

Relocation of Infrastructure within the Mandalong Services Site Section 96(1A) Application Statement of Environmental Effects

1. Introduction

Centennial Mandalong are proposing the relocation of approved, but not yet constructed, infrastructure within the Cooranbong Colliery (Mandalong Services Site) from the locations originally identified within the Cooranbong Colliery life Extension Project Environmental Impact Statement (Umwelt, 1997) (1998 EIS). Following discussions with the Department of Planning on 19 October 2009, it was requested that Centennial Mandalong submit a modification application to the Department for the relocation of approved infrastructure under section 96(1A) of the Environmental planning and Assessment Act 1979 (EP&A Act).

This Statement of Environmental Effects has been prepared to accompany a section 96(1A) application to modify the existing Part 4 Mandalong Mine Development Consent (DA97/800) for:

- The relocation of a 1200 tonne truck load out bin; and
- The realignment of internal haul roads linking the private Mandalong haul road from the Mandalong Services Site to the existing Newstan/Eraring private haul road.

2. Original Approved Developments

Mandalong Mine was approved by the then Minister for Urban Affairs and Planning in 1998 following the submission of the Cooranbong Colliery – Life Extension Project EIS (Umwelt 1998) and a Commission of Inquiry. The original approval allowed for the:

- Extension to underground mining activities for Cooranbong Colliery;
- Establishment of a mine access site;
- Modification to coal preparation and transportation system; and
- Establishment of a coarse reject emplacement area.

Modifications to the original Development Consent were approved by the Department in 2001, 2005, 2006 and 2008.

2.1. 1998 EIS Approved Works

As foreshadowed in correspondence to the Department on the 4 September 2009, Centennial Mandalong intends to undertake construction and operation of existing approved infrastructure at the Mandalong Services Site. This construction and operation consists of the following approved, but not yet constructed, infrastructure:

- 100,000 tonne run of mine coal stockpile
- Run of mine coal conveyor system (2000 tonnes per hour)

- Truck loading bin (1200 tonnes)
- Internal haul roads linking to the Private Haul Road from Mandalong Services Site to Newstan/Eraring Private Haul Road (**currently under construction**)
- Clean water diversion channel, diverting clean water from around the run of mine stockpile
- Sediment collection pit adjacent to the run of mine stockpile

2.2. Environmental Assessment of the Approved Works

In 1998, Powercoal completed an Environmental Impact Statement (“**1998 EIS**”) (Umwelt, 1998) assessing the potential environmental impacts of the CHP Upgrade. This assessment included a Modular Coal Wash Plant. This plant is not proposed to be constructed at this time.

The 1998 EIS included (but was not limited to) environmental assessment of the following aspects in relation to the CHP Upgrade:

- Flora and fauna
- Noise
- Air Quality
- Surface water

Flora and Fauna

A population of *Tetratheca juncea* was identified in the vicinity of the Run of Mine (**ROM**) coal stockpile. As proposed in the EIS and subsequently approved, the *Tetratheca juncea* has been translocated to areas of adjacent habitat. Subsequently, the proposed coal stockpile will not affect the long term viability of this species either in the immediate vicinity or general locality. The existing connections between habitat at the Mandalong Services Site and habitat in the general vicinity would remain unaffected by the construction of the infrastructure associated with the CHP Upgrade.

Therefore, no additional flora and fauna impact assessment is required for the CHP Upgrade.

Noise

Noise assessment in the 1998 EIS was undertaken for construction and operational phases of the CHP Upgrade.

The noise assessment conservatively concluded that the predicted noise emission levels, based on the construction and operation of the Modular Coal Wash Plant, at the nearest potentially affected residential properties complied with the recommended daytime noise limits, during both neutral and adverse meteorological conditions.

The noise assessment further concluded that the predicted noise emission levels, based on the construction and operation of the Modular Coal Wash Plant, complied with the recommended night time noise limits at all locations, during neutral meteorological conditions.

During adverse wind and temperature inversion conditions, noise emissions did not comply with the recommended night time noise limits at one location (BG5). The 1998 EIS noise assessment is included in **Appendix 1**.

The Mandalong Mine development consent (DA 97/800) approved in 1998 included relevant noise criteria for BG5 restricting noise levels for day (42 dB(A) L_{Aeq}) and night time periods (41 dB(A) L_{Aeq}).

In 2008, Centennial Mandalong applied to the Department of Planning to modify its existing development consent (*Mandalong Mine Modification to Development Consent Environmental Assessment*, September 2008) ("**2008 EA**"). This modification, approved in July 2009, included a noise compliance survey against the existing approved noise levels at the Mandalong Services Site and the current DECC[W] policies. The compliance survey modelled the current and future noise levels associated with the Modular Coal Wash Plant and private haul road against the adopted Industrial Noise Policy ("**INP**") criteria.

The subsequent noise impact assessment completed by Bridges Acoustics in 2008, concluded that

"existing noise levels from the Mandalong Mine Services Site currently meet relevant noise criteria and are expected to remain within the criteria when the approved coal preparation plant, conveyors, stockpiles and other equipment are constructed and operated".

The noise modelling undertaken during the 1998 EIS and the 2008 EA were conservative with emission levels determined based on the construction of the Modular Coal Wash Plant. Given the assessments conclusion, and that Centennial Mandalong is not proposing to construct the Modular Coal Wash Plant at this time, it is unlikely that the predicted noise emission levels will be exceeded at any residence. The *Mandalong Mine Noise and Vibration Impact Assessment*, May 2008 is included at **Appendix 1**.

Therefore, no additional noise impact assessment is required for the CHP Upgrade.

Air Quality

The 1998 EIS concluded that the minor earthworks required for the construction of the CHP Upgrade would not cause significant dust emissions. This conclusion is not likely to change as a result of the reduced construction activities planned.

The air quality assessment during operation of the CHP Upgrade was predicted to produce dust emissions from a number of sources. These included:

- Loading run of mine coal to 100,000 tonne stockpile
- Loading run of mine coal to the CHP hopper (**not to be constructed**)
- Loading product coal to two 50,000 tonne stockpiles (**not to be constructed**)
- Loading product coal to trucks
- Wind erosion from all stockpiles

- Run of mine and product stockpile maintenance

As noted above, several of the activities assessed in the 1998 EIS will not be constructed.

The air quality assessment applied in the 1998 EIS was conservative and concluded that dust deposition rates around the CHP Upgrade would not affect any sensitive receptors (using $2\text{g/m}^2/\text{month}$ contours), as identified in **Figure 4.8a** of the 1998 EIS. The air quality assessment further concluded that there are no sensitive receptors within the zone of affectation defined by the $50\mu\text{g/m}^3$ contour in **Figure 4.8b** of the 1998 EIS. **Figure 4.8a** and **Figure 4.8b** of the 1998 EIS are included in **Appendix 2**.

With no residential properties occurring north of the Gradwells Road/Simpsons Road intersection, the 1998 EIS air impact assessment is applicable to the current CHP Upgrade works. Despite this low level of amenity, the approved Mandalong Mine development consent includes air quality criteria and as discussed in the 1998 EIS the CHP is not predicated to impact on air quality at residential receivers. Given that Centennial Mandalong is not proposing to construct the Modular Coal Wash Plant at this time, it is unlikely that the CHP upgrades will impact on air quality at privately owned residences.

The proposed CHP Upgrade will reduce both the area of exposed stockpile and the dozer operated stockpile maintenance, therefore the overall air amenity will be less than that predicted in the 1998 EIS.

The activities assessed in the 1998 EIS are consistent with the activities Centennial Mandalong are proposing to undertake as approved but not yet constructed; therefore, no additional air quality assessment is required.

Surface Water

The 1998 EIS assessed the potential impacts of the construction and operation of the CHP Upgrade on surface water quality. The 1998 EIS determined that the existing surface water management structures in place at the site would adequately manage the dirty water from the site. The 1998 EIS included a proposed clean water diversion drain (approved but not yet constructed) that will be constructed to direct clean water away from the run of mine coal stockpile.

The works approved but not yet constructed are identical to those in the original 1998 EIS.

3. Proposed Modification

Centennial Mandalong are proposing the relocation of approved, but not yet constructed, infrastructure within the Mandalong Services Site. The relocation includes the:

- Relocation of a 1200 tonne truck loading bin; and
- Alignment of internal haul roads linking the private Mandalong haul road from the Mandalong Services Site to the existing Newstan/Eraring private haul road.

The location for this infrastructure was originally identified in Figure 2.8 of the Cooranbong Colliery Life Extension Project EIS (Umwelt 1997). The locations of internal haul roads were not defined in the 1998 EIS. Recent infrastructure designs for the Mandalong Services Site to

progress the approved works identified that from engineering and safety perspectives, the location of the haul road alignment and truck load out bin were not practical. Subsequently, engineering designs for the proposed infrastructure have resulted in the locations of the haul road alignment and truck load out bin being relocated to ensure that all operations within the Mandalong Services Site can continue in a safe and practical manner. **Appendix 3** details the new proposed location of infrastructure within the Mandalong Services Site as it relates to the existing approved infrastructure.

The 1998 EIS and 2008 EA identified the potential impacts of the CHP Upgrade and concluded that the construction and operation of the approved infrastructure will not adversely impact on air quality, flora, fauna, surface water quality, and noise amenity.

Given the conservative nature of these assessments and that these assessment considered the construction and operation of the Modular Coal Wash Plant and two 50,000 tonne product coal stockpiles (approved but not yet constructed), the proposed increase in height of the run of mine coal conveyor, realignment of the 200 tonne truck loading bin and the alignment of internal haul roads will not adversely affect the approved air quality or noise amenity criteria.

To assess the potential impacts of this increased height on visual amenity, Centennial Mandalong engaged GSSE Pty Ltd to undertake a visual impact assessment.

Following correspondence from the Department of Planning, Centennial Mandalong and GSSE Pty Ltd have reassessed the visual amenity to take into account potential exposure along the route of the Great Northern Railway. This revised assessment is included at **Appendix 4**. This reassessment of the visual amenity of the proposed increase in conveyor height, stockpile and haulage bin concluded that these will only be visible from the Great Northern Railway line as glimpses along a limited cleared section of the Transgrid power Line easement. GSS Environmental Pty Ltd concluded the visual impact on the Great Northern Railway line will be limited to this specific location and is considered to be minimal and unobtrusive. The existing visual amenity from residential properties will not be impacted on by the above listed CHP infrastructure as these are shielded by natural vegetation or topography surrounding the operation.

4. Approval Pathway

As discussed and agreed with the Department of Planning on 19 October 2009, a modification under section 96(1A) is required for the relocation of infrastructure within the Mandalong Services Site. Centennial Coal has made this application under section 96(1A) as the proposed modification is of minimal environmental impact with impacts within the existing approved footprint assessed in the 1998 EIS and the modifications as proposed are substantially the same development as the development for which the consent was originally granted.

5. Environmental Assessment

The environmental impacts associated with the construction and operation of the infrastructure within the Mandalong Services Site were assessed as part of the 1998 EIS. In summary:

Flora and Fauna - A population of *Tetratheca juncea* was identified in the vicinity of the Run of Mine (ROM) coal stockpile. As proposed in the EIS and subsequently approved, the *Tetratheca juncea* has been translocated to areas of adjacent habitat. Subsequently, the proposed coal stockpile will not affect the long term viability of this species either in the immediate vicinity or general locality.

Dust - As described in the 1998 EIS, there are no sensitive receptors within the zone of affectation defined by the 50 µg/m³ contour. The proposed CHP Upgrade will reduce both the area of exposed stockpile and the dozer operated stockpile maintenance, therefore the overall air amenity will be less than that predicted in the 1998 EIS.

The activities assessed in the 1998 EIS are consistent with the activities Centennial Mandalong are proposing to undertake as approved but not yet constructed.

Noise – The noise modelling undertaken during the 1998 EIS and the 2008 EA were conservative with emission levels determined based on the construction of the Coal Wash Plant. Given the assessments conclusion, and that Centennial Mandalong is not proposing to construct the Modular Coal Wash Plant at this time, the proposed modifications will result in no additional noise impacts to sensitive receptors.

Visual – As described above, the proposed amplification of handling facilities at the Cooranbong Colliery site will not be visible from any residences in the area or any public areas. Consequently no visual impact will result from these works.

Archaeology - No archaeological material was identified at the colliery site and as such, there are no constraints to the development on archaeological grounds.

The relocation of the 1200 tonne truck load out bin and haul road alignment will not result in any additional environmental impacts as previously identified in the Cooranbong Colliery Life Extension Project EIS (Umwelt, 1997) and subsequent approval of DA97/800.

6. Conclusion

Centennial Mandalong seeks approval from the Department of Planning for the relocation of infrastructure within the Mandalong Services Site under section 96(1A) of the EP&A Act. The proposed relocation of infrastructure is substantially the same development as the development for which the consent was originally granted and will have no impacts beyond those already approved.

Appendix 1 - *Mandalong Mine Noise and Vibration Impact Assessment*, May 2008

Appendix 2 - Figure 4.8a and Figure 4.8b of the 1998 EIS

Appendix 3 - location of proposed infrastructure within the Mandalong Services Site

Appendix 4 - GSS Environmental Pty Ltd (2009) Visual Assessment CHP Modification for Cooranbong Colliery.

Appendix 5 – Cooranbong Colliery Conveyor Elevation Diagrams 1 and 2

APPENDIX 1



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CENTENNIAL MANDALONG PTY LIMITED

MANDALONG MINE MODIFICATION TO DEVELOPMENT CONSENT NOISE AND VIBRATION IMPACT ASSESSMENT

**REPORT J0130-19-R1
7th MAY 2008**

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1 INTRODUCTION

Centennial Mandalong Pty Limited (Centennial) owns and operates the Mandalong underground coal mine (Mandalong Mine), located on the central coast of New South Wales.

Centennial will submit an application to Department of Planning (DoP) for a Modification to the Mandalong Mine Development Consent DA 97/800 under Section 75W of the Environmental Planning and Assessment Act 1979 (this Modification). This Modification specifically includes:

- The construction and operation of gas engines to be fuelled by waste coal mine methane gas extracted from the existing methane drainage plant;
- An increase of the rate of Run of Mine (ROM) coal extraction from the currently approved 4 Million tonnes per annum (Mtpa) to 6 Mtpa;
- The relocation of an approved, but not yet constructed ballast borehole; and
- Updating subsidence conditions to ensure consistency with the Department of Primary Industries – Mineral Resources (DPI) Subsidence Management Plan process.

Further details of this Modification are presented in the Environmental Assessment (EA).

Previous environmental noise assessments were completed before the current Department of Environment & Climate Change (DECC) noise assessment policies were developed. This assessment therefore includes development of updated noise criteria and reassessment of existing noise levels to current guidelines and policies. The assessment included a survey of existing environmental noise levels at one location near the proposed ballast borehole site, at two representative receiver locations near the existing Mandalong Mine Access Site and at one location near closest residences to the Mandalong Mine Services Site (formerly Cooranbong Colliery). Results of long term unattended and short term attended noise surveys at each of these four monitoring locations are included in this report.

This assessment also comments on the potential vibration impacts resulting from the proposed increase in coal extraction rate. Underground mining activities do not produce noticeable environmental noise at any sensitive receiver and an assessment of this aspect is not included in this report.

This report has been commissioned by Hansen Bailey Pty Ltd (Hansen) on behalf of Centennial to form part of the EA for this Modification. The assessment and report are based on current DECC guidelines and policies as described below.

1.1 Environmental Noise Policies and References

The DECC has developed or adopted policies and recommended procedures to assess environmental noise levels from various noise source categories. The following policy documents are relevant to this assessment:

- The NSW Industrial Noise Policy (INP) (EPA, 2000) provides guidance for noise investigations from existing or proposed industrial developments including coal mines. The INP recommends procedures to consistently determine:
 - background noise levels at receiver properties,
 - existing noise levels from an industrial site,
 - recommended, not mandatory, noise criteria for existing and proposed operations,
 - predicted noise levels from proposed developments, and
 - negotiation options if recommended noise criteria may not be met.

- The Environmental Noise Control Manual (ENCM) has been superseded by more recent policy documents although some sections remain relevant, including Chapter 19 related to sleep disturbance from industrial sources operating at night.
- The Environmental Criteria for Road Traffic Noise (ECRTN) (EPA, 1999) provides recommended noise criteria and assessment procedures for road traffic noise from public roads.

Data from the following previous environmental assessments for the mine site and services site have been relied on for this assessment:

- Statement of Environmental Effects for Mandalong Mine Installation and Operation of Enclosed Methane Gas Flare Units (Umwelt, February 2006) (Flare SEE);
- Mandalong Mine, Methane Drainage Plant and Coal Haulage, Statement of Environmental Effects (Sinclair Knight Merz, October 2004) (Methane Drainage and Haulage SEE); and
- Cooranbong Colliery Life Extension Project, Environmental Impact Statement (Umwelt, November 1997) (Life Extension EIS).

1.2 Receivers

Mandalong Mine currently includes three surface facilities including the Mandalong Mine Access Site located north of Mandalong Road just west of the F3 Freeway, the Mandalong Mine Services Site at the northern end of Gradwells Road and the Delta Link Project site adjacent to Delta Electricity's coal unloader at Wyee.

This Modification does not require any modifications or additions to the Delta Link Project site which is approved under a separate planning approval and this site is relatively remote from the other two sites, so no specific assessment of noise from the Delta Link site has been included. A fourth distinct site is proposed in an area south of Mandalong Road approximately 1500m west of the F3 Freeway and would contain a Ballast Borehole and associated facilities.

Nearest residences to the Mandalong Mine Site, Mandalong Services Site and Ballast Borehole site are shown in the noise contour figures in Appendix A.

2 EXISTING ENVIRONMENT

2.1 Noise Monitoring Program

An investigation into existing environmental noise levels has been carried out to determine appropriate noise criteria for this assessment according to procedures recommended in the INP. Noise surveys have been carried out to measure existing background and ambient noise levels using a combination of long term unattended noise monitoring and short term operator-attended noise measurements at four assessment locations.

Noise monitors providing results to Type 1 accuracy according to AS1259, which are suitable for laboratory or field use, were installed for a minimum 12 day period from the afternoon of Monday 10th December to the afternoon of Saturday 22nd December 2007. The monitor at Location M4, near the Mandalong Mine Services Site, had a higher memory capacity and operated until all monitors were retrieved on the afternoon of Monday 24th December 2007.

Attended noise surveys over 15 minute periods were also undertaken during the day, evening and night to assist in identifying and quantifying the noise contribution from dominant noise sources at each location. Noise monitoring locations are shown on the noise contour figures in Appendix A and described in Table 1.

Table 1: Noise Monitoring Locations.

Receivers	Noise Monitoring Locations
M1. Residences near the proposed Ballast Borehole	Noise monitoring was undertaken in a grassed and lightly wooded area just south of the proposed Borehole location and approximately 400m east and south of nearest residences. This location was chosen to minimise disturbance to residents and due to boggy ground and potential interference from animals closer to residences.
M2. Residences west of the Mandalong mine access site	Noise monitoring was undertaken adjacent to the gate of the former Lee property (now owned by Centennial), in the absence of permission to install the monitor at adjacent privately-owned residences.
M3. Residences east of the Mandalong mine access site	Noise monitoring was undertaken in front of the McLean residence on Gimberts Road, with the logger attached to a tree adjacent to the property's driveway and attended measurements completed approximately 60m further south of the logger to minimise disturbance to residents.
M4. Residences near the Mandalong services site	Noise monitoring was undertaken on the western side of Gradwells Road approximately 90m north west of the nearest residence, to minimise disturbance to residents and the potential effects of barking dogs.

The long term noise monitors at Location M1 to M3 were 01dB SIP95S sound level meters while the monitor at location M4 was a Svan 949 sound level meter. All instruments were housed inside weatherproof boxes and fitted with a 12.7mm condenser microphone on an extension cable and a windshield over the microphone. The monitors were installed within wire security cages and attached to a tree, fence or sign post with the microphones mounted approximately 1.2m above the ground. The sound level meters were programmed to measure and store one-second average (LAeq) values for the entire monitoring period, allowing software provided by the instrument manufacturer to calculate 15 minute percentile statistics for analysis and presentation in this report.

Short term attended noise surveys were completed using a Svan 912AE Type 1 sound level analyser fitted with a 12.7mm polarised condenser microphone and a windshield. This instrument was mounted on a tripod close to each long term monitor or at the alternative locations described in Table 1, with the microphone approximately 1.2m above the ground. Calibration levels for all instruments were checked at the beginning and end of the survey using an 01dB Cal-01 Type 1 calibrator producing 94 dB at 1kHz, with each reading within 0.2 dB of the expected value and a maximum difference of 0.2 dB noted from the start to the end of the survey. Appendix B includes detailed results from each monitor.

2.2 Background Noise Levels

The background noise level at each monitoring location has been determined to recommended procedures in the INP. The background level in any 15 minute period is defined in the INP as 'the level exceeded for 90% of the time' which is more easily understood as the quietest 10% of the time. The background level is therefore controlled by constant or long-term noise sources such as insects and heavy traffic rather than louder short-term sources such as intermittent road traffic or barking dogs. Results from all noise monitors include the background noise level in each 15 minute period.

The INP further recommends that 'assessment background noise levels' (ABLs) are determined for each day, evening or night period by taking the 'L90 of the individual 15 minute L90s' after excluding data affected by wind above 5m/s or rain. Weather data collected during the noise survey were supplied by Centennial in hourly intervals and included air temperature, wind speed, wind direction and precipitation. Calculated ABLs for each time period and receiver location are included on the results charts in Appendix B. A single 'rating background level' (RBL) was then determined for each receiver

location by taking the median value of all ABLs for each day, evening or night period. Results from this calculation are shown in Table 2.

Table 2: Measured Background Noise Levels, LA90,15min.

Monitoring Location	Measured Background Level, LA90,15min		
	Day	Evening	Night
M1. Near Ballast Borehole	39.9	43.2	38.8
M2. West of Mine Access Site	49.0	48.8	48.7
M3. East of Mine Access Site	55.6	50.6	45.9
M4. Near Services Site	41.6	43.4	46.7

2.3 Receiver Areas

2.3.1 Receivers near the Ballast Borehole (M1)

Observations made during the attended noise surveys indicate background noise levels in this area are dominated by a combination of F3 Freeway traffic, frogs and insects. The freeway is the dominant background source during the day and early evening, while frogs and insects can contribute significant noise during the latter half of the evening and first half of the night. Ambient (LAeq) noise levels were primarily influenced by a combination of freeway and Mandalong Road traffic during the day and evening, and by freeway traffic during the night, with an intermittent contribution from birds, cows, and other extraneous sources during all time periods. Noise levels from Mandalong Mine were not audible at any time.

Daytime background levels were dominated by consistent traffic noise due to the approximately 3km length of freeway that is audible from this location. Intermittent noise from local Mandalong Road traffic and birds was audible but these sources are not consistent so do not affect the measured background level.

Evening background levels would not substantially reduce in the absence of frogs and insect noise due to consistent peak traffic flows during this period. Animal noise tended to increase at dusk, which occurred around 8pm during the survey, which resulted in lowest background noise levels typically occurring during the early part of the evening. Observations during the later evening and early in the night confirmed freeway traffic noise remained consistently audible, with an estimated background noise level similar to the early evening if insects and frogs were removed.

Insect and frog noise continued into the first half of the night but tended to reduce to the background traffic noise level during the period 3am to 4am approximately. The measured background noise level therefore represents a combination of traffic and insect noise and 3 dBA has been subtracted from the measured night background level to remove any influence from insects.

As the ballast borehole would only be used during the day period, evening and night background levels at this location are not relevant for residences near the borehole site. Background noise levels measured at this location are considered representative of residences at a similar distance from the freeway including 64, 103, 112, 114 and 115.

2.3.2 Receivers West of the Mine Access Site (M2)

Observations and measurements at monitoring location M2 indicate the F3 Freeway is a major source of background noise during all time periods. Insect noise can also be significant at this location and was often dominant during the night. Ambient (LAeq) noise levels were dominated by a combination of freeway and local Mandalong Road traffic, although Mandalong Road traffic noise would be

substantially lower at each residence located further from the road. Other sources such as resident's cars and horses were intermittently audible but are unlikely to affect long term average noise levels.

Noise from Mandalong Mine was not audible during the attended noise surveys but may be audible at times depending on weather conditions and activities occurring on the mine access site. As audible mining noise would be caused by mobile plant movements which only occur intermittently, it is clear that mine noise does not affect the background noise level and would provide an insignificant contribution to long term ambient noise levels.

Noise levels during the day were dominated by freeway and local traffic, with very little contribution from insects. Background noise levels during the evening were also dominated by peak traffic flows on the freeway, with no significant contribution from insects according to observations made during this period.

Background noise levels during the night were primarily influenced by insects, with fairly consistent freeway traffic noise also audible. Figure 1 shows LAeq and LA90 measurement results for two separate 15 minute periods, from 11:45pm to 00:15am on 10th and 11th December 2007, for A-weighted 1/3 octave frequency bands from 50Hz to 5kHz. Noise levels within the frequency range 50Hz to approximately 2000Hz are produced by freeway traffic, including truck turbochargers producing noise up to 2000Hz, while noise levels measured in the frequency bands above 2000Hz are almost entirely due to insects.

Figure 1: Attended Noise Measurement Results, Location M2, Night, dBA.

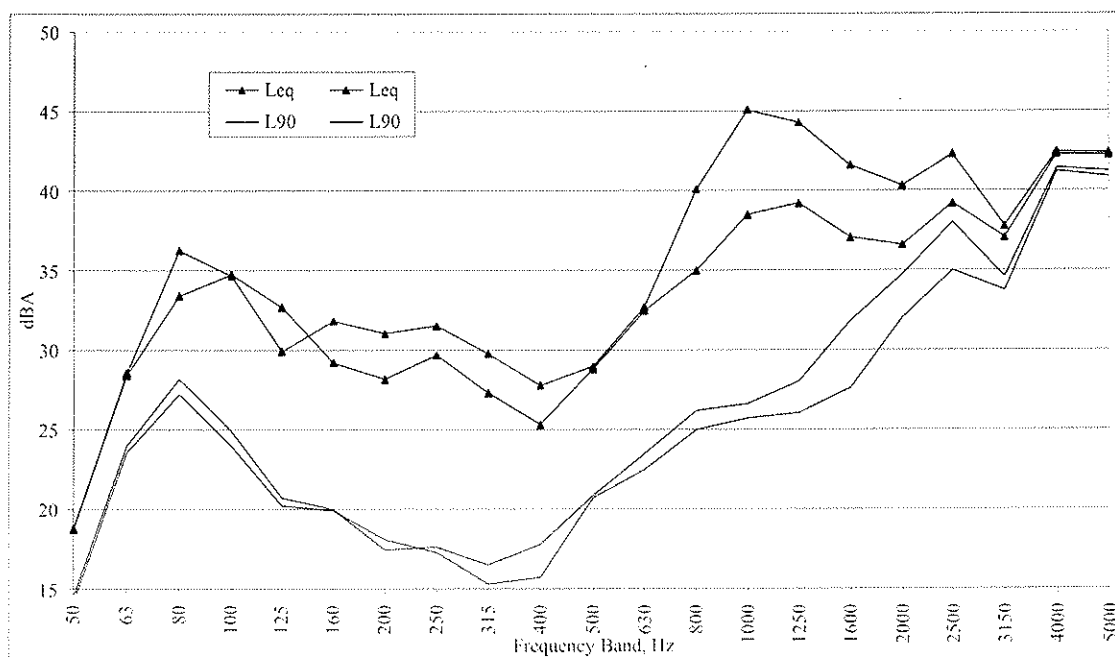


Figure 1 shows that most sound energy is produced in frequencies above 2000Hz, which excludes significant traffic noise. The measured background noise levels of 46.4 and 47.3 LA90,15min, including all sources of noise, reduce to 37.0 and 39.1 LA90,15min respectively if high frequency insect noise is excluded and only the frequency range 50Hz to 2000Hz is considered. Figure 1 indicates an average insect noise level of approximately 44 LAeq,15min during both measurement periods.

Given all residences in this area are located close to both grassed and wooded areas, there is no reason to assume insect noise would be substantially lower during other seasons. Nevertheless, a conservative night background level of 37 LA90,15min is adopted for this area to ensure long term levels are not

overestimated. Background noise levels adopted at this location are considered representative of residences 82, 97, 107 to 110, 124 and 126.

2.3.3 Receivers East of the Mine Access Site (M3)

Observations and measurements at monitoring location M3 indicate the F3 Freeway is the dominant source of background noise during all time periods. Insect noise can also be audible at this location but is rarely a significant source compared to traffic. Mandalong Road traffic noise is audible at times but only during relatively long breaks in freeway traffic. Local Gimberts Road traffic, dogs and birds are intermittent sources of noise but were noted to produce an insignificant contribution compared to the freeway.

Noise levels during the day and evening are dominated by the freeway with no significant contribution from other sources. Attended noise monitoring results during the night indicate background noise levels due to road traffic are typically louder than background noise levels produced by insects, although traffic noise levels can reduce to the level of insect noise during relatively quiet periods. Insect noise at frequencies above 2500Hz was typically measured at 42 LA91,15min during the attended surveys. To ensure long term background noise levels are not overstated, 3 dBA has been subtracted from the measured night background noise level to remove any influence from insects.

Background noise levels measured at this location are considered representative of residences 57, 66, 72, 85 and 86.

2.3.4 Receivers near the Mandalong Mine Services Site (M4)

Observations and measurements at monitoring location M4 indicate traffic on the F3 Freeway and Wangi Road, insects, Eraring Power Station and the Mandalong Mine Services Site all produce audible noise at times.

Noise levels during the day are dominated by distant traffic, insects and birds with no audible contribution from the power station or the mine. Observations in this area indicate distant traffic and insects produce a similar level of ambient noise and a similar comment can be made regarding background noise levels during the day.

Insect noise tends to increase and become dominant during the evening, while distant traffic noise levels remain at levels comparable to the day period. It is reasonable to assume Eraring Power Station or the Mine Services Site may occasionally be audible during the evening although these sources were not audible at any time during the evening attended noise surveys. The lower daytime background noise level has been adopted for the evening period to ensure long term average background levels during the evening are not overestimated.

Insect noise is also dominant during the night as traffic noise levels from Wangi Road and to a lesser extent from the F3 Freeway tend to reduce during the night. Figure 2 shows LAeq and LA90 measurement results for two separate 15 minute periods, from 1:30am to 2:00am on 17th December 2007, for A-weighted 1/3 octave frequency bands from 50Hz to 5kHz. Noise levels within the frequency range 50Hz to approximately 2000Hz are potentially produced by the Mandalong Mine Services Site and by traffic and the power station, although most noise energy from the Mine Services Site and the power station is expected to occur below 200Hz. Noise levels measured in the frequency bands above 2000Hz are due to insects and occasional birds.

Figure 2: Attended Noise Measurement Results, Location M4, Night, dBA.

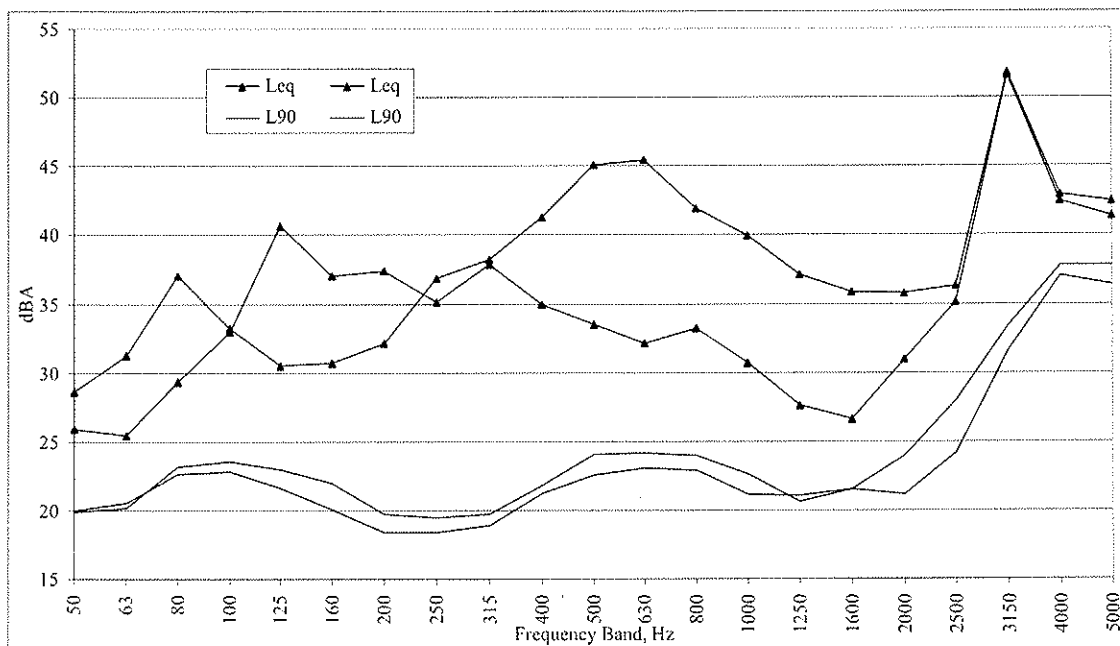


Figure 2 shows that most sound energy is produced in frequencies above 2000Hz, which excludes Mine Services Site noise. The measured background noise levels of 44.4 and 45.0 LA90,15min, including all sources of noise, reduce to 33.8 and 34.4 LA90,15min respectively if high frequency insect noise is excluded and only the frequency range 50Hz to 2000Hz is considered. Given that the site was barely audible over road traffic as this noise measurement was taken, and that road traffic, the site and Eraring Power Station all produce noise in a similar frequency range, it is clear that traffic noise levels were close to 33 LA90,15min and the combined site and power station produced a lower noise level estimated at 25 LA90,15min but certainly below 30 LA90,15min. As site noise does not appreciably change from one minute to the next, both background (LA90) and average maximum (LA10) noise levels produced by the site would be similar and a site contribution in the range 27 to 30 LAeq,15min is estimated. A similar contribution is expected from the power station, while combined freeway and Wangi Road traffic is estimated to produce a noise level in the range 47 to 51 LAeq,15min based on the measured noise level below 2000Hz. Figure 2 indicates an average insect noise level of 52 LAeq,15min during both measurement periods.

Based on the analysis described above, a background noise level of 34 LA90,15min which excludes all insect and mining noise is adopted for this area during the night, compared to the actual measured background noise level of 46.7 LA90,15min shown in Table 2. As it is reasonable to assume some insect noise would occur in all seasons, the adopted background level is considered very conservative. Measured noise levels in this area are considered to represent residences 22, 23, 26, 28 and 32.

2.3.5 Summary of Adopted Background and Ambient Noise Levels

Table 3 summarises the adopted background noise levels based on the analysis and discussion presented above for each noise monitoring location. Entries shown in bold font in Table 3 have been reduced below the actual measured background levels shown in Table 2, primarily to remove the influence of insect noise and any existing mining noise.

Table 3: Adopted Background (RBL) and Ambient Noise Levels, LA90,15min.

Monitoring Location	Background, LA90,15min			Ambient, LAeq,15min		
	Day	Evening	Night	Day	Evening	Night
M1. Ballast Borehole	39.9	43.2	35.8	50.2	49.8	47.4
M2. West of Mine Access Site	49.0	48.8	37.0	64.4	62.0	58.8
M3. East of Mine Access Site	55.6	50.6	42.9	64.4	58.0	56.9
M4. Mandalong Mine Services Site	41.6	41.6	34.0	55.6	55.8	54.0

3 CRITERIA

3.1 Mining Noise

Noise criteria for this assessment have been developed using procedures in the DECC's INP which recommends methods to determine background noise levels and to derive appropriate operational noise criteria for an industrial site near noise-sensitive receivers such as residences. Both the intrusive and amenity noise criteria are normally referred to in each of the day, evening and night time periods and are described below.

3.2 Intrusive Criteria

Intrusive criteria are set 5 decibels above the Rating Background Level (RBL) in each time period and are designed to limit the relative audibility of this Modification. These criteria can be adjusted by one or more 'modifying factors' described in Section 4 of the INP, or alternatively the source noise levels can be adjusted to consider any modifying factors applicable to those sources.

Modifying factors apply to specific sources, such as conveyor start alarms, but do not apply to other sources such as ventilation fans. As modifying factors do not apply to all sources on the site they have been added to source noise levels as required, rather than subtracted from the intrusive criteria.

3.3 Amenity Criteria

Amenity limits recommended in the INP depend on existing industrial noise levels and the nature of the receiver area. The amenity limits are designed to control the total or cumulative level of industrial noise at a sensitive receiver such as a residence. Amenity criteria are set to the amenity limits in cases where limited industrial noise is currently received, or to lower levels to ensure the cumulative impact of existing and proposed noise sources does not exceed the limit for each time period.

Rural receivers located within audible range of the F3 Freeway are defined as 'urban' receivers according to the INP, although it is noted that the Department of Planning prefers these residences to be considered rural receivers despite the dominant nature of Freeway traffic noise in this area. This assessment has adopted a conservative approach with all receivers considered to lie in the 'rural' amenity category unless the high traffic amenity criterion applies as further discussed below.

Section 2.2.3 of the INP describes alternative amenity criteria to be applied in areas of high traffic noise, defined as an area where traffic noise levels exceed the applicable amenity limits by more than 10 dBA. These criteria do not reasonably apply to monitoring location M1 which is approximately 1600m from the freeway, and cannot readily be applied to location M2 as measured Mandalong Road traffic noise levels at this location are significantly higher than the levels would be at nearby residences. Location M3 is significantly affected by freeway noise during all time periods so it is reasonable to consider high traffic noise criteria at this location. Table 4 shows the amenity limits that would apply

depending on the category selected, with the high traffic amenity levels set 10 dBA below the measured ambient levels shown for location M3 in Table 3.

Table 4: Amenity Limits, LAeq.

Amenity Category	Rural	High traffic (location M3 only)
Day (LAeq,11hr)	50	54
Evening (LAeq,4hr)	45	48
Night (LAeq,9hr)	40	47

Table 2.2 in the INP recommends corrections to the amenity limits to consider existing sources of industrial noise. No corrections are recommended when existing industrial noise levels (excluding any noise contribution from the development being considered) are at least 6 dBA below the relevant amenity limits, which is the case for all receivers according to the noise survey results described in Section 2 above.

An industrial area currently extends from the south eastern corner of the Mandalong Road and F3 Freeway intersection, with most developments in this area appearing to be occupied primarily during the day. Attended noise survey results indicate no audible noise has been heard from this industrial area at any time, which is to be expected considering the dominant nature of adjacent freeway traffic noise.

Attended noise surveys have also indicated Eraring Power Station produces approximately 27 LAeq,15min at residences near the Mandalong Mine Services Site, which is at least 6 dBA below the conservative 'rural' night amenity limit of 40 LAeq,9hr so does not require any cumulative noise correction.

3.4 Summary of Mining Noise Criteria

Table 5 shows intrusive and amenity criteria applied to each receiver area. Amenity criteria are based on the high traffic category for receiver area M3 and on the rural category for all other receivers.

Table 5: Adopted Mining Noise Criteria at Residences, LAeq.

Receiver Area	Intrusive Criteria, LAeq,15min			Amenity Criteria, LAeq,period		
	Day	Evening	Night	Day	Evening	Night
M1. Near Ballast Borehole	45	48	41	50	45	40
M2. West of Mine	54	54	42	50	45	40
M3. East of Mine	60	56	48	54	48	47
M4. Near Mine Services Site	47	47	39	50	45	40

The assessment point for each residential property is defined in the INP as the closest or potentially most affected point within 30m of the residence, or at the property boundary if the boundary is closer than 30m from the residence.

3.5 Where Criteria May be Exceeded

Noise criteria listed in Table 5 should be considered the levels above which some acoustic impact may be noticed by residents. Louder noise levels at a residence do not necessarily imply the noise is unacceptable at that residence.

The INP describes strategies to deal with potential exceedances of the criteria such as:

- best practice noise mitigation measures applied to individual plant items and mine operating procedures;
- adoption of alternative noise criteria based on achievable noise levels and considering other factors such as social worth attached to the development and historical noise levels from existing developments;
- negotiation of offset arrangements with regulators and/or the affected community; and
- acquisition of properties where the predicted or measured noise impacts are unacceptable.

Recent noise assessment practice for greenfield mine sites considers an exceedance of up to 5 dBA above the intrusive or amenity criteria is generally acceptable provided the proponent can show all reasonable and feasible noise control measures and best practice operational noise management measures have been incorporated into the design and operational planning for the development. Residences expected to receive more than 5 dBA above the criteria are typically considered to lie within an area of affectation and are often subject to acquisition by the mine, or are offered other negotiated mitigation options if desired by residents.

Residential properties expected to receive less than 5 dBA above the intrusive or amenity noise criteria are typically considered to fall within a 'management zone' and the proponent is normally expected to implement ongoing management practices and engineering noise control measures to achieve the lowest practical levels at these properties.

The INP recognises that this strategy is not necessarily appropriate for relatively minor modifications to an existing site such as Mandalong Mine that was approved and has been operating under previous and now outdated noise assessment guidelines.

3.6 Sleep Disturbance

Sleep disturbance potentially occurs when short, sharp sounds that intrude above the ambient level can be heard within a bedroom. Common sources of sleep disturbance include road, air and rail traffic, impact sounds from an industrial site, bird calls and voices. Of these sources, only impact sounds originating within the Mandalong Mine Access Site can potentially cause sleep disturbance at a residence during the night.

Sleep disturbance criteria are sourced from the State Pollution Control Commission (now DECC) Environmental Noise Control Manual (ENCM) which recommends a limit of 15 LA1,1min above the background noise level during the hours 10pm to 7am or to 8am on Sundays and public holidays. According to the DECC, this sleep disturbance criterion does not apply to the day and evening periods. While noise levels and character capable of causing sleep disturbance are not well understood at present, this criterion is acknowledged to be conservative and is the most widely accepted for situations of this type.

Sleep disturbance criteria based on the adopted night background noise levels listed in Table 3 of this report, for areas near the mine access site, are shown in Table 6.

Table 6: Adopted Sleep Disturbance Criteria, LA1,1min.

Residential Areas	Sleep Disturbance Criteria, LA1,1min
M2. West of Mine	52
M3. East of Mine	58
M4. Near Services Site	49

According to the ENCM, sleep disturbance is assessed at a point 1m outside the potentially most affected bedroom window of a residence. For the purposes of this assessment, sleep disturbance is assessed at the closest facade of each residence within receiver areas M2 and M3.

4 ASSESSMENT

4.1 Weather Conditions

4.1.1 General Discussion

A detailed review of weather conditions that occur in this area has been carried out to assist in determining the effect of weather conditions on noise propagation from each site. Parameters such as air temperature, relative humidity, wind speed profile and vertical temperature gradient can influence noise levels at some distance from a source, while such effects are rarely significant at much shorter distances.

It is commonly understood that winds tend to 'blow' noise and increase received levels downwind from a source. The actual noise enhancement mechanism is related to bending or refraction of sound rays as they pass from one wind speed zone to another or, in real cases, as they pass through a gradually changing wind speed profile. Sound rays travelling in the same direction as the wind tend to be bent towards the ground, while those travelling against the wind tend to be refracted away from the ground. The average radius of curvature of each sound ray can be calculated if the wind speed profile is known.

Wind speeds tend to increase with height in a non-linear fashion, requiring all important wind speed measurements to be taken at a standardised height of 10m above the ground. The wind speed profile, or the variation of wind speed with height, varies depending on the average roughness of the ground surface and near major changes in ground elevation such as hills and valleys. The actual wind speed and direction varies in a complex way over undulating and forested areas and it would be very difficult to accurately measure or model this situation for a single point in time. This high difficulty level substantially increases when variations in wind conditions over time are considered.

A less complex approach is adopted for noise assessment purposes. This approach assumes a standard wind speed profile occurs over the entire site, resulting in a more easily determined radius of curvature for sound rays that only depends on the wind speed and whether the sound rays are travelling downwind, upwind or at an angle to the wind direction.

It is also commonly understood that temperature inversions tend to increase noise levels at some distance from a source. A temperature inversion is formed when air near the ground is cooler than the air above, which primarily occurs during the night or to a lesser extent during cloudy days away from large bodies of water. Sunny days allow the sun to heat the ground surface which disperses an inversion and creates the opposite effect, known as a temperature lapse.

As cool air is denser than warm air, sound rays are refracted towards the cooler air which is towards the ground for an inversion or away from the ground for a lapse. This effect is the most important reason why sound carries better at night.

Cool air, being heavier, tends to run down hills and pool in valleys. The depth of cool air settling in a valley tends to increase during the night, particularly in winter. In most cases the cold air mass moves down the valley towards the ocean, creating a 'drainage flow'. While water is much heavier than air and faithfully follows the lowest path along the valley, cool air is only marginally heavier than warm air and the moving cool air mass tends to spill out over the width of the valley floor. The speed of this movement depends on site conditions but is typically around 1m/s.

The wind speed and direction during a calm night therefore varies depending on the direction of the main valleys in the area and can be vastly different over various areas of a site. The depth of any cool air flows vary depending on terrain conditions. As for gradient winds discussed above, it would be very

difficult to measure and model air temperatures and flows over the entire area for a particular point in time and it would be more difficult to model the situation as it changes with time.

A simpler situation is considered for noise modelling, in which a constant temperature gradient above ground level is assumed over the entire site and surrounds. A constant temperature gradient allows an average radius of curvature for sound rays to be determined and, in this case, the radius of curvature is assumed to apply in all directions from the source. Any drainage flows associated with temperature inversions are modelled as a wind speed and direction at an assumed height of 10m above the ground.

Currently available noise modelling software assumes the separate radii of curvature due to winds and inversions have a similar effect on noise propagation and can add together or cancel each other depending on wind direction and relative strength. For the noise model software, sound ray curvature due to an inversion is the same as curvature downwind from a source provided the radii of curvature are the same. Greatest sound ray curvature occurs downwind from a source during inversion conditions, as these effects are cumulative.

This discussion highlights the difficulty of modelling exact weather conditions that occur in the area from time to time. DECC recognises this difficulty and has developed a general assessment procedure for the purpose of noise modelling, as described in the INP, which is intended to represent most real situations for most of the time. Essentially, in cases where such weather effects occur for 30% of the time or more in any season or time period, the INP recommends the following weather effects are modelled:

- A 3°C/100m inversion during the night plus a 2m/s drainage flow from source to receiver where the source is on higher ground; or
- A 3m/s gradient wind.

4.1.2 Wind Analysis

Data from Centennial's Mandalong weather station, for the period January 2002 to July 2007 in hourly intervals, were analysed to determine appropriate weather parameters for use in this assessment. Data analysis has been carried out according to the following procedure:

- separate all valid data by season and time period;
- for each season and time period, count and discard wind speeds less than 0.5m/s and greater than 3m/s as these speeds represent either calm or turbulent conditions and do not tend to increase received noise levels, and
- for remaining data, determine the percentage occurrence of wind towards each of the 16 standard compass directions and combine results for 5 adjacent directions to identify a common vector component which has the potential to enhance noise in any direction.

Results are shown in Table 7 with entries in bold font highlighting dominant winds occurring for at least 30% of the time in each season or time period.

Table 7 indicates a wide range of wind directions occur during the day, although winds from the south west to west are reasonably common and almost reach the 30% threshold in autumn and winter. Dominant evening winds occur from the east or east south east in summer and are most likely a result of typical onshore breezes that occur near the ocean during warm afternoons. Evening winds during autumn and winter tend to occur from the south west to west, as for the day period, but do not approach the 30% threshold.

Winds tend to reduce at night with calm conditions occurring for 67% of the time averaged over all seasons. Any winds that do occur tend to blow from the south westerly to westerly directions and would either be weak drainage flows or typical coastal offshore breezes with a speed of less than 2 m/s.

Table 7: Noise Enhancing Winds, Mandalong Mine Met Data, 2002 to 2007.

Wind Direction	Occurrence of Noise Enhancing Winds, % of Season and Time Period											
	Summer			Autumn			Winter			Spring		
	Day	Ev	Nt	Day	Ev	Nt	Day	Ev	Nt	Day	Ev	Nt
N	8	8	3	11	4	2	17	7	8	10	9	5
NNE	11	17	5	14	5	2	16	5	6	13	12	4
NE	14	23	5	17	6	1	14	3	3	16	14	4
ENE	16	28	5	18	7	1	12	2	3	17	17	3
E	17	31	6	19	7	1	11	2	2	18	17	3
ESE	18	31	5	19	6	1	10	2	2	17	15	3
SE	17	27	6	19	7	2	9	2	1	16	13	3
SSE	16	24	10	20	9	3	11	3	2	14	15	6
S	17	23	19	25	16	15	17	9	11	14	17	15
SSW	16	21	23	29	22	21	24	13	17	15	20	20
SW	13	17	23	29	22	22	26	17	18	15	21	21
WSW	11	12	21	26	21	22	28	20	20	13	20	22
W	8	8	17	23	18	21	29	22	23	11	17	20
WNW	5	4	7	16	10	10	25	17	16	10	12	11
NW	4	2	2	11	4	4	20	13	11	8	8	6
NNW	5	3	2	11	3	3	18	10	10	8	6	6

4.1.3 Temperature Inversions

Available weather data do not include wind sigma theta (the standard deviation of wind direction), cloud cover observations or direct measurement of inversion strength. It is therefore difficult to determine the occurrence of temperature inversions in this area based on direct scientific data.

The wind analysis described above indicates light winds from the west or south west, which may represent drainage flows, occur up to 23% of the time during the night in all seasons. This implies temperature inversions occur for less than 30% of the time which is not considered significant according to the INP.

Analysis of the air temperature measurement data obtained during the night indicates a typical reduction of 2°C from 11:00pm to 5:00am, which is a minor change compared to areas of the Hunter Valley known to experience stronger and more frequent temperature inversions. This result shows air temperatures change very little during the night at the Mandalong weather station, which could indicate the nearby Lake Macquarie has a significant temperature stabilising effect on the area or that the west to south westerly air movements are offshore gradient winds rather than drainage flows. Either conclusion implies temperature inversions do not substantially occur in this area.

The INP recommends drainage flows associated with inversions be considered where the source is on higher ground than the receiver. Residents near Gimberts Road, east of the site, are on higher ground so should not expect noise enhancement due to inversions. Similarly, residents west of the mine access site are either towards the south west, which is upwind from the typical night wind direction, or are on the opposite side of Morans Creek from the mine access site. Drainage flows are therefore not expected to occur towards any residence near the mine access site.

A similar analysis of topography around the Mandalong Mine Services Site indicates the site is at a similar elevation or is slightly lower than nearest residences, while an unnamed creek runs around the site then to the south towards Lake Macquarie via Muddy Lake. Any cold air drainage flows from the site, and from the residential area, would be expected to run initially north east or east towards the creek

then generally south towards Lake Macquarie. Drainage flows from the site towards residences are considered unlikely to occur. In any case, any flows that occur in this area would be small as the creek has a very small catchment area of approximately 3 square kilometres upstream from the residential area.

As the ballast borehole is not proposed to operate at night, temperature inversions and drainage flows are not relevant to an assessment of noise from this site.

4.1.4 Weather Conditions Summary

Results from an analysis of weather conditions in this area imply the following prevailing weather parameters should be included in this assessment.

- Day No wind,
20°C average air temperature,
70% relative humidity, and
-2.0°C/100m lapse representing a warm sunny day.
- Evening 3m/s wind from the east,
15°C average air temperature,
70% relative humidity, and
No vertical temperature gradient.
- Night No wind,
10°C average air temperature,
80% relative humidity, and
No vertical temperature gradient.

As the adopted weather conditions for the night period represent acoustically neutral conditions, no separate analysis of neutral conditions is warranted.

4.2 Operational Noise Sources

Table 8 shows modelled sound power levels for each item of equipment currently operating or proposed to operate on the Mandalong Mine Access Site, Mandalong Services Site or Ballast Borehole Site. Sound power levels and spectra for existing equipment are based on noise level measurements taken on site in April 2008 and are consistent with sound power levels previously reported by others. Sound power spectra for proposed equipment have been assumed based on noise measurements around similar equipment on other sites, while total A-weighted sound power levels for proposed equipment are derived from Table 6 in Appendix 3 to the Mandalong Gas Flare SEE and from Table 4-10 in the Methane Drainage and Haulage SEE, which in turn are based on noise measurement data according to information provided with each Table. Both previous reports were prepared by Heggies Australia.

An Eimco is a front end loader capable of being used in an underground coal mine, while a PJB (or Driftrunner equivalent) is a diesel powered personnel carrier that resembles a large car. Each of these machines primarily operate within the underground mine but regularly emerge from the portal and drive within defined areas on the surface. Eimcos are typically brought to the surface to pick up heavy items of equipment for transporting underground, while PJBs are principally used to transport personnel to and from the underground mine at the beginning and end of each shift.

Eimcos are not currently operated during the night within the material storage area located generally north west of the portal, in order to minimise noise levels to closest residences. Any materials required within this area during the night are retrieved by the forklift and transferred to an Eimco within the better shielded materials handling area generally east of the portal.

Average Eimco and PJB noise levels have been reduced 3 dB below the maximum measured sound power levels, on the basis that these machines typically operate on the surface for up to 50% of the time at full engine speed in a busy 15 minute period. Idling machines are significantly quieter and do not produce significant noise compared to machines operating at high engine speed.

Dump trucks accessing the ballast borehole site are assumed to produce a sound power level of 108 dBA and to be travelling at a speed of 30km/hr along the access track from Mandalong Road to the borehole. With truck noise sources modelled at 25m intervals along the access track, a truck would be audible for 3 seconds at each modelled source covering 25m of track, which is 0.3% of a 15 minute period and requires a correction factor of -25 dB from maximum to modelled sound power levels. This calculation assumes an average of one truck movement per 15 minute period during the day, which is significantly more than the proposed 10 trucks per week required to provide sufficient ballast material for the mine.

Table 8: Modelled Equipment Sound Power Levels, dB re 1pW.

Code*	Source Description	Octave Band Centre Frequency, dB(Lin)								Lin Total	A Total
		63	125	250	500	1k	2k	4k	8k		
MF	Mandalong vent fan	105	95	90	87	81	84	80	70	106	91
MP	Methane discharge plant	102	98	93	95	86	84	85	74	105	95
FL	Gas flare and booster	94	97	83	78	75	72	68	63	98	82
GE	Gas engines #	81	100	91	97	96	96	94	81	104	102
Cp	Mandalong compressors	94	101	99	94	88	85	76	68	105	96
-	Eimco (maximum)	99	102	111	104	103	100	95	87	113	108
E	Eimco (LAeq,15min)	96	99	108	101	100	97	92	84	110	105
-	PJB (maximum)	99	109	106	104	104	100	94	85	113	108
E	PJB (LAeq,15min)	96	106	103	101	101	97	91	82	110	105
-	Forklift (maximum)	107	102	98	98	98	94	87	80	109	102
F	Forklift (LAeq,15min)	104	99	95	95	95	91	84	77	106	99
-	Dump truck (maximum)	113	107	104	105	105	99	92	86	116	108
T	Borehole truck Leq,15min	88	82	79	80	80	74	67	61	91	83
SDC	South drift conveyor	107	105	104	104	102	95	88	75	114	106
B	Breaker	101	101	102	102	102	99	92	78	110	106
C	Site conveyor (per 100m)	102	103	101	100	98	90	84	72	109	102
CHP	Coal handling plant	108	109	109	105	101	99	96	89	117	108
Er	Eraring conveyor (/100m)	98	100	97	96	93	85	79	69	105	97
Co	Services compressors	102	102	104	100	99	96	85	76	109	103
CF	Services vent fans	101	94	97	89	80	81	72	63	104	91
CPP	Coal preparation plant	106	111	108	105	102	100	97	89	115	108
H	Coal haul truck Leq,15min	105	99	96	97	97	91	84	78	108	100
L	Front end loader	101	104	107	108	104	101	95	83	113	109

* The source code is shown on the noise contour figures to indicate the actual location of each modelled source for each scenario.

Sound power levels for the gas engines have been set to ensure noise criteria are met at all residences and represent a recommended sound power level for this future source.

Coal trucks on the approved and realigned haul road from the Service Site to the Newstan-Eraring Haul Road are also assumed to produce a maximum sound power level of 108 dBA, as the trucks are essentially standard road trucks with larger dump bodies and a higher load capacity.

Noise contour figures in Appendix A show the noise source locations used to derive each set of contours.

4.3 Mining Noise Levels

4.3.1 Calculation Procedure

Environmental noise levels produced by the Mandalong Mine and nearby Ballast Borehole sites have been calculated using RTA Technology's Environmental Noise Model (ENM) software. ENM is a general purpose noise modelling package that combines terrain and noise source information with other input parameters such as weather conditions to predict noise levels at specific receiver locations or as contours over a specified receiver area. It is recognised in NSW as the most appropriate choice for situations involving complex topography and a large number of individual noise sources and where a detailed assessment of the effects of atmospheric conditions on noise propagation is required.

The standard ENM package includes data input modules to allow terrain and noise source information to be entered and amended, plus an initial setup page containing terrain and source lists and modelled weather conditions for each scenario. All terrain and source files were prepared for this assessment using a combination of AutoCad and Excel based data then automatically converted to ENM format terrain and source files using specially prepared software. All outputs were obtained using ENM's standard sectioning and contouring algorithms and are presented on a base plan after minor tidying such as closing gaps in the contour lines. All noise contour figures are presented in Appendix A.

4.3.2 Calculated Noise Levels

Summary results are shown in Table 9 to all assessed receivers, excluding those predicted to receive 25 dBA or less in all time periods. The Table shows predicted noise levels within adopted noise criteria at all residences.

Table 9: Summary of Received Noise Levels, LAeq,15min.

Receiver	Received Level, LAeq,15min by Time Period				Noise Criteria	
	Day	Evening	Night	Engines #	Intrusive D/E/N	Amenity D/E/N
22	30	32	32	-	47/47/39	50/45/40
23	36	39	39	-		
26	34	37	37	-		
28	27	29	29	-		
32	30	33	33	-		
57	29	27	31	27	60/56/48	54/48/47
66	35	32	36	34		
72	37	34	39	37		
85	37	34	38	36		
86	34	31	36	32		
89	34	31	36	31	54/54/42	50/45/40
82	29	35	30	<25		
97	34	39	35	30		
109	33	33	34	25		
110	34	32	36	25		
Noise Contour Figure, Appendix A	Fig A1	Fig A2	Fig A3	Fig A4		

Received noise levels from only two sources, the gas engines and flares, operating during the night.

4.3.3 Recommended Sound Power Levels

Predicted received noise levels in Table 9 assume the proposed gas engines to be installed on the Mandalong Mine Access Site meet the upper limiting sound power level listed in Table 8. Any proposed increase in the sound power level produced by the engines would give a corresponding increase in noise level at each receiver. The recommended sound power level for the engines has been set to produce a received noise level of 37 LAeq,15min at the potentially worst affected receiver (property 72) during the night, which is conservative and would result in the engines being only occasionally audible during breaks in F3 Freeway traffic. It is noted that the engines would be the dominant source on the mine site and would be approximately 2 dBA louder than all other sources combined at closest receivers assuming they produce the recommended sound power level.

Rather than a single gas engine, a number of smaller units are expected to be installed to allow more flexible operating conditions under a range of gas flows and to minimise the operational effects of equipment failures. At present two units with a capacity of 6MW each or six units with a capacity of 2MW each are considered the most likely options, for a total capacity of 12MW. The recommended sound power level for the gas engines as listed in Table 8 represents total noise from all gas engines operating together, or from all engines that are likely to operate together if additional standby units are installed.

The gas engines are expected to be large piston units based on diesel engine design principles and components. Noise levels from the engines are therefore expected to be similar to noise levels produced by equivalent diesel engines. While no specific information is currently available regarding noise levels produced by each engine, they are assumed to produce a total sound power level in the range 126 to 128 dBA in the absence of any acoustic enclosures or other noise control measures.

Based on these approximations, it is clear that some form of noise control would be required to allow the gas engines to operate on the site. Centennial currently proposes to install the engines within suitably designed enclosures or a building and this strategy can provide the necessary level of noise control assuming the enclosures, cooling and exhaust systems are appropriately designed and constructed. Diesel engines of a size anticipated to be used at the mine site are often incorporated into commercial and medical buildings as backup power generators so effective noise control devices are most likely already available for these units or can be readily designed and constructed.

4.4 Sleep Disturbance

Disturbance to sleep can occur when a short, sharp noise that is clearly audible over the background noise level occurs near a residence. While the background noise level to be considered is the level that exists at the time the noise is audible, this level is difficult to predict and the conservative background noise levels shown in Table 3 of this Report have been used to determine sleep disturbance criteria.

Mine Site sources having the potential to disturb sleep include Eimco bucket impacts, reverse alarms, vehicle horns and material handling impacts. These sources currently have the potential to occur on the mine site and the situation is not expected to change as a result of this Modification.

Noise compliance surveys for Mandalong Mine have been carried out at a number of residential locations in September 2002, December 2005, November 2006 and December 2007. All compliance surveys indicated the mine was barely, if at all, audible at all assessed residences for much of the time. The November 2006 survey indicated noise from a dropped pod produced an estimated 52 LA1,1min at the front gate of the Hunt property (property 97) compared to the sleep disturbance criterion of 52 dBA shown for area M2 in Table 6 above. This comparison indicates occasional impact sounds from the mine access site can reach the sleep disturbance criterion at closest residences and it is reasonable to assume occasional exceedances of the criterion may possibly occur.

Coal truck movements on the Services Site also have the potential to cause impact noise to nearest residences. Coal trucks on the Services Site can produce impact sounds as they travel over rough ground or while being loaded using a front end loader or similar machine. As the trucks would normally be loaded from a conveyor and storage bin system there is little potential for heavy impacts on the truck body. Noise from coal dropping into the truck body during loading operations may cause audible impact noise and is considered in more detail.

Impact noise from coal falling into a truck body is expected to produce a sound power level typically in the range 110 to 115 dBA but up to 120 dBA in the event of rocks being mixed with the coal. Received noise levels in the range 40 to 45 LA1,1min but potentially up to 50 LA1,1min could be produced by this source, compared to the sleep disturbance criterion of 49 LA1,1min at nearby residences. This comparison indicates worst case noise impacts may approach the sleep disturbance criterion while normal operation of the site is unlikely to cause maximum noise levels to approach the criterion.

It is difficult to justify significant additional noise control measures to treat possible exceedances of sleep disturbance criteria due to the following factors:

- Sleep disturbance criteria developed in this report are based on adopted and conservative background noise levels in each receiver area. Actual measured background noise levels, including insect noise, are significantly higher at all locations;
- Noise monitoring results presented in Table 3 show measured average noise levels in the range 57 to 59 LAeq,15min at residences near the mine during the night, compared to sleep disturbance criteria in the range 52 to 58 LA1,1min at those residences. Traffic on the F3 freeway therefore exceeds the adopted sleep disturbance criterion on a large number of occasions during most nights; and
- Similarly, monitoring shows an existing ambient noise level of 54 LAeq,15min at residences near the services site compared to the predicted maximum noise level of 50 LA1,1min due to occasional material impacts.

While impact sounds originating from either site would have a different character compared to traffic noise peaks, and would therefore be easily distinguishable from traffic or other source of environmental noise, such impact sounds are well within the normal range of noise levels that occur at each residence and are unlikely to disturb a resident's sleep. A resident that hears occasional impact sounds would already be awake, or may have been woken by an unusually loud vehicle that passed by a short time before.

Notwithstanding the low probability of disturbance to residents as a result of occasional impact events, Centennial would continue to manage site operations to minimise the occurrence of such events.

4.5 Road Traffic Noise

The Modification would result in additional staff being required at the Access Site compared to existing approved staffing levels, with no change to approved staff numbers at the Services Site. The Mine Site is expected to require up to 305 Full Time Employees (FTE) including contractors, compared to the currently approved limit of 220 FTE.

Section 4.4.2 of the 1997 EIS estimated 400 vehicle movements per day on Mandalong Road west of the F3 Freeway with a maximum of 100 one way movements associated with shift changes. The proposed 305 FTE would generate less than 600 vehicle movements per day to and from the Access Site and, with most staff spread over three working shifts plus a shift on leave, would not exceed the previously assumed limit of 100 one way vehicle movements associated with shift changes.

Section 4.4.5 of the 1997 EIS stated *"In view of the proximity of the Mine Access Site to the Morisset Interchange and F3 Freeway, the assessment of additional traffic noise associated with employee vehicle movements is not warranted."* As the vast majority of additional staff vehicle movements

would approach the Access Site from the F3 Freeway, closest residences are located over 200m from this section of road and peak traffic flows associated with the Access Site would not increase over approved levels, a detailed assessment of traffic noise from additional vehicle movements to the Access Site is not warranted.

The proposed ballast borehole is the only component of this Modification that is likely to noticeably increase traffic noise levels from public roads, apart from some short term increases in traffic flows during the initial construction phase of this component of this Modification.

The mine is expected to require approximately ten truck trips (20 movements) to the ballast borehole in an average week, although it is likely that truck movements would occur on some days and not on others. A worst case situation with 2 trucks per hour can be assumed for the purposes of calculating an upper limit for Mandalong Road traffic noise associated with this Modification.

Trucks accessing the proposed Borehole site are expected to travel from the Access Site via Mandalong Road and would therefore travel past residences 97 and 82 which are located approximately 70m and 120m from Mandalong Road. According to calculations based on a trapezoidal time trace, an assumed truck speed of 70km/hr and a sound power level of 108 dBA, worst case truck movements are expected to result in received noise levels of 43 and 41 LAeq,1hr at each residence, compared to a criterion of 55 LAeq,1hr for local roads recommended by the DECC's Environmental Criteria for Road Traffic Noise. It is therefore clear that proposed truck movements to and from the ballast borehole site are unlikely to reach or exceed relevant traffic noise criteria at any residence.

4.6 Existing Mandalong Mine Services Site Noise

This Modification does not include any modifications or additions to the Mandalong Mine Services Site and would not require any additional staff or significant additional materials to be transported to or from the site by road, compared to the currently approved situation. This Modification does not propose an increase in the currently approved production limit.

Notwithstanding the lack of change associated with this Modification on this site, it is appropriate to determine whether approved noise levels from the site would meet updated noise criteria developed to current DECC policies. A noise compliance survey at monitoring location M4 adjacent to Gradwells Road was therefore carried out in conjunction with the background noise survey completed for this assessment while future noise levels with the coal preparation plant operating and truck movements on the private haul road have been modelled for comparison with the adopted INP noise criteria. Predicted noise levels at residences near the Services site are included in Table 9.

4.6.1 Long Term Logger Results

As dominant noise sources on this site consist of conveyors, screens and crushers, noise levels generally remain unchanged from one minute to the next. A front end loader operates on the site at times to reclaim coal from the emergency stockpile and would be used in the future to load trucks, but this machine does not make a significant difference to total noise levels from the site. Noise logger data have been analysed by identifying and removing data obtained during periods of rain or wind over 5m/s, then by correlating background (LA90,15min) noise levels with plant operating records supplied by Centennial. A chart showing measured LA90,15min levels over the survey period by time of day and by plant operating conditions is shown in Figure 3.

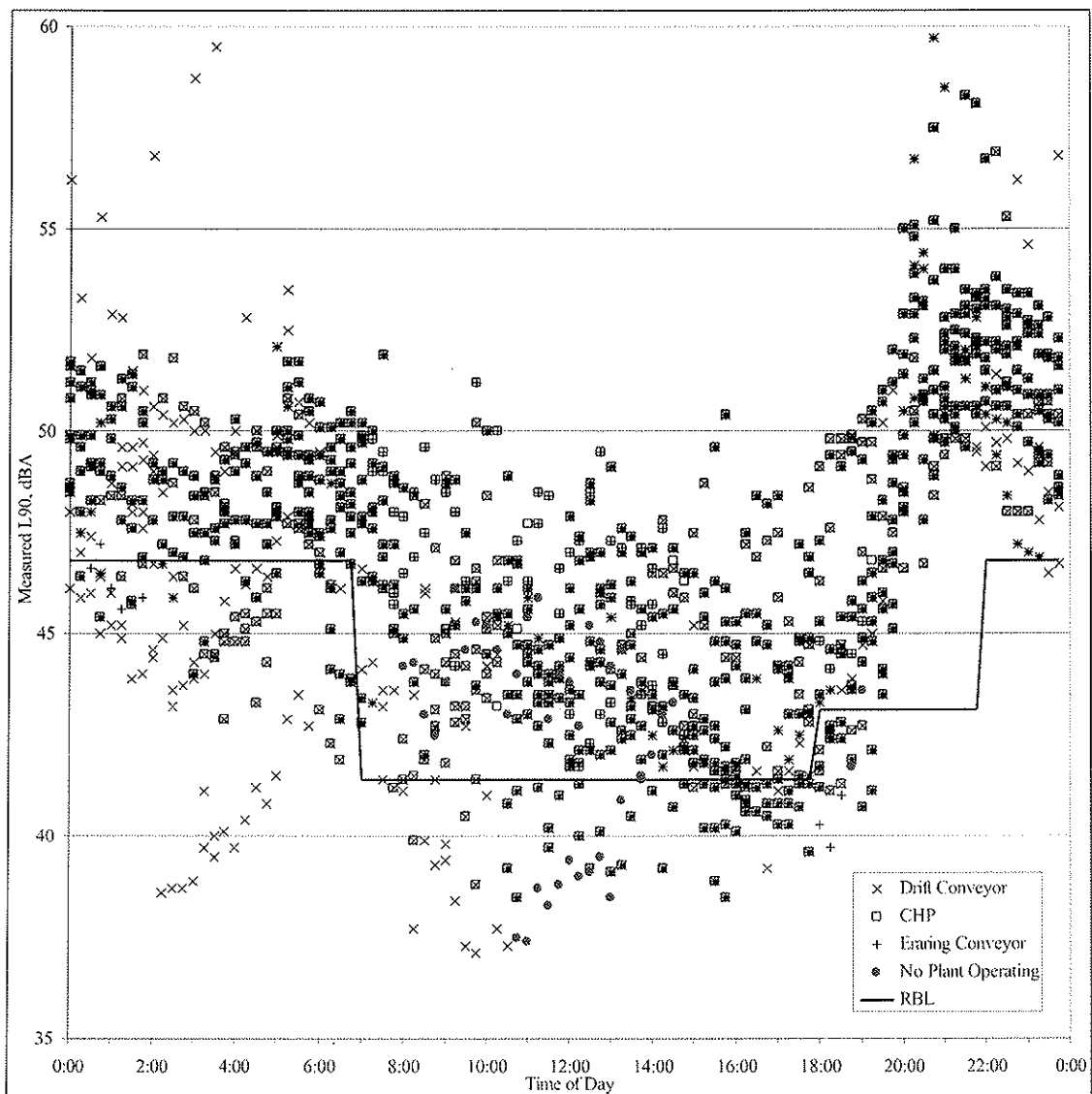
Operating plant are divided into the following three items or groups:

- The drift conveyor which carries ROM coal from the underground mine to the above-ground ROM bin;

- The CHP which consists of a number of individual items of equipment that convey coal from the ROM bin, screen and crush the coal then convey it to the product bin; and
- The overland conveyor to Eraring Power Station.

These plant items or groups can operate independently subject to the level of coal in each storage bin. It is common practise for all equipment to operate together when coal is produced by the mine to ensure the two storage bins do not completely fill, as a full bin would halt mine production or require coal to be temporarily stockpiled and double handled with the loader. Most data points in Figure 3 include more than one symbol, indicating more than one plant group operating simultaneously, with a small number of data points representing no plant operating at that time. The figure includes the Rating Background Level (RBL), which is the arithmetic mean of daily Assessment Background Levels (ABLs) as defined in the INP, for each time period.

Figure 3: Noise Levels, Location 3 Gradwells Road, with Plant Operating Conditions



Data points representing the lowest noise levels are more likely to include some plant noise, while higher noise levels are due to extraneous sources such as wind, traffic and insects. Inspection of Figure 3 indicates little difference in lowest noise level with and without the plant operating, although it is acknowledged that relatively few data points represent inactive periods.

Detailed inspection of daily noise charts combined with plant operating conditions indicates no correlation exists between noise levels and plant conditions, which confirms the Mandalong Mine Services Site does not produce measurable noise levels at closest residences.

4.6.2 Short Term Attended Results

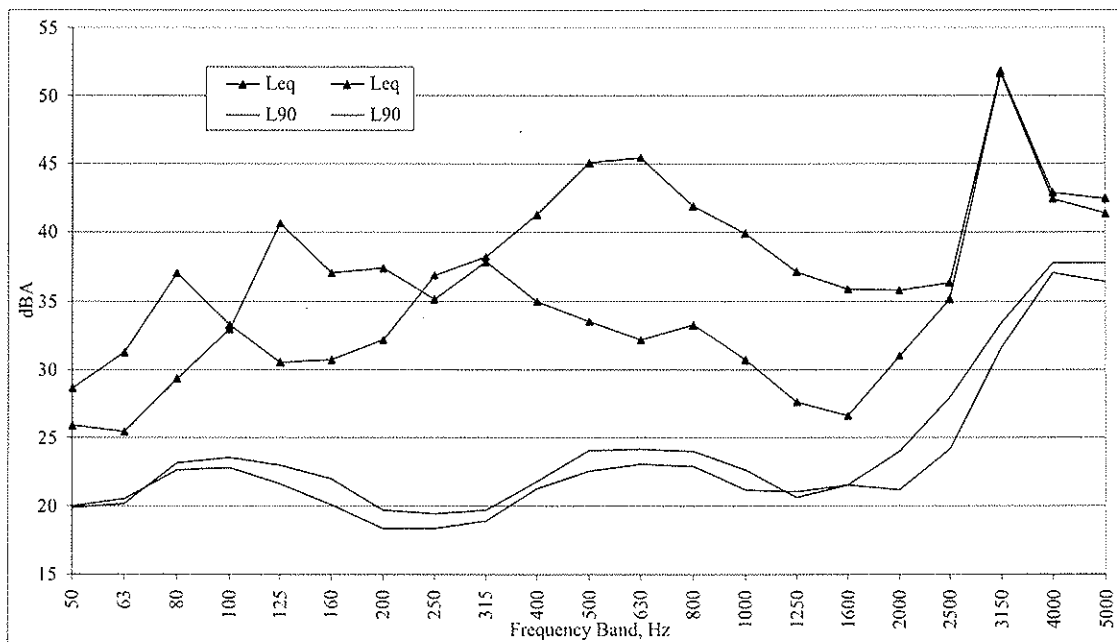
Attended noise measurements were taken adjacent to the noise logger during the day, evening and night periods, as follows:

- Daytime measurements were taken at approximately 8am on 17th December and at midday on 24th December 2007, as the logger was retrieved. Audible sources included traffic on local roads, the F3 Freeway and Wangi Road, insects, birds and wind noise in nearby trees. The site was not audible during the day;
- Evening measurements were taken at approximately 6:30pm on 10th December, immediately after the noise logger was installed. Audible sources included traffic on local roads, the F3 Freeway and Wangi Road, insects and birds. The site was not audible during the evening; and
- Night measurements were taken from 1:30am to 2:00am on 11th December and again from 6:15am to 6:30am on 17th December 2007. Dominant sources included traffic on the F3 Freeway and Wangi Road, and insects. Eraring Power Station was audible as a low background hum, as was the CHP on the site for part of the 11th December survey period. The drift conveyor and overland conveyor were not audible over the CHP, and the CHP was only barely audible during breaks in F3 traffic noise.

Figure 4 shows LAeq and LA90 measurement results for two separate 15 minute periods, from 1:30am to 2:00am on 17th December 2007 at the Gradwells Road noise monitoring location, for 1/3 octave frequency bands from 50Hz to 5kHz. Noise levels within the frequency range 50Hz to approximately 2000Hz are potentially produced by the Mandalong Services site and by traffic, although most noise energy from these sources is expected to occur below 200Hz. Noise levels measured in the frequency bands above 2000Hz are entirely due to insects and occasional birds.

Figure 4 shows most sound energy is produced in frequencies above 2000Hz, which excludes site noise. The measured background noise levels of 44.4 and 45.0 LA90,15min, including all sources of noise, reduce to 33.8 and 34.4 LA90,15min respectively if high frequency insect noise is excluded and only the frequency range 50Hz to 2000Hz is included. Given that the site was barely audible over road traffic, and that road traffic, the site and Eraring Power Station all produce noise in the same frequency range, it is clear that traffic produced close to 33 LA90,15min and the combined site and power station produced a lower noise level estimated at 25 LA90,15min but certainly well below 30 LA90,15min. As site noise does not appreciably change from one minute to the next, both background (LA90) and average maximum (LA10) noise levels produced by the site would be similar.

Figure 4: Attended Noise Measurement Results, Location M4 Gradwells Road, Night



Based on the analysis and reasoning described above, the attended noise surveys indicated a site noise contribution of less than 27 LA10,15min during the night at the time the noise measurements were taken. Day and evening noise levels from the site could not be estimated as site noise was inaudible, although they are expected to be below the 27 LA10,15min level estimated for the night. Predicted future noise levels are higher than existing measured noise levels due to the addition of the preparation plant and associated conveyors and stockpiles and with truck movements on the private haul road.

4.7 Ground Vibration

Underground mining is carried out using continuous miners for development work, including excavation of access and ventilation tunnels, and using longwall mining equipment to extract coal from each panel. Both the continuous miners and longwalls use rotating cutting heads to cut, break and remove coal from the face and both machines have the potential to generate ground vibration.

This Modification does not include any changes to mining methods or equipment, with the proposed increase in annual production being achieved via increased efficiency and equipment utilisation rather than additional or larger equipment. The Modification therefore does not have the potential to increase ground vibration levels above those that would have occurred if the Modification does not proceed.

It is also noted that the Mine Subsidence Board currently monitor ground vibration levels at receiver locations in the vicinity of active working areas, with results to date indicating acceptable vibration levels at all receivers. As the Modification is not proposed to affect currently approved ground vibration levels, no further assessment of this issue is warranted.

5 CONCLUSION

This assessment shows the proposed alterations and additions to the existing Mandalong Mine are expected to produce acceptable environmental noise levels to all residential receivers.

Predicted noise levels from the proposed ballast borehole are expected to remain within relevant noise criteria provided the hopper at the top of the borehole is constructed with an effective noise damping material such as concrete. Truck movements associated with operation of the borehole during the day are not expected to cause excessive noise to any residence.

Existing noise levels from the Mandalong Mine Services Site currently meet relevant noise criteria and are expected to remain within the criteria when the approved coal preparation plant, conveyors, stockpiles and other equipment are constructed and operated.

Based on the results of this assessment, environmental noise and vibration levels associated with this Modification are considered acceptable provided the gas engines are designed and constructed to meet the recommended sound power level listed in Table 8 for these units.

APPENDIX A – NOISE CONTOUR FIGURES

FIGURE	DESCRIPTION
1S	Noise Contours – Day – Services Site
1M	Noise Contours – Day – Mine Access Site
2M	Noise Contours – Evening – Mine Access Site
3S	Noise Contours – Night – Services Site
3M	Noise Contours – Night – Mine Access Site
4M	Noise Contours – Night – Mine Access Site – Flare and Gas Engines Only.

Noise source location codes are included in each contour figure. A description of noise sources represented by each code, and the source's sound power level, are shown in Table 8.

Figure 1S: Noise Contours, Day, Services Site, dBA

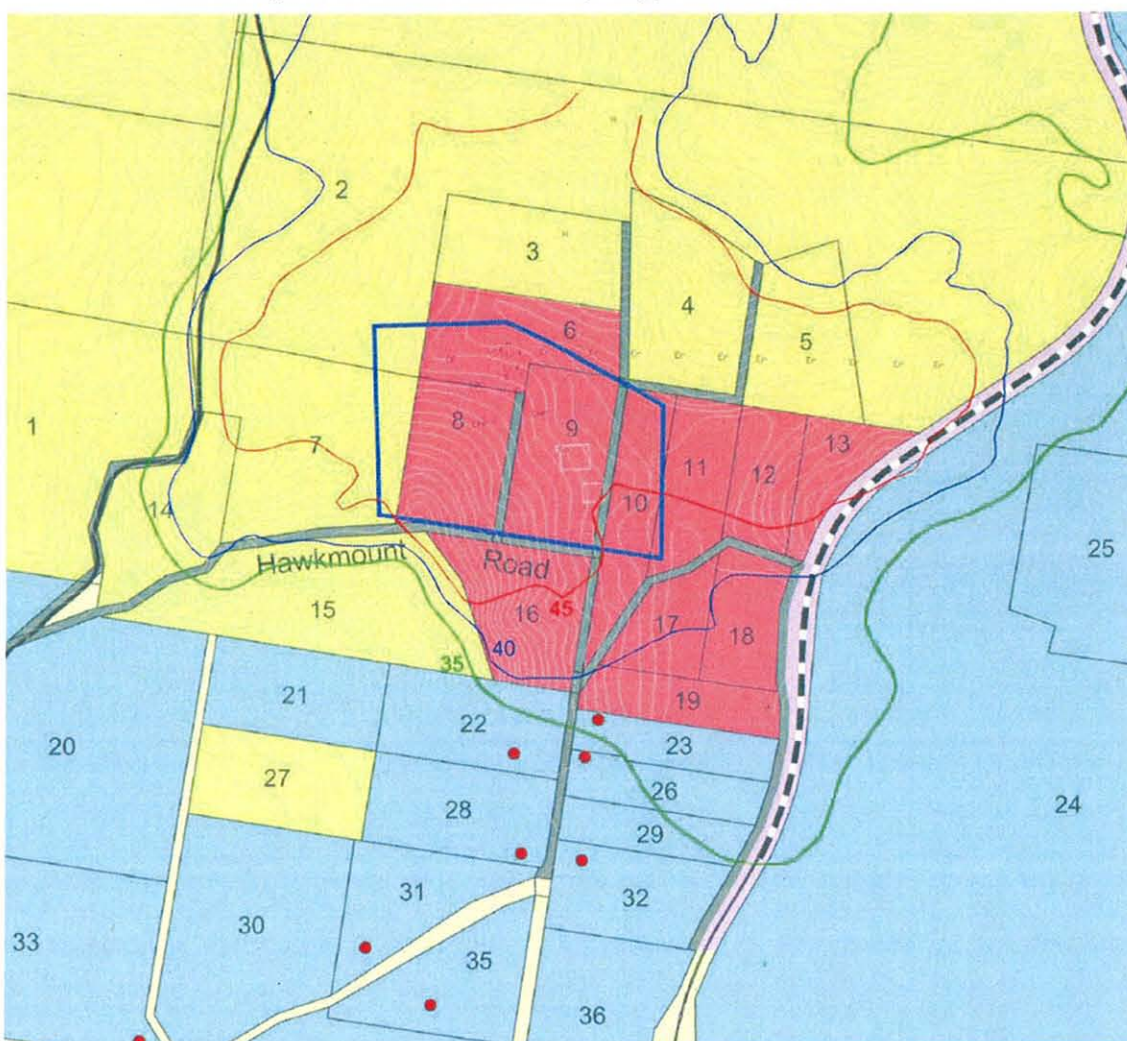


Figure 1M: Noise Contours, Day, Mine Access Site, dBA

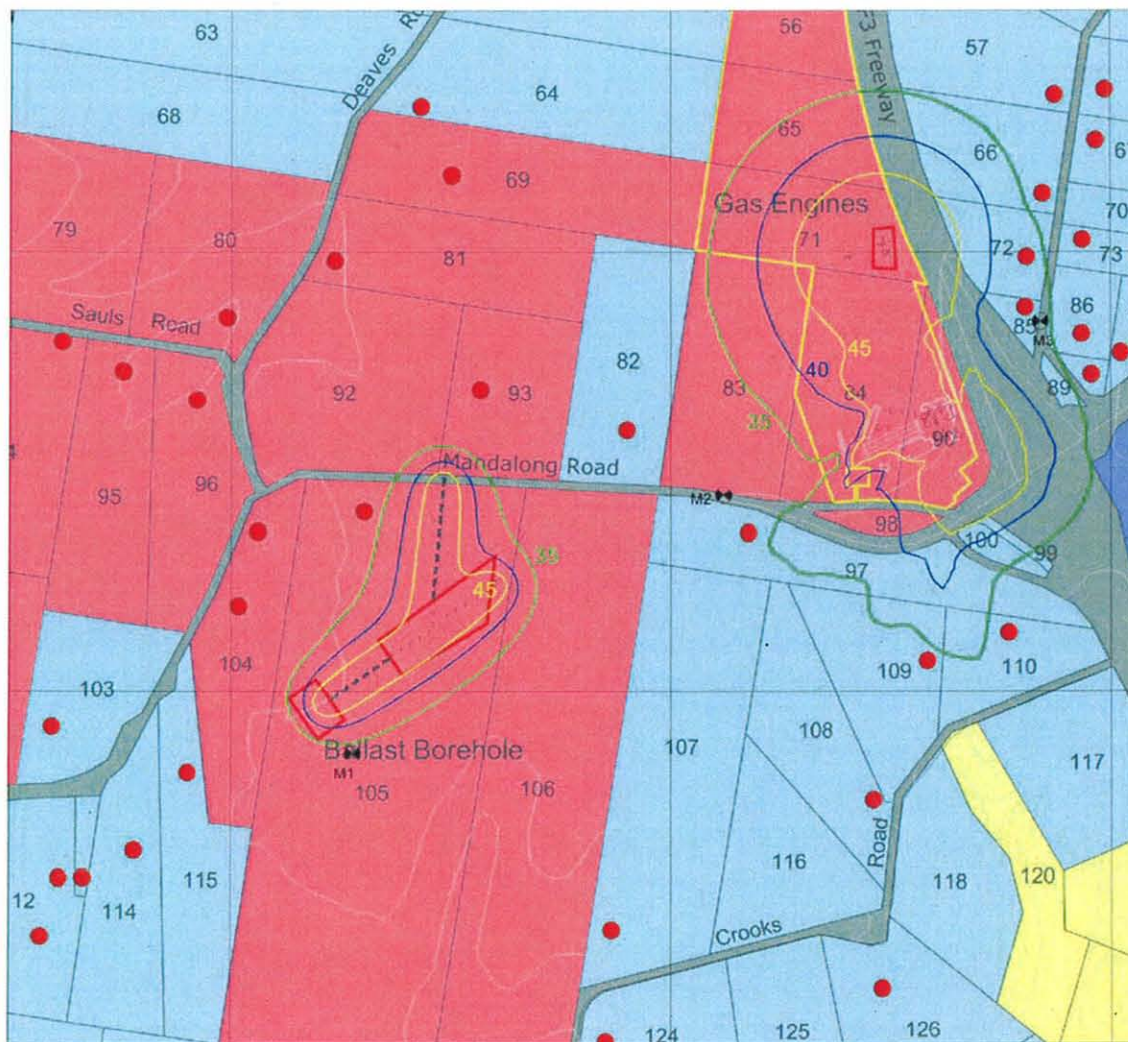


Figure 2M: Noise Contours, Evening, Mine Access Site, dBA

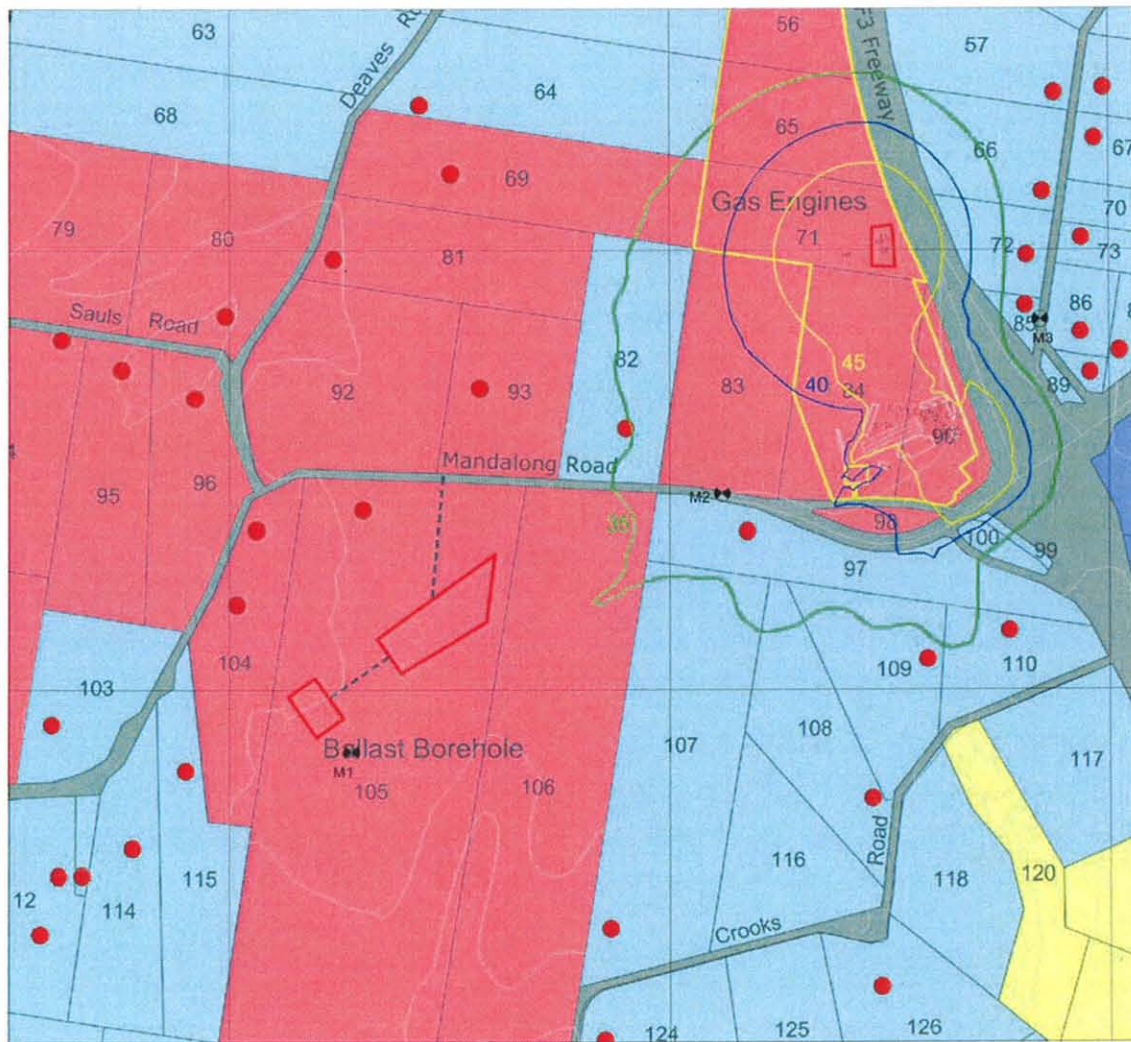


Figure 3S: Noise Contours, Evening and Night, Services Site, dBA

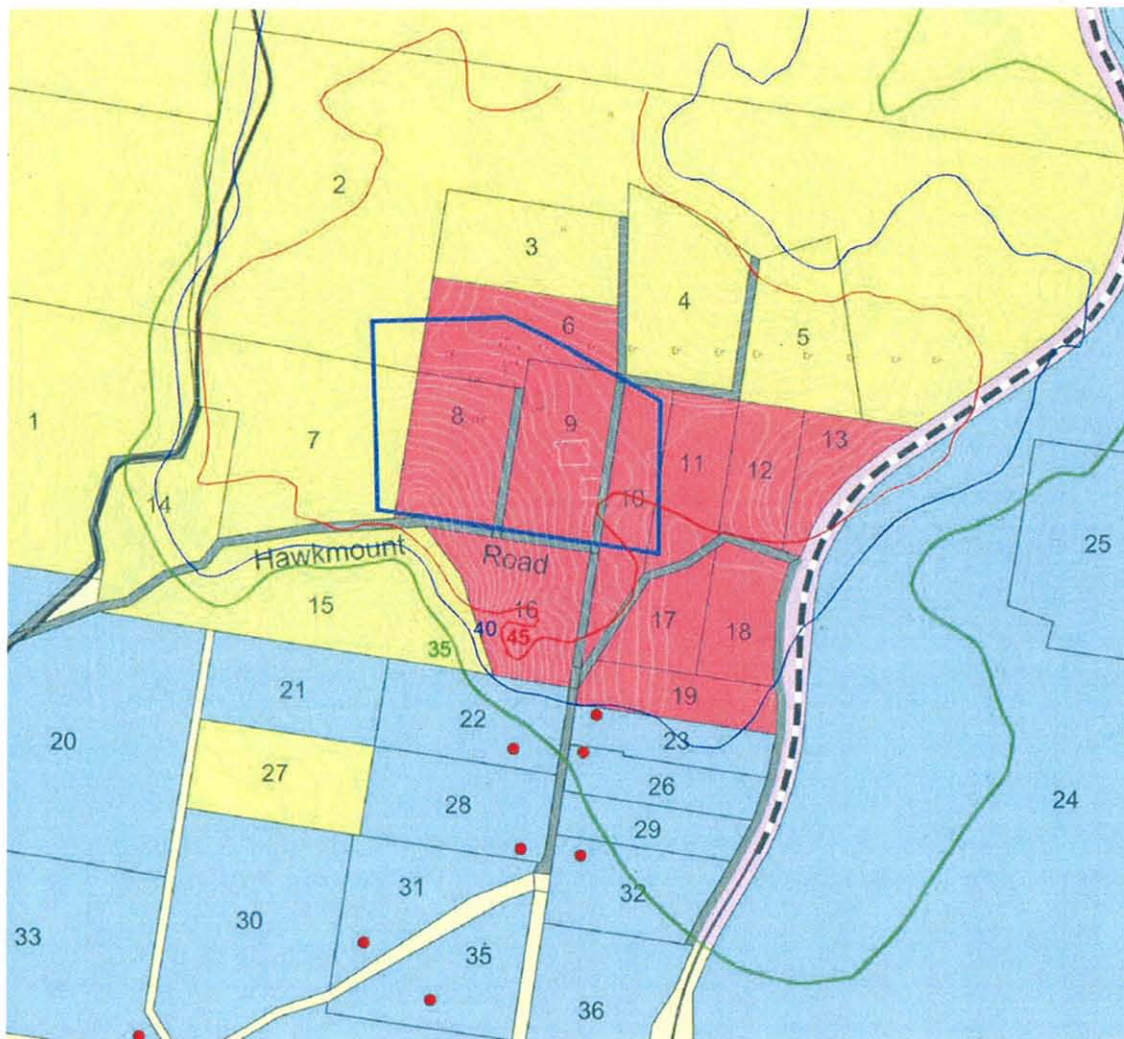


Figure 3M: Noise Contours, Night, Mine Access Site, dBA

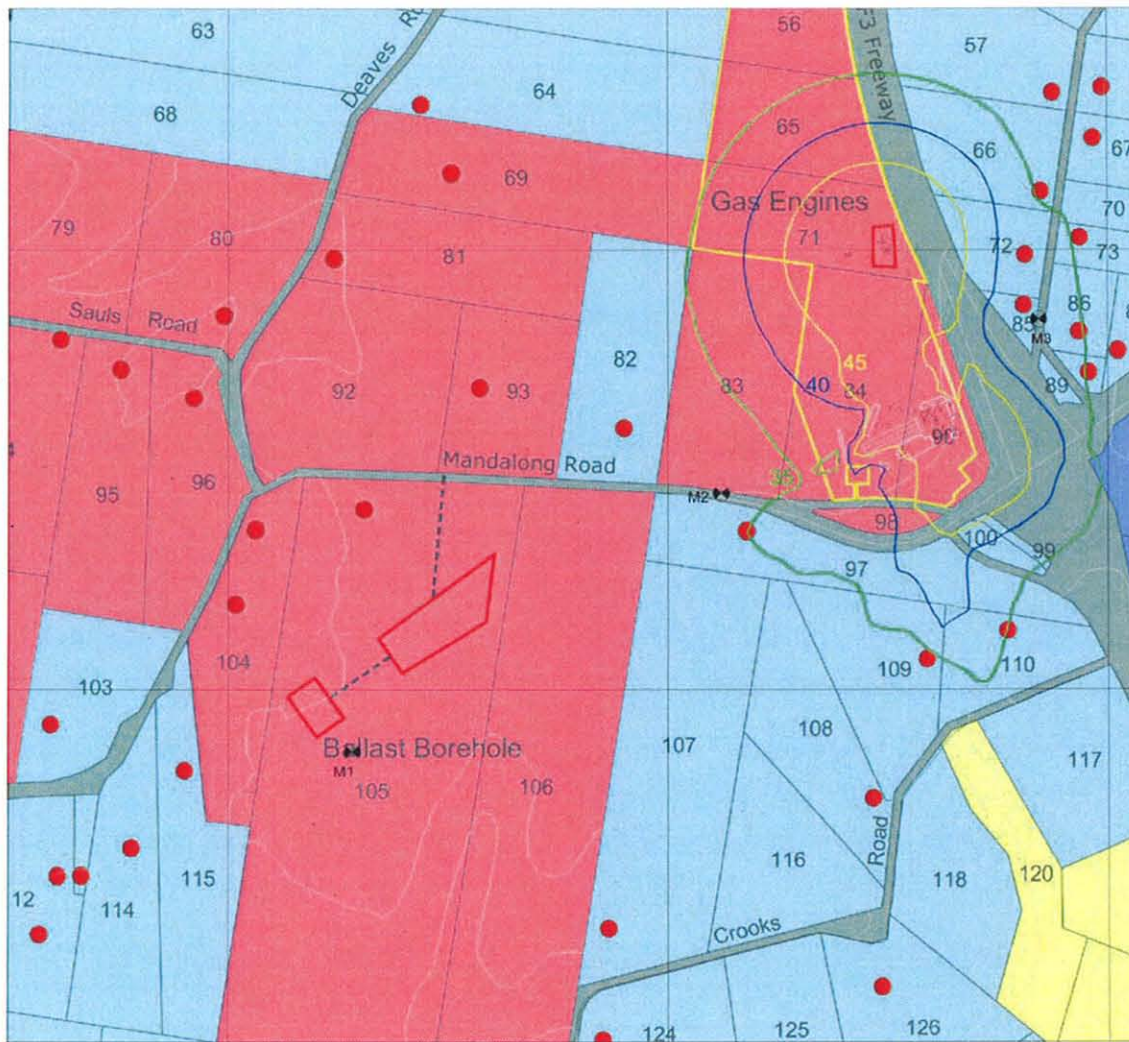
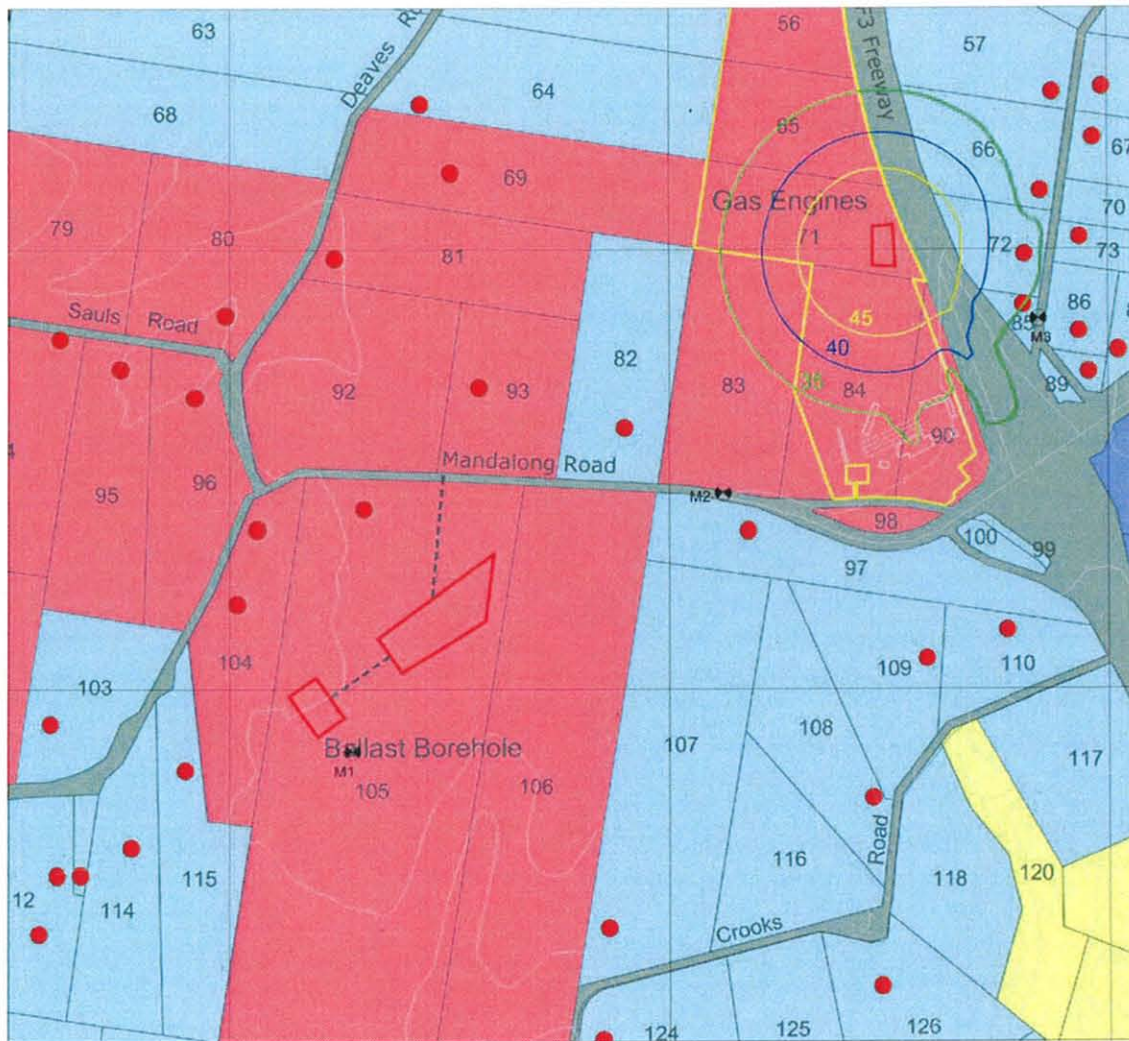


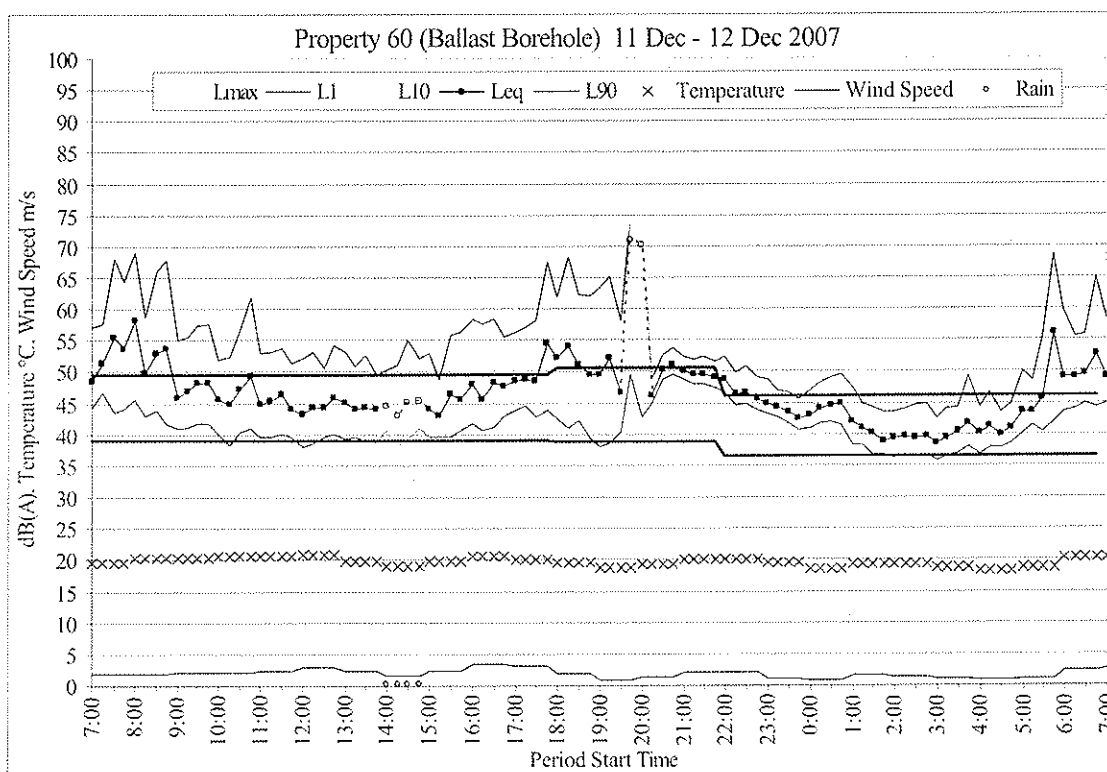
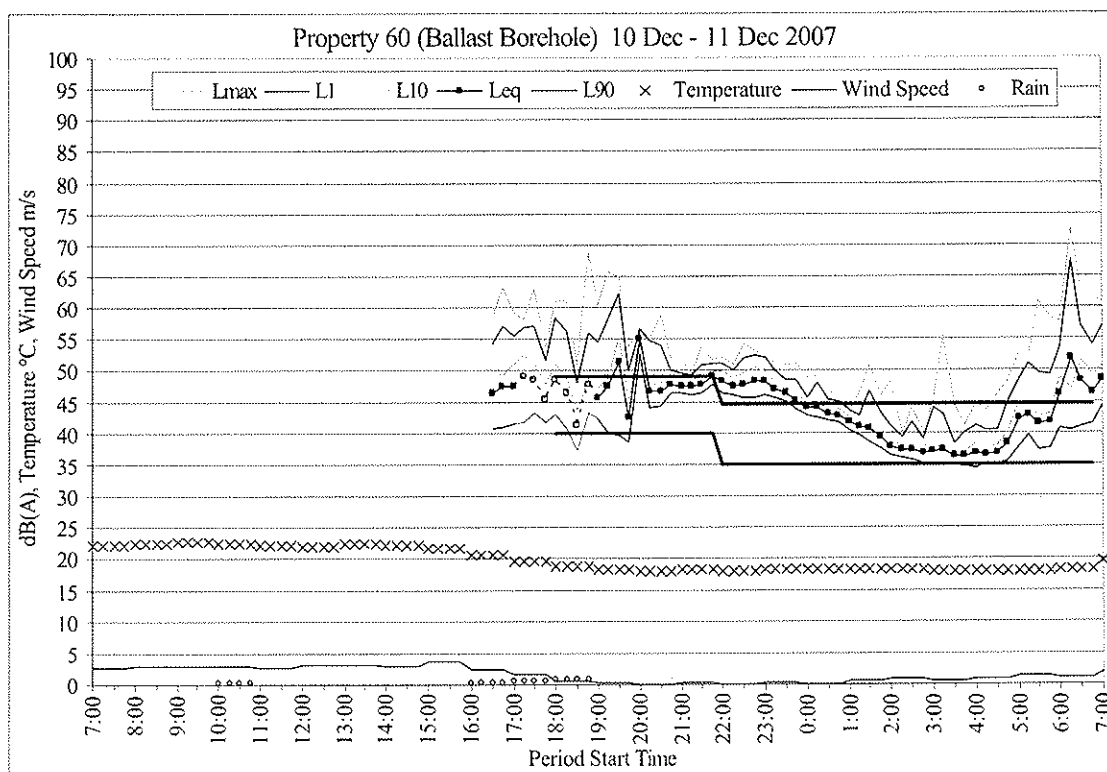
Figure 4M: Noise Contours, Night, Mine Access Site, Flares and Gas Engines Only

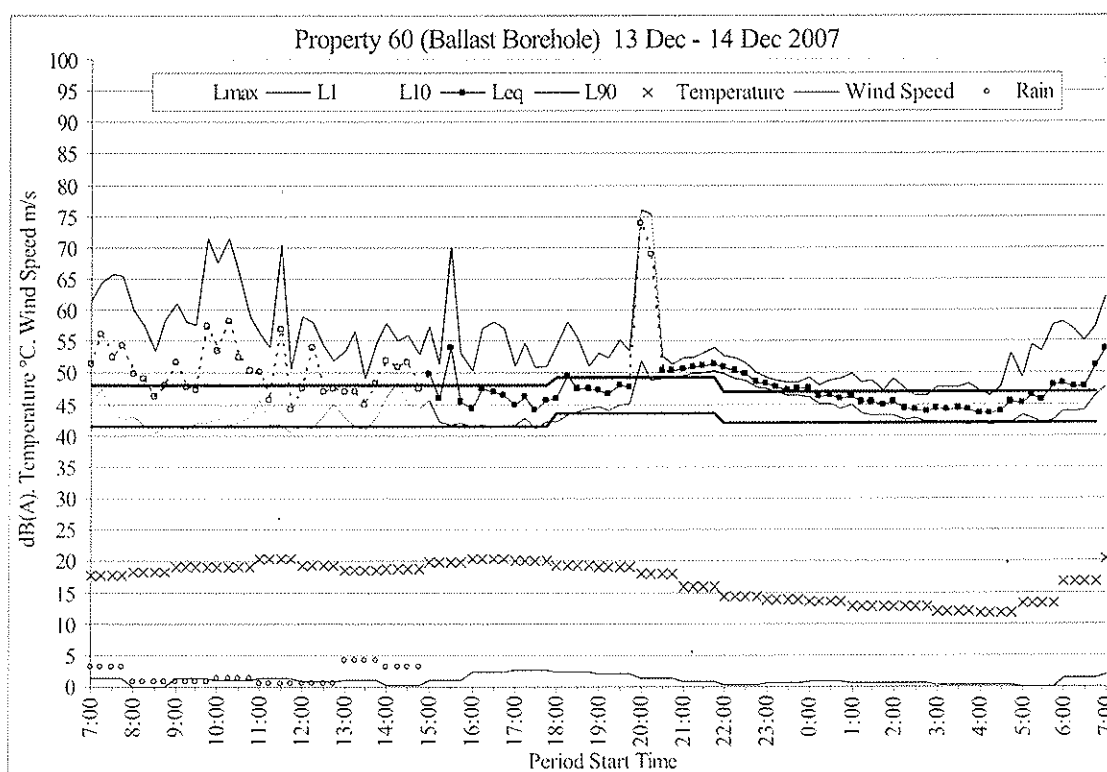
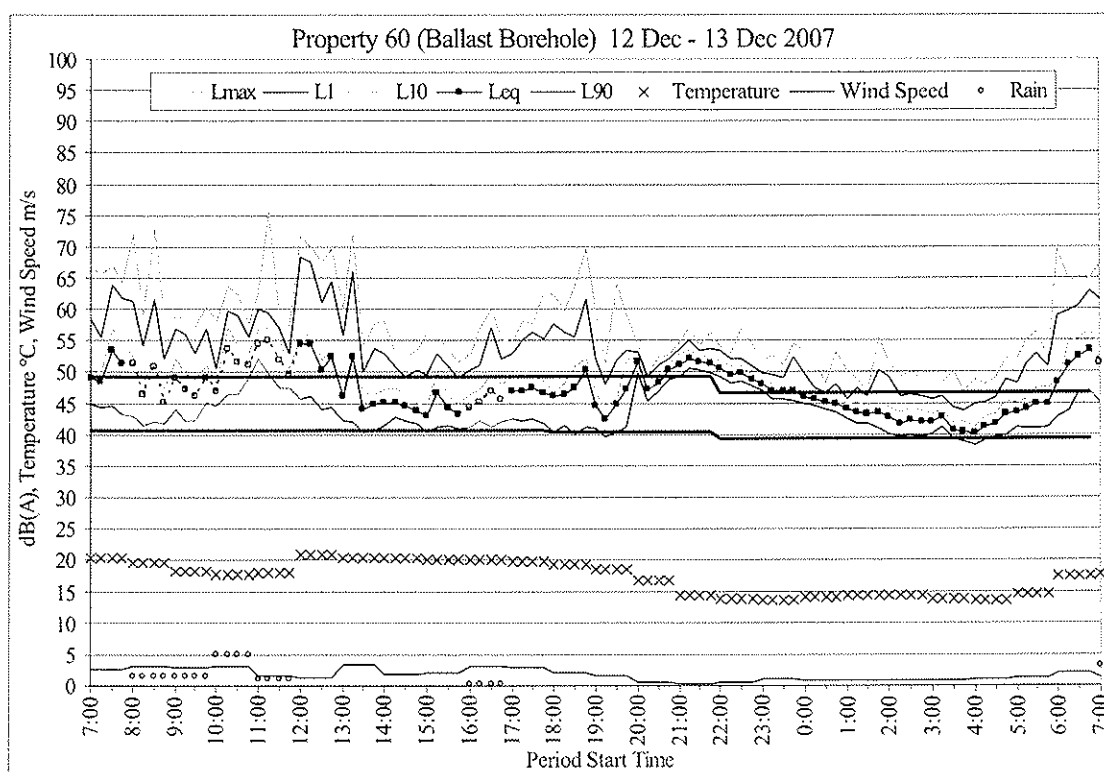


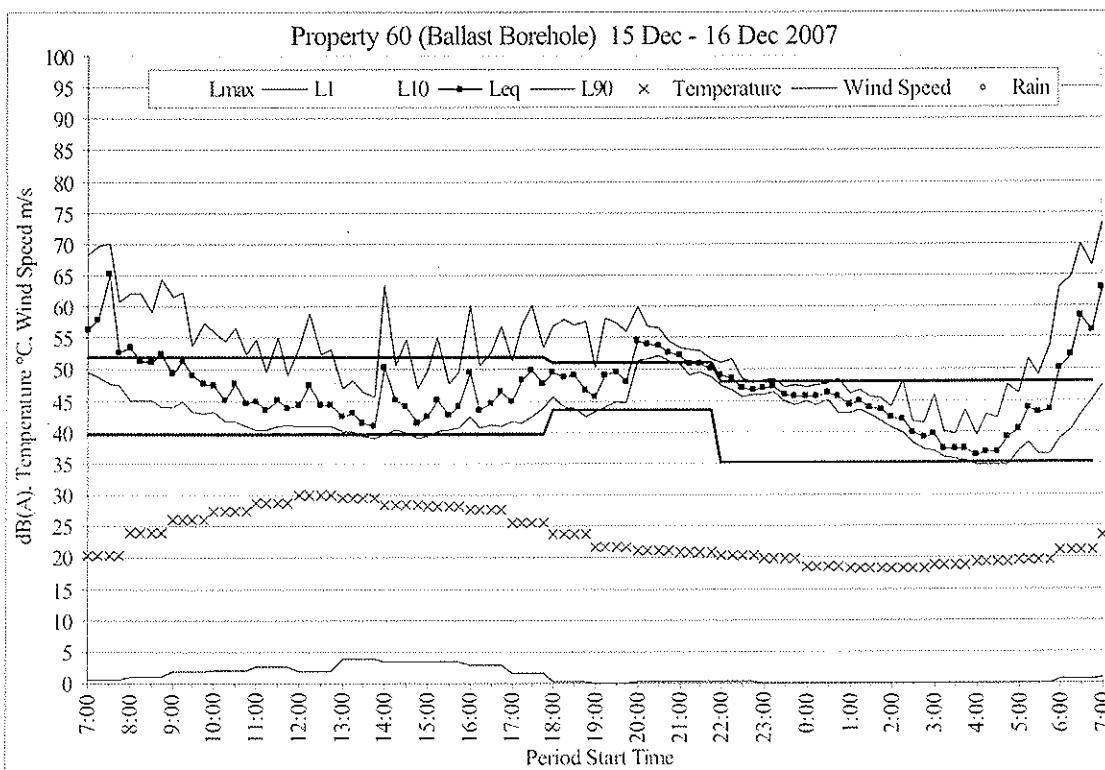
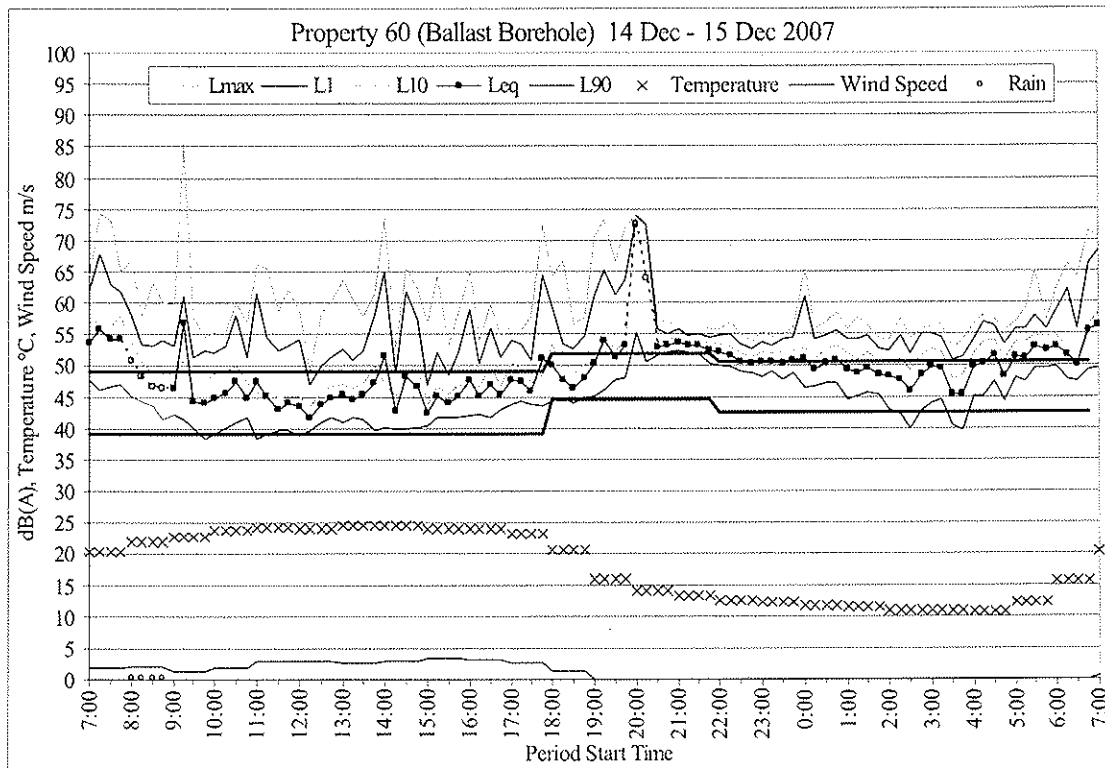
APPENDIX B – LONG TERM NOISE MONITORING RESULTS

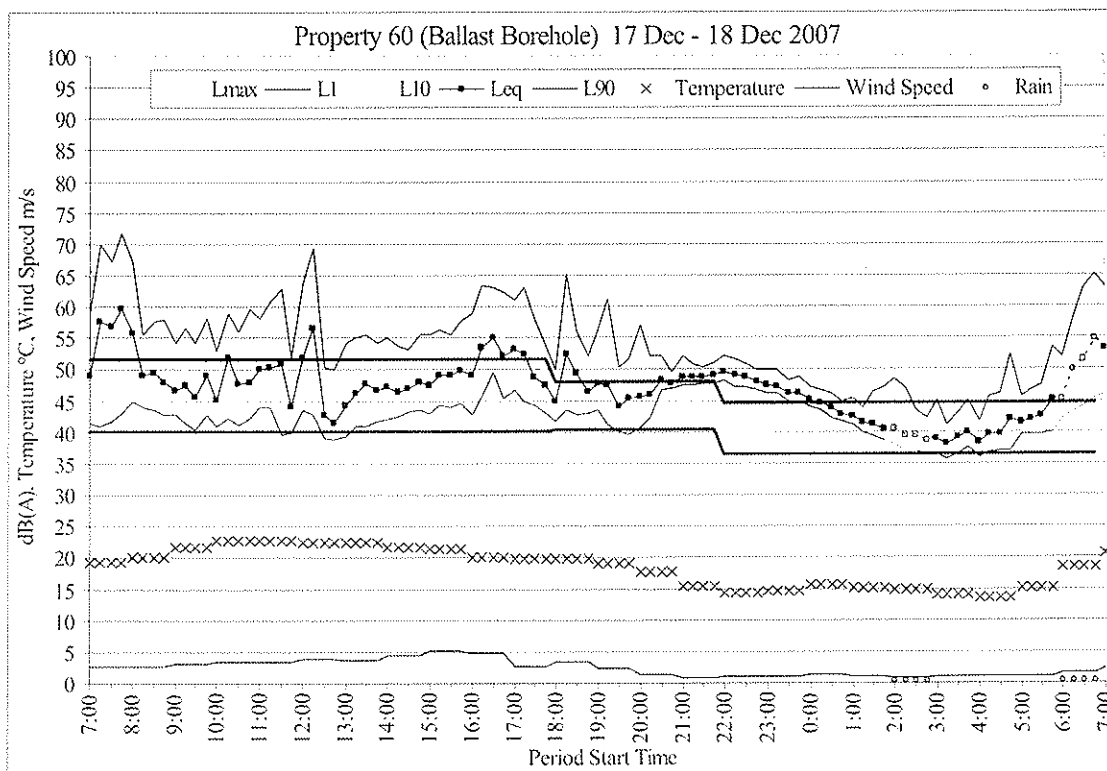
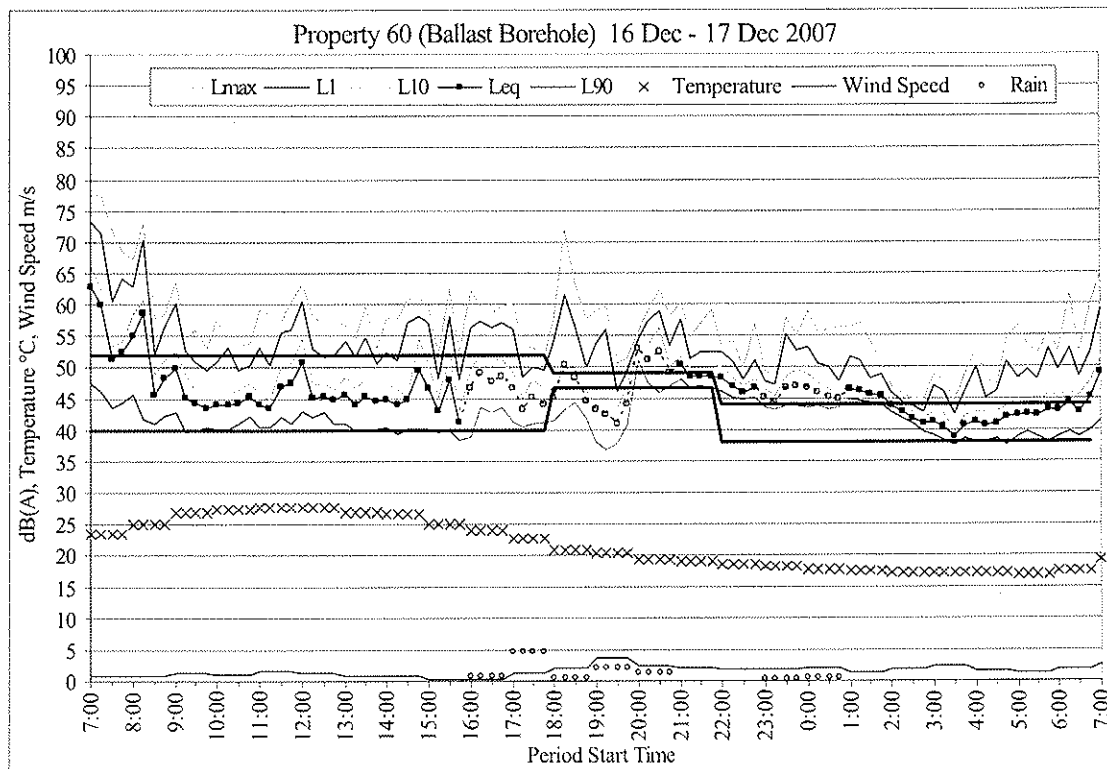
Environmental noise level charts on the following pages show 15 minute percentile statistics from noise loggers installed at four locations in December 2007, with each chart showing a 24 hour period beginning at 7:00am. The charts also show wind speed and air temperature reported by Centennial's Mandalong weather station, with original data in hourly intervals expanded to 15 minute intervals to match the noise data. Each chart includes:

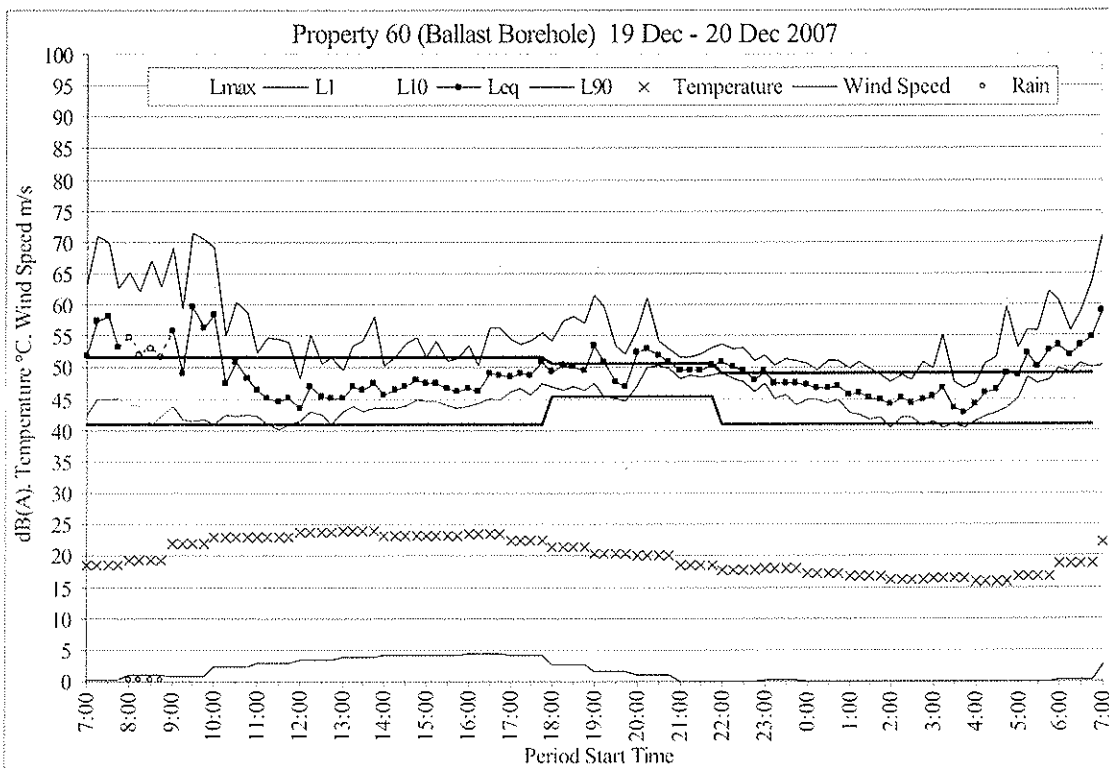
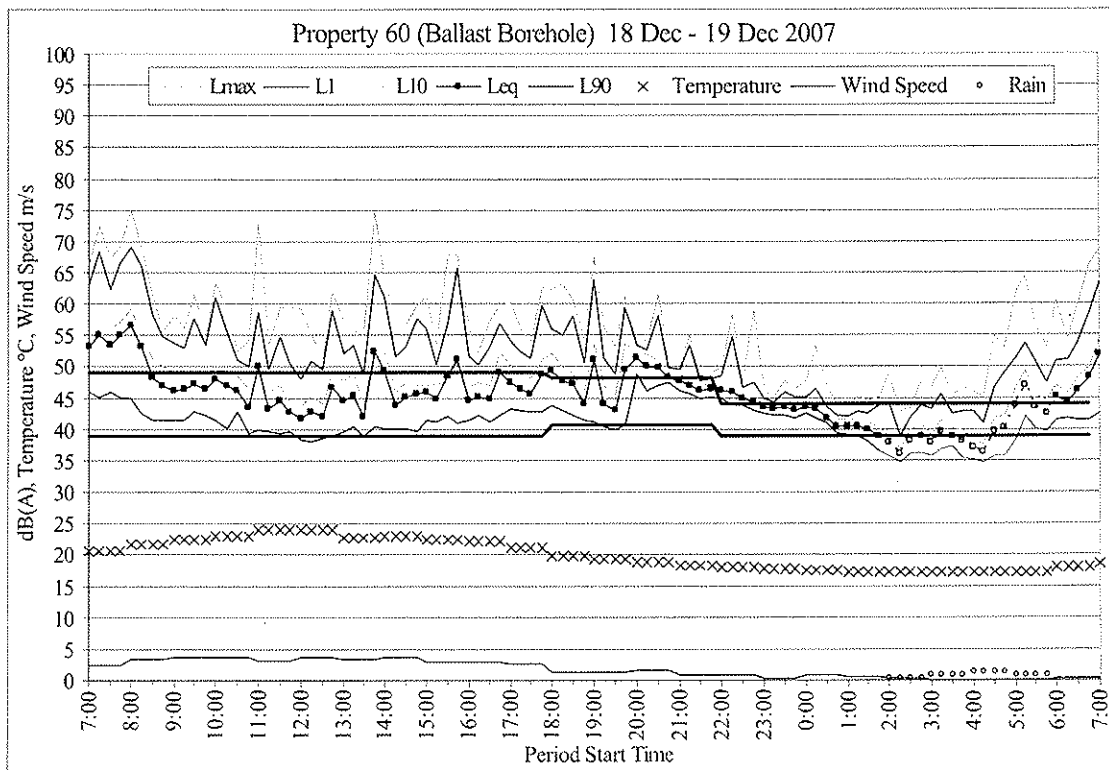
- Lmax - The highest line on the chart, shown with a light line. The Lmax is the maximum dBA noise level measured in each 15 minute period.
- L1 - The second highest line on the chart, shown with a medium line and representing the loudest 1 percent of the time (9 seconds) in each 15 minute period.
- L10 - The third highest line on each chart without data markers, shown as a light line and representing the loudest 10% of the time (90 seconds) during each 15 minute period.
- Leq - the equivalent continuous (acoustic average) noise level in each 15 minute period, shown as a medium line with small data point markers. The Leq can be above or below the L10 line and can, in extreme cases, extend above the L1 line.
- Period Leq - the equivalent continuous (acoustic average) noise level in each day, evening or night period, calculated from the average of all 15 minute Leq values in that time period excluding those affected by wind over 5m/s or rain. The Period Leq line is the upper of the two heaviest lines.
- L90 - the lowest line on the chart, shown by a solid line, representing the quietest 10 percent of the time in each 15 minute period and accepted as the background noise level. Sections of line shown dotted indicate periods affected by wind over 5m/s or rain.
- Period L90 - The 'L90 of the 15 minute L90s' for each day, evening and night period, representing the Assessment Background Levels (ABLs) for each period according to the EPA's INP. The Period L90 represents the lowest 10% of all 15 minute L90 values in that time period, excluding those affected by wind or rain, and is shown as the lower of the two heaviest lines.
- Temperature - Air temperature 10m above the ground as measured at Norah Head. The same results are shown for all monitoring locations.
- Wind Speed - Wind speed in m/s measured by Mandalong's weather station. The same results are shown for all monitoring locations.
- Rain - Occurrence of rain during a 15 minute period as reported by the weather station. Occasional rain periods are indicated by small circles along the bottom of the charts.

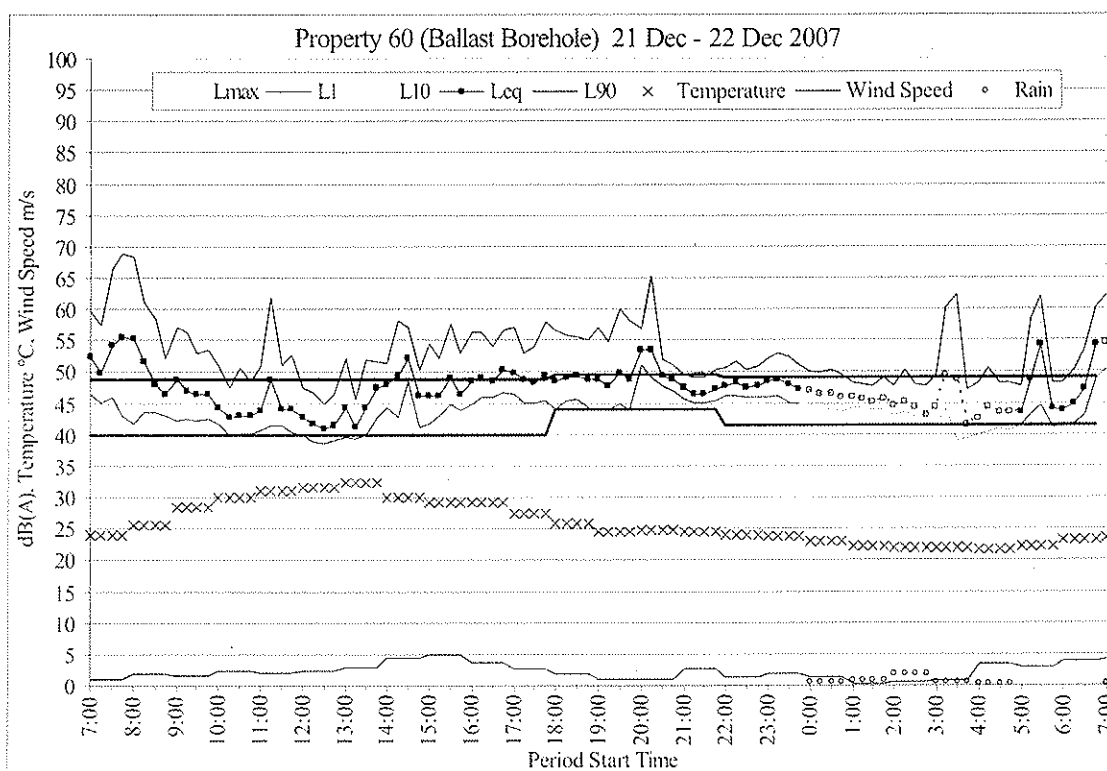
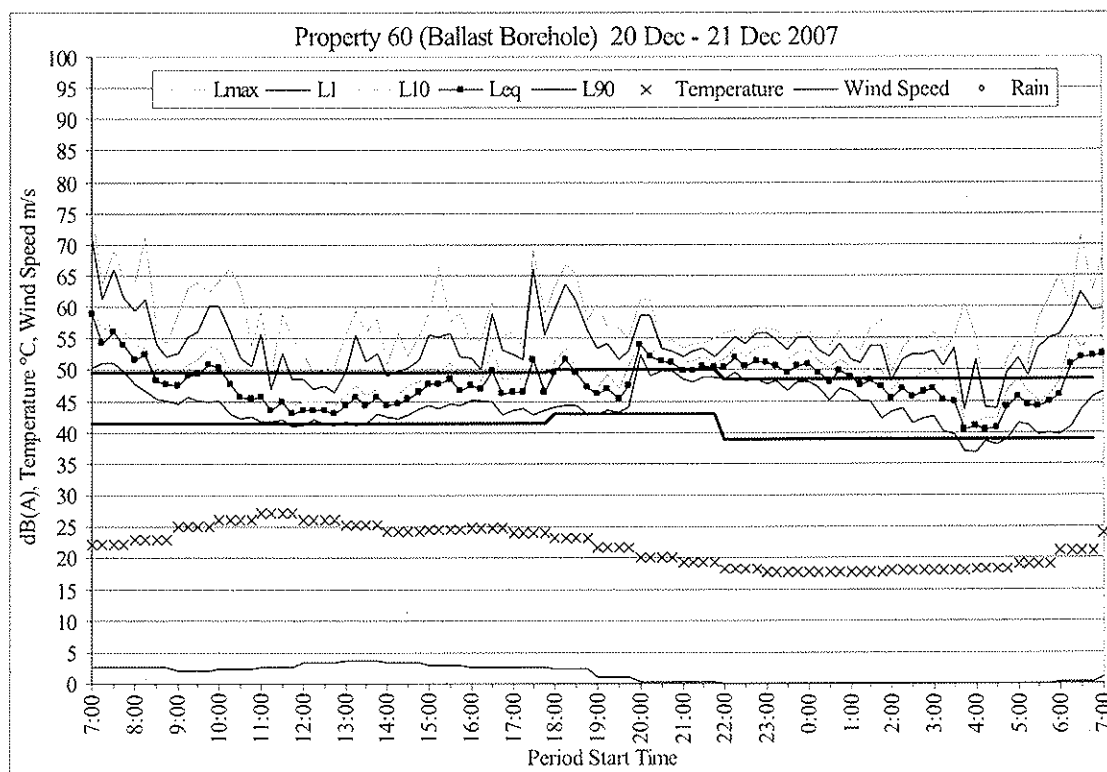


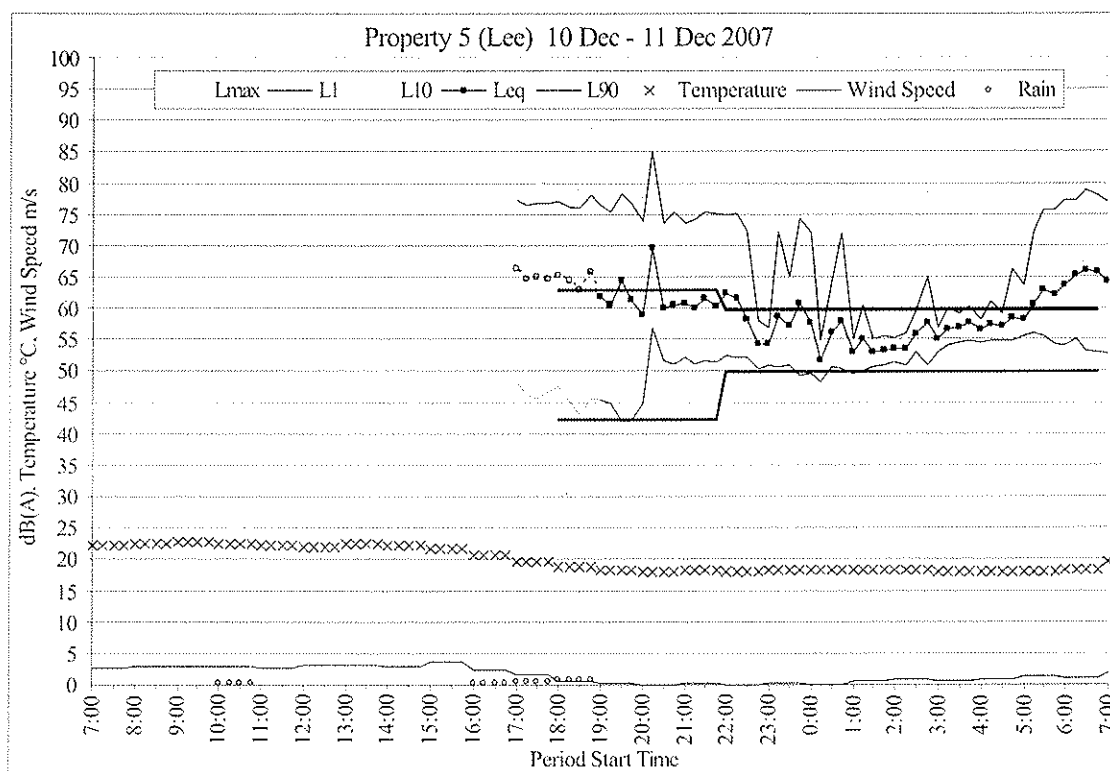
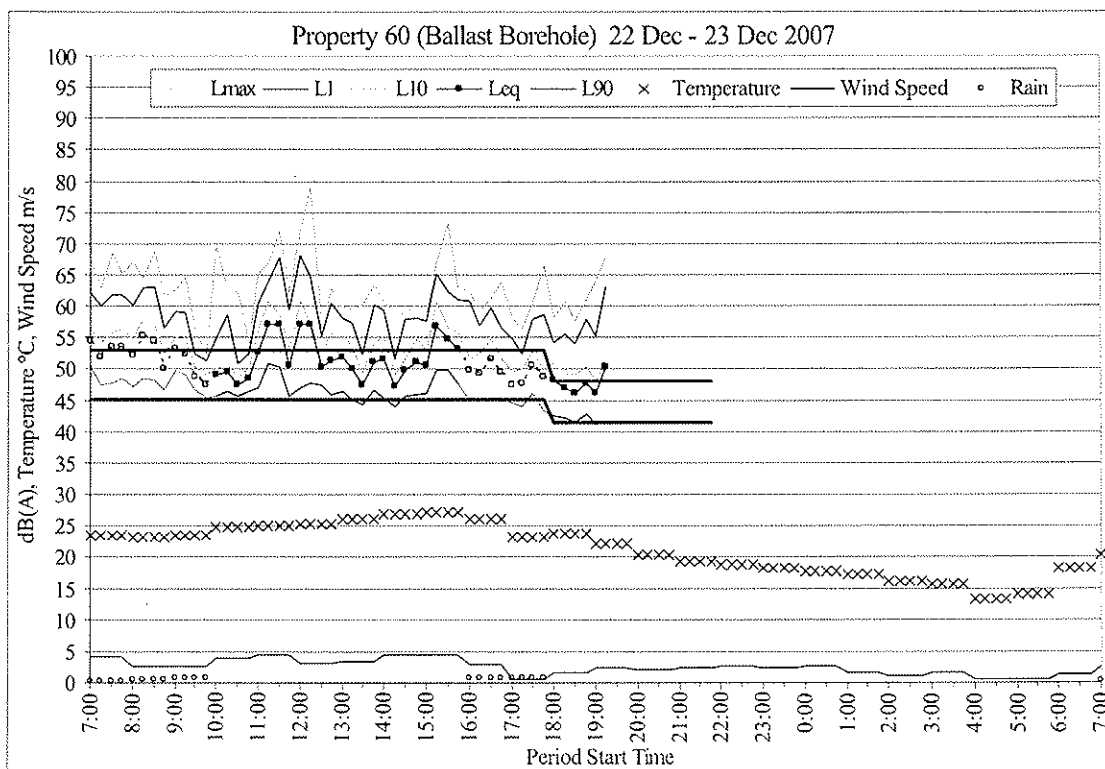


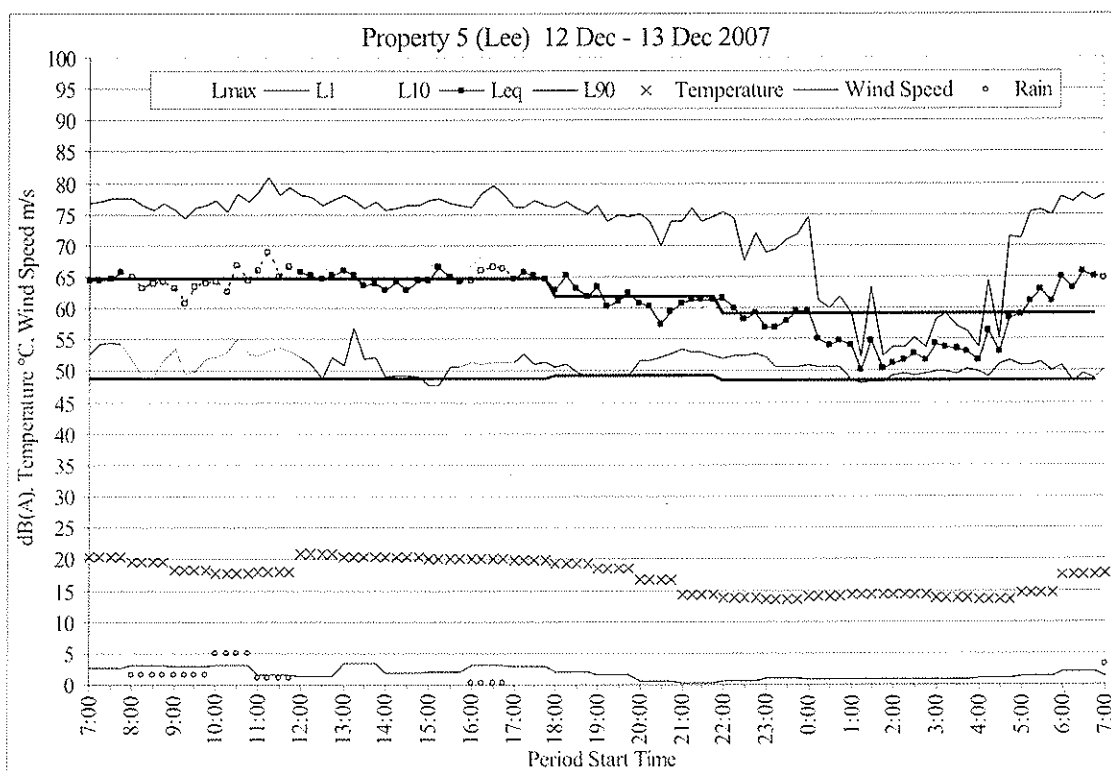
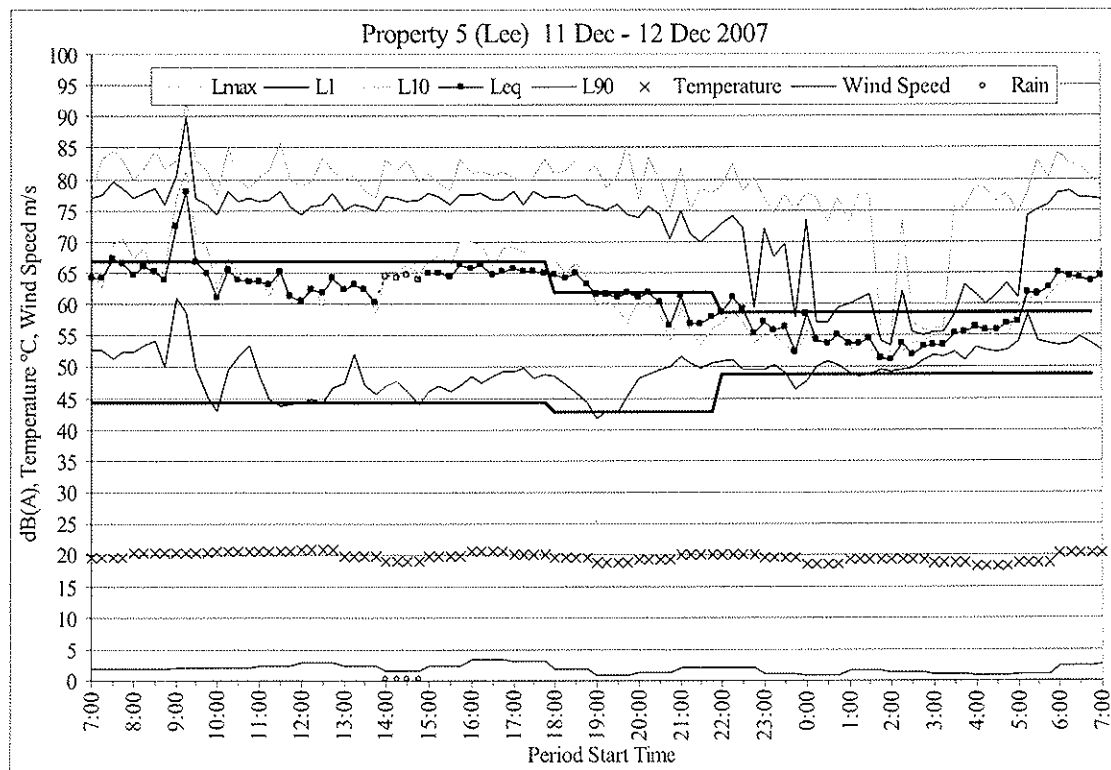


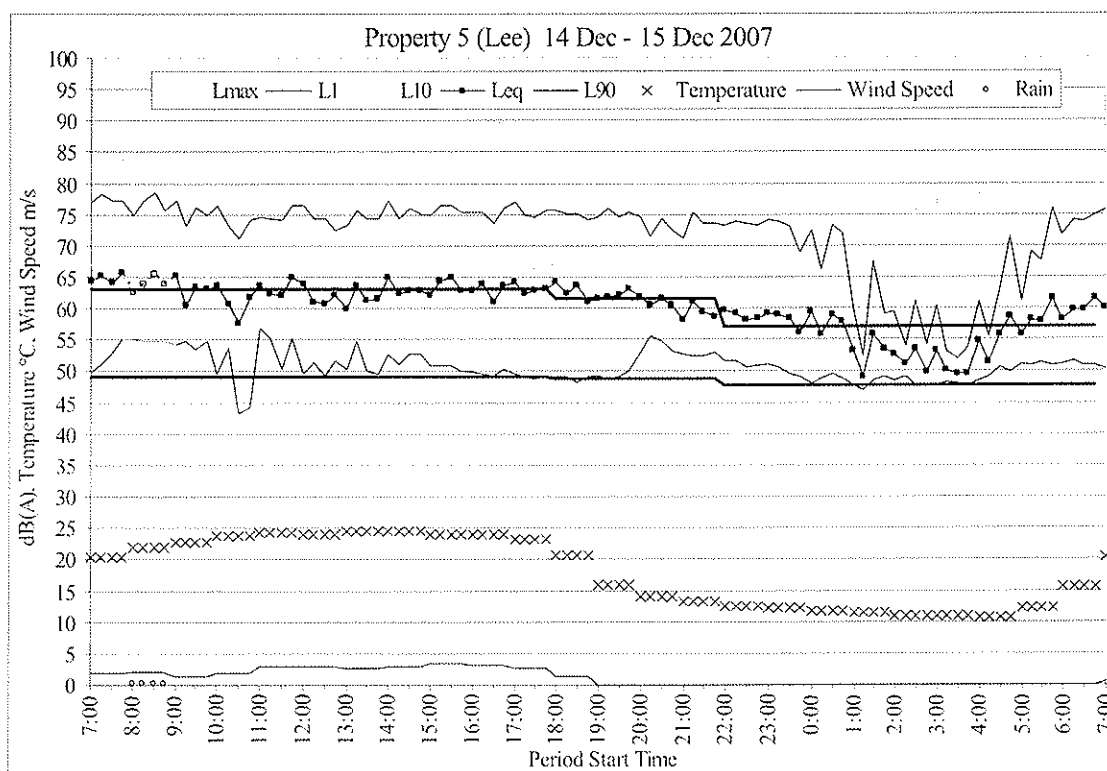
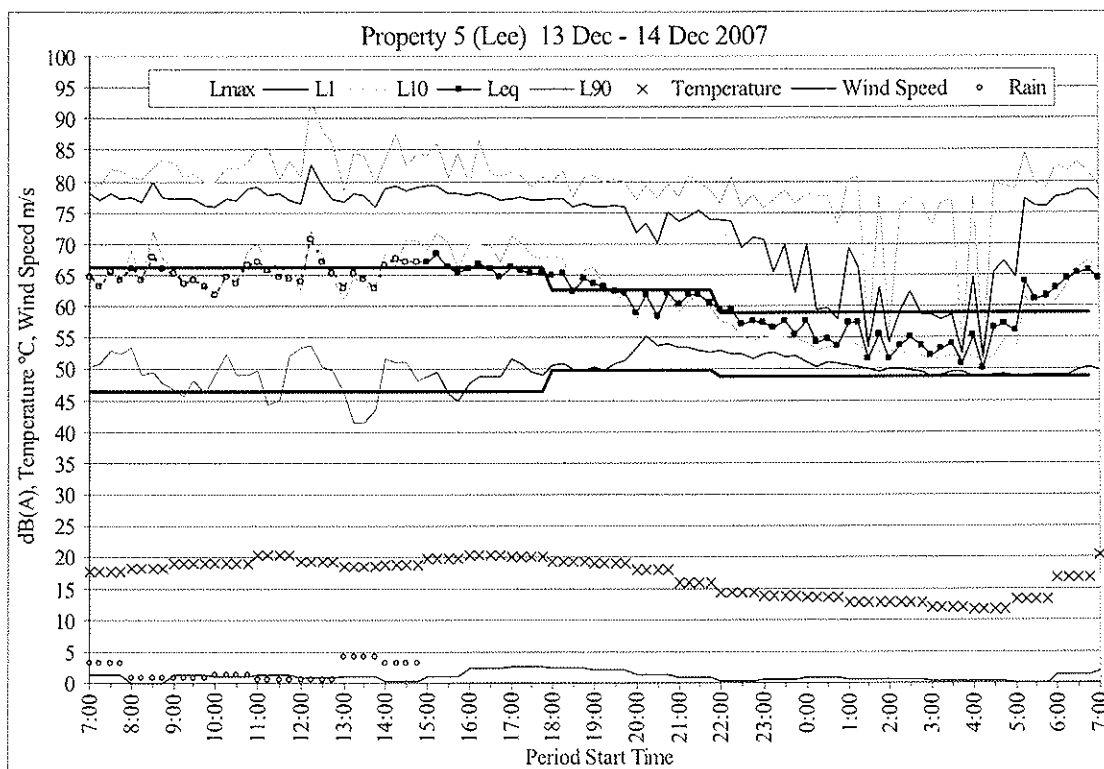


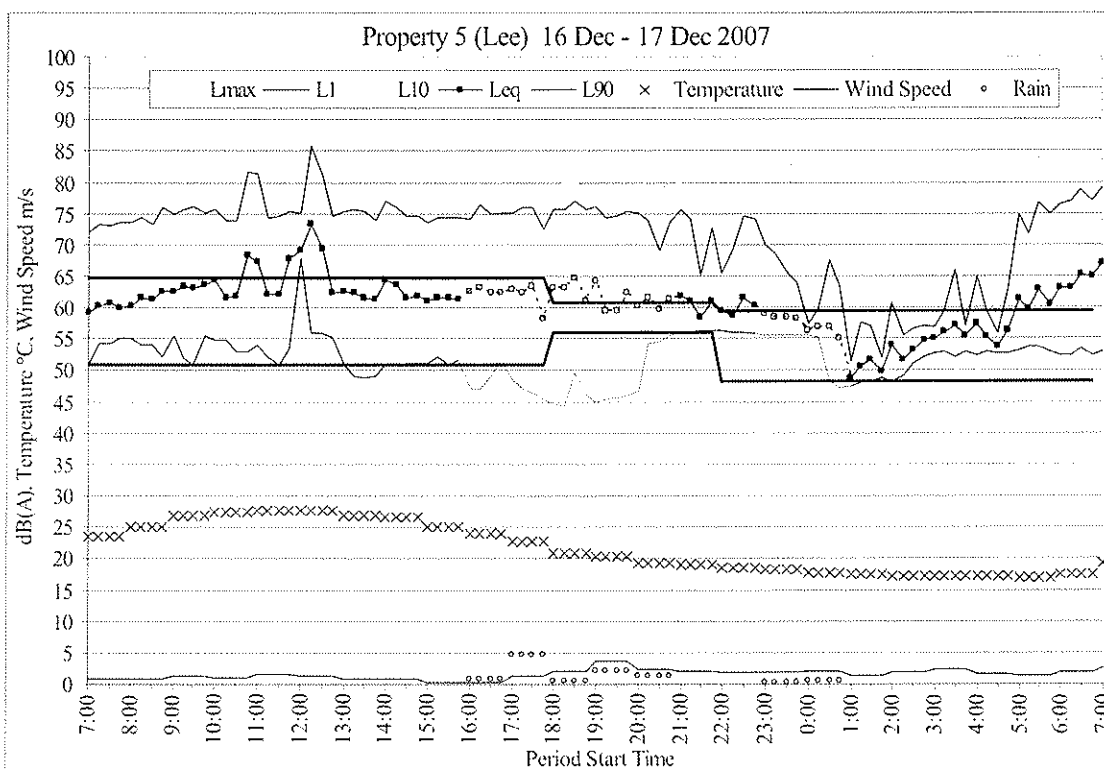
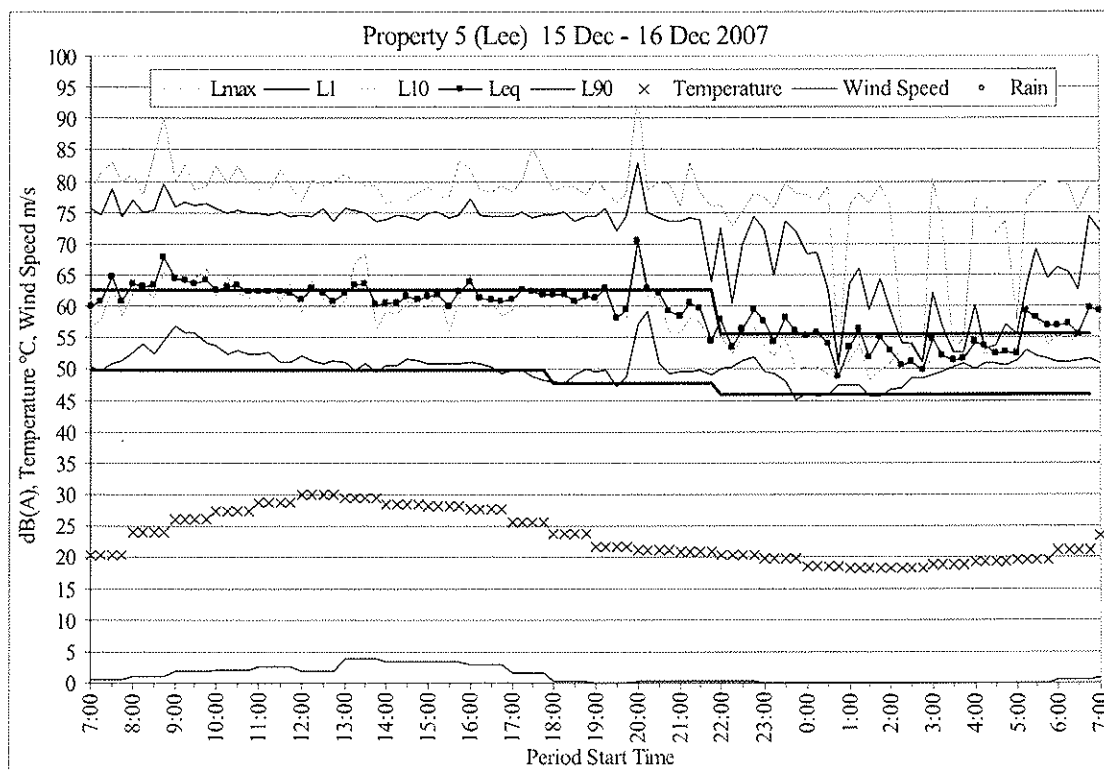


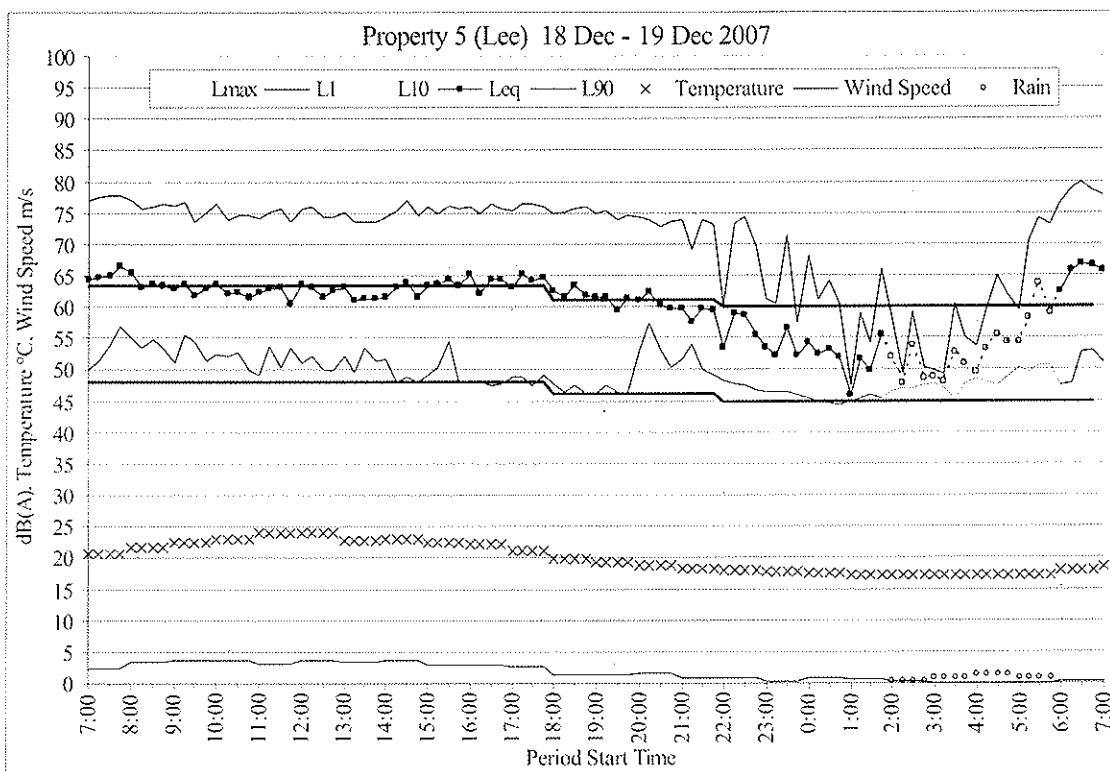
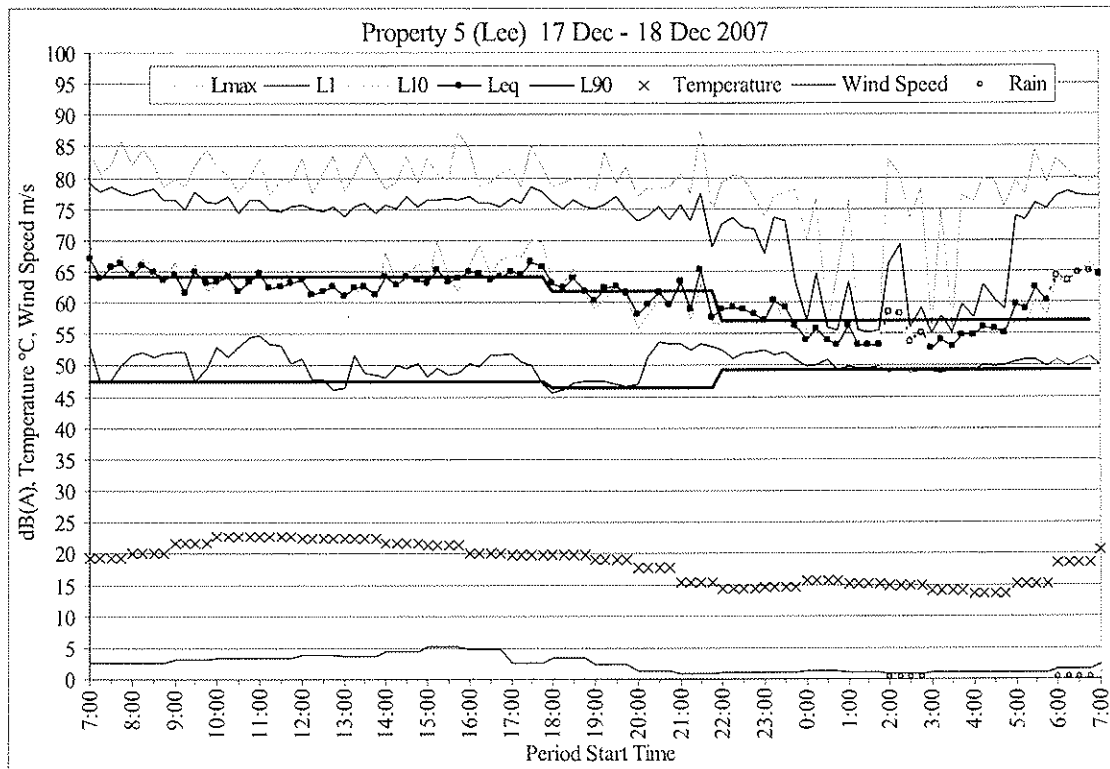


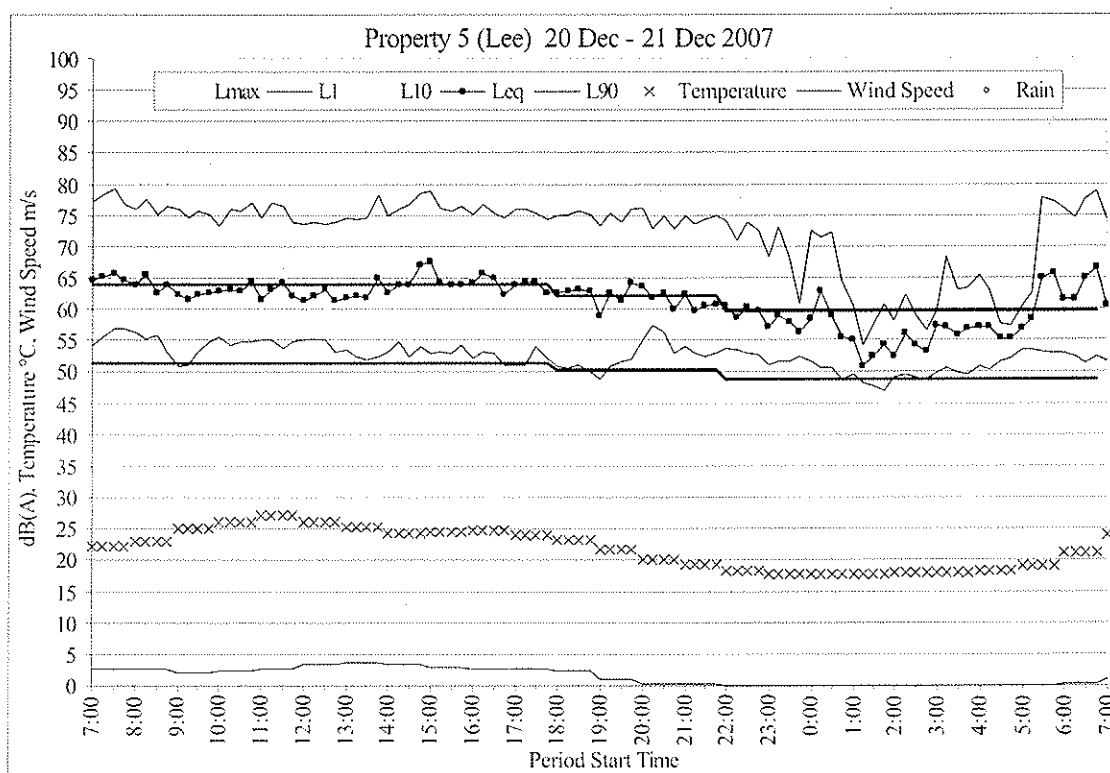
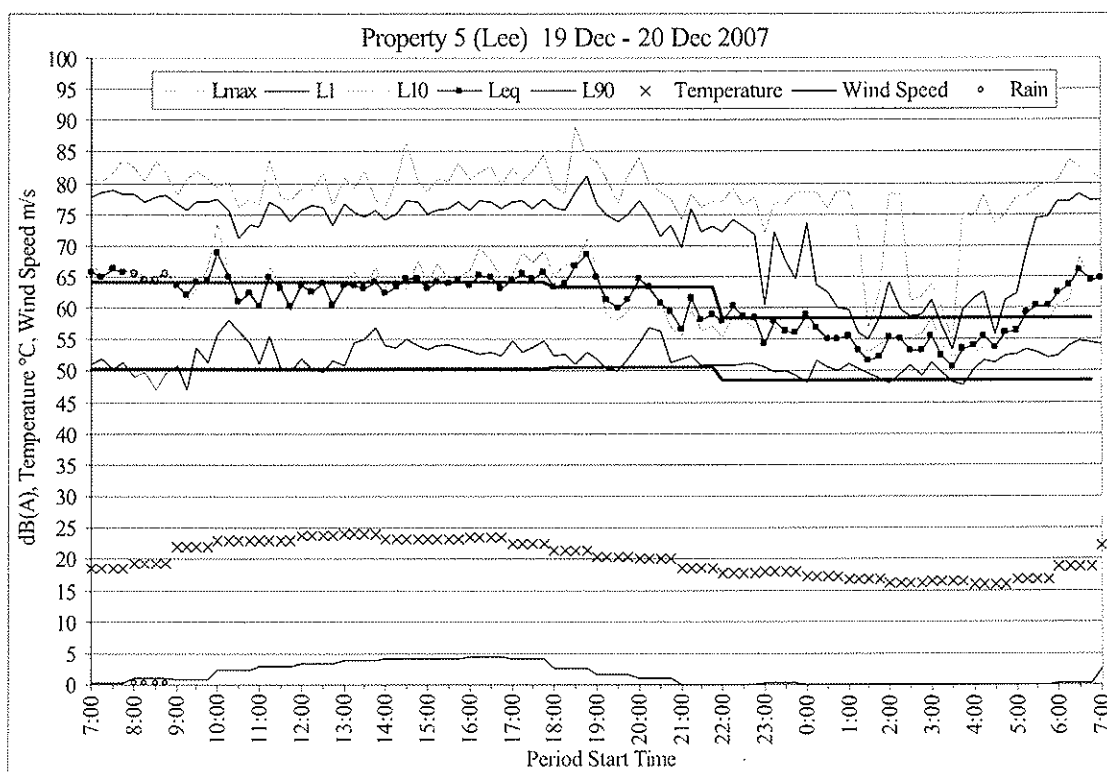


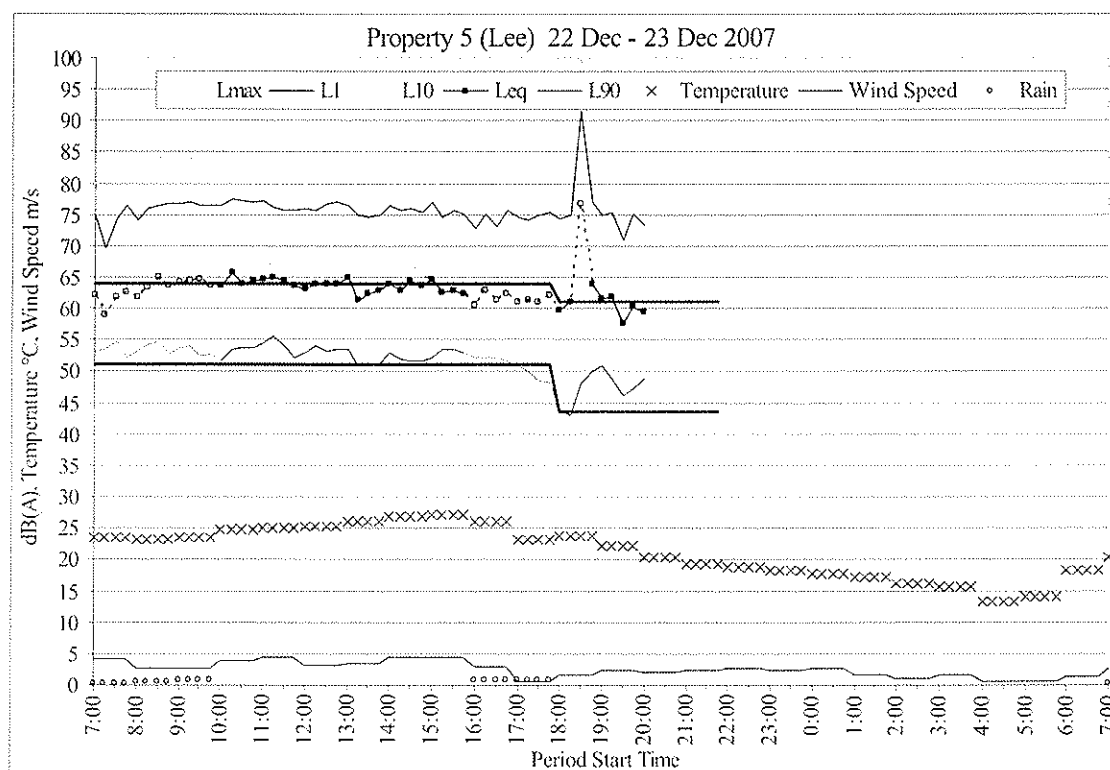
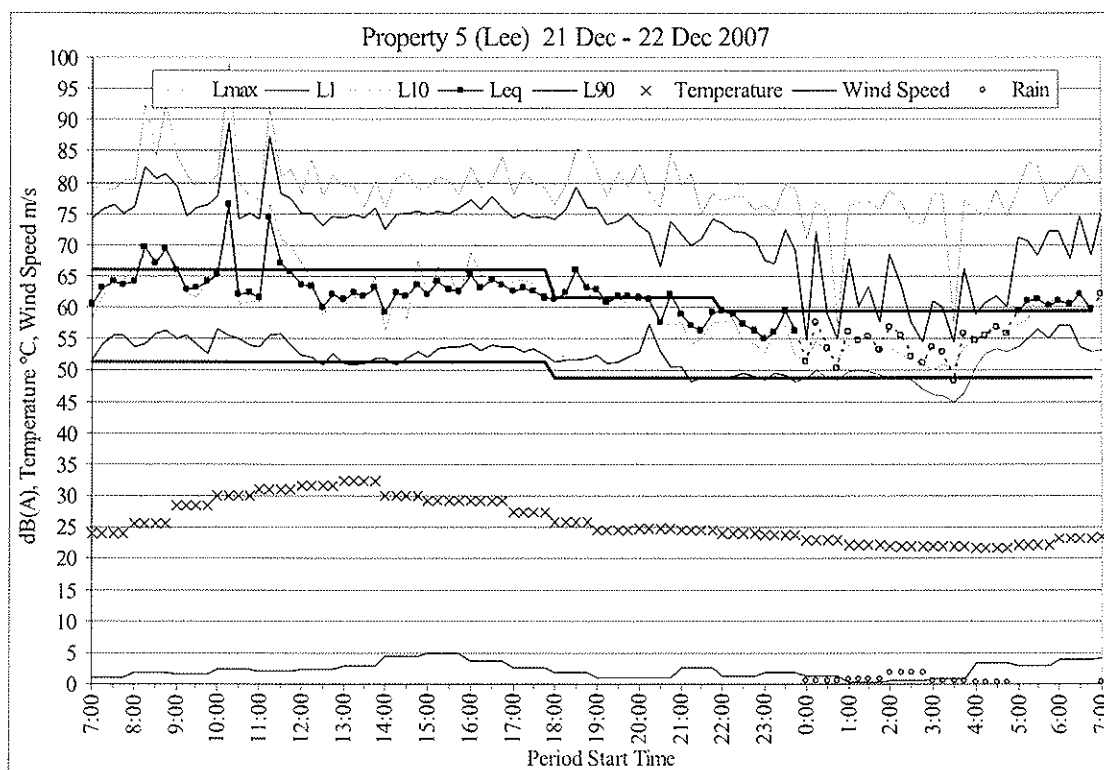


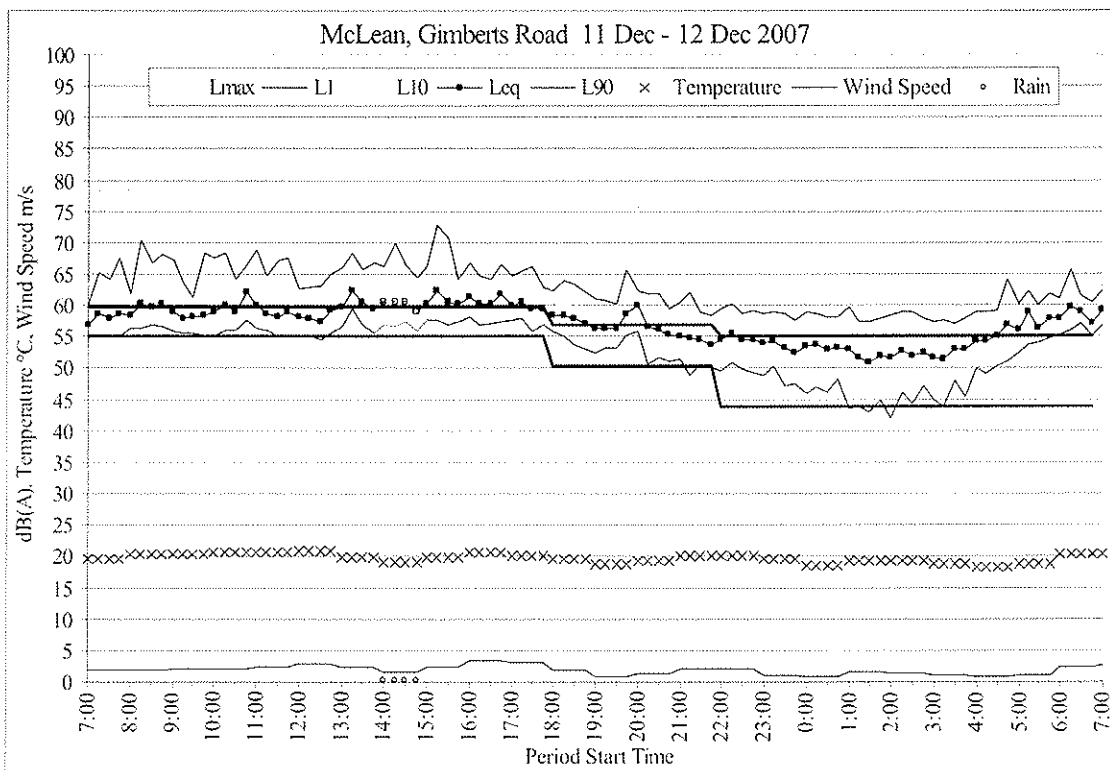
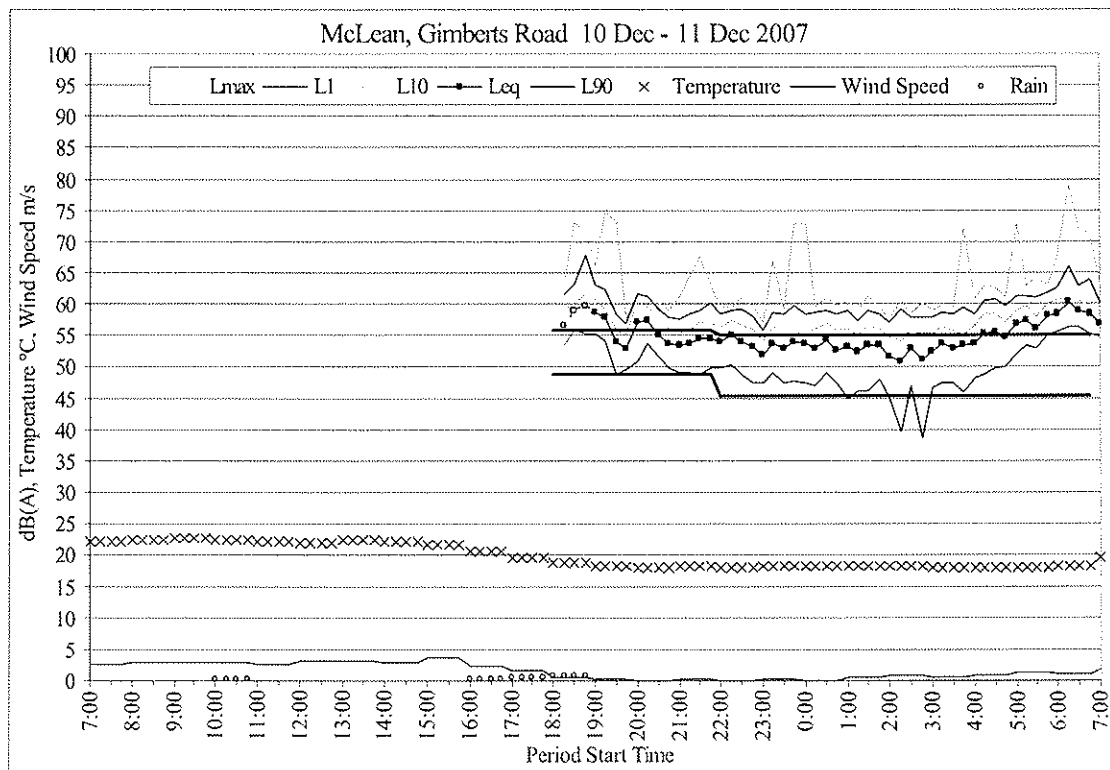


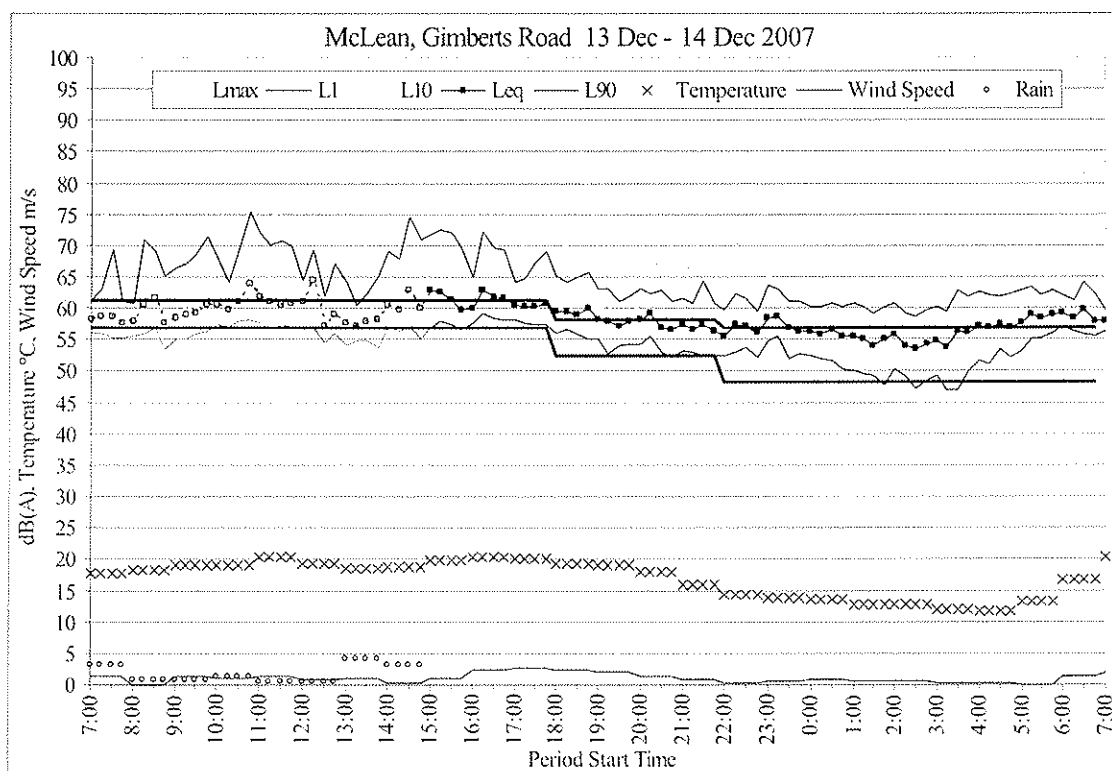
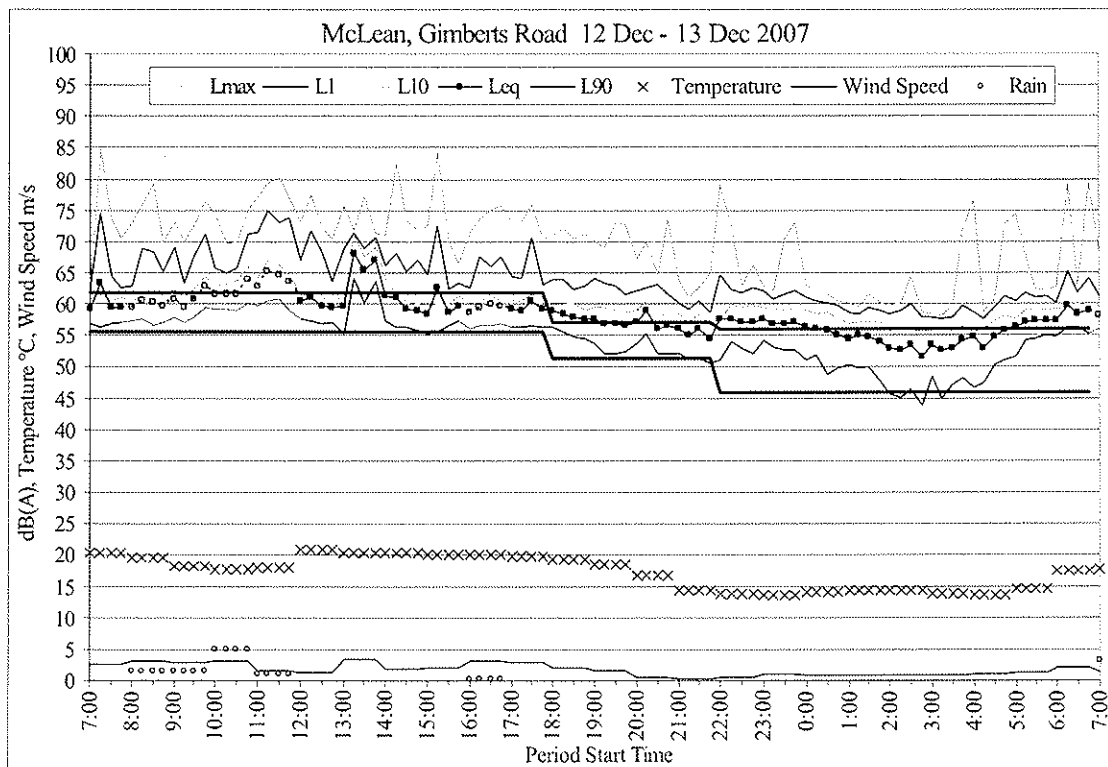


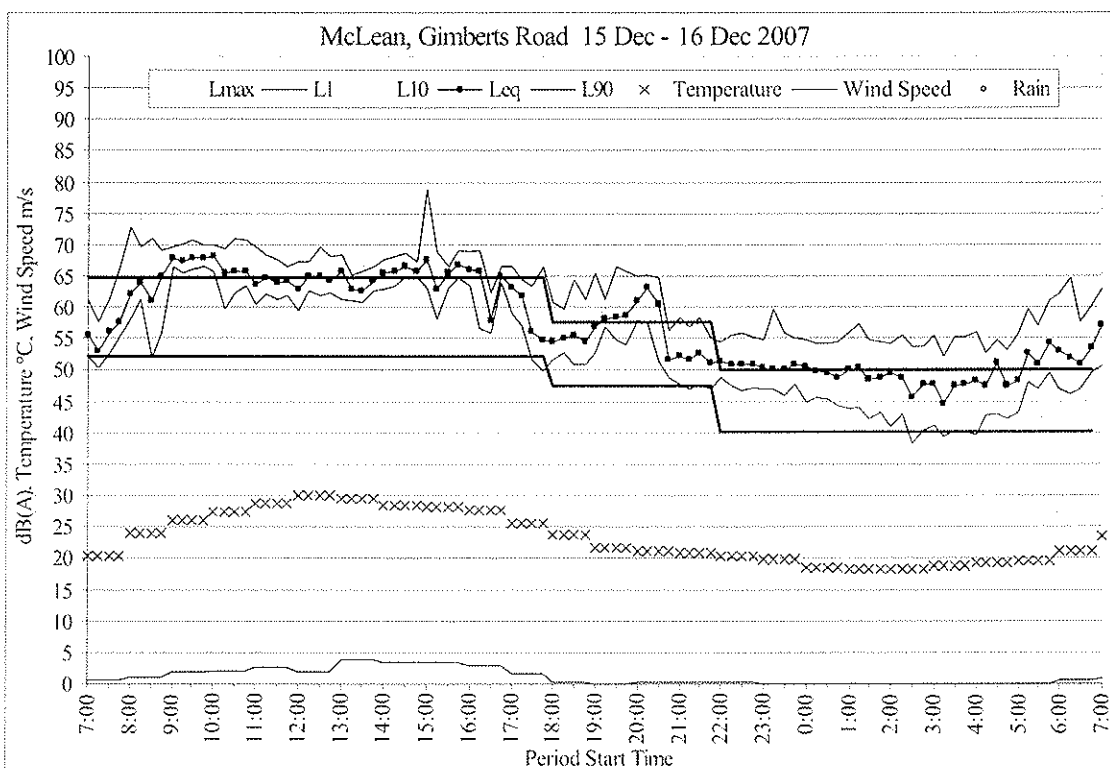
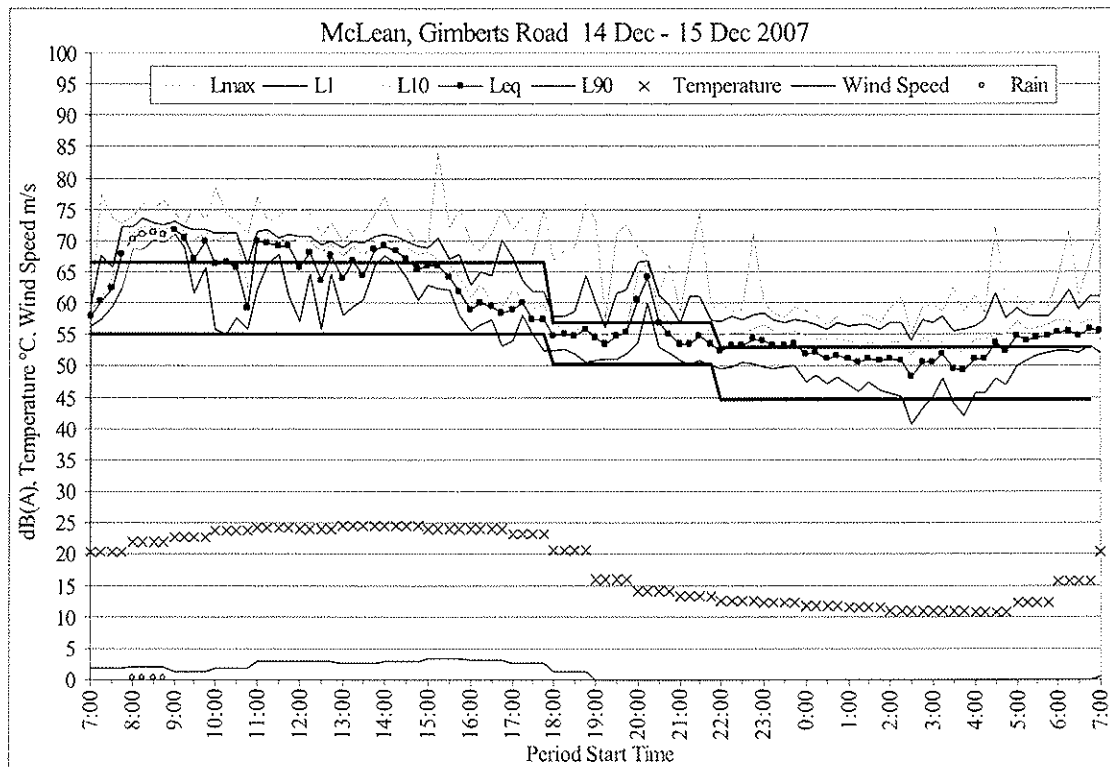


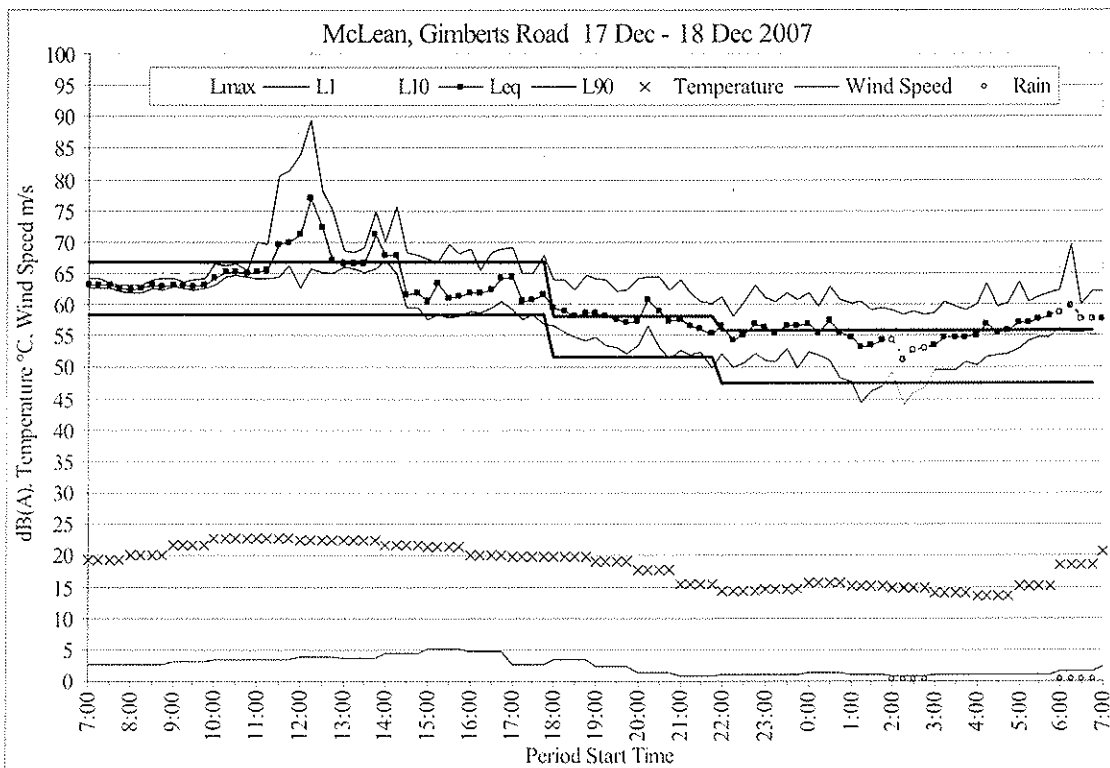
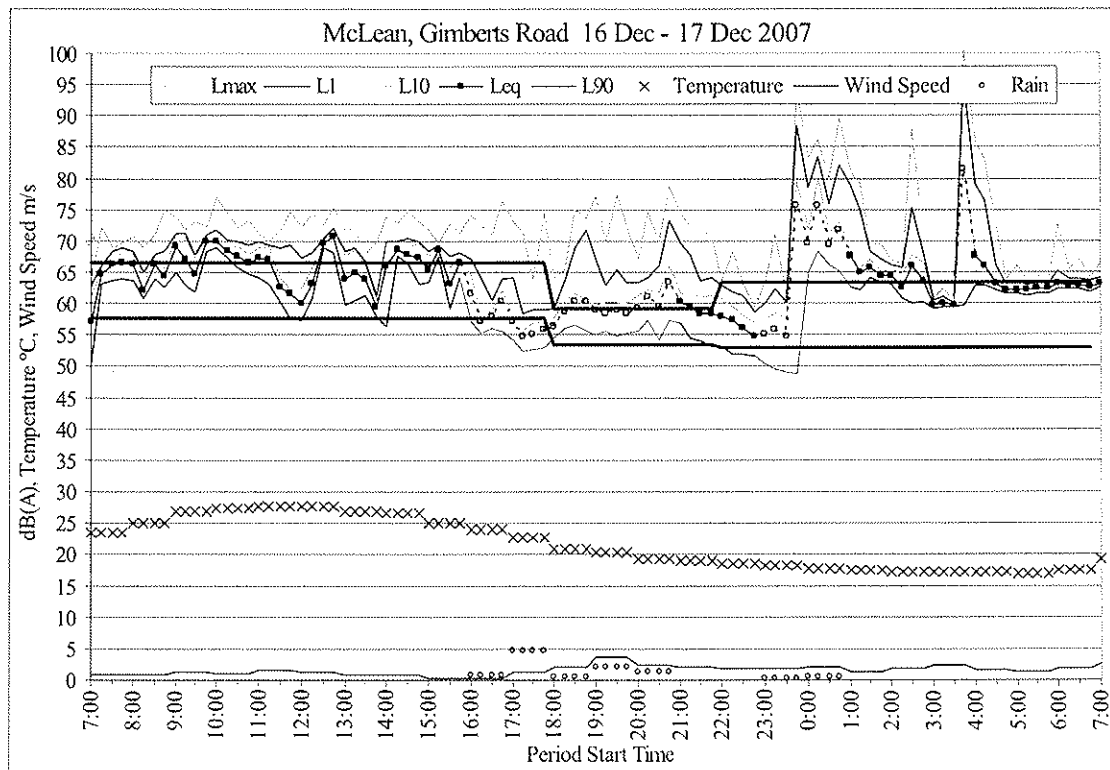


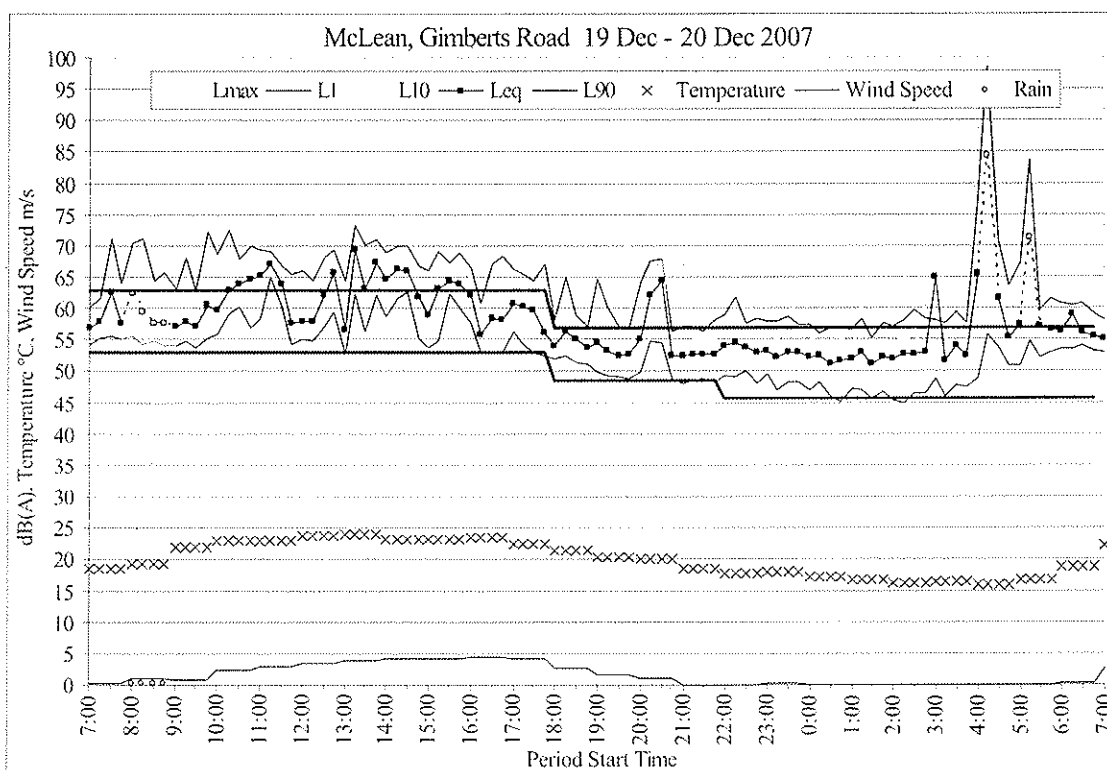
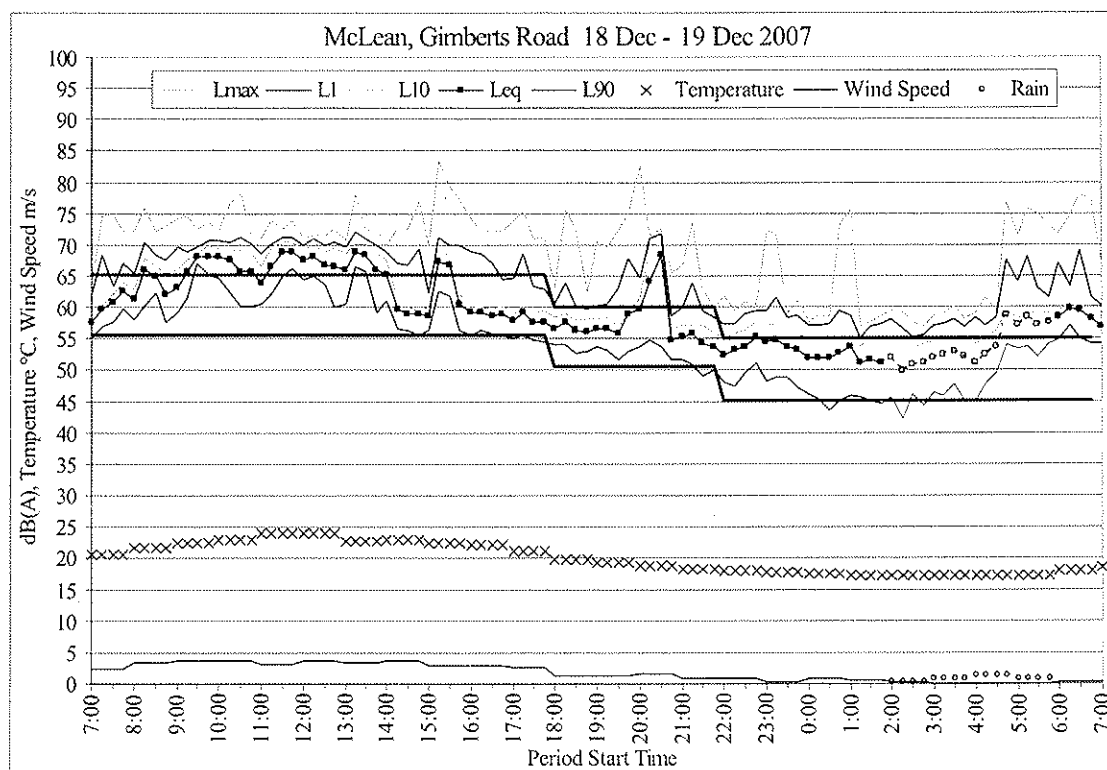


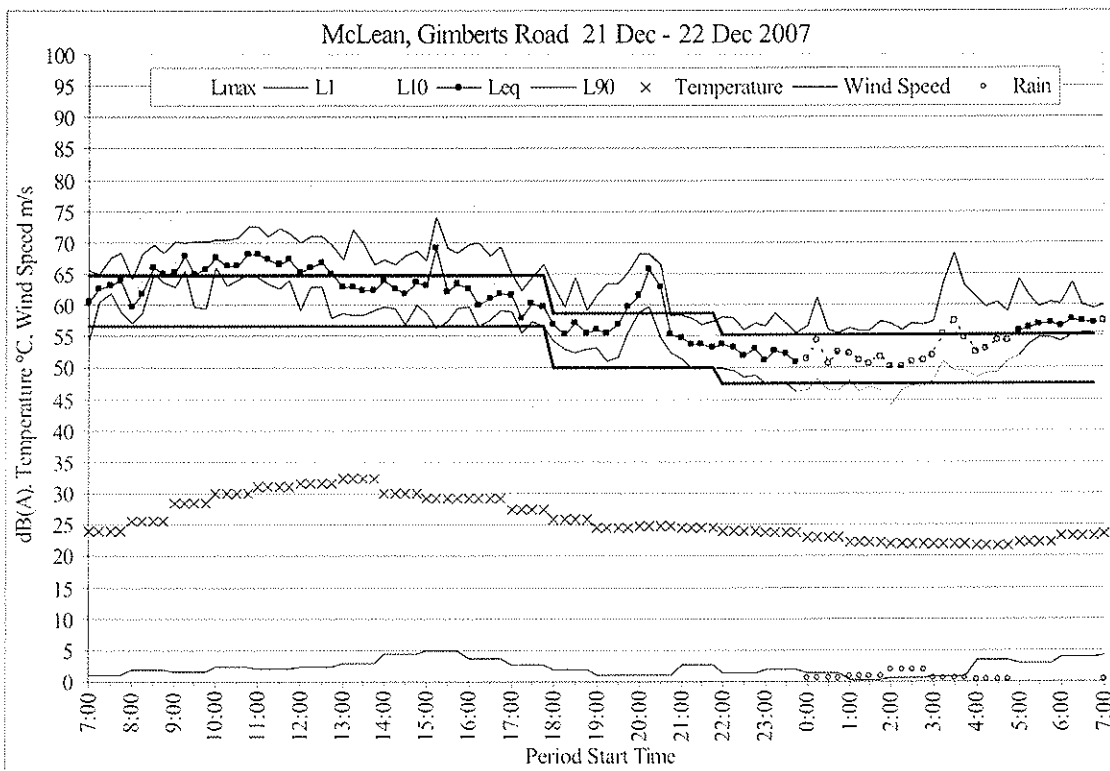
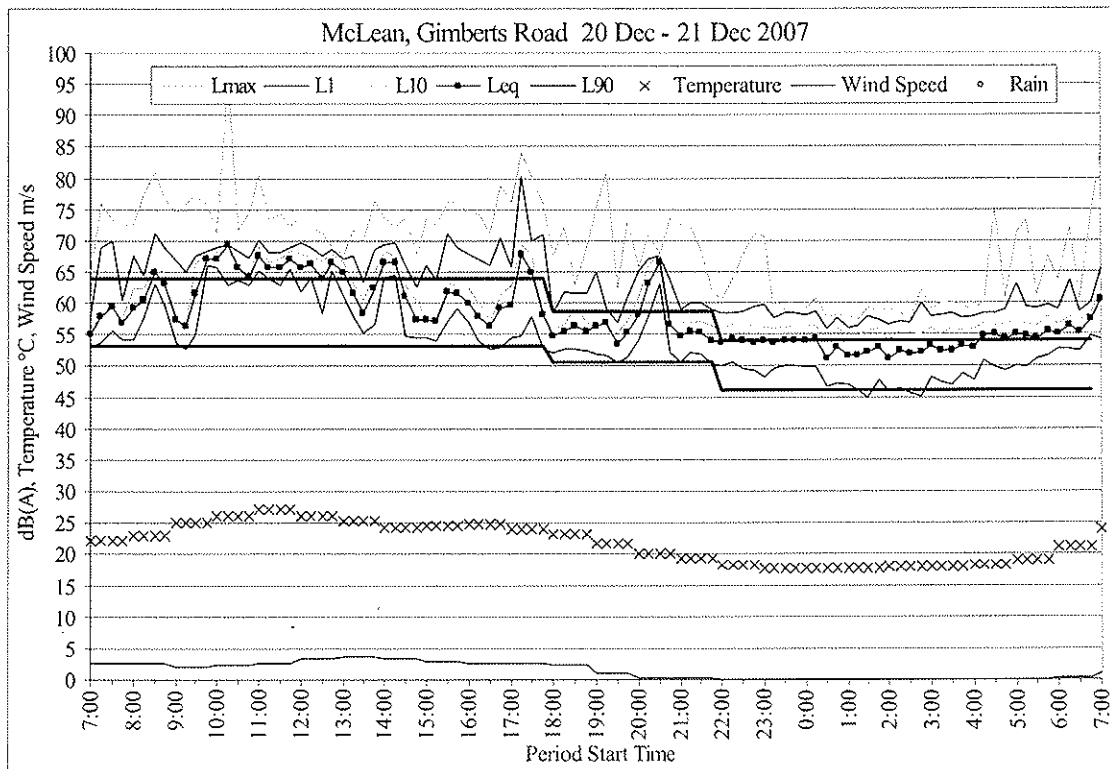


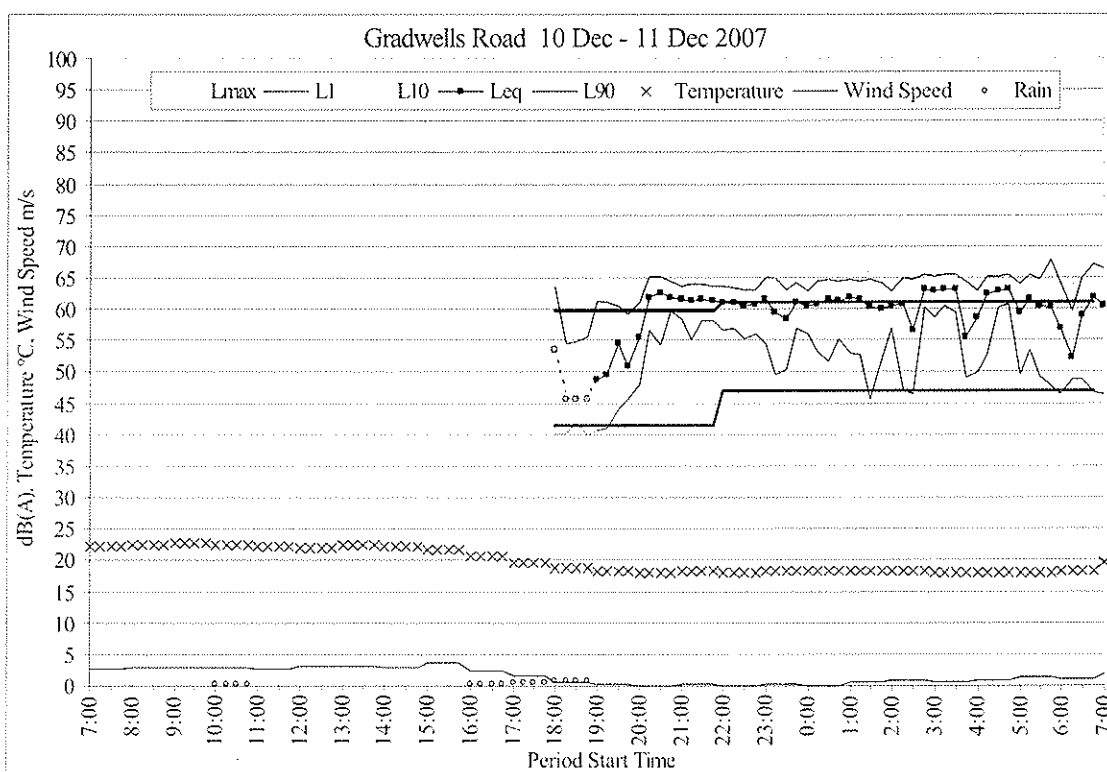
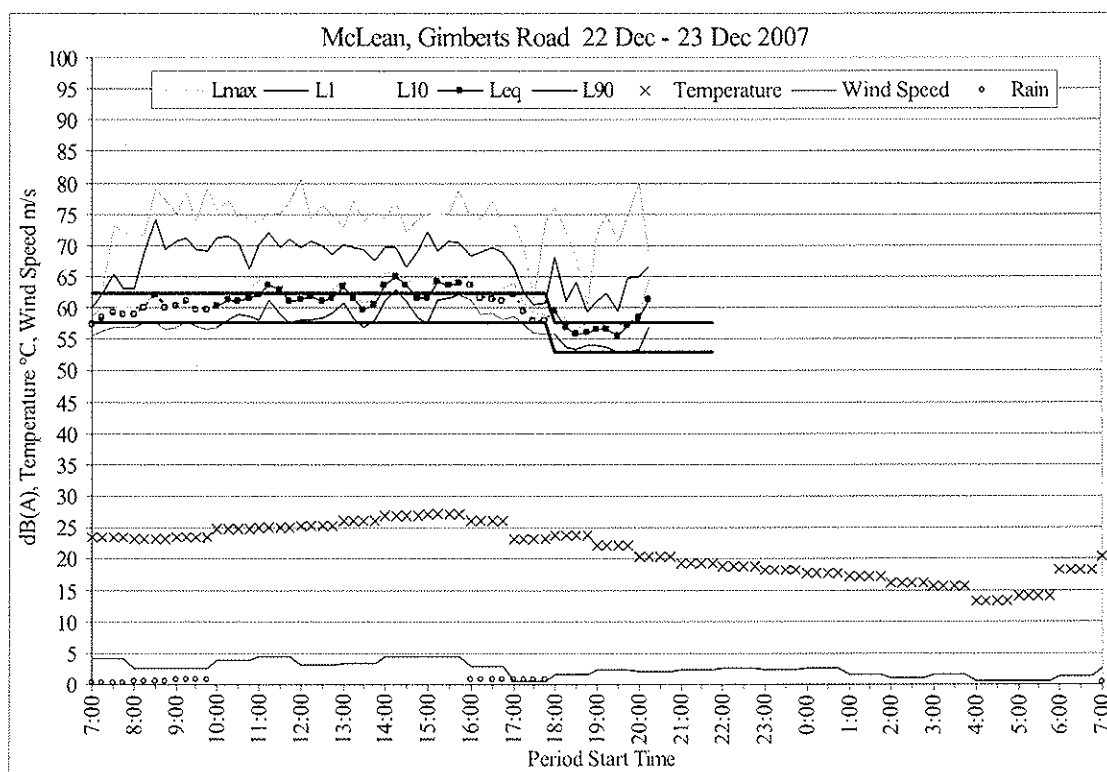


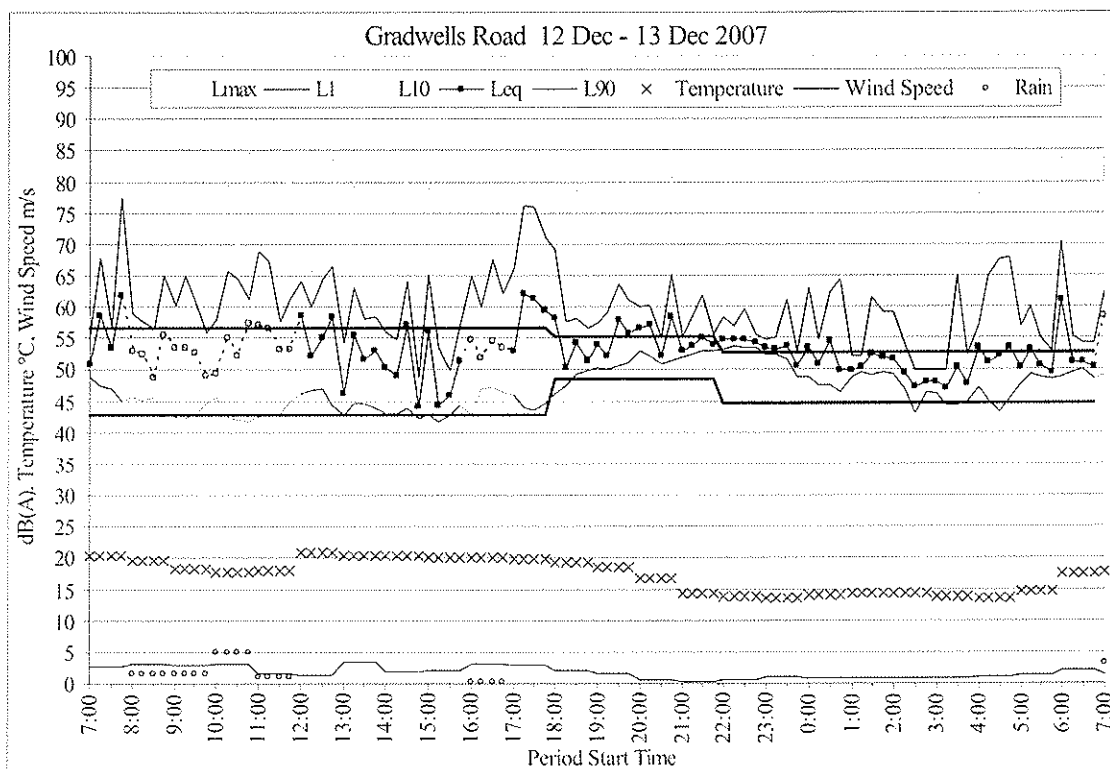
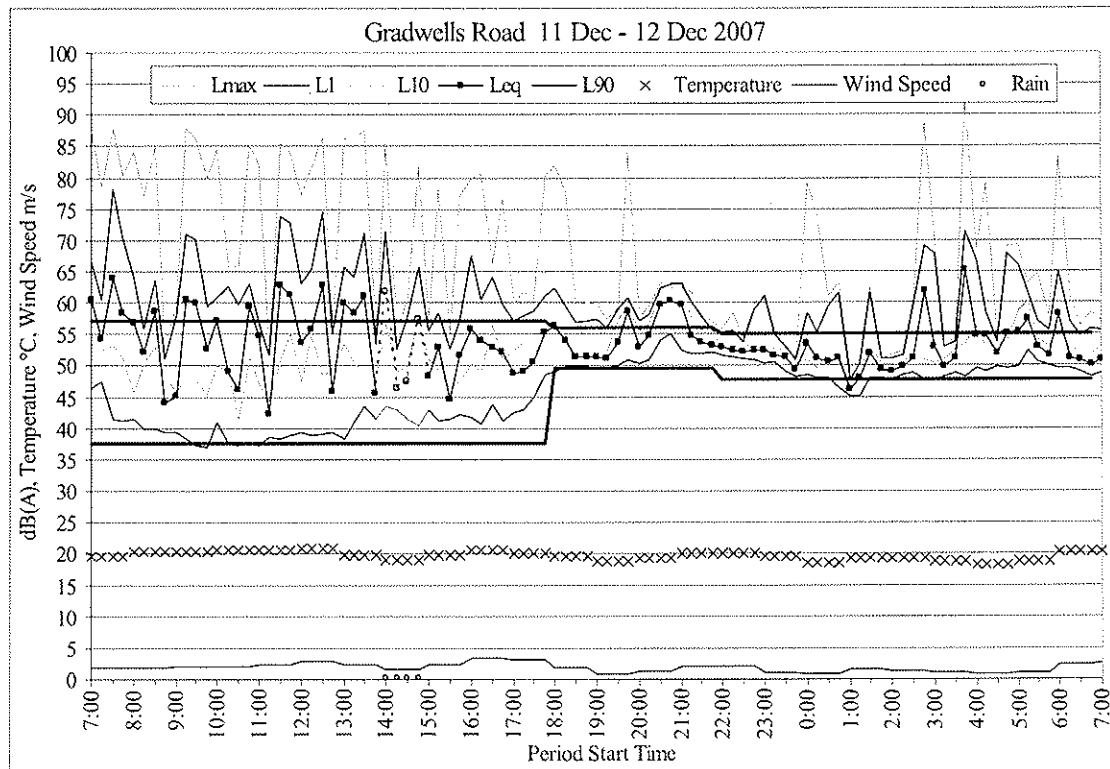


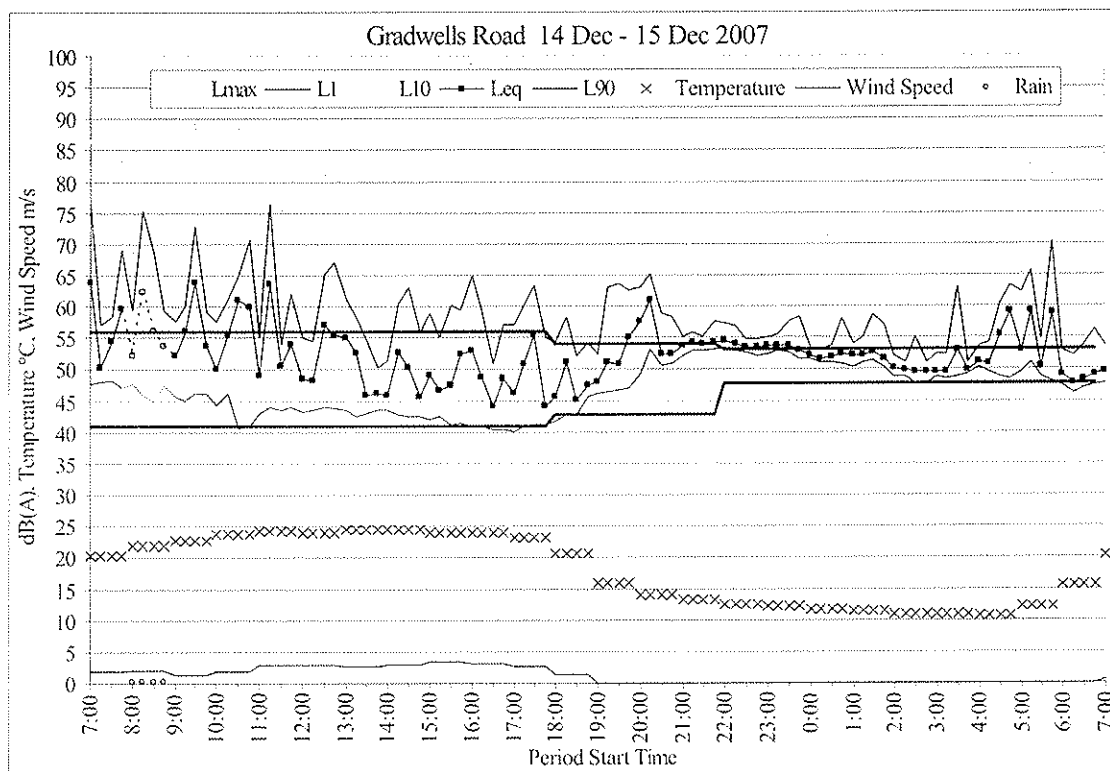
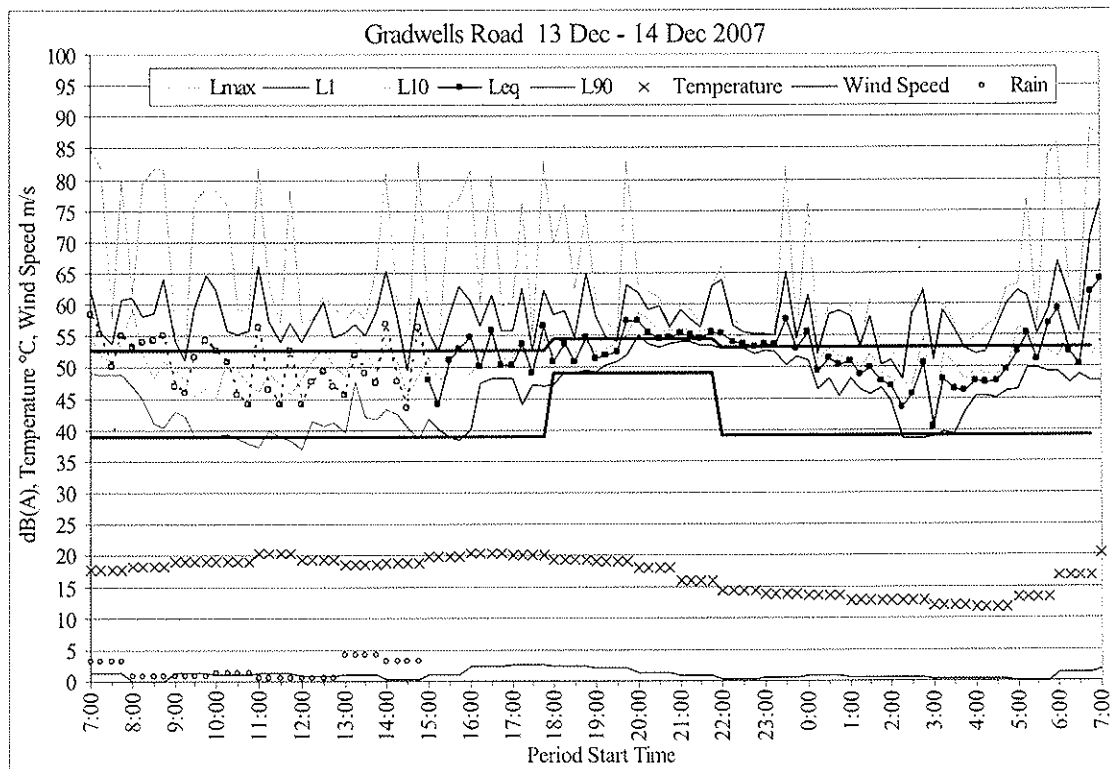


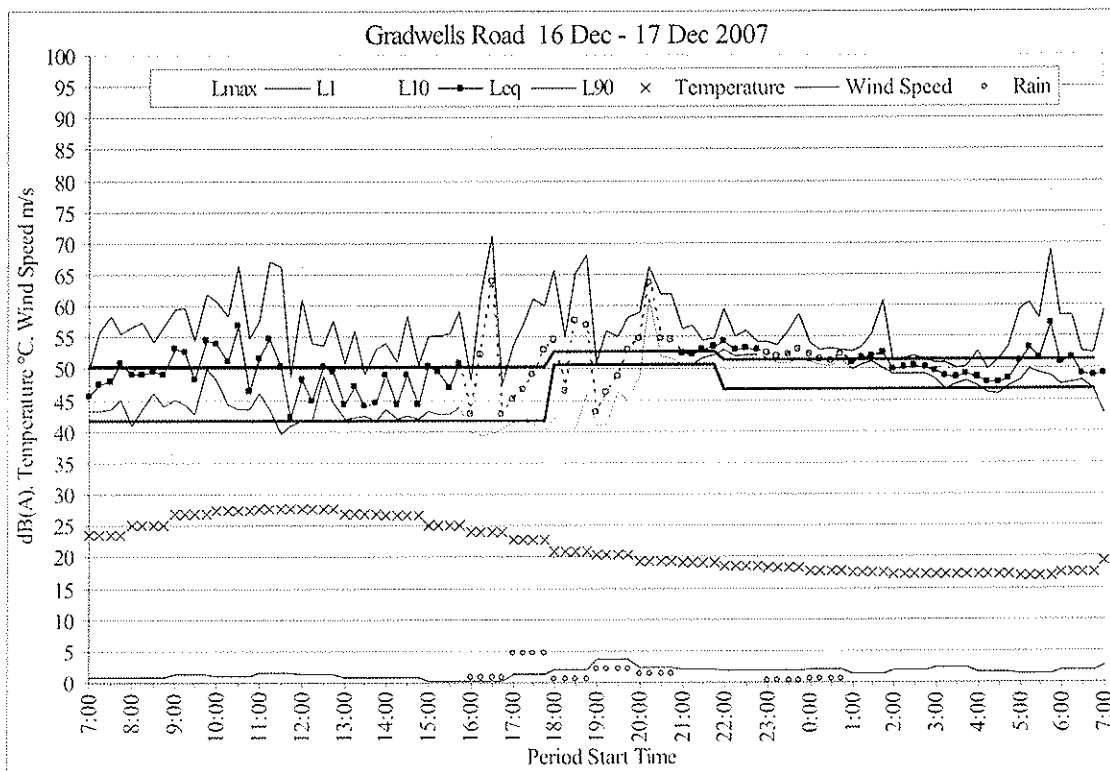
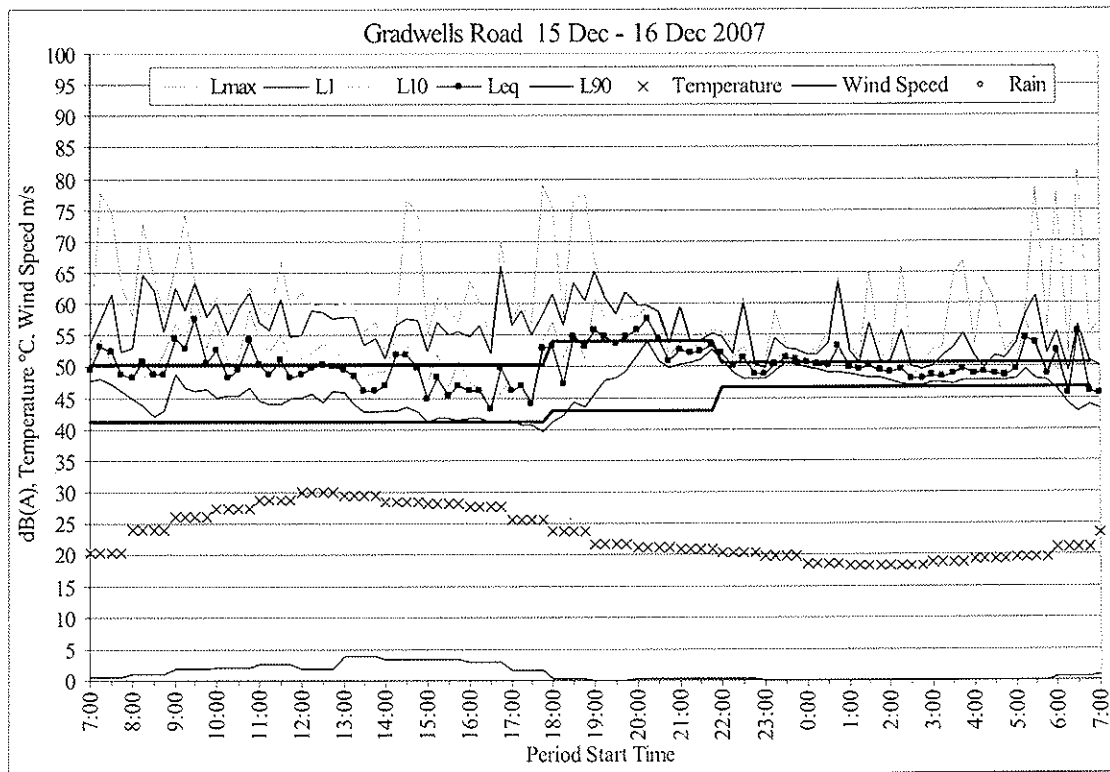


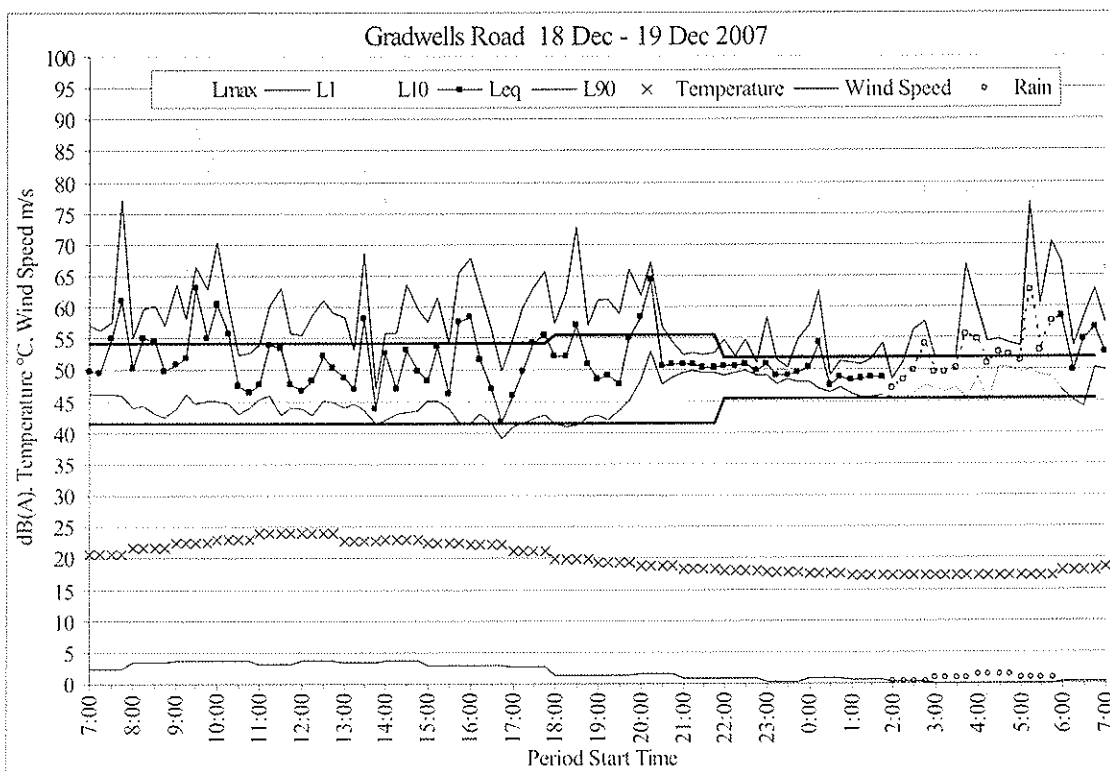
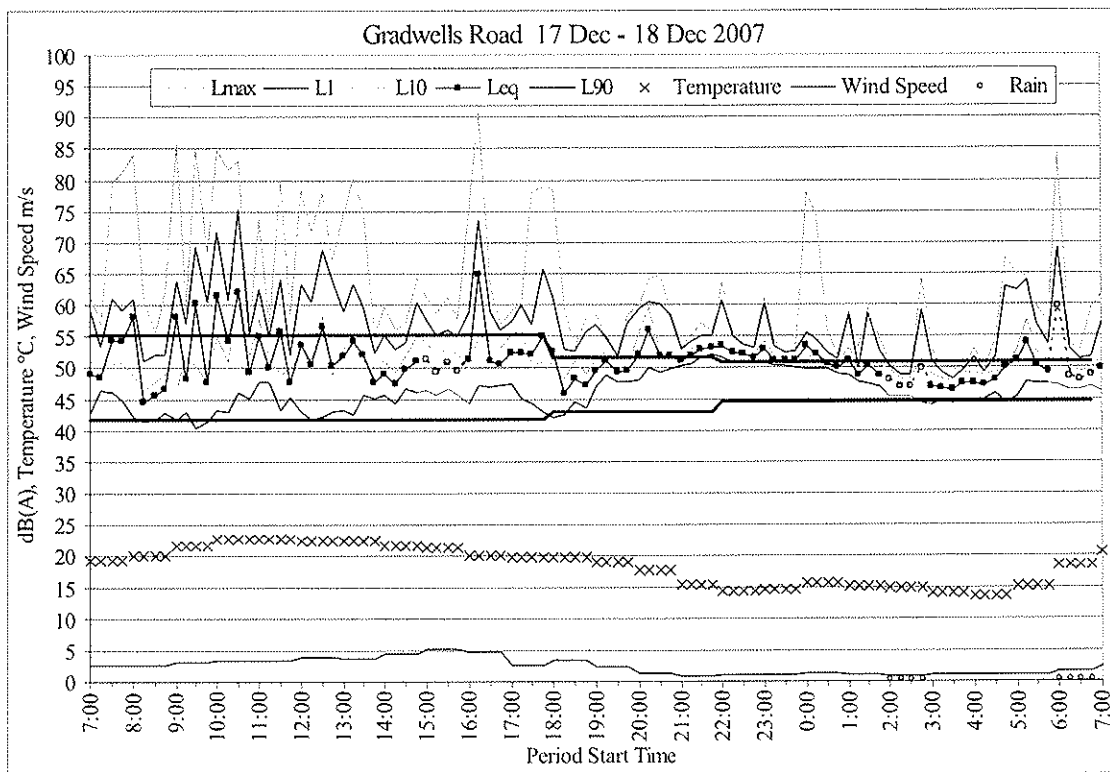


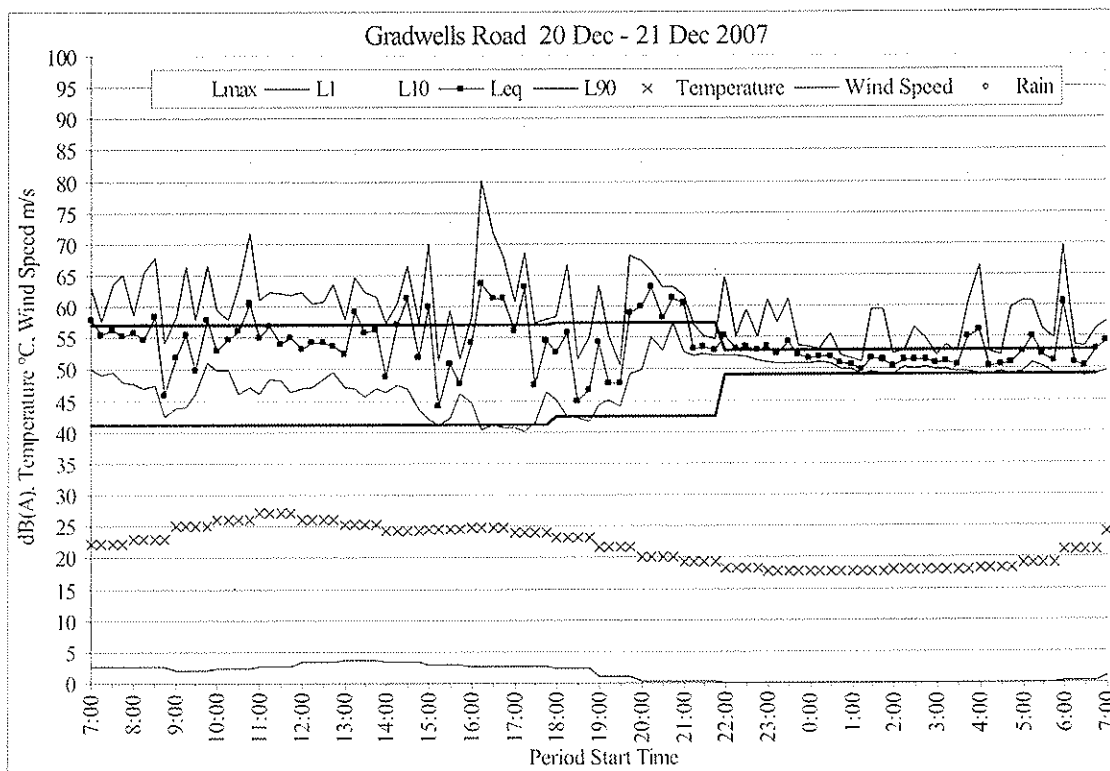
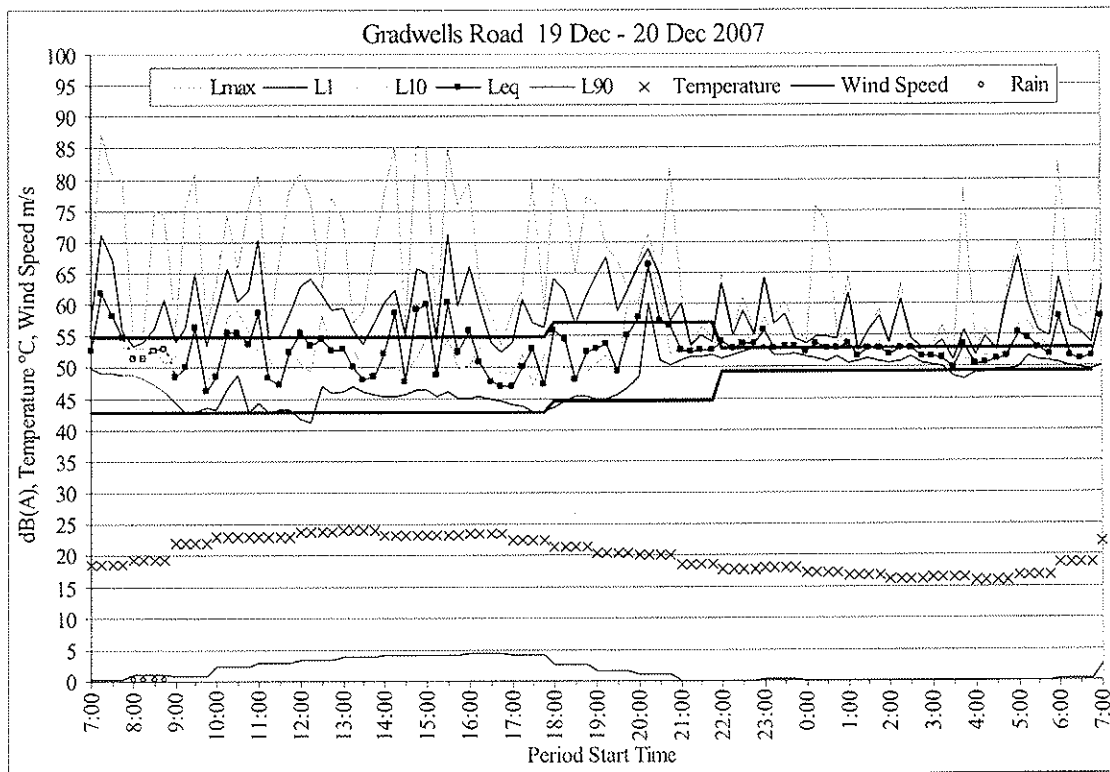


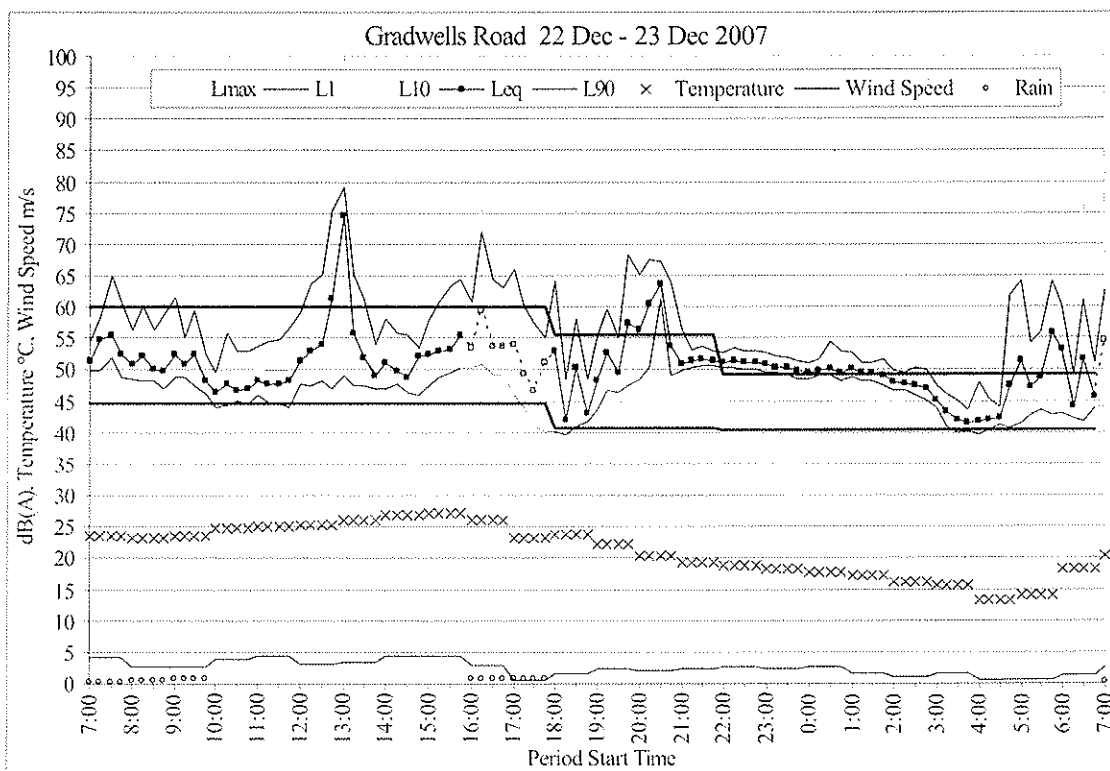
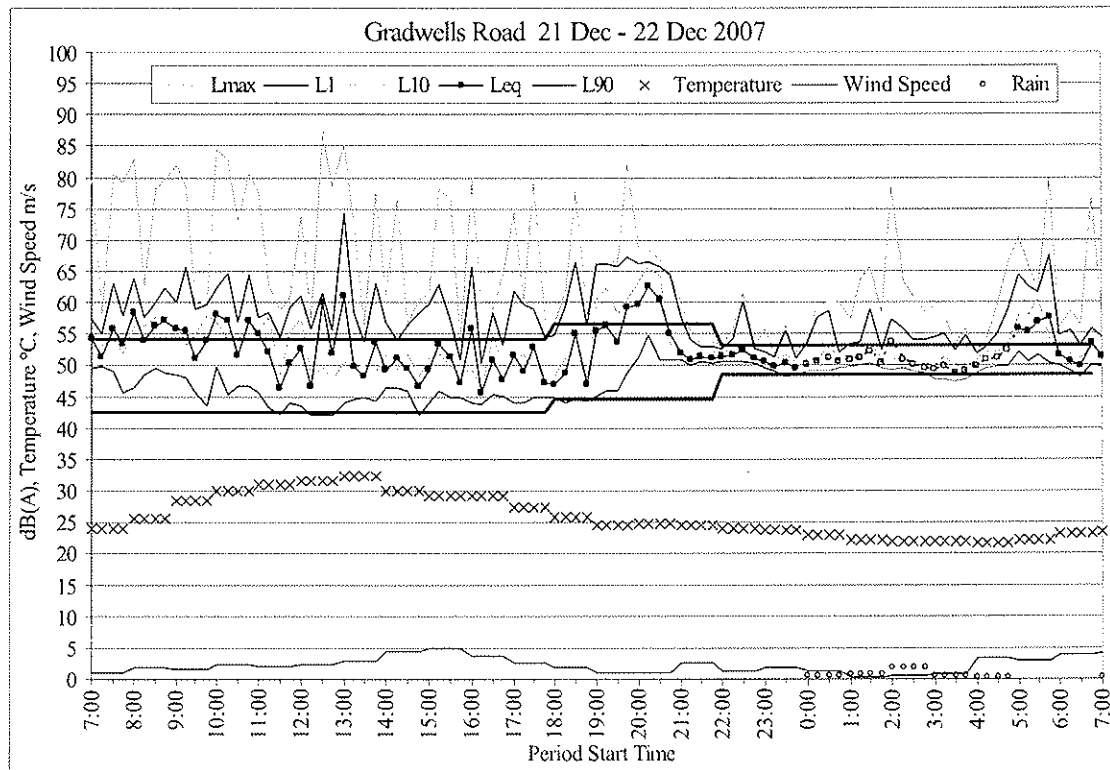




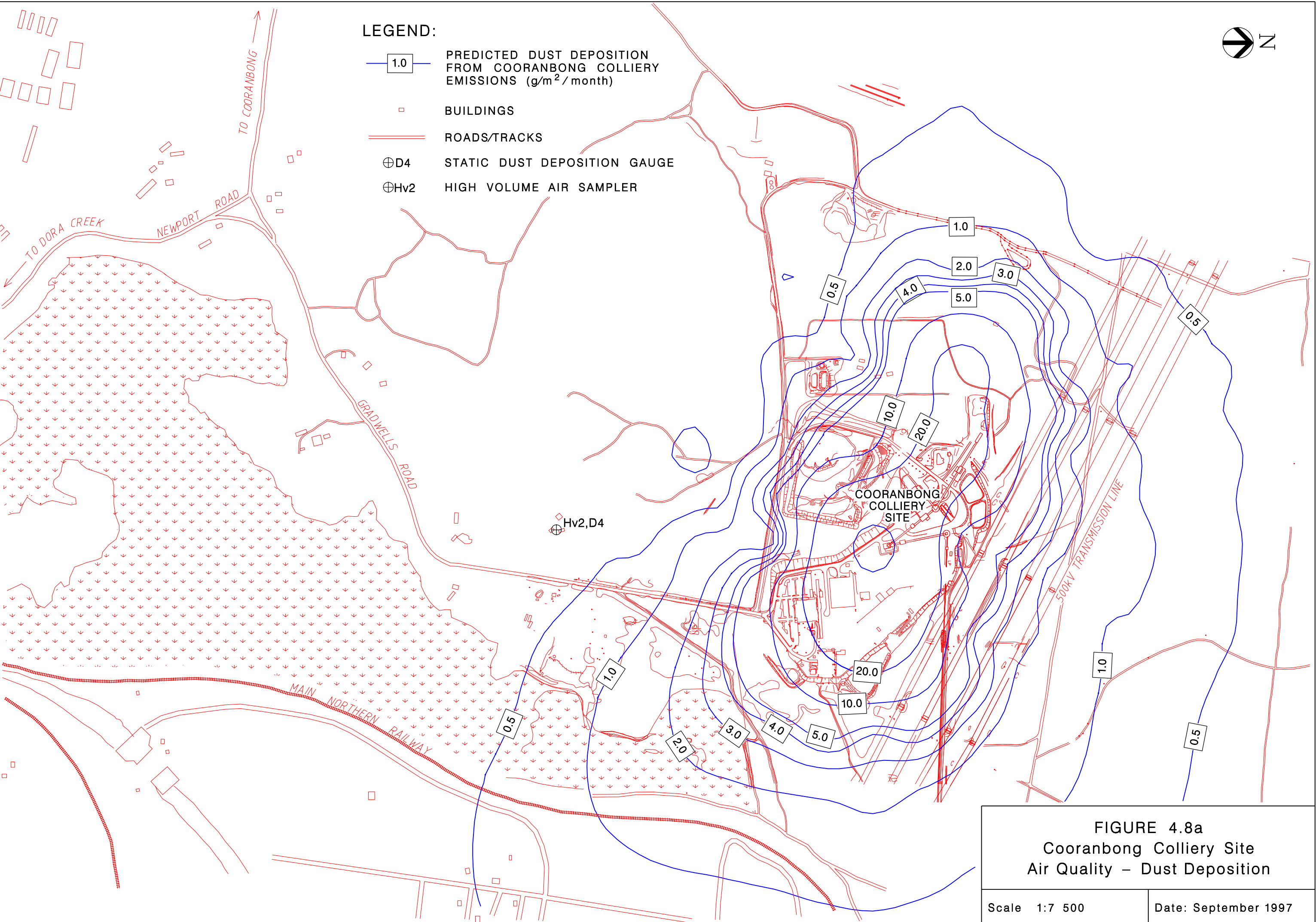


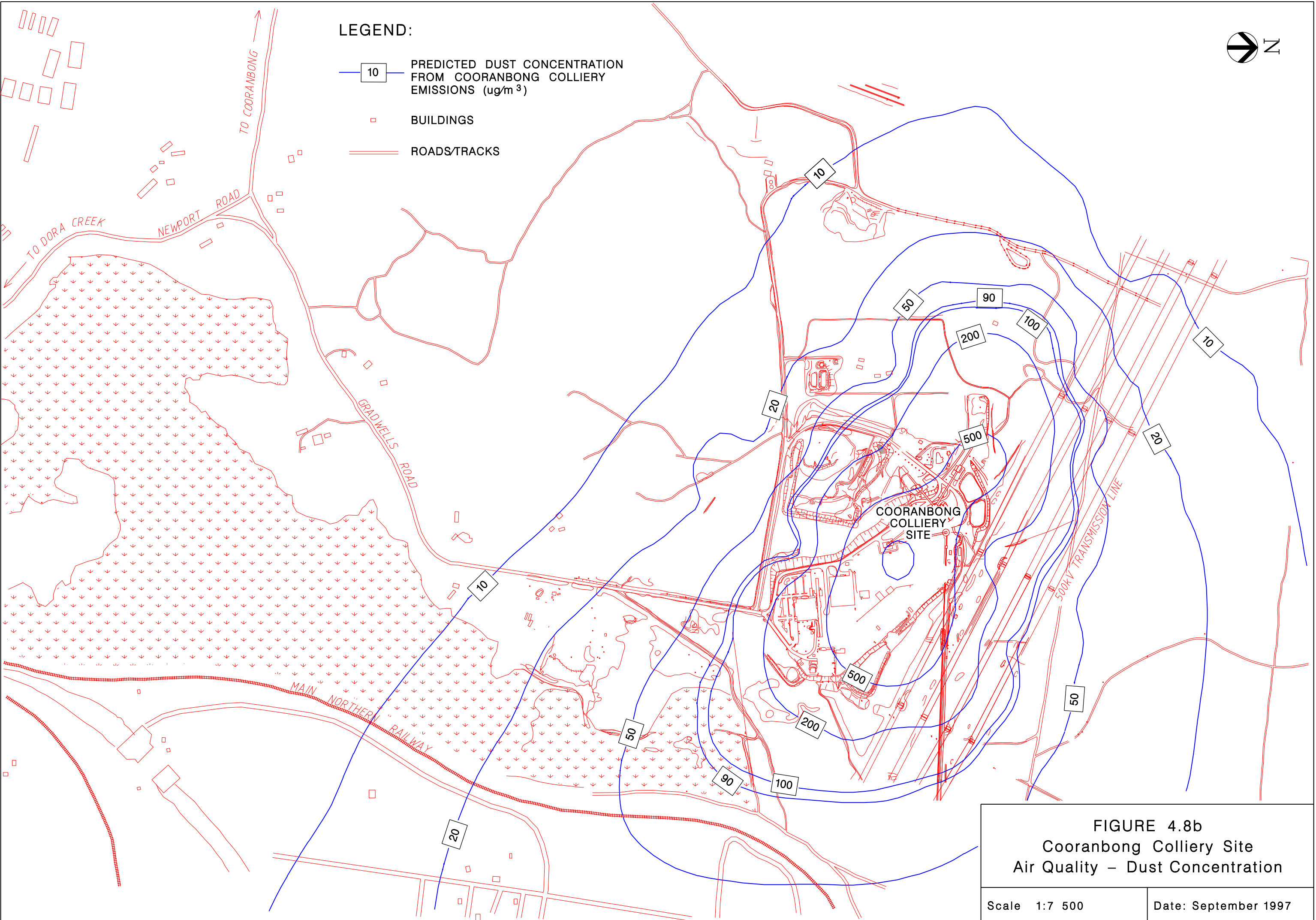






APPENDIX 2





APPENDIX 3



- LEGEND
- Existing Facilities
 - Proposed Facilities

Cooranbong Surface Facilities
Proposed Ammendments



APPENDIX 4



Centennial Coal



VISUAL ASSESSMENT

CHP Modification for Cooranbong Colliery

Centennial Mandalong Pty Limited

October 2009

CCC14-002



GSS ENVIRONMENTAL
Environmental, Land and Project
Management Consultants

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1.0 INTRODUCTION

Centennial Mandalong Pty Limited (Centennial) intends to upgrade the Coal Handling Plant (CHP) at the Cooranbong Colliery. The proposed upgrade to the CHP design is considered to be minor and concurrent with the design assessed and approved in the Cooranbong Colliery Life Extension Project Environmental Impact Statement (Umwelt, 1997). Therefore there is no additional infrastructure requiring approval. The general location of the site is illustrated in **Figure 1**.

2.0 PROPOSAL

Mandalong Mine located approximately 2.5 kilometres west of Morisset in the Lake Macquarie local government area delivers coal to the Cooranbong Services Site (formally Cooranbong Colliery) located at Dora Creek for processing by way of an underground conveyor system to supply product coal to local power generators.

The EIS (Umwelt 1998) considered the construction and operation of a CHP including stockpiles, reclaimers and washery rejects to produce export coal from Mandalong Mine. Development Consent (DA97/800) approves this infrastructure, however the Mine proposes to undertake minor modifications to the CHP while still remaining consistent with the design assessed in the EIS (Umwelt 1998).

The modifications to the existing CHP, while not as extensive as those assessed in the EIS, involve the construction of coal stack-out and reclaim conveyors (including supporting trestle), stockpiles, truck loading bin, coal sizers and screens and bin storage. These have all been previously assessed and approved through DA97/800.

3.0 VISUAL ASSESSMENT

A **Visual Assessment** of the proposed modifications to the CHP has been undertaken to determine if there is any additional visual impact from development. Initially photographs were taken from key viewpoints surrounding the site towards the CHP. The locations and heights of these sites in relation to the CHP are shown on **Figure 2**.

The Cooranbong Colliery site is shielded extensively from surrounding residences by intervening terrain and vegetation. Access to the site is from the northern end of Gradwells Road located immediately west of the Eraring-Newstan private coal haul road and Eraring Power Station. The site is steeply sloping with extensive vegetation around the perimeter. In the south, from residences along Coorumbung Road, vegetation also screens the site. To the north the area is dominated by dense vegetation. To the west along Hawkemount Road there is one residence which is quite elevated, however natural screening in front of the property and the steep terrain shield the site. To the east is the great northern rail line which is separated from the site by thick vegetation.

The CHP modification requires the installation of additional infrastructure; including a stacking conveyor at 43.6m in height which represents 58.6m AHD, truck loading bin at 33m in height which represents 48m AHD, and a stabilising trestle arm at 56.2m in height which represents 71.2m AHD. The highest piece of infrastructure currently approved at the CHP is 22m (37m AHD). The elevation of the floor of the CHP area (including the base of the export stockpile) is 15m AHD. The elevations (AHD) of each of the surrounding viewpoints are shown in **Table 1**.



SOURCE: UBD Lake Macquarie Regional Touring Map 2

0.0 1.0 2.0 3.0 4.0 5.0km

FIGURE 1

Location Plan

Project
Cooranbong CHP Consent Modification

Client:
Centennial Coal

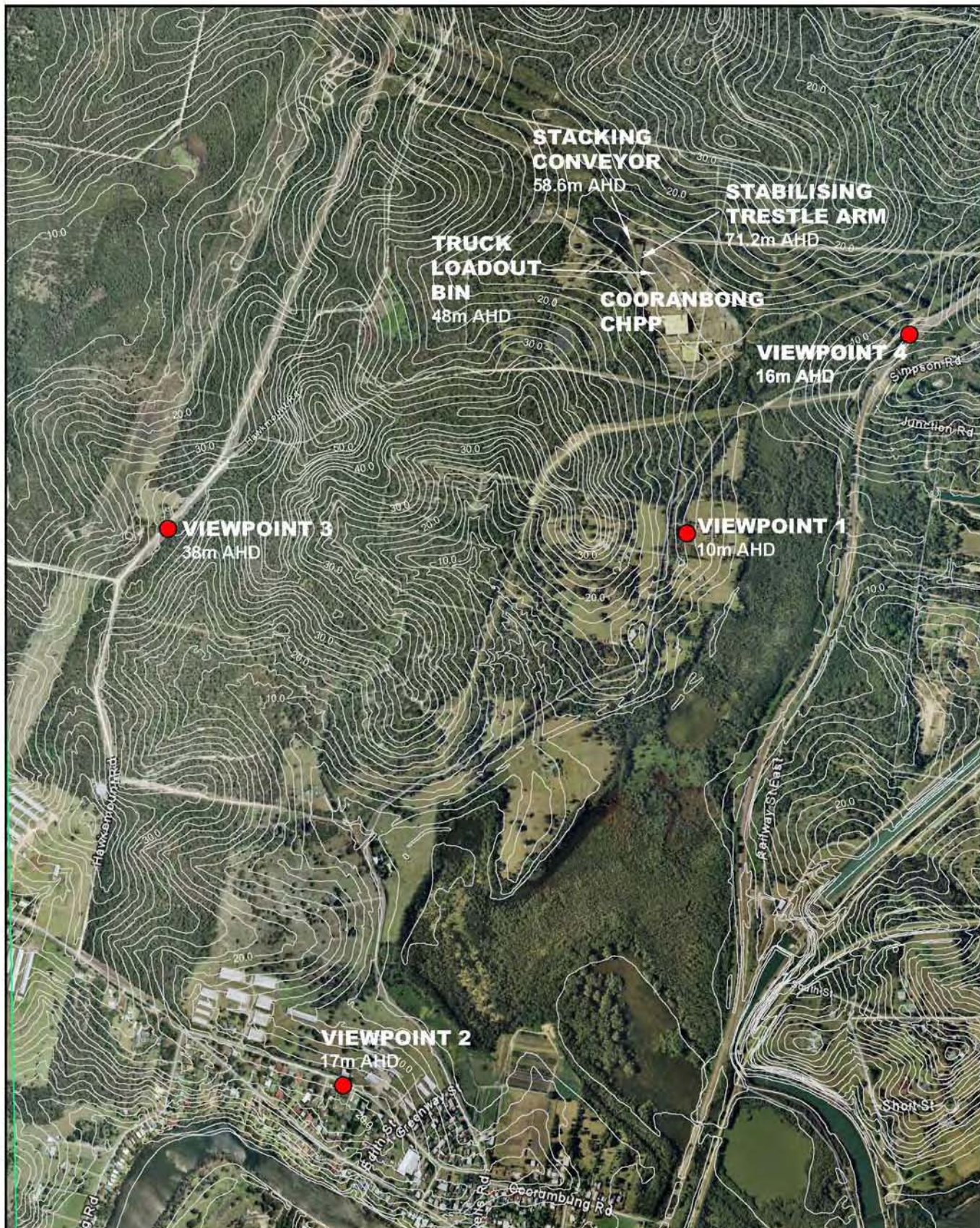
File:
Fg1_CCC14-002_Loc Plan_090623_V1

Projection:
MGA Zone 56

Version 1	Date: 23/6/09	Author: LF	Checked: SS	Approved: SS
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LEGEND

● Viewpoint (Photo Locations)

FIGURE 2

Photo Location Plan

Project: Cooranbong CHP Consent Modification

Client: Centennial Coal

Version	Date:	Author:	Checked:	Approved:
1	23/6/09	LF	SS	SS
2	6/8/09	LF	SS	SS
3	12/10/09	LF	SS	SS



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File: Fg2_CCC14-002_Photo Loc_091012

Projection: MGA Zone 56

Table 1 – Surrounding Viewpoints and Heights

Location	Meters AHD
Viewpoint 1	10
Viewpoint 2	17
Viewpoint 3	38
Viewpoint 4	16

In order to determine the potential visual impact, viewpoint profiles were established using contour data for the surrounding area (see **Figure 3**). In addition, photographs were taken from the viewpoints listed in **Table 1** above. **Plates 1 to 6** show the current view towards the CHP from each viewpoint.

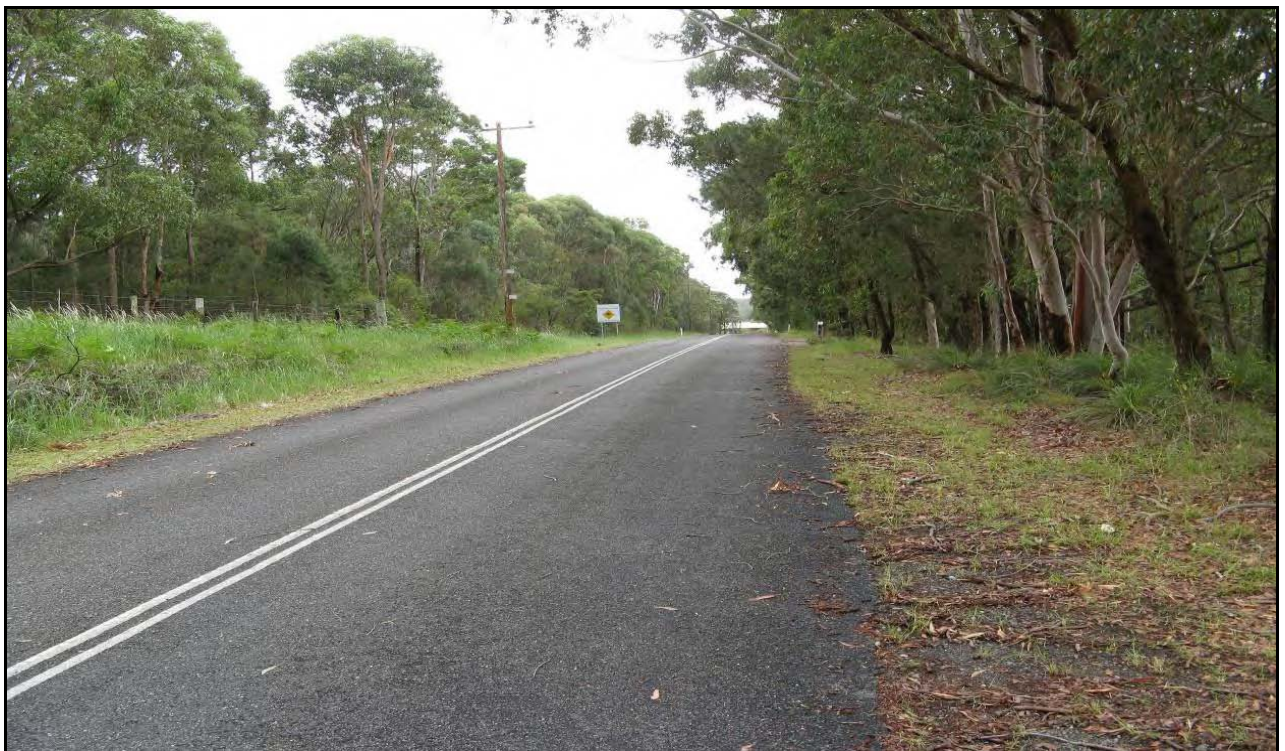


Plate 1 – Viewpoint 1 looking north north-west towards the CHP from the Richards residence on Gradwells Road



Plate 2 - Viewpoint 2 looking north north-east towards the CHP from residences along Coorumbung Road



Plate 3 - Viewpoint 3 looking north-east towards the CHP from a residential property along Hawkemount Road



Plate 4 - Viewpoint 4 looking west towards the CHP from the great northern rail line



Plate 5 - Viewpoint 4 looking west towards the CHP from the great northern rail line



Plate 6 - Viewpoint 4 looking west towards the CHP from the great northern rail line

As can be seen from **Figure 3** and **Plates 1 to 3** above, there are no existing visual amenity issues associated with the operation from viewpoints 1, 2 and 3. The stacking conveyor at 58.6m AHD and truck loading bin at 48m AHD will not be visible from viewpoints 1, 2 and 3 (10m, 17m and 38m AHD respectively) due to the undulating topography and height and shielding effect by surrounding vegetation even though the elevation of the stacking conveyor is higher than those viewpoints.

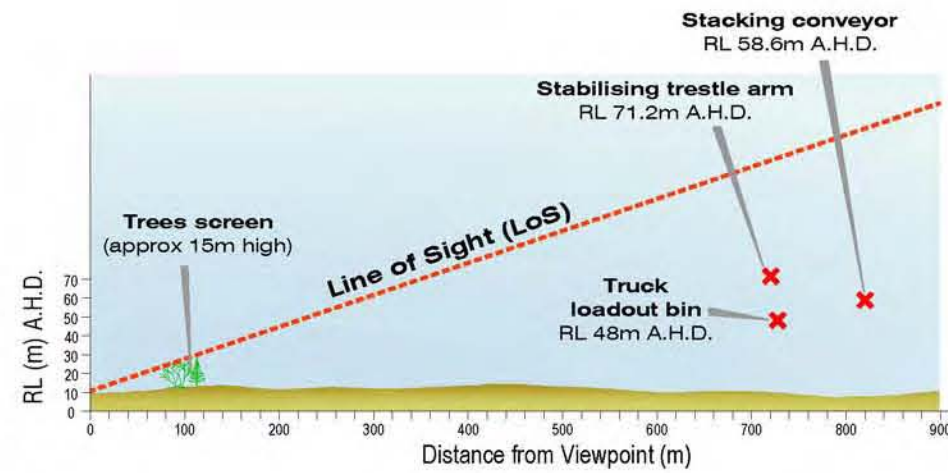
Similarly, the stabilising trestle arm at 71.2m AHD will not be visible from viewpoints 1, 2 and 3 (10m, 17m and 38m AHD respectively) also due to the undulating topography and the height and shielding effect by surrounding vegetation even though the elevation of the trestle arm is higher than those viewpoints.

Plates 4 to 6 taken from viewpoint 4 (16m AHD) do show that there are some glimpses of the current infrastructure from the great northern rail line which is the result of vegetation clearing for an existing power easement. However as this view is limited to a very specific point, the glimpses of infrastructure are considered to be minimal and not obtrusive. Colour of the CHP infrastructure has been selected so as to blend with the natural environment. Similarly, the proposed infrastructure will be visible to a degree, however this will also be limited to glimpses between the remaining vegetation and will be minimal. With partial screening provided by the current vegetation it is estimated that 10% of the field of view will be impacted upon. New infrastructure will be of a colour that will blend with the natural environment. **Figure 3** depicts the visual profiles from all viewpoints.

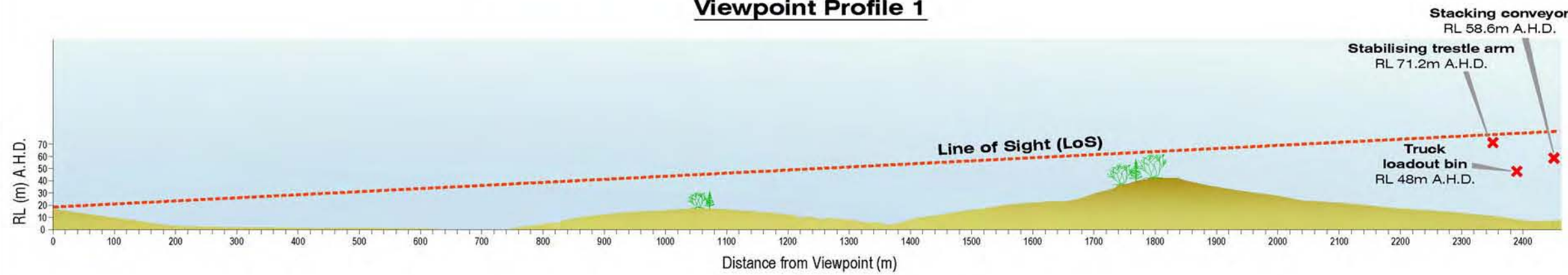
4.0 CONCLUSIONS

The assessment of visual amenity has determined that the CHP modification, with regard to the addition of the stacking conveyor, truck loading bin and stabilising trestle arm, will not cause any additional impact to the existing visual amenity from viewpoints 1, 2 and 3. From these points the infrastructure being shielded by natural vegetation and/or the steep topography that currently surrounds the operation.

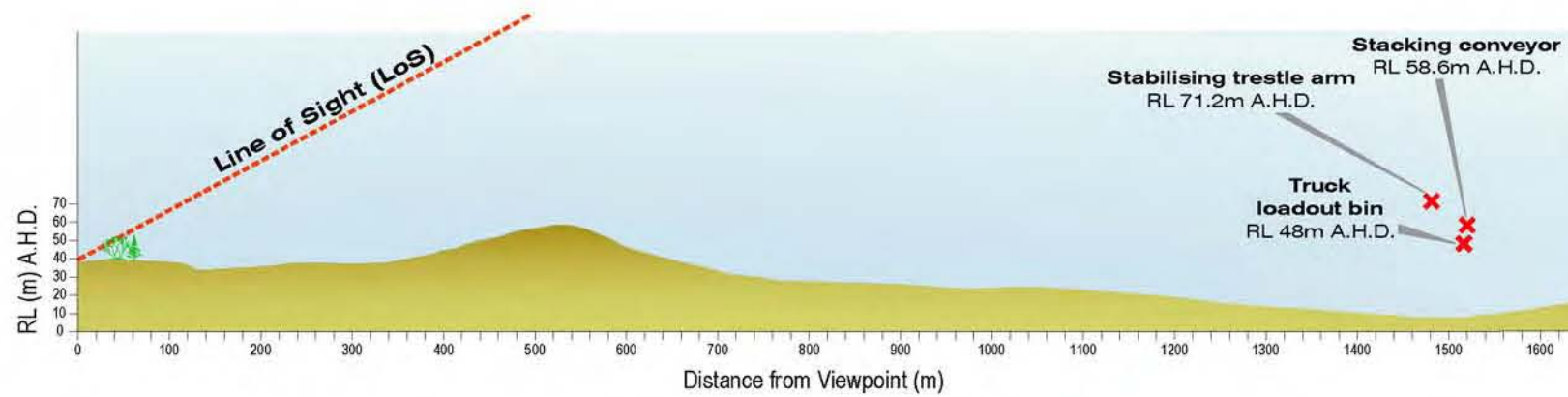
From viewpoint 4, along the great northern rail line, there are existing glimpses of infrastructure and this will be the case for the additional infrastructure. However these glimpses are limited to a specific point along the rail line resulting from clearing for a power easement. Due to the view of the infrastructure being limited to this very specific location, any visual impact is considered minimal and not obtrusive.



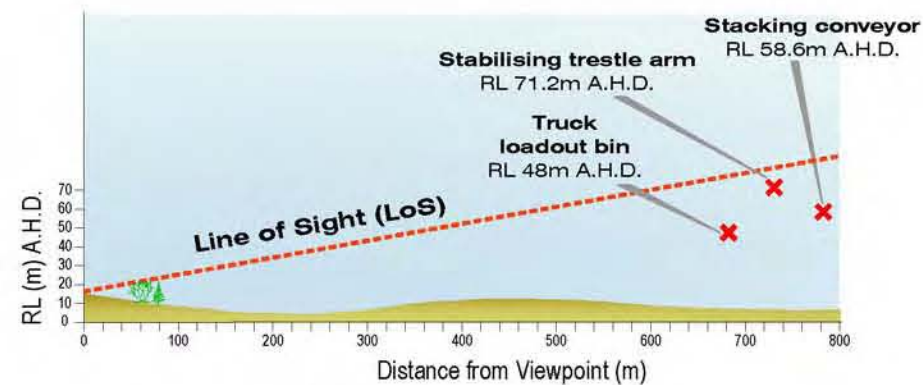
Viewpoint Profile 1



Viewpoint Profile 2



Viewpoint Profile 3



Viewpoint Profile 4

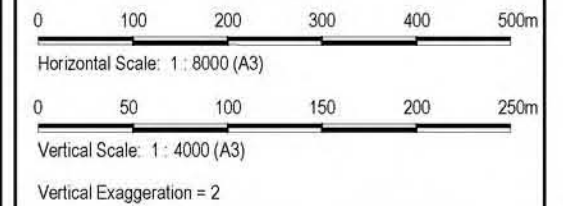


FIGURE 3

Viewpoint Profiles

Project:
Cooranbong CHP Consent Modification

Client:
Centennial Coal

File:
Fg3_CCC14-002_VP_091012

Projection:
N/A

Version:	Date:	Author:	Checked:	Approved:
1	11/8/09	LF	SS	SS
2	12/10/09	LF	SS	SS



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Existing and new infrastructure will be of a colour which blends with the natural environment and further reduces any visual impact.

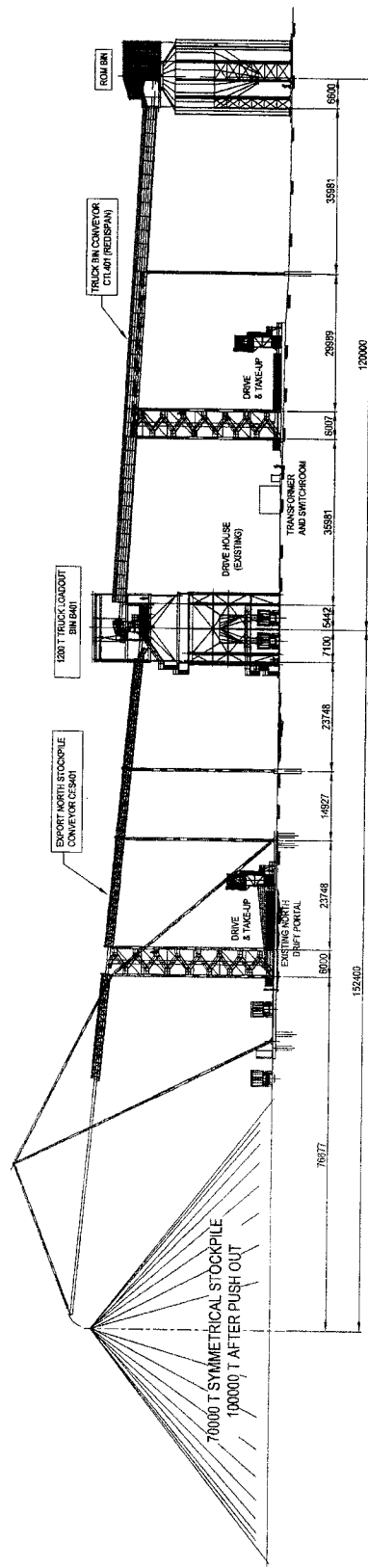
Therefore, it is anticipated that there will be minimal visual impacts from the proposed modifications to the CHP from viewpoints 1, 2, 3 and 4. It is estimated that 10% of the field of view will be impacted upon by the current and additional infrastructure.

5.0 REFERENCES

Umwelt (1997) *Cooranbong Colliery Life Extension Project Environmental Impact Statement*, Centennial Coal.

Maunsell AECOM (2009) *Cooranbong Coal Handling Plant Export Facility Feasibility Study*, Centennial Coal.

APPENDIX 5

ELEVATION

PRELIMINARY
ISSUED FOR
INFORMATION

CONTRACT No.	-
PLOTFILE No.	
A1	MAE13002
DRAWING REVISION	A
15	16
15	17

 Centennial Coal
 COORANBONG COAL HANDLING PLANT
 SITE GENERAL ARRANGEMENT
 ELEVATION

LOCATION	MANDALONG
SEAM	WEST WALLARAH
DRAWN	JON
CHECKED	-
APPROVED	-
SCALE	1:500

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6	

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