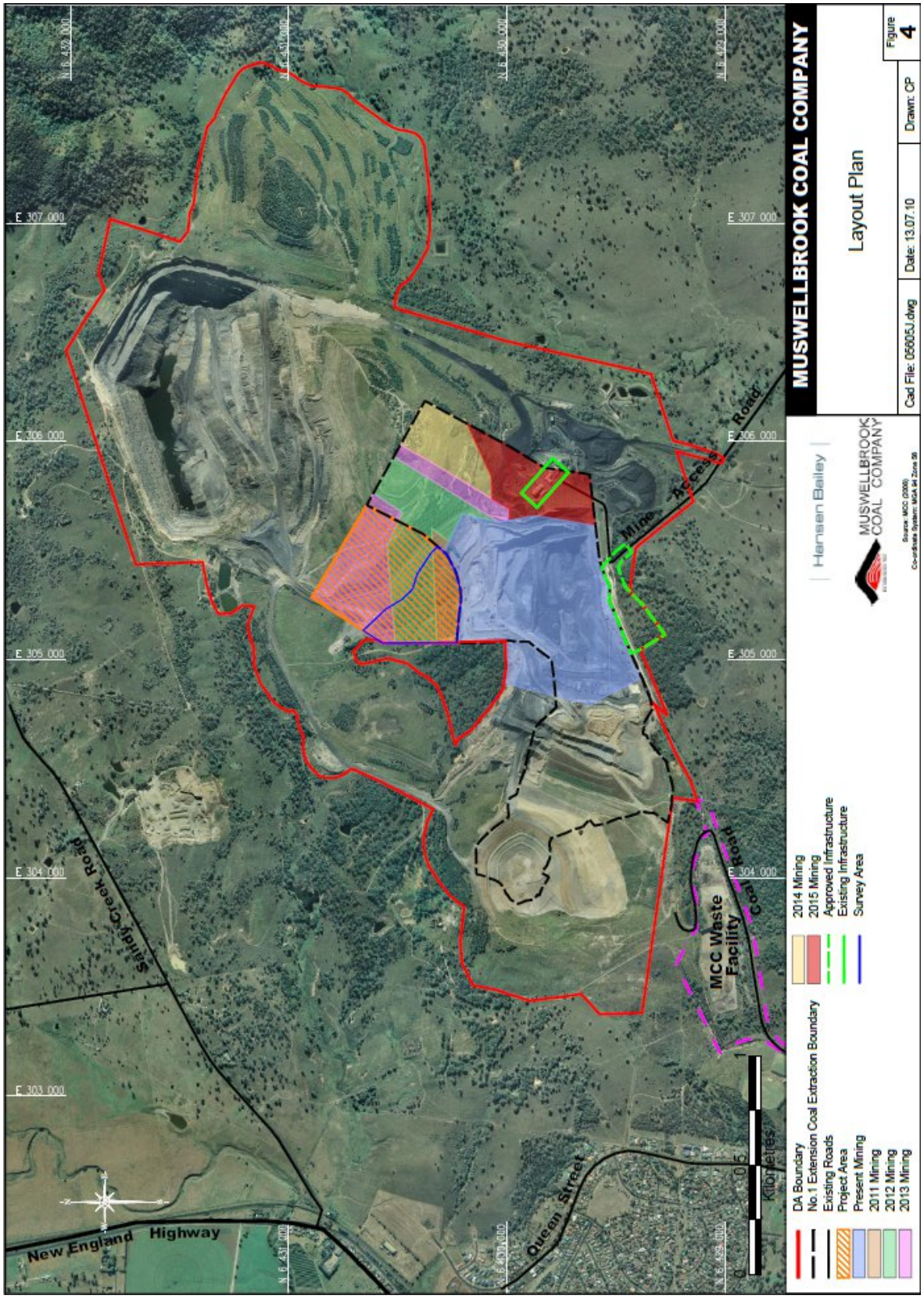
The proposed Modification would have little effect on current blasting impacts. The proposed Modification is also not expected to increase sleep disturbance, low frequency or road traffic noise levels.

Yours faithfully,

BRIDGES ACOUSTICS

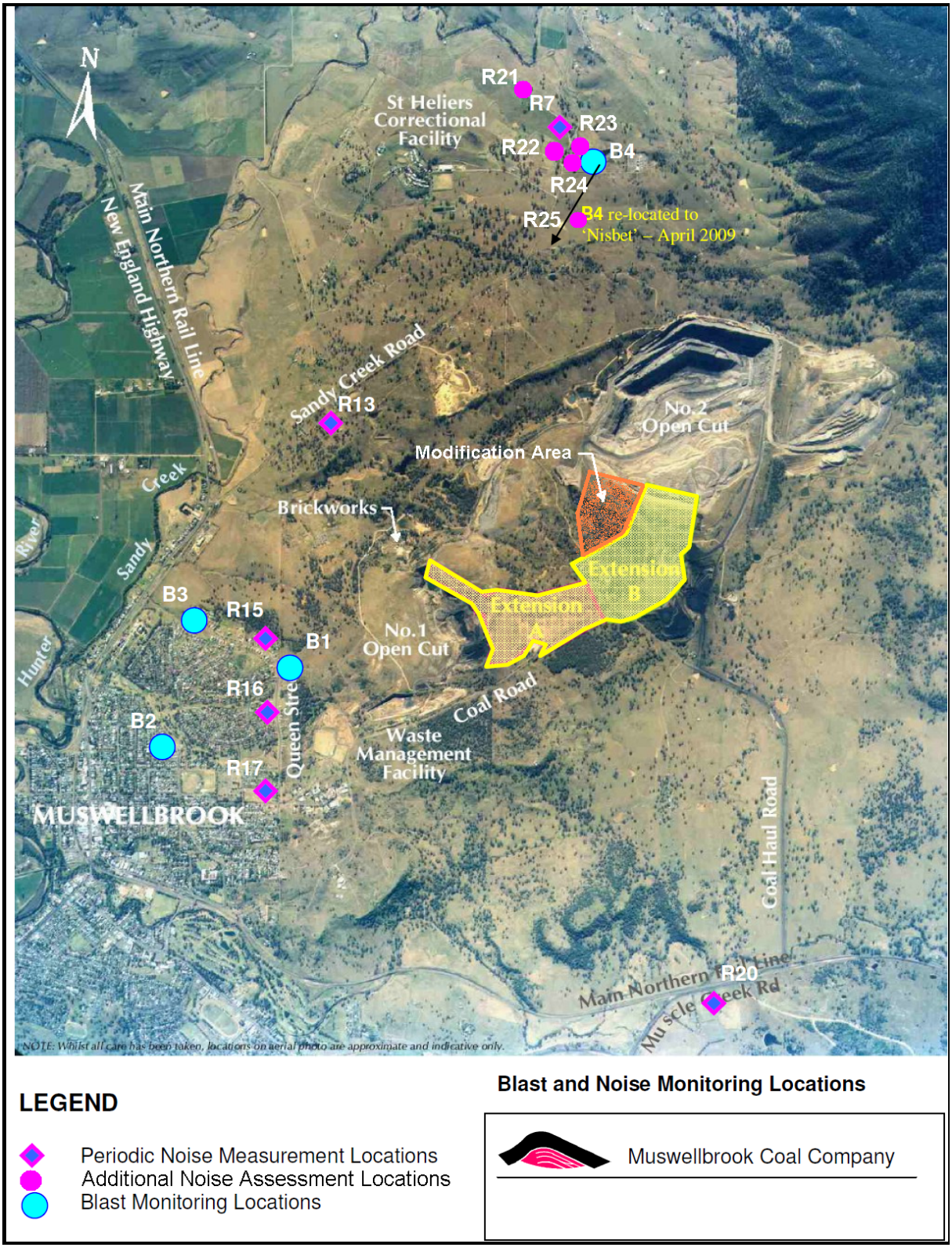
MARK BRIDGES BE (Mech) (Hons) MAAS
Principal Consultant

APPENDIX A – PLAN SHOWING APPROVED AND PROPOSED MINING AREAS



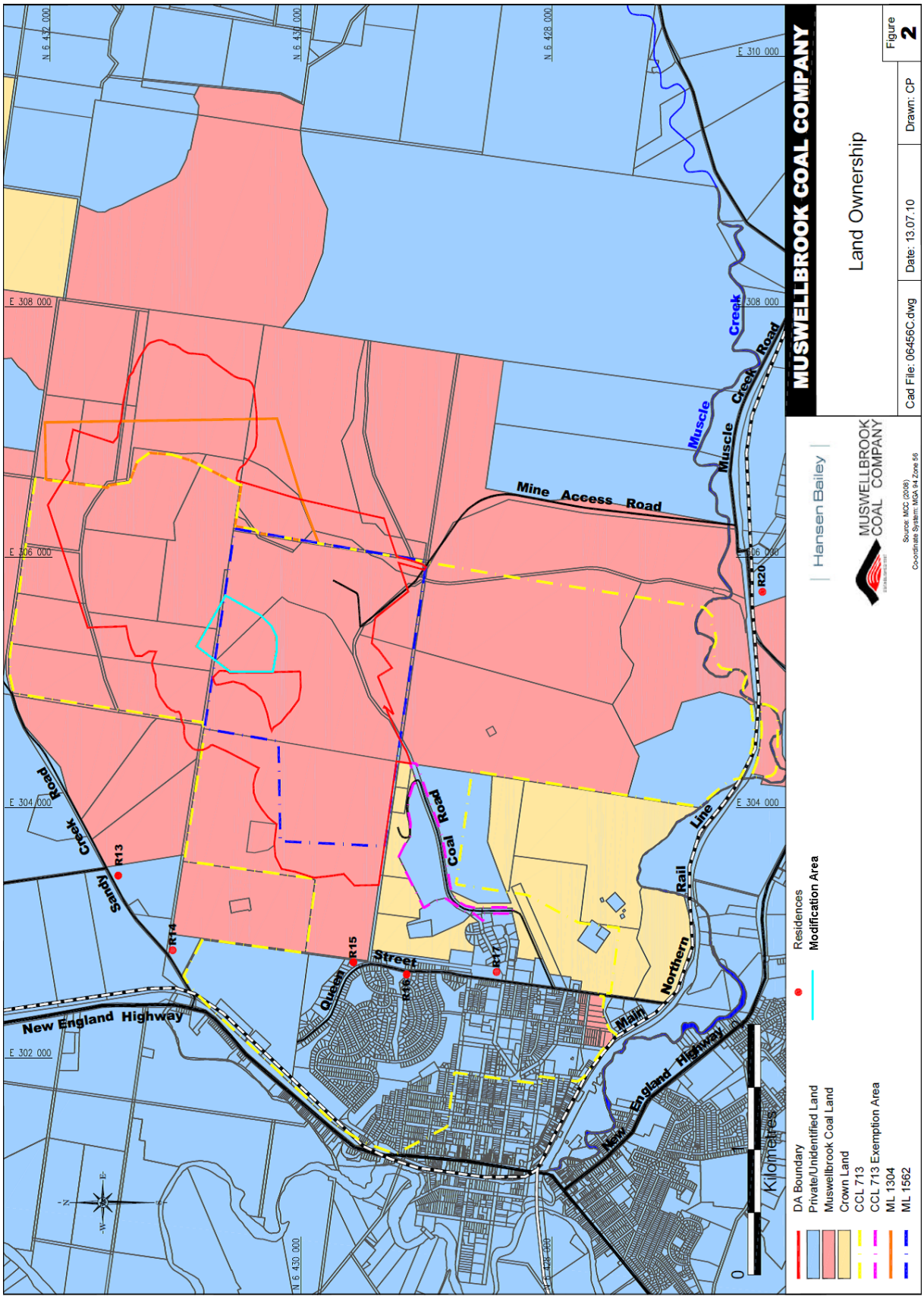
Layout plan supplied by Hansen Bailey

APPENDIX B – NOISE AND BLAST MONITORING LOCATIONS



Base plan from Figure 50 of the MCC AEMR 2009

APPENDIX C – LAND OWNERSHIP PLAN



Base Land Ownership Plan supplied by Hansen Bailey