Mt Piper Power Station
Ash Placement Project

APPENDIX C

CONTRUCTION AND OPERATIONAL NOISE ASSESSMENT

- Final
- August 2010

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Contents

1. Introduction

1.1. Background

Delta Electricity owns and operates Mt Piper Power Station (MPPS), located approximately 17 km northwest of Lithgow (refer to **Figure 1-1)**. The station currently comprises two coal-fired generating units, each of which is operating at 700 MW.

The original development consent for Mt Piper in 1982 included a proposal to place ash produced at the station in an ash dam – i.e. a wet system. Due to a deferment in construction of Mt Piper, the opportunity for an alternative ash placement arose and, based on the Environmental Impact Statement (EIS) prepared in November 1989, consent was granted by Lithgow City Council in March 1990 for ash placement in a former Western Main open cut mine void adjacent to the power station. This area is known as Area 1 and employs basically dry ash placement.

Based on the existing operation of Mt Piper Power Station, the present ash placement area is expected to reach capacity in five to six years (by around 2015), well before the power station reaches the end of its economic life. Accordingly there is a need to obtain development consent for ash placement beyond that time.

Concept Plan approval has been granted for the construction and operation of the Mt Piper Extension project. This would, following more detailed studies and planning approvals, the construction and operation of a new power station next to the existing power station. The generating capacity of the new power station would be about 2,000 MW, with the facility fuelled by either coal or gas. If planning approval is sought for a coal fired power station, the ash produced as a result of the new generating capacity would need to be placed in the areas proposed for this approval.

The Mt Piper Ash Placement Project (referred to as the 'Project'), involves the development of new ash placement areas to cater for the ash generated from the existing Mt Piper Power Station and to accommodate ash from the proposed Mt Piper Extension Project. The Project involves four proposed areas for ash placement which comprise four sites: at Lamberts North, Lamberts South, Ivanhoe No 4 and Neubecks Creek. On 20th October 2009, the Minister for Planning formed the opinion pursuant to clause section 75B (1) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) that the Project is of State environmental planning significance requiring assessment under Part 3A of the EP&A Act. Delta Electricity (Delta) is seeking concept plan approval for the entire project and project approval for the Lamberts North and Lamberts South sites. On the 12th November 2009 Delta received the Director General Requirements (DGRs) as issued by the DoP to be addressed within the Project's Environmental Assessment.

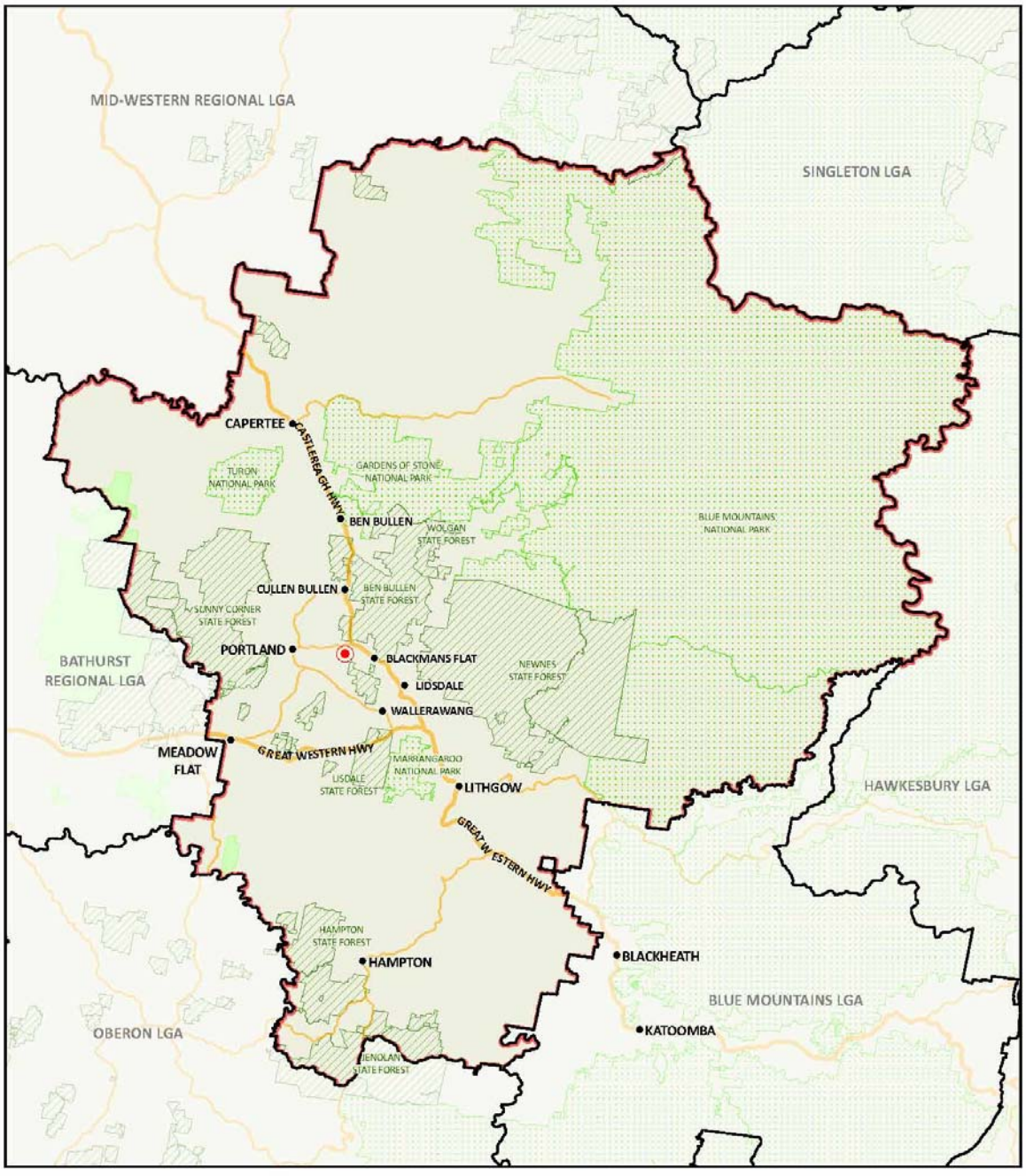


Figure 1-1 Regional Overview

1.2. Purpose of the Report

This report has been prepared by SKM for Delta Electricity. The purpose of the report is to assess the noise impact of the Mt Piper Ash Placement Project for inclusion in the Environmental Assessment of the EP&A Act.

The Director-General's requirements for the noise impact assessment within the EA are:

"for the Neubecks Creek and Ivanhoe No. 4 sites (concept plan application only) include an analysis of potential noise constraints to the development of these sites including available mitigation and/or management options that may be applied to achieve acceptable environmental outcomes, with consideration of cumulative impacts from the project and other existing or proposed activities in close proximity to the project site. Key noise risk factors and/or design criteria that would require further detailed investigation prior to the development of these sites must be identified.

For Lamberts North and Lamberts South sites (project application), include a construction and operational noise assessment that identifies impacts on surrounding residential premises and other sensitive receivers, with particular consideration of cumulative noise impacts from surrounding power stations (including Mt Piper and Wallerawang) and the Western Rail Coal Unloader. A framework for the mitigation, management and monitoring of noise impacts during construction and operation of the project must also be provided, particularly with respect to receptors and receptor types likely to be significantly impacted by the project and with specific references to noise-intensive works/activities (for example bulk excavation and heavy vehicle movements during construction). The assessment must be undertaken consistent with:

- *NSW Industrial Noise Policy (EPA, 2000);*
- *Interim Construction Noise Guidelines (DECC, 2009); and;*
- *Environmental Criteria for Road Traffic Noise (EPA, 1999)."*

This report provides a detailed assessment of the noise from the construction and operation of ash placement at Lamberts North and Lamberts South ash placement sites. It also provides an analysis of potential noise constraints to the development of the Neubecks Creek and Ivanhoe No 4 sites, along with noise risk factors that would require detailed investigation prior to development of these two sites.

2. Project Description

2.1. Existing Operations

Under existing operations, ash is transported to the ash storage area from MPPS via an enclosed belt conveyor. The conveyor discharges into separate surge bins located within the ash storage area, from which the ash is discharged into an off-road articulated trailer-truck for emplacement.

The current ash placement area (Area 1) is an open cut mine void located on the north east side of the power station (refer to **Figure 2-1**). It is estimated that this area has 5-6 million m^3 of remaining capacity with approximately 786,000 m^3 of ash currently being placed within the storage area annually.

Should approval to develop a new 2,000 MW ultra-supercritical (USC) coal-fired plant be given this would result in the generation of additional ash requiring placement. It is estimated that an additional 1,314,000 m^3 would be generated annually for the new power station.

2.2. Project Description and Staging

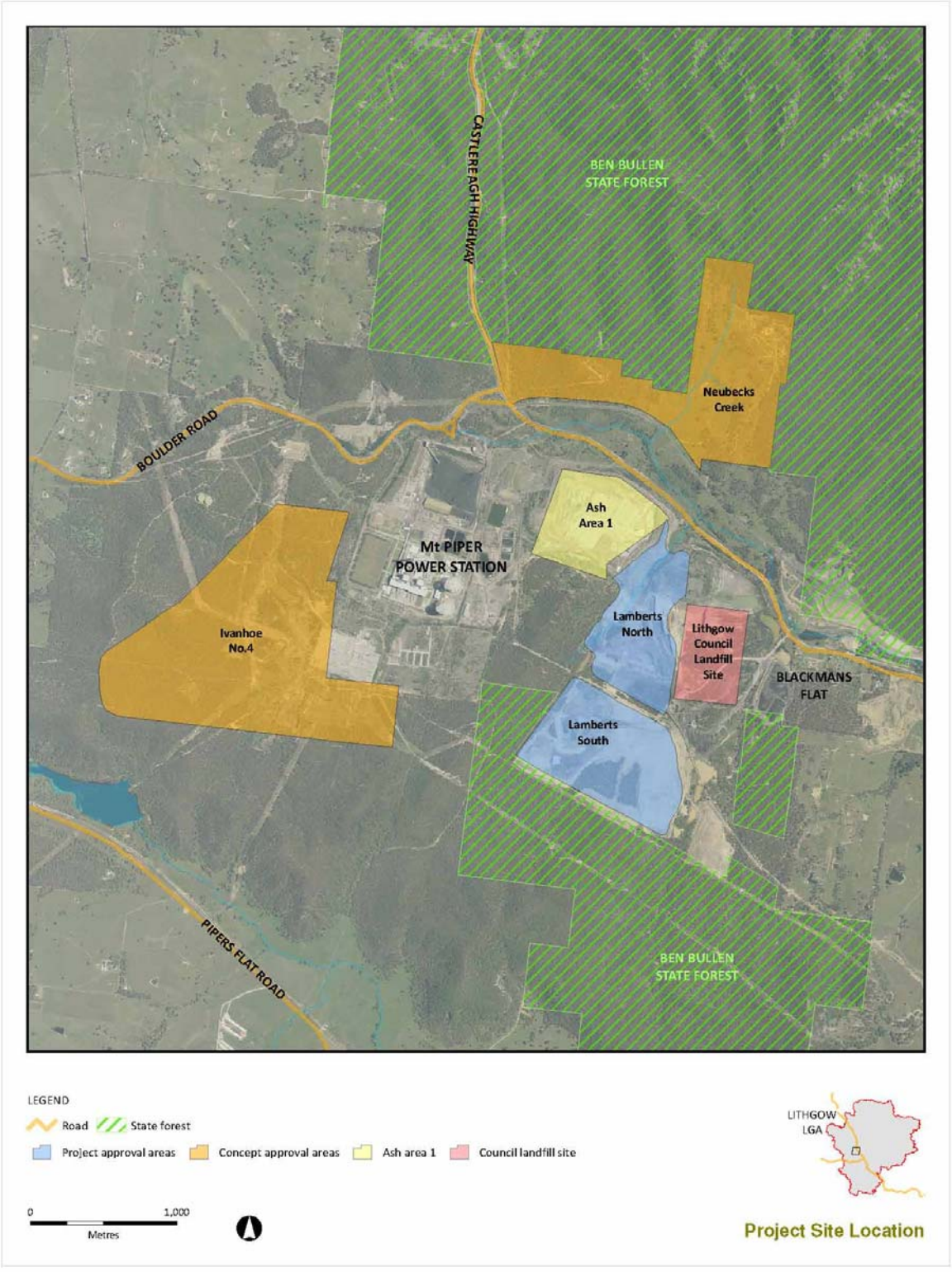
Based on current and proposed operations, Delta Electricity has identified the need to expand its current ash placement facilities to enable the further placement of ash once the existing ash placement area has reached capacity. Previous feasibility and site selection studies have selected four broad sites on which Delta is proposing to undertake planning activities and obtain relevant approvals for ash placement. The four sites are, Lamberts North, Lamberts South, Neubecks Creek and Ivanhoe No 4. The location of each site is shown in **Figure 2-1.**

Lamberts North and Lamberts South are currently being mined for coal and it is intended that their development would occur within the next few years. Ash placement at Neubecks Creek and Ivanhoe No. 4 would be unlikely to occur before 2026 and hence Concept Approval only for these sites is being sought.

In order to maximise the placement of ash within the existing ash placement area (Area 1) and the adjoining Lamberts North site, it is proposed to construct a sub-surface drainage blanket over the current drainage course (Huons Gully) that separates the two areas. This would allow the drainage course to be filled with ash. Construction of the blanket would require stabilisation works to the existing banks and drainage channel.

The proposed strategy for Lamberts North and Lamberts South is broken up into four stages, as discussed in **Table 2-1**. It should be noted that Lamberts North is separated into two stages (Stage 2 and 3) for different sectors. For the purpose of this assessment Stage 2 and Stage 3 sites will be referred to as Area 2 and Lamberts North respectively.

- **Figure 2-1 Mt Piper Power Station and Ash Placement Sites**



Based on the current operating conditions at Mt Piper Power Station, the proposed new areas of ash placement would not involve an increase in the amount of ash disposed of annually. However, the proposed location of the emplacement facility is closer to nearby residents at Blackmans Flat and therefore has the potential for a greater impact on sensitive receivers.

Table 2-1 Proposed Placement Strategy for Lamberts North and Lamberts South

Stage	Description	Timing
Stage 1	■ Continuation of current placement activities within the existing ash Area 1 until current level filled for RL 960. ■ Once the RL level is reached the entire area would be capped and revegetated.	2009-2014
Stage 2	■ Preparation works for Lambert North, east of and including Huons Gully, to commence in 2012. Huons Gully would be converted to a sub-surface drain. ■ Ash placement in Area 2 to commence in 2014 or 2015.	2012-2017
Stage 3	■ Preparation works for Lambert North including extension of the current ash conveyor to commence in 2015 ■ Ash placement in Lamberts North to commence in 2015.	2012-2025
Stage 4	■ Preparation works for Lambert South including possible further extension of the overland conveyor to commence in 2023 ■ Ash placement in Lamberts South to commence in 2025	2023-2042

Ash placement activities in the proposed sites would be similar to that which is currently undertaken in Disposal Area 1 and are described in the sections below. Under existing operations, fly ash is conveyed in the fly ash collection plant by means of a dense phase system to a silo for transfer to conveyor. Furnace ash is transferred from the boilers by submerged scraper conveyor. The furnace ash then passes to a hopper for transfer to the repository by heavy haulage vehicles.

Transportation to the ash area of both the dewatered furnace ash from the dewatering screen and excess conditioned fly ash is by enclosed belt conveyor. The conveyor discharges into separate surge bins located in the ash storage area, from which the ash is discharged into an off-road articulated trailer-truck for ash emplacement. When the conveyor is out of service, ash is taken by truck to the ash placement area.

The current system of transport will be maintained for the proposed ash placement sites.

Detailed methodologies have been developed for the placement of ash materials to optimise compaction and stability of the emplacement areas during and after construction. Existing ash placement methods including target moisture content, compaction density and progressive revegetation, would be adopted for these sites, with ongoing monitoring and assessment of

specifications to optimise placement and moisture conditioning requirements. The current practice is that ash is placed to the desired height in 'pads', with materials moisture conditioned with water placed in the lower layers to an elevation of up to 946 m AHD. Above this level, ash moisture conditioned with brine is permitted. Typically ash is placed by:

- Delivering ash to the working face via truck and dumping into position,
- The ash is then spread and shaped via dozer operation,
- Ash is then compacted using controlled number of passes with dozer and/or truck to achieve required compactive effort as discussed below.

Typically, ash is placed in 500 mm lifts. The ash is compacted to achieve a compactive effort of 95% relative to its maximum standard compaction through a combination of controlled addition of water (through conditioning) and a process of machine compacting with the use of rollers and rubber tyred vehicles which are also used for the transport of the material. Ash is placed in layers and stepped to produce an overall batter slope of (typically) 1(V):4(H), with benches added every 10 m (approximately) in vertical height change.

The proposed operational hours of the Lamberts North and Lamberts South ash placement areas would correspond to the working hours for the existing ash placement operations. The operational hours would be between 06:00 and 20:00 on Monday to Friday and 06:00 to 17:00 on Saturday and Sunday.

3. Existing Noise Environment

3.1. Overview

In accordance with NSW environmental policy (refer to **Section 4**), it is necessary to conduct noise monitoring for the project to enable the setting of appropriate criteria with respect to the existing environment. In general, to categorise the variation in background noise levels, one week of ambient noise monitoring is required. The Department of Environment Climate Change and Water (DECCW) further categorises one 24-hour monitoring period into the following three assessment periods:

- Day – 7:00am to 6:00pm;
- Evening – 6:00pm to 10:00pm; and
- Night – 10:00pm to 7:00am.

Background noise levels were measured at Blackmans Flat between 10 and 20 of December 2009 and at Wallerawang between 22 December 2009 and 8 January2010. The purpose of the long term noise monitoring is to provide noise level data to help characterise the influence of existing noises in the vicinity of the ash placement site.

The sites selected for logging were two key residential dwellings that represent the nearest receiver locations to the proposed ash placement areas. The locations of the noise loggers, with respect to the Power Station, are shown in **Figure 3-1**. An address and description of where the loggers were situated on the properties is given in **Table 3-1** below.

- **Table 3-1 Receiver an monitoring locations**

Location ID	Location Description	Noise monitor location
1	Blackmans Flat	Located at the western end of Noon Street on the southern side of the road. Positioned at the rear of the property approximately 100 metres from the Castlereagh Highway
2	Wallerawang	Located on a rural property west of the Castlereagh Highway. The dwelling is located approximately 1100m from the Castlereagh Highway. The logger was positioned 70m north of the house.

- **Figure 3-1 Location of proposed ash placement areas and receiver locations.**

3.2. Environmental Noise Measurements

The following section provides a summary of the background noise surveys and the results of the attended and unattended monitoring.

3.2.1. Unattended Noise Monitoring

The unattended monitoring was undertaken with automatic noise loggers that measure environmental noise and store the results in memory. The loggers were ARL type 215 and had been NATA tested by the manufacturer within the last 12 months. The loggers were set to record a range of noise indices at 15 minute intervals. These data were used to determine the median values for the following descriptors for the day, evening and night time periods.

- L_{Amax} – the maximum noise level measured at a given location over the 15 minute interval.
- L_{A10} – the noise level exceeded for 10 percent of the 15 minute interval, this is commonly referred to as the average-maximum level.
- L_{Aeq} – the noise level having the same energy as the time varying noise level over the 15 minute interval.
- L_{A90} – the noise level exceeded for 90 percent of the 15 minute interval. This is commonly referred to as the background noise level and represents the quietest 90 seconds in a 15 minute period.

The Rating Background Level (RBL) is the overall, single-figure, L_{A90} background level representing each of the day, evening or night assessment periods over the whole monitoring period. This is often referred to as the background level and is the noise level used for assessment purposes. It is defined as the median value of all the day, evening or night assessment levels over the monitoring period.

A summary of the noise data is presented in **Table 3-2** and the daily graphs are provided in **Appendix A**.

- **Table 3-2 Summary of Unattended Noise Survey**

Location	Date	Rating Background Level (RBL) dB(A)			L_{Aeq} over the assessment period dB(A)		
		Day	Evening	Night	Day	Evening	Night
1	10/12/09 20/12/09	44	33	29	54	51	49
2	22/12/09 08/01/10	33	33	30	41	40	38

3.2.2. Discussion of Unattended Noise Data

The noise monitoring at both locations indicates low background noise levels are present during the day, evening and night time periods. While the ambient noise levels at the Wallerawang location are low for each of the assessment periods, the measured levels at Blackmans Flat location shows the influence from road traffic on the Castlereagh Highway.

3.3. Attended Monitoring

Attended noise monitoring was carried out at the same locations where noise loggers had been positioned. The attended monitoring was conducted on 10 December 2009 between 10:00am and 10:45am to establish the level and contribution to the noise environment. **Table 3-3** presents a summary of the monitored noise levels and the various sources that comprised the noise environment for the survey.

- **Table 3-3 Summary of Attended Noise Survey**

Location	Date & Time	Noise Levels – dB(A)				Contribution to noise environment
		L_{A90}	L_{A10}	L_{Aeq}	L_{Amax}	
1	10/12/09 10:00	48	58	54	64	Operational noise from Centennial Coal was audible at this location. Influences included: ■ Trucks and reverse beepers ~44 dB(A) ■ Excavator ~ 45 dB(A) ■ Caterpillar track and engine revving (possibly dozer) ~ 50 dB(A) ■ Traffic on Castlereagh Highway - Cars 54 dB(A) - Tucks 64 dB(A)
2	10/12/09 10:30	40	44	42	55	Operational noise from Centennial Coal was audible at this location. Influences included: ■ Caterpillar track (dozer) ~ 44 dB(A) ■ Traffic on Castlereagh Highway - General 40 dB(A) ■ Cicadas (Intermittent) ~42 dB(A)

3.4. Discussion of Noise Monitoring Results

Results of the attended monitoring show good agreement with the measured data from the unattended noise survey, with unattended daytime L_{Aeq} values of 54 dB(A) and 41 dB(A) for Locations 1 and 2 respectively.

At Location 1, the greatest influence on the noise environment came from road traffic, although noise influences from mining operations at the Lamberts Gulley site were noted at this location. During the attended measurements at Location 2 noise from the Castlereagh Highway and operations from the Lamberts Gulley mining site were audible. The Wallerawang residence is located approximately 3.4 km north west of the Wallerawang Power Station and is shielded by a ridgeline from the intervening topography. This residence is also located approximately 3.3 km to the east of Mt Piper Power Station. It is expected that the ambient noise levels coupled with these large distances was the reason that there were no observed noise emissions from either Mt Piper or Wallerawang Power Stations during the monitoring period.

4. Legislative Requirements

The Mt Piper Environment Protection Licence number 13007 does not include the provision for noise limits for current ash disposal operations. In the absence of site specific requirements, the noise impacts from the proposed ash placement area would be assessed against NSW noise guidelines.

The DECCW administer the *NSW Industrial Noise Policy* (INP) (EPA, 2000), which provides guidelines for the assessment of noise impacts from industrial premises that are scheduled under the *Protection of the Environment and Operations Act, 1997*. This document also provides guidance for developments and activities of an industrial nature that are not scheduled premises.

The INP is used to determine an acceptable level of impact to the existing noise environment within a community. Where the INP criteria are met at the closest or most affected receivers, no adverse noise impacts would be reasonably expected. The specific noise objectives that are presented in this report have been derived in accordance with the INP.

The INP requires that the noise from a development under assessment comply with the lower of the amenity or intrusive noise criteria. The intrusive criterion is determined by an L_{Aeq} noise level for the day, evening and night time period being no more than 5 dB(A) above the Rating Background Level (RBL) determined for the representative receiver location(s). The RBL is the tenth percentile of the background noise environment evaluated in the absence of industrial noise from the development in question. This is usually assessed prior to the commencement of operations.

The amenity criterion is a predetermined value based on the existing noise influences and the zoning of the residences likely to be affected by noise. Where there is an existing influence of industrial noise, the INP introduces modifying factors to the amenity criteria level to account for cumulative noise impacts. This helps to minimise background noise creep and control the long term noise environment. While the amenity criteria are more suited to planning of noise levels rather than the assessment of project specific impacts the intrusive noise criteria are designed to account for shorter duration noise impacts and are often the most appropriate tool for assessing the effects of noise from developments at a residential location.

4.1. Intrusive Noise Criteria

A noise source is considered to be non-intrusive if:

- the $L_{Aeq, 15minute}$ level does not exceed the RBL by more than 5dB(A) for each of the day, evening and night-time periods,
- the subject noise does not contain tonal, impulsive, or other modifying factors as detailed in Chapter 4 of the INP.

From **Table 3-2** the RBL noise levels for day, evening and night the intrusive noise limits have been applied to the monitoring locations as the assessment criteria. The corresponding intrusive noise criteria for the day, evening and night time periods are presented in **Table 4-1**. It should be noted that in relation to an RBL used for assessment purposes, where this level is found to be less than 30 dB(A), the rating background level is adjusted to equal 30 dB(A), thus making the lowest $L_{Aeq,\ 15\ minute}$ intrusive noise criterion 35 dB(A) at all locations for night time operations.

4.2. Amenity Noise Criterion

The amenity criteria apply to the L_{Aeq} level determined for the period of assessment of day, evening and night. The definition of the noise amenity classification for receivers surrounding the ash placement is "Rural" based on the description for this type of location in the DECCW Industrial Noise Policy. In Table 2-1 of the INP minimum noise level values are recommended for residences located in a rural area, and an acceptable amenity criteria is defined by an $L_{Aeq\ (Period)}$ of 50, 45 and 40 dB(A) for day, evening and night periods respectively.

4.2.1. Cumulative Noise Impact Criteria

The INP aims to control cumulative noise impacts resulting from the combined effects of a proposed project and existing industrial noise sources by modifying the amenity criteria depending on the level of existing impact. Where there is an existing industrial noise influence, the amenity criteria are decreased in accordance with the INP.

In reviewing **Table 3-3** and the measured existing L_{Aeq} noise levels for day, evening and night at each monitoring location, the intermittent operational noise from Lamberts Gulley mine is audible during the daytime at both locations, but the influence of road traffic noise is the dominant daytime noise source at Blackmans Flat.

Road traffic noise also influences the noise levels at the Wallerawang residential receiver, with traffic noise levels rising from about 5 am , peaking at about 44 dB(A) by 7 am and then remaining steady at about 40 dB(A) until about 10 pm when the levels drop to about 35 dB(A).

Additional noise influences include the Springvale to Mt Piper overland conveyor, which transports coal past the receiver at Location 2 to the Mt Piper stockpile. This conveyor operates on an as-needs basis and therefore does not operate continuously or for a fixed duration. The conveyor is also located in a cutting for the majority of the length adjacent to this receiver.

As discussed in the monitoring results, the respective power stations are approximately 3.3 km from the residence at Location 2. It is expected that these distances are significant in making both the Wallerawang and Mt Piper Power Stations inaudible during the attended monitoring survey and as such, there is no cumulative impact from these sources at this location.

4.3. Summary of Project Noise Goals

Table 4-1 summarises the project specific noise goals outlined above at the potentially most affected residence.

Table 4-1 Summary of Project Specific Noise Criteria

	Day	Evening	Night-time
Intrusiveness Criteria	$L_{Aeq15\ min}$	$L_{Aeq15\ min}$	$L_{Aeq15\ min}$
Project Intrusiveness Criteria	RBL + 5 dB(A)	RBL + 5 dB(A)	RBL + 5 dB(A)
Project Specific RBL levels			
Location 1	49 dB(A)	38 dB(A)	35 dB(A)*
Location 2	38 dB(A)	38 dB(A)	35 dB(A)
Amenity Criteria	$L_{Aeq\ 11hr}$	$L_{Aeq\ 4hr}$	$L_{Aeq\ 9hr}$
Acceptable Amenity Criteria	50 dB(A)	45 dB(A)	40 dB(A)
Modified Amenity Criteria	-	-	-
Project Amenity Criteria	50 dB(A)	45 dB(A)	40 dB(A)
Project Noise Criteria	$L_{Aeq15\ min}$	$L_{Aeq15\ min}$	$L_{Aeq15\ min}$
Location 1	49 dB(A)	38 dB(A)	35 dB(A)
Location 2	38 dB(A)	38 dB(A)	35 dB(A)

(*) Adjusted to meet the INP Minimum RBL Requirement

In **Table 4-1** the information from **Table 3-3** is used to develop the intrusiveness criteria. The amenity criteria are taken from Table 2-1 of the INP. The most stringent of the noise goals for each assessment period is then adopted as the project specific noise criteria that are used to assess compliance.

5. Operational Impact Assessment

5.1. Assessment Methodology

The proposed project site is the Lamberts Gully mine and is currently operated by Centennial Coal. When mining activities at this site cease the site will be acquired by Delta Electricity for use as an ash placement area. The current mining activities on this site would not continue and therefore have not been included in the assessment of noise impacts.

In accordance with the Director General's requirements, cumulative noise impacts from the Mt Piper and Wallerawang Power Stations have been considered as well as the influence from the Western Rail Coal Unloader and the Springvale-Mt Piper overland conveyor. These sources have been incorporated into a single noise model, which predicts the total noise impact resulting from the identified noise sources.

Elements of the noise model include noise levels of the proposed equipment, terrain data and the nearest or most affected receiver locations. The cumulative impacts from surrounding industrial noise influences and the proposed ash placement area are predicted at the receiver locations and compared to the project specific noise goals identified in **Table 4-1** to confirm compliance with these goals.

5.2. Noise Modelling Methodology

The assessment of noise impacts at residences nearest to the ash placement area is based on the prediction of noise levels using a noise model. The model used has been validated and used previously for noise studies for the Mount Piper site by comparing predictions at known locations to measurements taken at the same locations during the noise survey. This noise model has been revised to include the ash placement operations and therefore provides a cumulative impact from noise sources previously identified at the Mt Piper site.

SoundPLAN noise prediction software was used to predict noise levels from the placement area for each of the identified residential locations. The noise modelling was based on sound power data provided by equipment manufacturers or data taken from SKM's acoustic database.

The noise model used CONCAWE algorithms to predict the L_{Aeq} noise levels at the nearby residences for the daytime period, which is in line with the proposed operational hours. The use of the CONCAWE model allows for prediction of noise levels that incorporate adverse weather conditions such as gentle source-to-receiver winds and inversion layers, where the INP identifies these phenomena must be assessed.

The operations of the ash placement area have been assessed for the Lamberts North and Lamberts South regions based on 3 scenarios for each site. These scenarios include the initial operations that include the existing terrain, a mid stage scenario based on projected terrain contours at that time and a final stage scenario based on the projected final terrain contours.

5.2.1. Sources of Noise Emissions

The noise emissions associated with the ash placement areas have been identified by Delta Electricity as part of the operational methodology. Operation of the ash placement areas involves the transportation, distribution and compaction of the ash within the placement area and the proposed equipment list is presented in **Table 5-1** with the sound power data for each item.

- **Table 5-1 Equipment list and associated sound power levels.**

Typical activity description	Equipment noise source	Quantity	L_{Aeq} sound power level re: 1pW, dB(A)
Ash placement Operation: dumping, ash distribution, dust suppression, rolling and capping	Komatsu HM400 articulated dumper	2	113
	Komatsu D65EX dozer	1	108
	Multipac 15 Ton smooth drum roller	1	107
	Hitachi AH250D water cart	1	109

Additional details provided by Delta in relation to the operation of the ash placement area include the following.

- Cycle times for the haul trucks are approximately 8 minutes with 60-70 loads per shift.
- Operational hours for the Lamberts North and Lamberts South areas would be between 06:00 and 20:00 Monday to Friday and 06:00 and 17:00 on Saturday and Sunday.
- The equipment operates cyclically with the following percentages; dozer 60%, water trucks/tankers 65% (10 hrs/day summer and 7 hrs/day winter), and drum roller 30%.
- Normal operational cycle is for ash to be dumped until the required amount is in place. The dozer then distributes the ash along the bench. Once distribution is complete, it is packed with the drum roller until the required compaction is achieved.
- Capping is progressive and is undertaken as an addendum to ash placement utilising the equipment.

Each modelling scenario includes a static dumper and dozer noise source as well as a dumper represented as a moving noise source. This combination is representative of a typical combination of equipment at any time during operation of the placement area.

5.3. Operational Noise Impacts Assessment

The operational noise impacts have been assessed at the nearest affected receiver locations for both the Lamberts North and Lamberts South ash placement areas. The noise levels for each location represent the predicted levels for the daytime and evening shoulder operational hours. The predicted levels would be the same for the morning shoulder period between 06:00 to 07:00 and for the evening shoulder period between 18:00 to 20:00.

During the morning shoulder periods, the noise levels in the area are generally increasing due to traffic movements on the highway, which tend to dominate the noise environment. During the evening, the noise levels are reducing from about 18:00 to 22:00 hours, where they reach the lower night time noise levels.

The results are presented for each receiver location for the north and south placement areas which have been assessed separately for both neutral and adverse weather conditions. Adverse weather conditions have been assessed using a 3m/s wind from the source to the receiver. The noise goals from **Table 4-1** for the daytime and evening period are shown for reference for each site. **Table 5-2** and **Table 5-3** present the results for the Lamberts North and Lamberts South placements for neutral weather conditions.

- **Table 5-2 Predicted noise levels at sensitive receiver locations Lamberts North (neutral meteorology)**

Receiver	Assessment Period	Noise Goal dB(A)	Initial Stage	Mid Stage	Final Stage
Location 1	Daytime	49	37	37	38
	Evening	38			
Location 2	Daytime	38	34	35	35
	Evening	38			

- **Table 5-3 Predicted noise levels at sensitive receiver locations Lamberts South (neutral meteorology)**

Receiver	Assessment Period	Noise Goal dB(A)	Initial Stage	Mid Stage	Final Stage
Location 1	Daytime	49	38	38	36
	Evening	38			
Location 2	Daytime	38	39	37	36
	Evening	38			

Table 5-4 and **Table 5-5** present the results for the Lamberts North and Lamberts South placements for adverse weather conditions.

- **Table 5-1 Predicted noise levels at sensitive receiver locations Lamberts North (adverse meteorology)**

Receiver	Assessment Period	Noise Goal dB(A)	Initial Stage	Mid Stage	Final Stage
Location 1	Daytime	49	39	40	41
	Evening	38			
Location 2	Daytime	38	37	38	39
	Evening	38			

- **Table 5-2 Predicted noise levels at sensitive receiver locations Lamberts South (adverse meteorology)**

Receiver	Assessment Period	Noise Goal dB(A)	Initial Stage	Mid Stage	Final Stage
Location 1	Daytime	49	41	40	39
	Evening	38			
Location 2	Daytime	38	42	41	40
	Evening	38			

5.3.1. Discussion of Results

Under neutral weather conditions, the operation of the ash placement areas for Lamberts North and South both indicate that compliance with the noise goals would generally be expected for both daytime and evening periods. Without mitigation measures a marginal exceedance of the project specific noise goals may occur at Location 2 when operations reach the Lamberts South placement area in 2023. This is likely to occur in the early stages of the operations due to the topography of the site and the proximity to the receiver near the eastern edge of the placement area.

At Lamberts North, the predicted noise levels under adverse meteorological conditions indicate general compliance during the daytime for both locations, with a marginal exceedance possible without mitigation during the latter stages at Location 2. The same result is again expected at Location 2 for the evening period, although an exceedance of up to about 3 dB(A) is possible at Location 1 during this time.

At Lamberts South, the results generally indicate exceedances for both receiver locations without mitigation, the exception during this phase of works is Location 1 for the daytime period, which is expected to comply even under adverse weather conditions. The exceedances during the evening

period are predicted to be up to 4 dB(A) at Location 2. These are expected, however, to reduce to approximately 1-2 dB(A) at both locations during the final stage of works.

5.3.2. Mitigation Measures

The nature of the operations for the ash placement makes mitigation feasible by utilising the benched ash mound as a noise barrier. Testing various barrier options has indicated that where the top of the barrier is 4 m higher than the ground level of the equipment, a 5-6 dB(A) reduction in the noise level at the receiver location is possible.

There are limitations to this method due to the mobile nature of the noise sources and the movement of trucks to and from the dump location, since the barriers effectiveness would be decreased as the noise source moves further from it. While the use of the ash placement as a barrier has been identified as a potential solution, the construction of the ash mound and its progression through the site will require more detailed planning and may be subject to safety and process constraints.

Given the life cycle of the sites, it may be feasible to purchase new, quieter equipment when the existing equipment requires replacement. In a similar fashion, maintenance of the equipment should include the use of quiet components such as exhausts when replacements are being scheduled.

5.4. Ivanhoe No. 4 and Neubecks Creek Sites

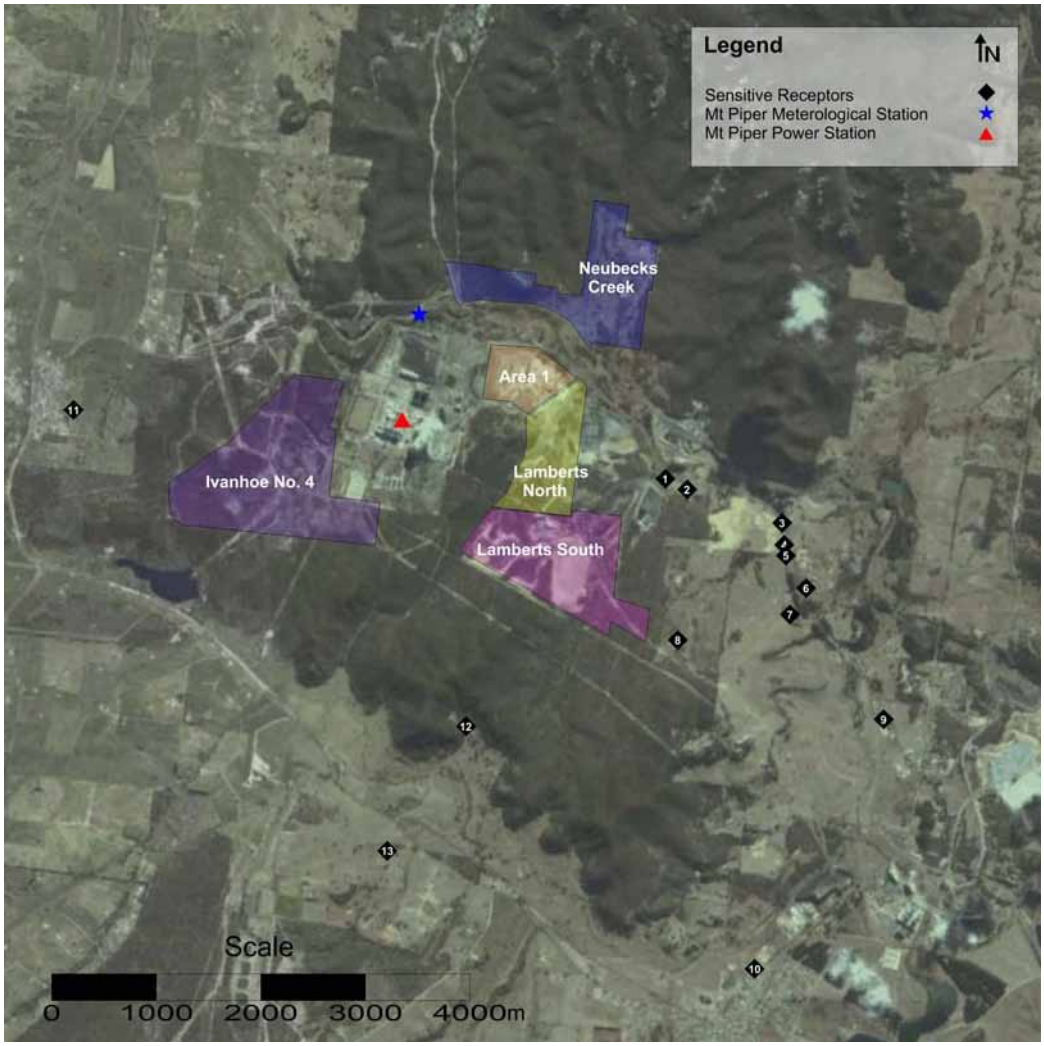
Placement of fly ash and furnace ash at the proposed Ivanhoe No. 4 and Neubecks Creek sites would have potential noise impacts on nearby sensitive receivers and would require further detailed assessment in accordance with the NSW Industrial Noise Policy (EPA, 2000).

Potential noise emissions associated with the Ivanhoe No. 4 and Neubecks Creek ash placement areas would primarily be from operations of the haul trucks, dozer, roller and water cart within the site. The key risks with these operations include the simultaneous use of multiple pieces of machinery during operations and for the Neubecks Creek site, and the haul road route used to deposit the ash in the placement area. For the Ivanhoe No.4 site, the existing topography is likely to provide sufficient noise barrier effect. In addition haul roads would not need to pass near any residential locations. The layout for the site works has not been developed, so any qualitative assessment assumes that the distance to an affected receiver is taken from the nearest edge of the defined concept area.

A review of sensitive receivers was undertaken for the air quality assessment, and these same sites applied for noise impacts. These sites are shown in **Figure 5-1**. For the Neubecks Creek concept approval site, affected residences would primarily be located in Blackmans Flat (sites 1 and 2),

some 1.5 km away. These residences are also across the Castlereagh Highway from the concept area. Any impact would be fairly localised, and it is unlikely there would be evidence of noise impact at Blackmans Flat.

Figure 5-1 Concept Approval Sites and Sensitive Receptors



At Ivanhoe No. 4 the residences in the eastern areas of Portland (Site 11) and the rural properties in Pipers Flat are the closest receiver locations. The distance to Portland and to Pipers Flat is about 1.5 km and the potential for noise impact in these locations would be minimal, due to the distance between the possible ash placement area and the residences as well as the significant intervening topography.

Potential mitigation measures for the concept approval sites would include options such as the use of noise barriers constructed from the ash placement and strategic benching during the site lifecycle.

Further detailed assessment would be required for these sites at project approval stage. This would be undertaken following the guidelines set by the NSW Industrial Noise Policy, using the version relevant to the timing of the proposal. The INP is used to determine an acceptable level of impact to the existing noise environment within a community. Where the INP criteria are met at the closest or most affected receivers, no adverse noise impacts would be reasonable expected. The study would include:

- Noise monitoring for the projects to enable the setting of appropriate criteria with respect to the existing environment. This would need to be done closer to the time it is likely for the works to be required;
- Setting appropriate noise criteria and project noise goals;
- Estimating noise emission levels from the project operations;
- Assessment of noise impacts at residences nearest to the proposal based on the prediction of noise levels at those sites using a noise model; and
- Identifying mitigation measures, if required, to manage any impacts identified.

6. Construction Assessment

6.1. Construction noise guidelines

The NSW DECCW has established an *Interim Construction Noise Guideline* (ICNG) (DECC 2009) that supersedes any previous guidance on management of construction noise impacts. This Proposal has been assessed in accordance with the guideline requirements to determine the potential for the construction activities to create an adverse noise impact at the nearby receiver locations.

The DECCW has identified two forms of assessment for construction activities based on the expected duration of the works. For new public infrastructure or major developments, a quantitative assessment is required. For shorter duration works such as maintenance and repair, a qualitative assessment may be satisfactory.

The ICNG recommends standard hours for construction work as summarised in **Table 6-1** although these may be able to be varied in specific circumstances to undertake work for safety or accessibility reasons.

Table 6-1 Recommended standard hours for construction work

Work type	Recommended standard hours of work
Normal construction	Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays
Blasting	Monday to Friday 9 am to 5 pm Saturday 9 am to 1 pm No blasting on Sundays or public holidays

Works outside these hours may be permissible where the following circumstances apply:

a) Works that do not cause construction noise to be audible at any sensitive receivers.
b) For the delivery of materials required outside these hours by the Police or other authorities for safety reasons.
c) As agreed by the DoP and the DECCW.

Local residents and the DECCW must be informed of the timing and duration of work as soon as possible before that work commences.

Recommended noise levels for airborne noise at sensitive receivers and advice on how they should be applied are provided in **Table 6-2**. The RBL described in the table is the overall single-figure

background noise level measured in each relevant assessment period (during or outside the approved construction hours).

- **Table 6-2 Recommended noise management levels (DECC 2009).**

Recommended Standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. ■ Where the predicted or measured LAeq (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. ■ The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB(A)	■ The highly noise affected level represents the point above which there may be strong community reaction to noise. ■ Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: ■ 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences. ■ 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5 dB	■ A strong justification would typically be required for works outside the recommended standard hours. ■ The proponent should apply all feasible and reasonable work practices to meet the noise affected level. ■ Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. ■ For guidance on negotiating agreements see section 7.2.2, ICNG.

* Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence.
-Noise levels may be higher at upper floors of the noise affected residence.

The ICNG states that the noise management level applies at any property boundary that is most exposed to the construction noise, at a height of 1.5 m above ground level. In cases where the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence.

6.2. Construction Noise Impacts

The construction activities for the Lamberts North and Lamberts South areas would involve the preparatory works prior to ash deposition. Due to the nature of the existing areas proposed as placement sites, works such grubbing and clearing and re-profiling are expected to be minimal. The following section provides a description of the anticipated works specific to each of the ash placement areas.

6.2.1. Preparation of Lamberts North

Near the end of the life of the current ash placement area the northern area of Lamberts North, would require the following preparation:

- Clearing and grubbing of remnant vegetation across the site.
- Re-grading/profiling of the existing Huons Gully area to remove any existing stockpiles from current mining operations.
- Extension of haul roads from Ash Area 1 by the placement of fill to maintain road grades of less than 10%.
- Earth banks would be constructed around the boundary of the proposed Lithgow City Council Landfill Site and construction of containment bunds around the footprint.
- Placement of drainage material would be installed in the invert of the Huons Gully.

6.2.2. Preparation of Lamberts South

Approximately 12 months in advance of the Lamberts North site reaching its capacity, site preparation works would commence for the Lamberts South site. Preparatory works would include:

- Clearing and grubbing of remnant vegetation across the site.
- Extension of haul roads from Lamberts North by the placement of fill to maintain road grades of less than 10%.
- Earthen bunds would be constructed around the boundary of the placement area.

6.3. Construction Noise Impact Assessment

The predicted noise levels for construction activities for each of the placement areas are presented in **Table 6-1**.

Table 6-1 Predicted construction noise levels

Receiver	Noise Goal dB(A)	Lamberts North	Lamberts South
Location 1	54	32	33
Location 2	43	35	37

The predicted levels for the construction activities are based on the use of an excavator, a dozer and a dump truck operating simultaneously. The predictions are based on the specific location of the works such as Huon Creek drainage for Lamberts North site and therefore some topographic shielding is apparent, which is not available during the ash placement operations. The modelling predictions indicate that the noise levels from construction activities would be below the project noise goals at the receiver locations.

7. Monitoring requirements

Monitoring must be undertaken for specific equipment and overall construction noise levels on the project. Specific equipment levels should be measured and assessed against details listed for equipment types in **Table 3-3** and overall noise levels should be assessed in consultation with criteria listed in **Table 4-1.** If a specific piece of equipment other than the general types listed in **Table 3-3** and **Table 5-1** is to be used for the project, a further assessment of noise impacts may be necessary. This matter should initially be referred to the project acoustic consultant to determine any further action.

Noise monitoring and measurements should be performed according to relevant standards and policies including but not limited to:

- The Department of Environment and Conservation's *Environmental Noise Control Manual*;
- The Department of Environment and Conservation's *Industrial Noise Policy*; and
- Australian Standard *AS1055.*

If the noise from a construction activity is substantially tonal or impulsive in nature (as described in Chapter 4 of the NSW Industrial Noise Policy above), 5dB(A) must be added to the measured construction noise level when comparing the measured noise with the construction noise objectives.

7.1. Monitoring of equipment

Equipment noise levels will be monitored:

- When key items of equipment are first brought onto site to establish baseline noise levels (measured at a distance of 7 m and compared to **Table 5-1** for compliance); and
- At 12 month intervals.

Prior to commencement on site, a noise test must be completed for items of plant which includes a check of reverse / travel alarm noise levels (L_{Amax}) at 7 m as well as operational noise levels.

7.2. Environmental Noise Monitoring

Long term environmental noise monitoring using unattended noise monitoring equipment as described in **Section 3**. This monitoring will be carried out to confirm actual operational noise levels at the sensitive receiver locations or where a noise complaint has been received. This monitoring should be carried out every 12 months, or as part of investigations in response to a valid complaint received in relation to the works. The objective of the measurements is to measure the $L_{Aeq\ 15min}$ noise levels, to determine compliance with the noise project specific goals.

Environmental noise monitoring is to be conducted:

- When works and activities have commenced at a new location;
- Every 12 months; and
- In response to complaints, where necessary.

Environmental noise compliance monitoring should be conducted at the locations corresponding to the identified sensitive receivers shown in **Table 3-1**.

8. Conclusion and Recommendations

SKM has undertaken a noise assessment for the proposed ash placement areas known as Lambert's North and Lambert's South. The noise impact assessment has considered the location of the proposed operations in relation to existing noise sensitive receivers. The predicted noise levels at these locations indicate a general compliance with the project noise goals under neutral weather conditions, with the potential for a marginal exceedance at one receiver location (Location 2) during the initial stage of the Lamberts South placement area.

At Lamberts North, the predicted noise levels under adverse meteorological conditions indicate general compliance during the daytime for both locations, with a marginal exceedance possible during the latter stages at the residence near Wallerawang (Location 2). The same result is again expected at Location 2 for the evening period, although an exceedance of up to about 3 dB(A) is possible at Blackmans Flat (Location 1) during this time.

At Lamberts South, the results generally indicate exceedances for both receiver locations , the exception during this phase of works is Location 1 for the daytime period, which is expected to comply even under adverse weather conditions. The exceedances during the evening period are predicted to be up to 4 dB(A) at Location 2. These are expected, however, to reduce to approximately 1-2 dB(A) at both locations during the final stage of works.

There is potential to reduce noise levels by strategic placement of ash to act as a noise barrier to shield equipment noise from the sensitive receivers. The progressive benching of the ash so as to maintain a barrier between the operations and the residential location would require further consideration in relation the existing terrain and process requirements.

Construction activities for each site would be limited to preparatory works such as grubbing and clearing of vegetation and bunding of the site boundary. The predicted noise levels from the construction activities indicate that noise guidelines would be met for standard construction hours.

References

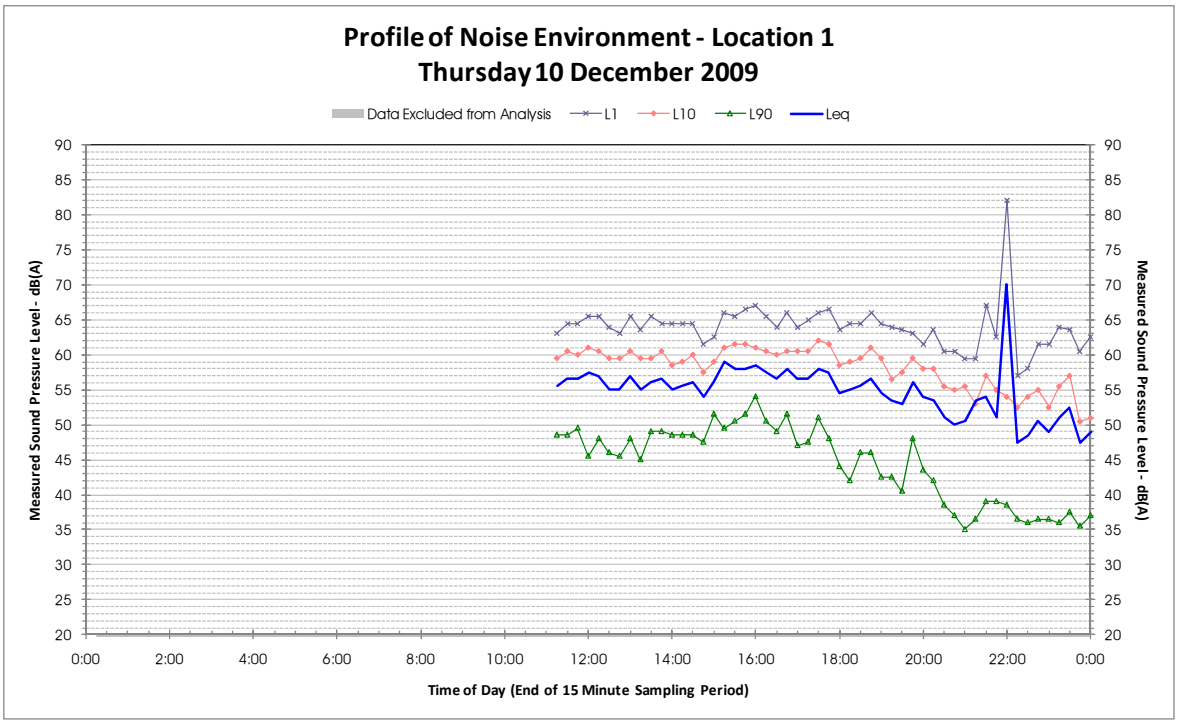
Mt Piper Environment Protection Licence number 13007

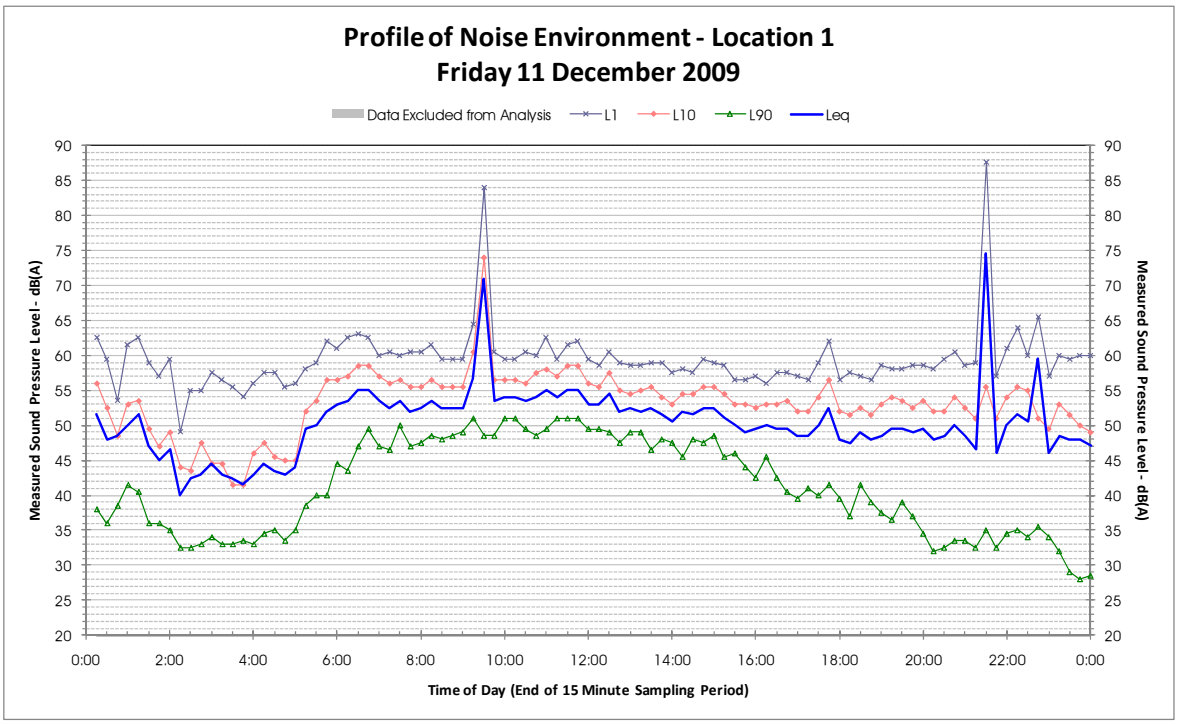
Environment Protection Authority, Sydney, *Industrial Noise Policy*, 2000

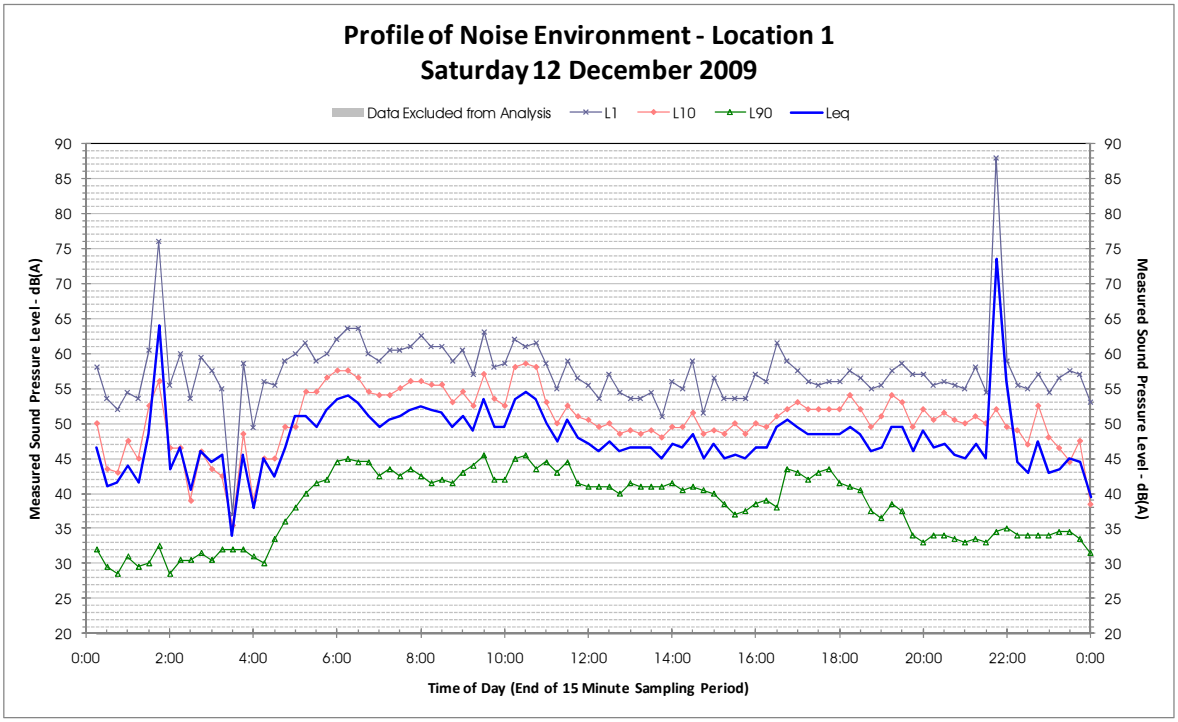
Department of Environment, Climate Change and Water, Sydney, Interim Construction Noise Guideline, 2009

Appendix A Ambient Noise Monitoring Data

A.1 Location 1



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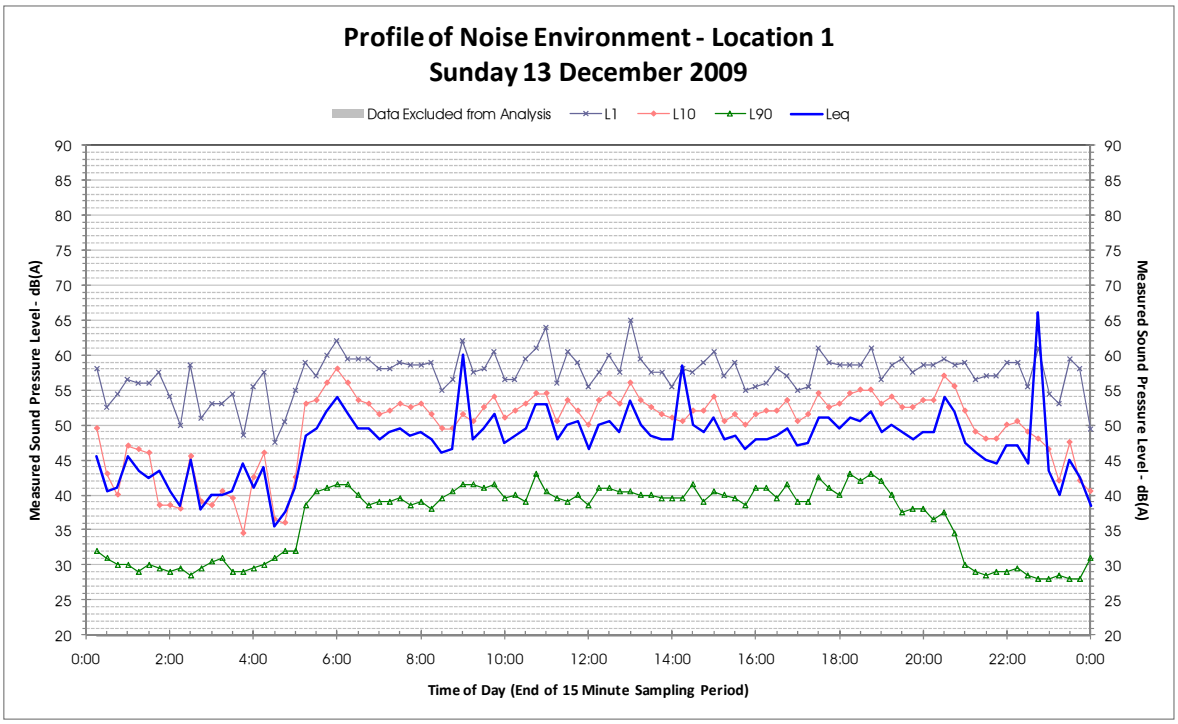
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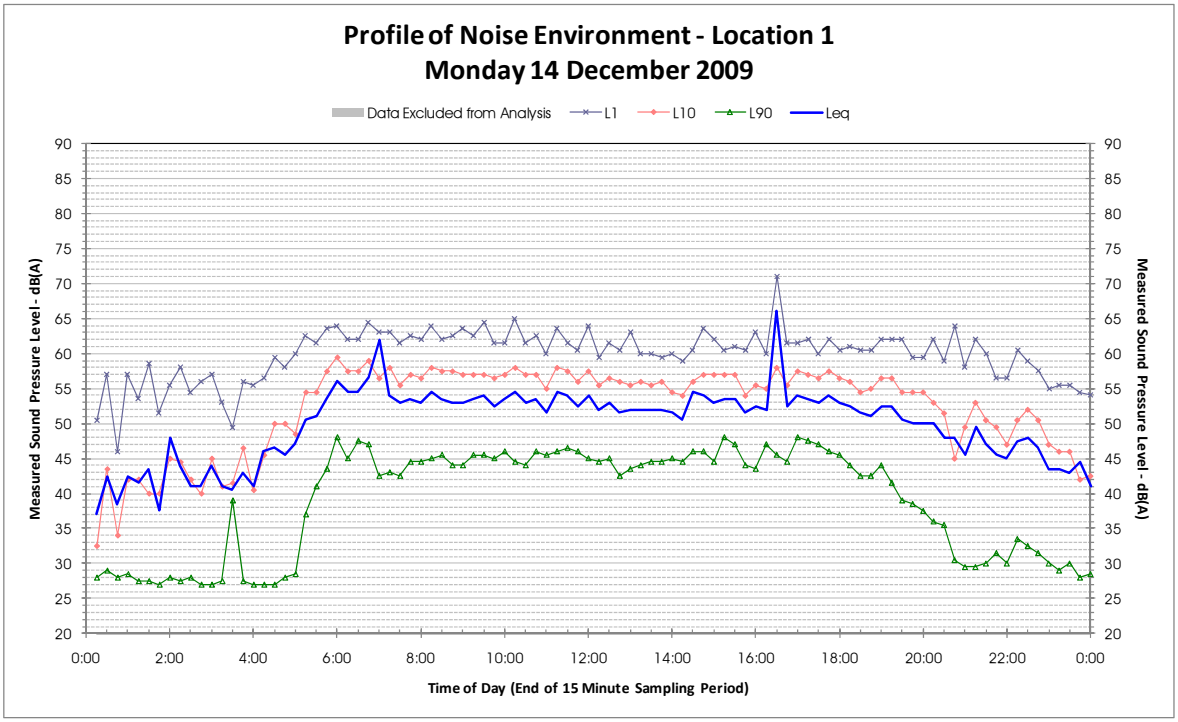
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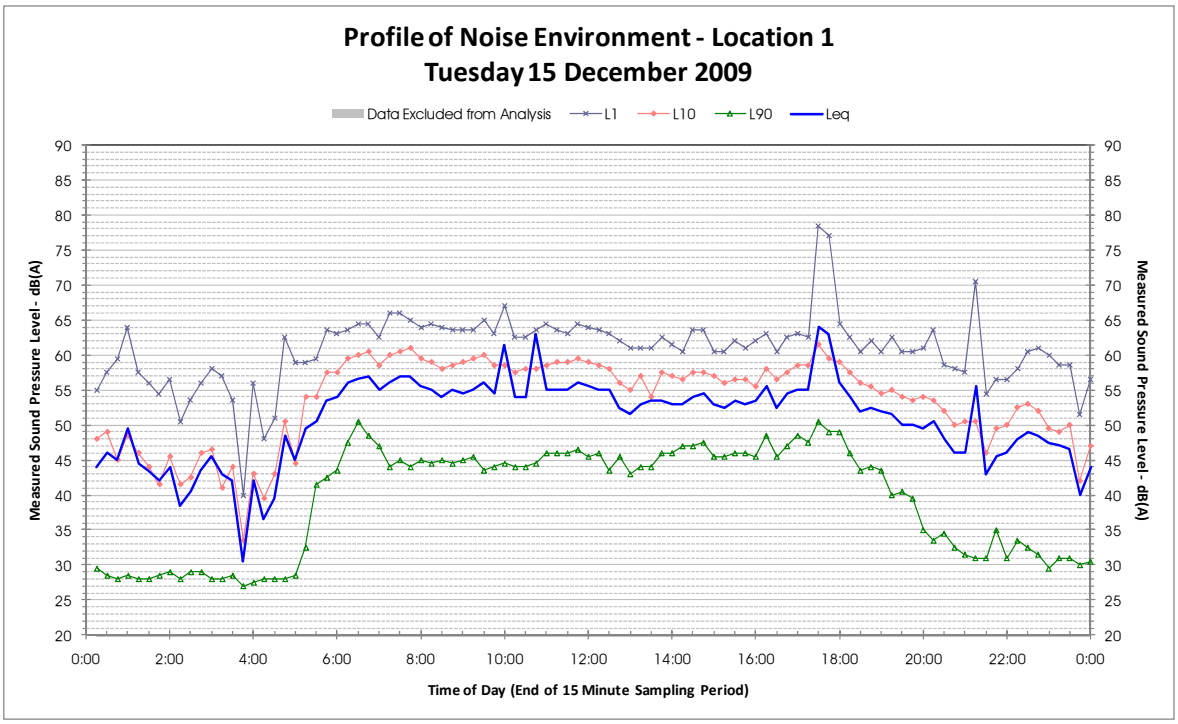
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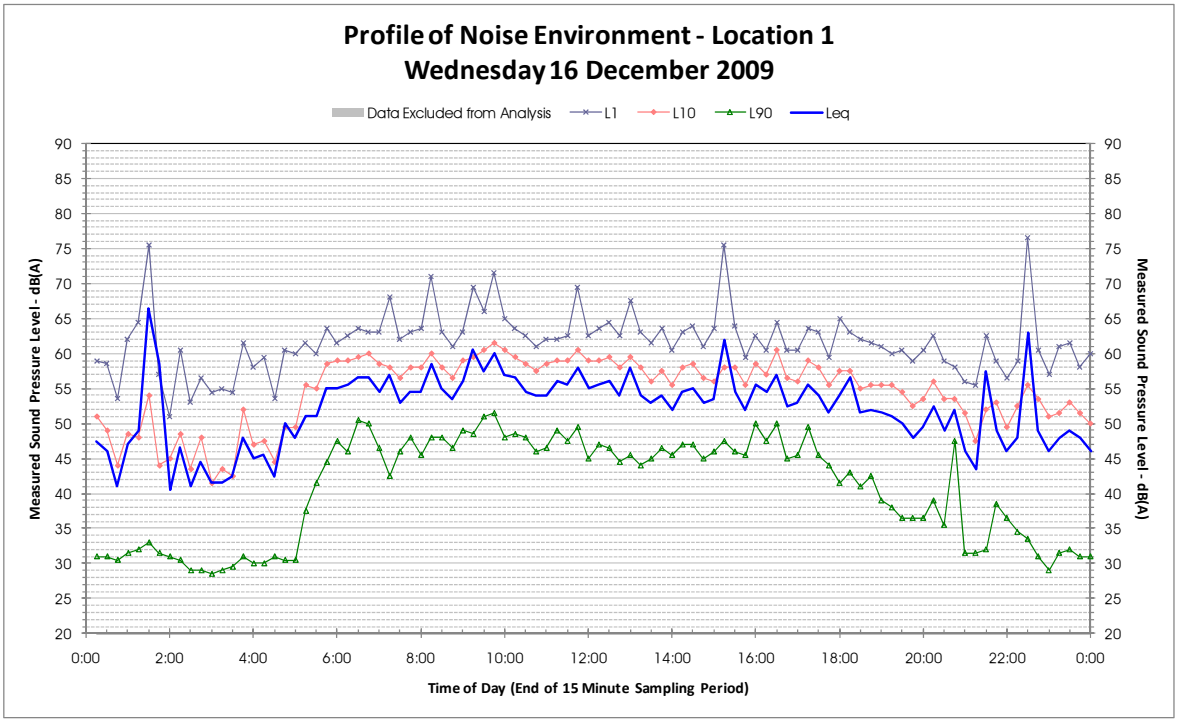
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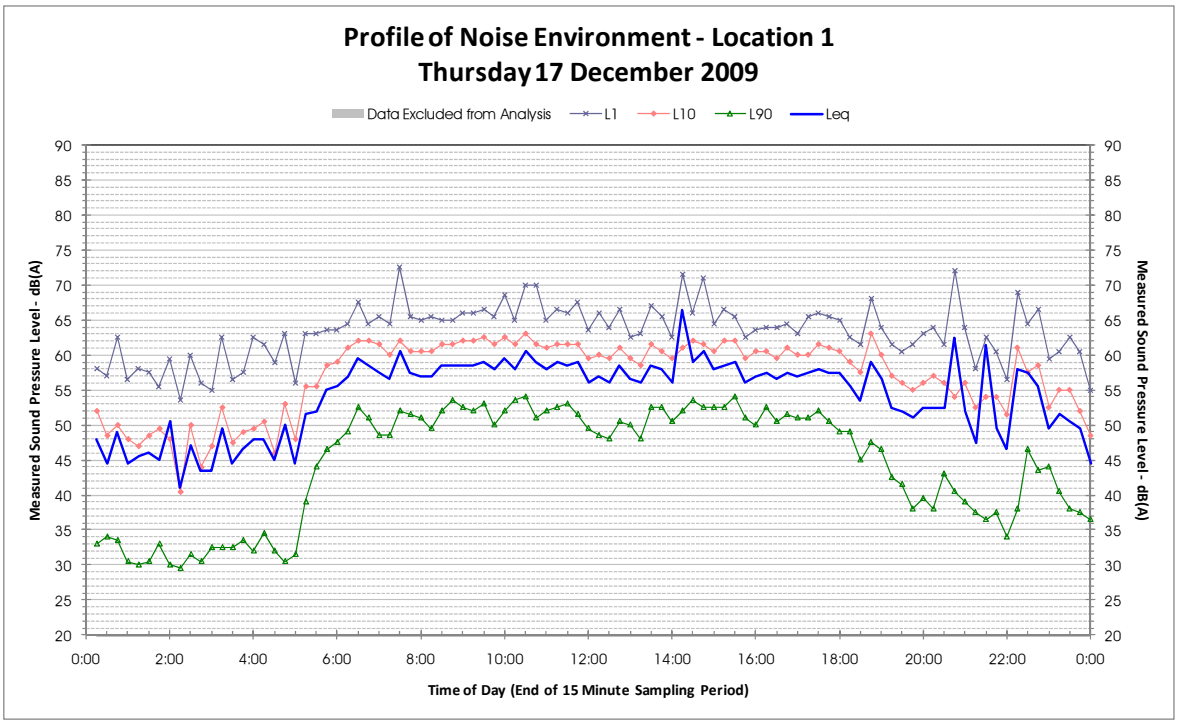
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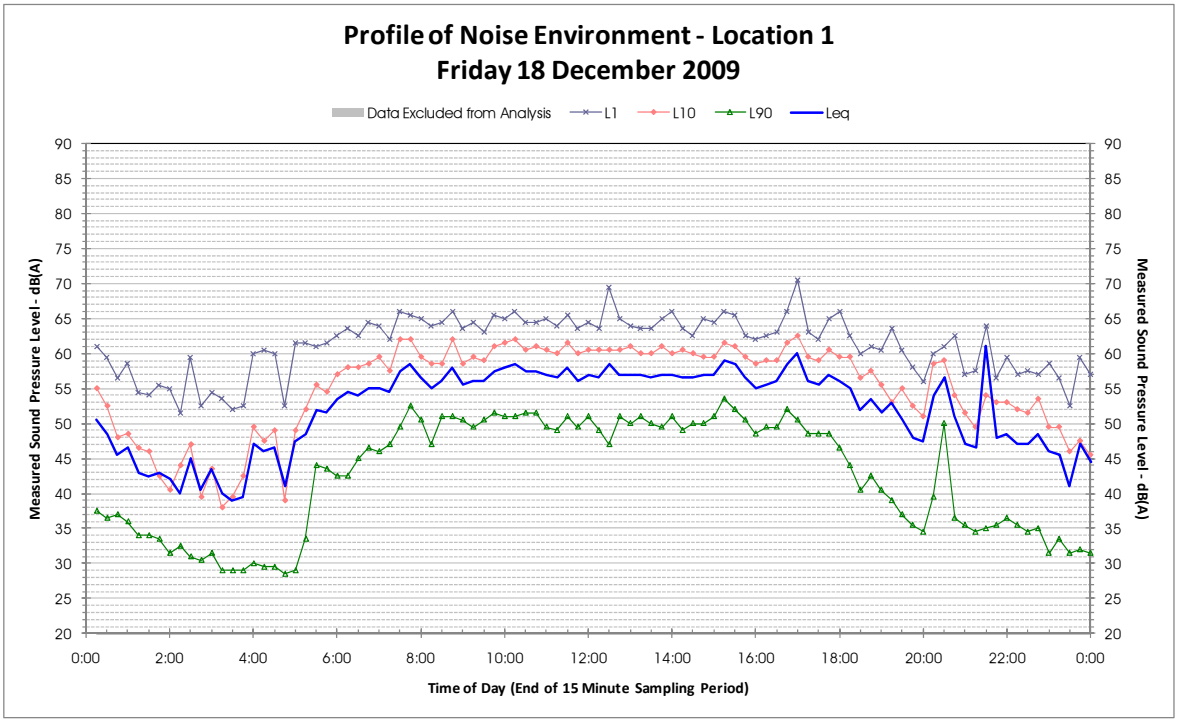
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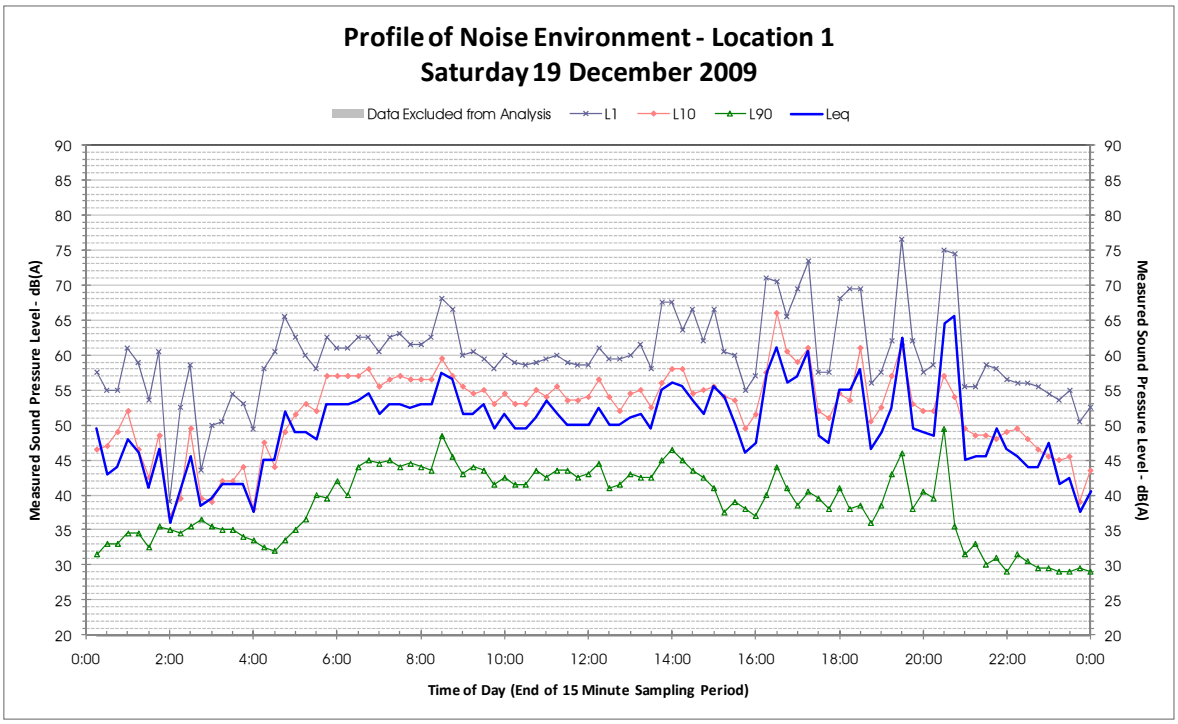
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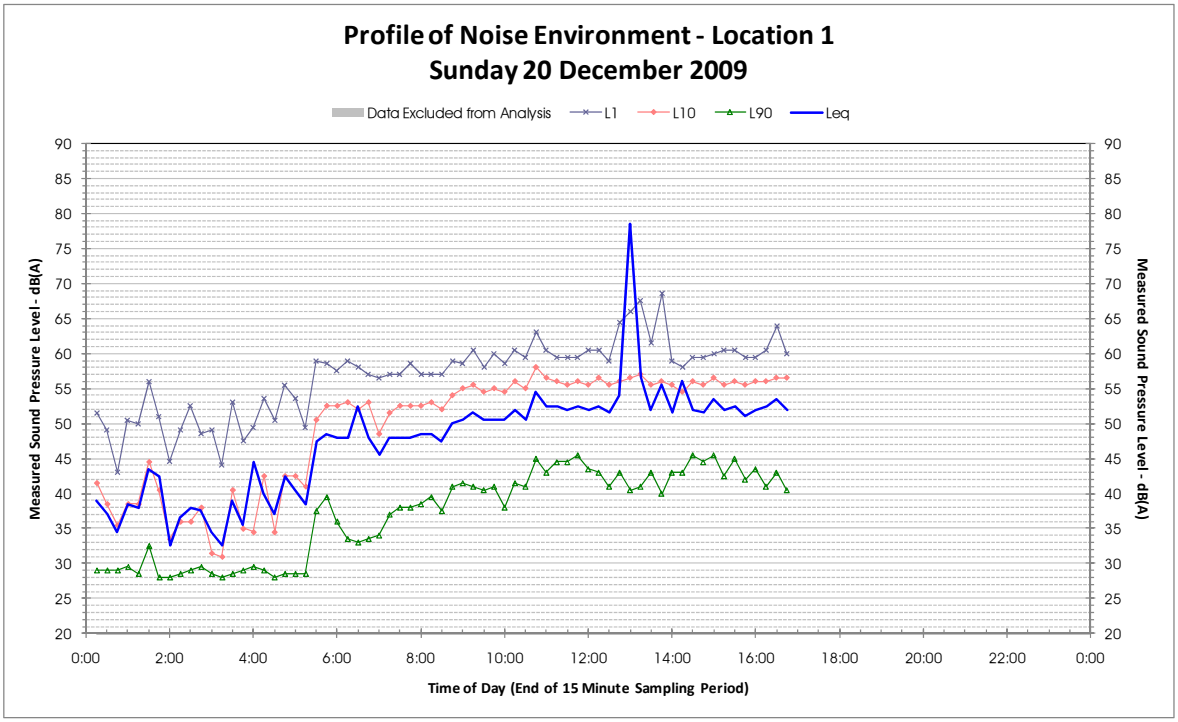

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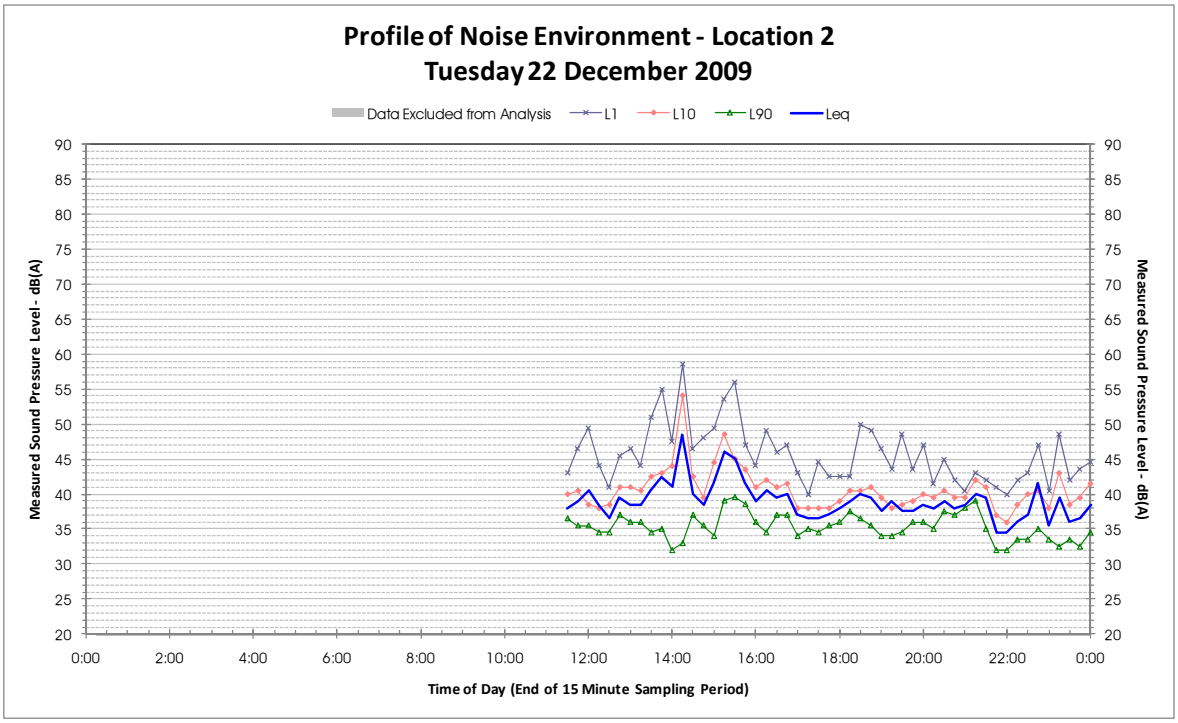

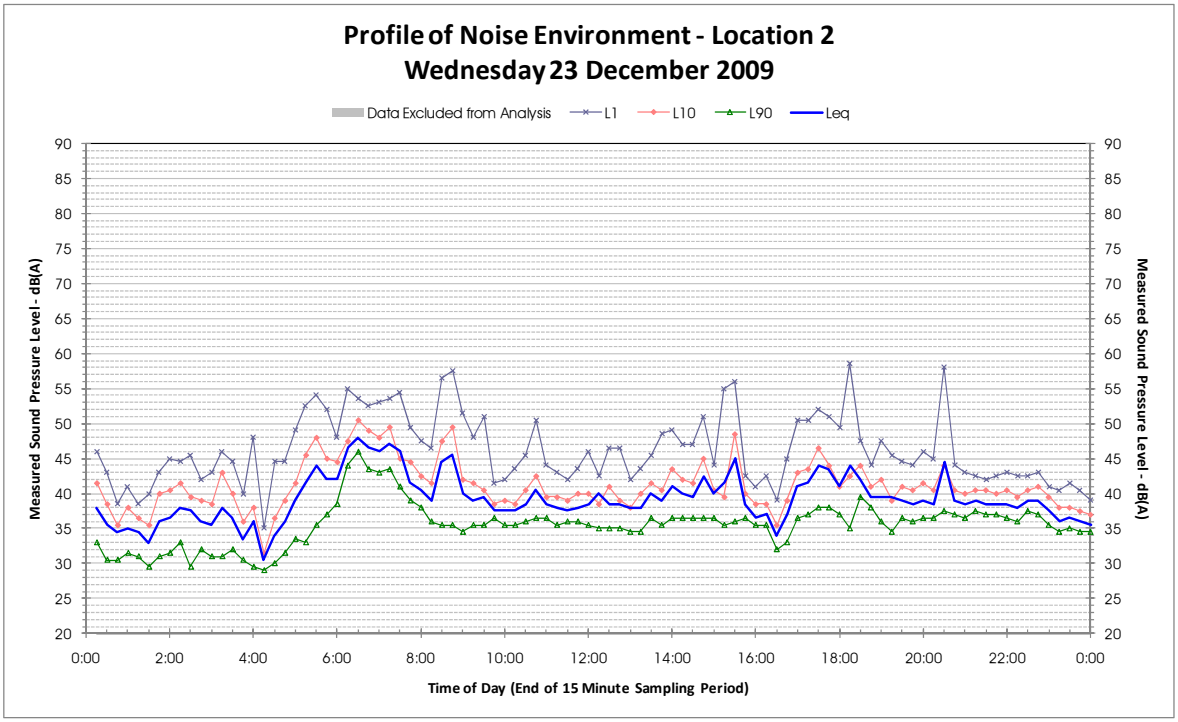
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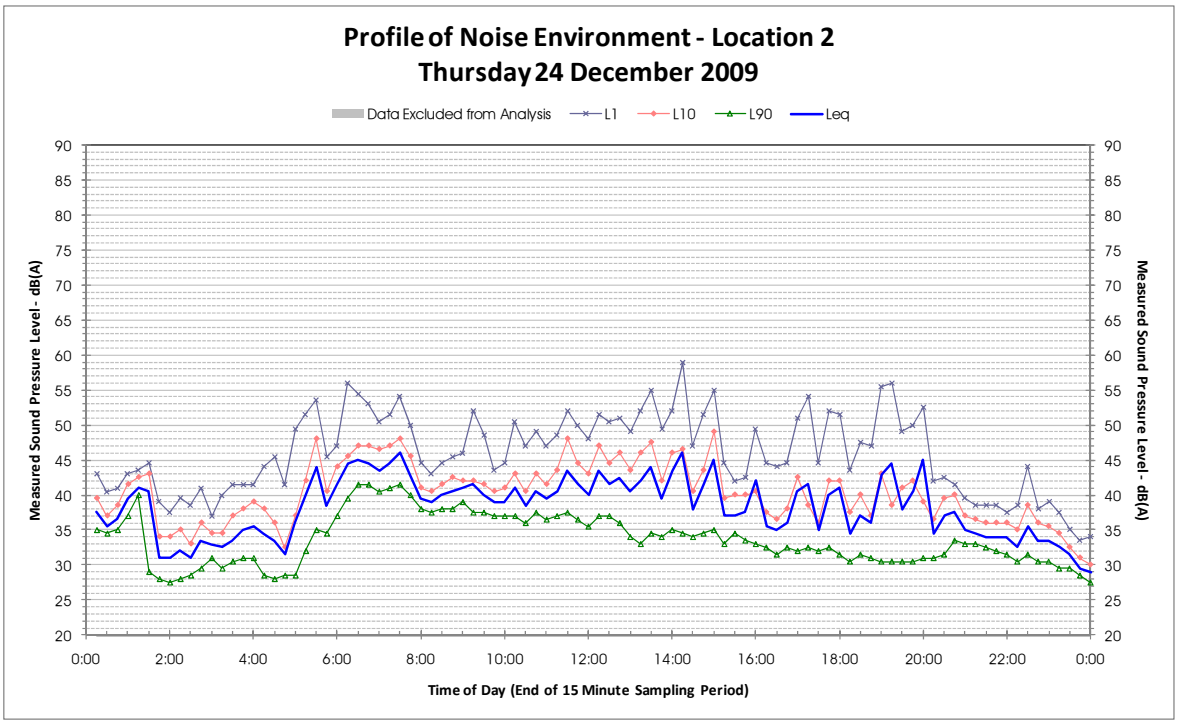
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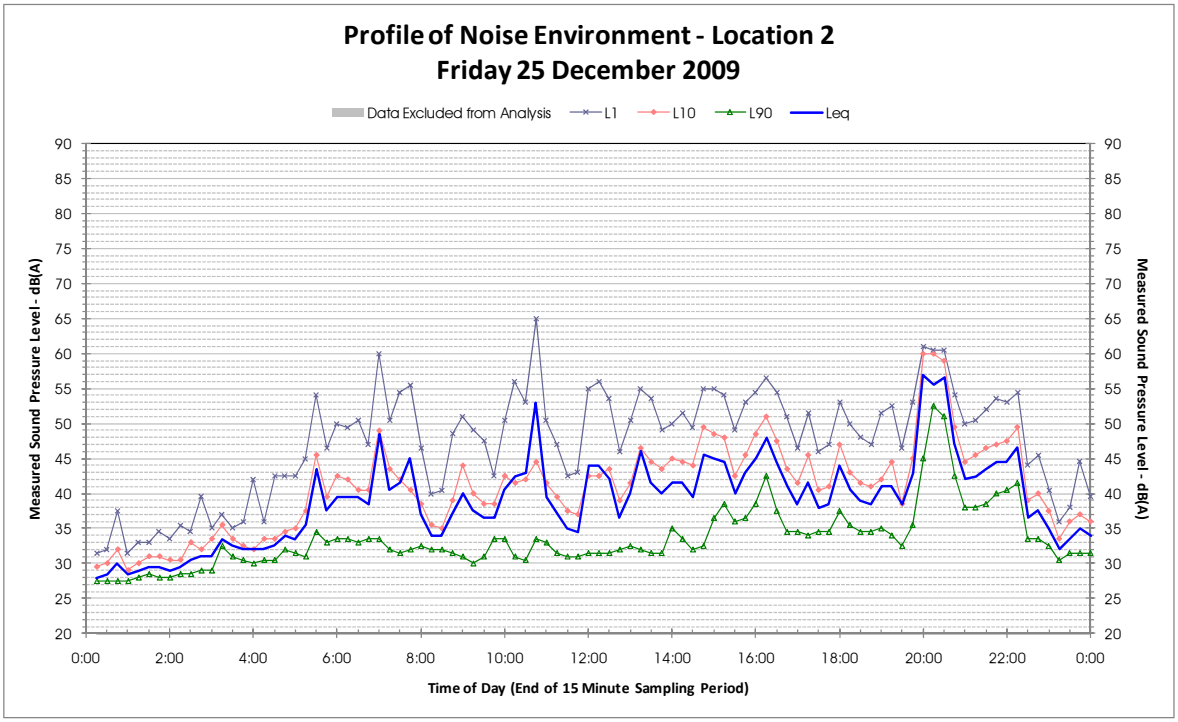
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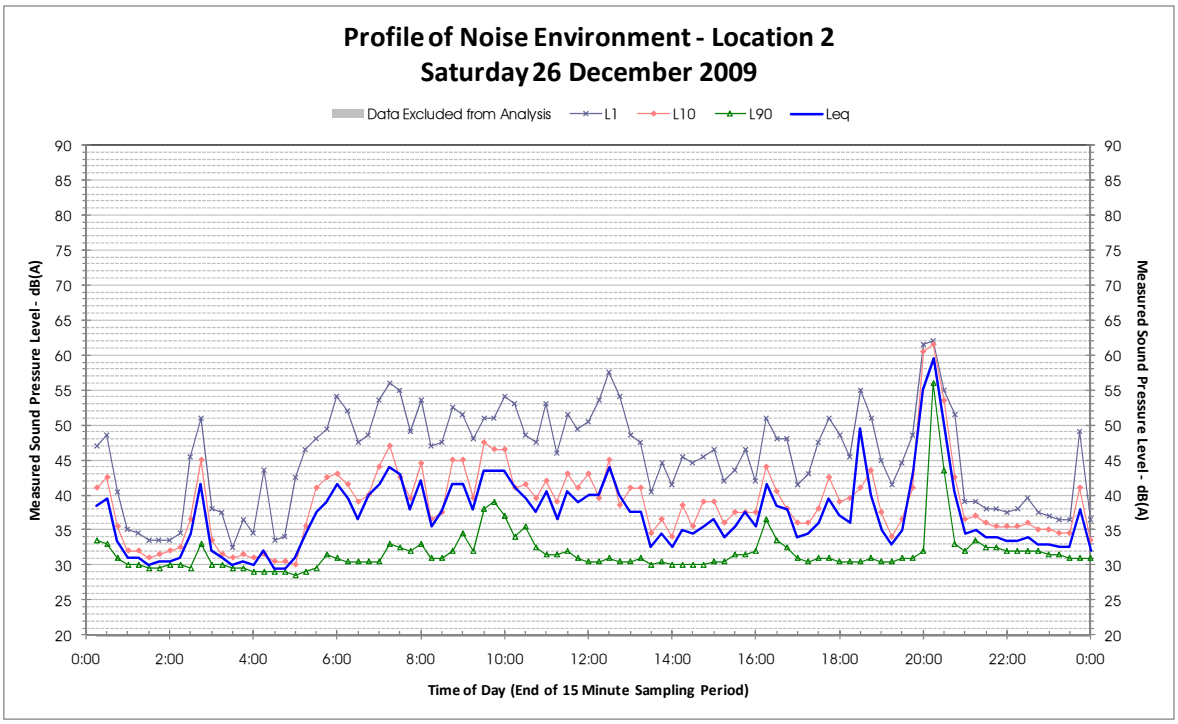
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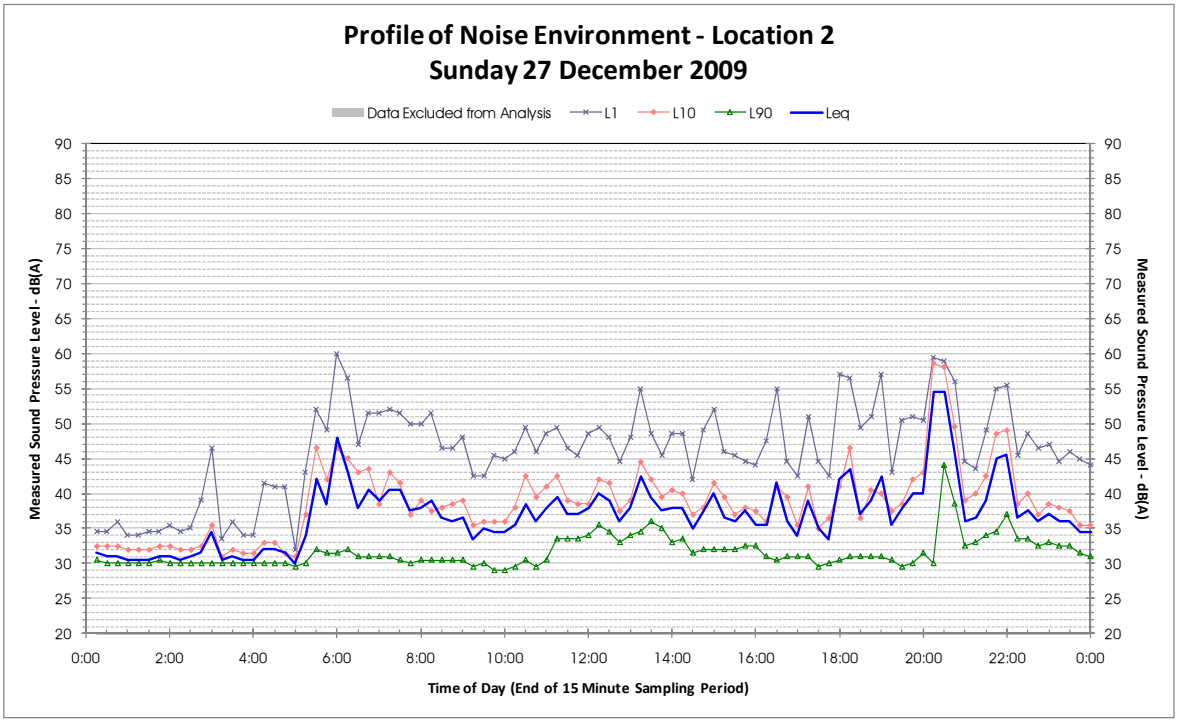
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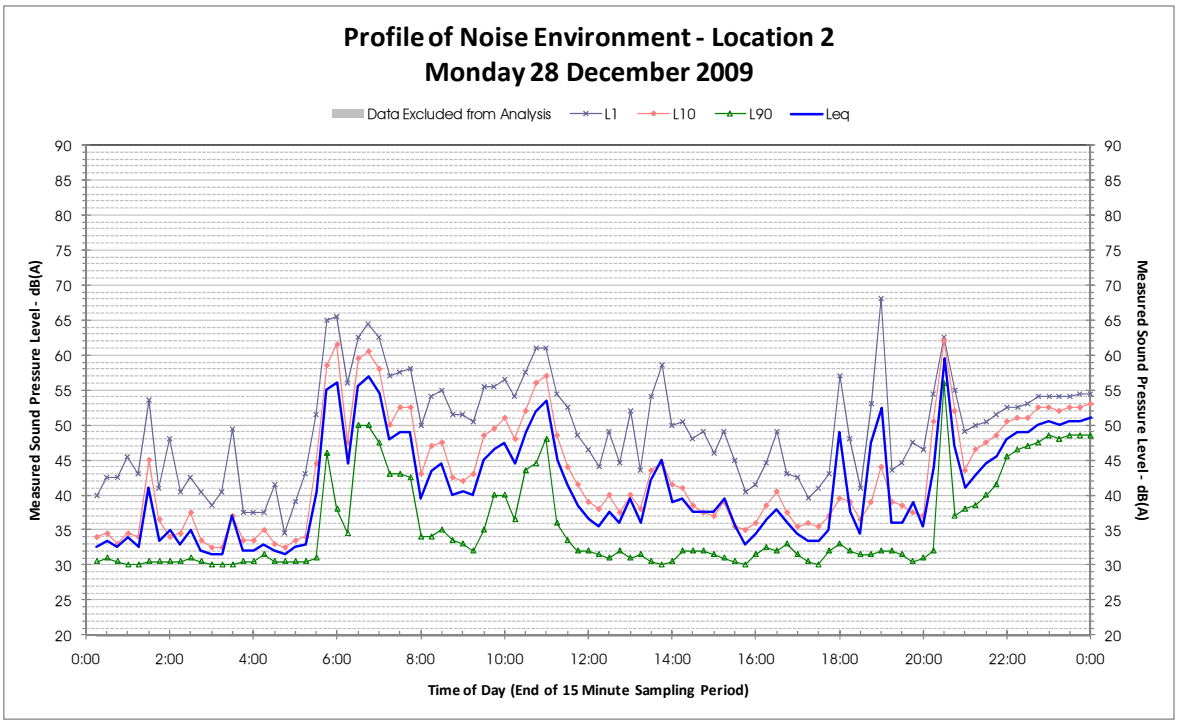
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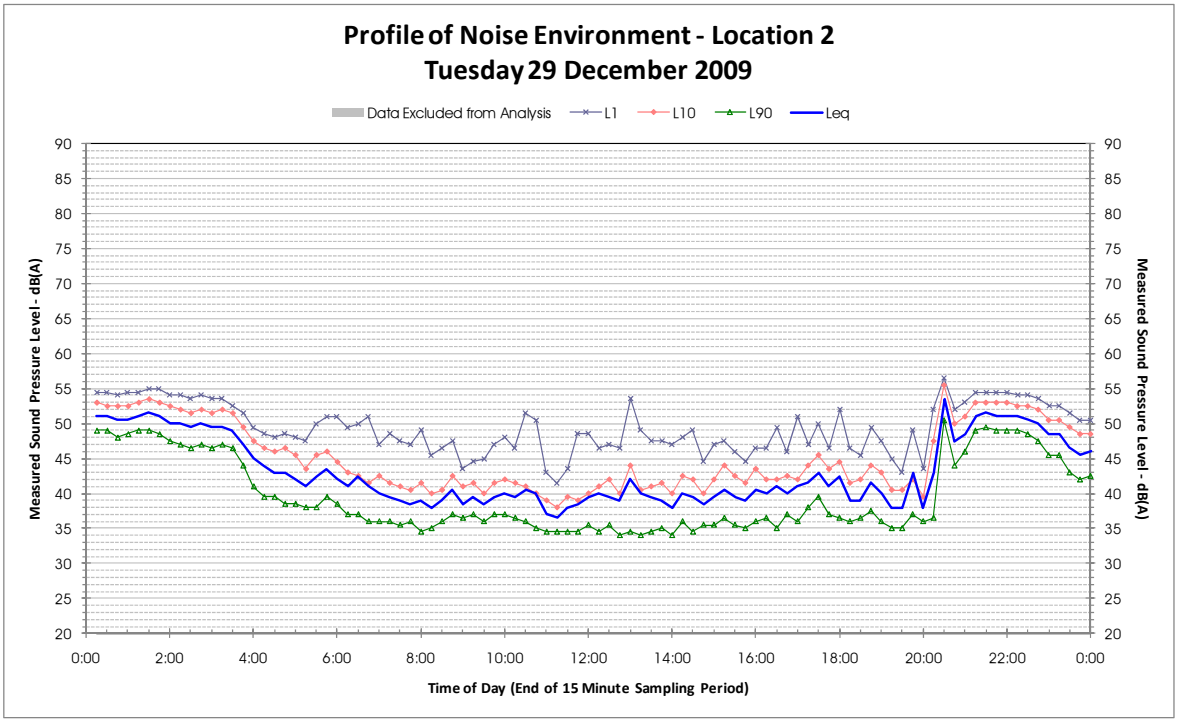
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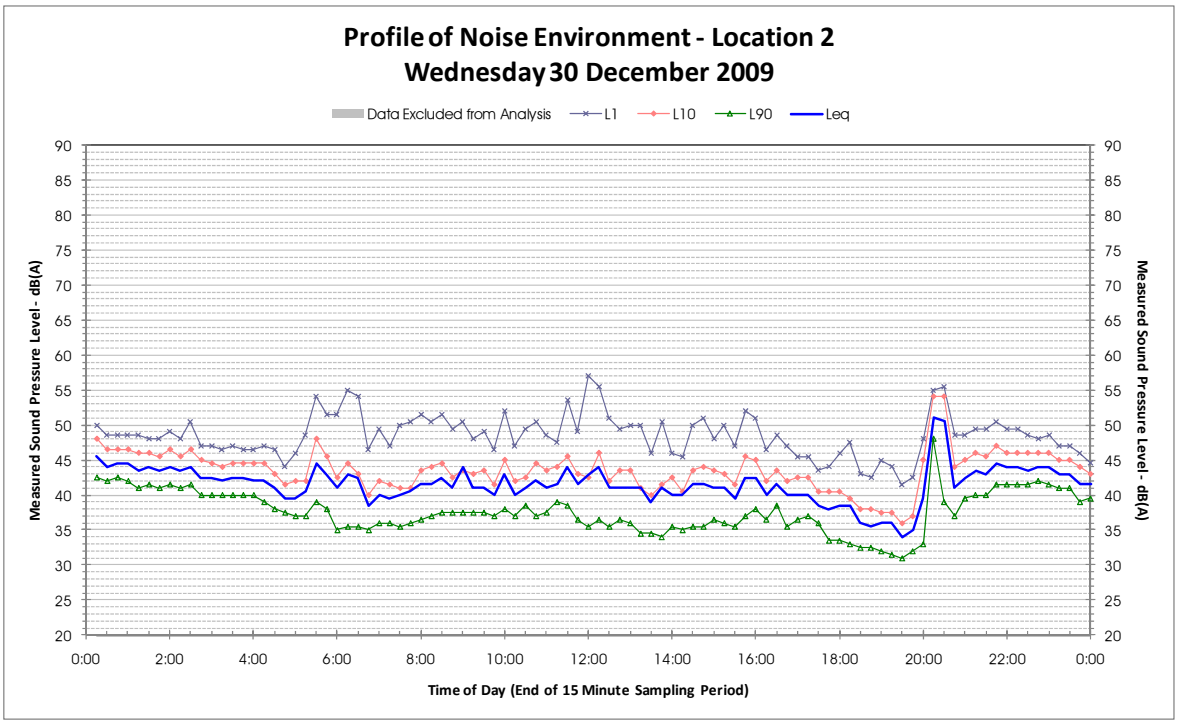
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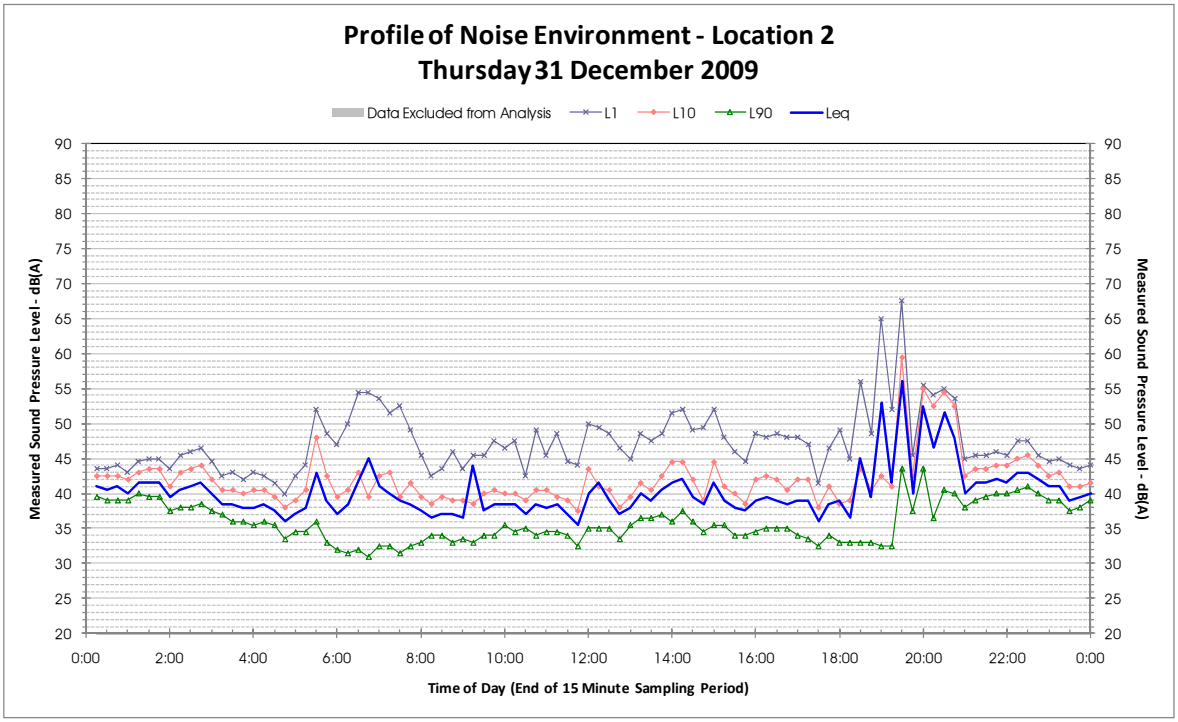
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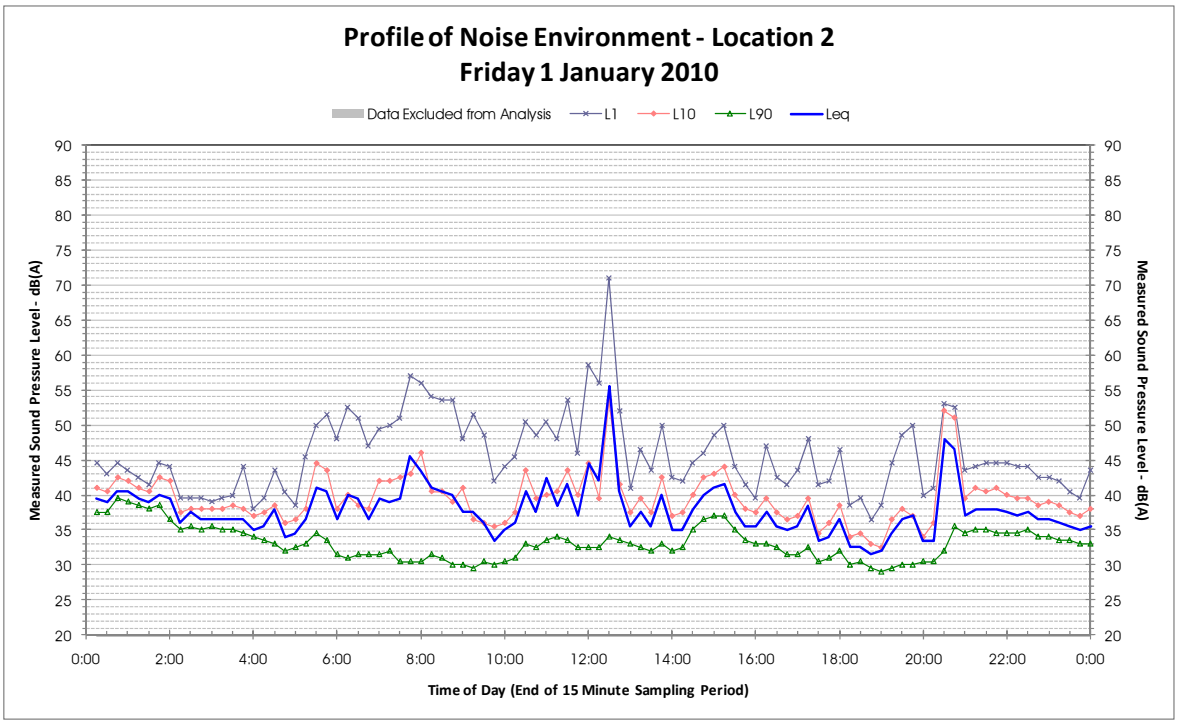
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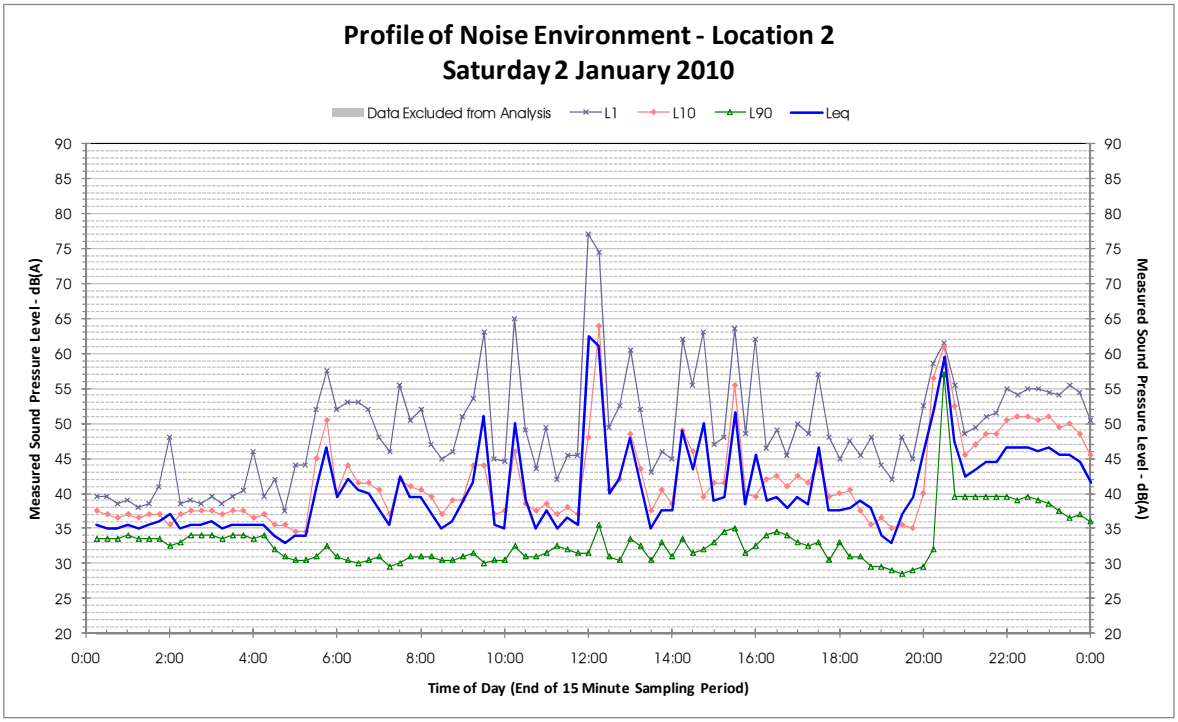
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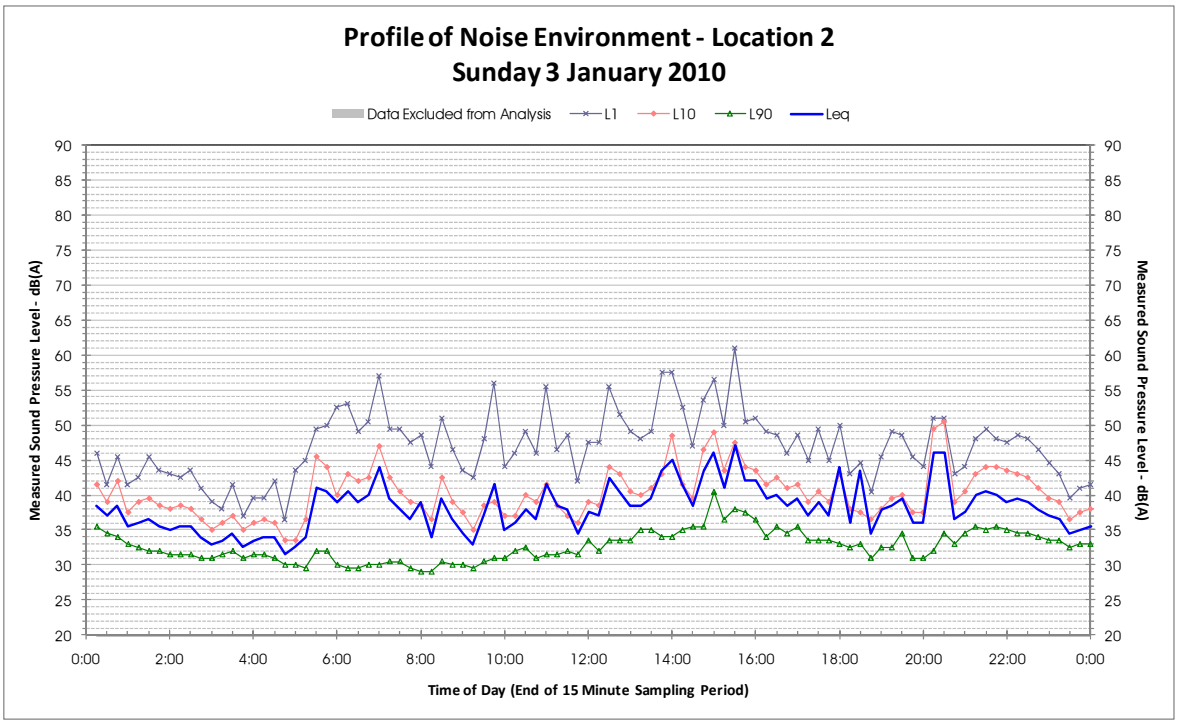
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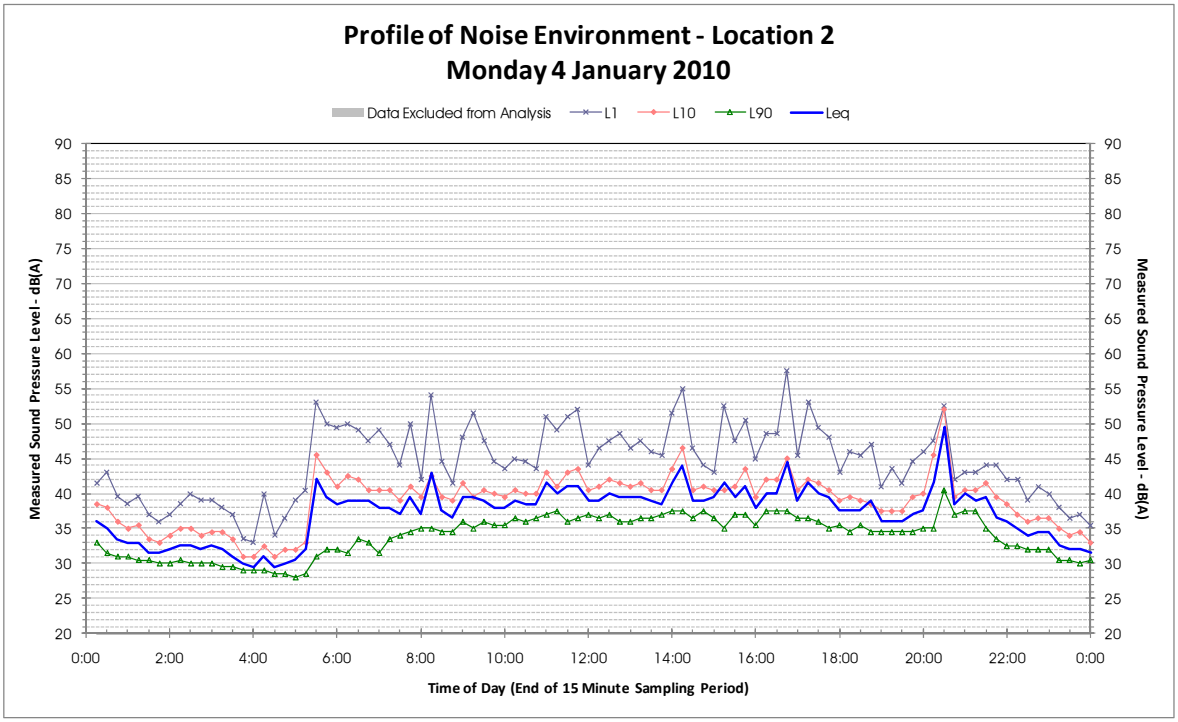
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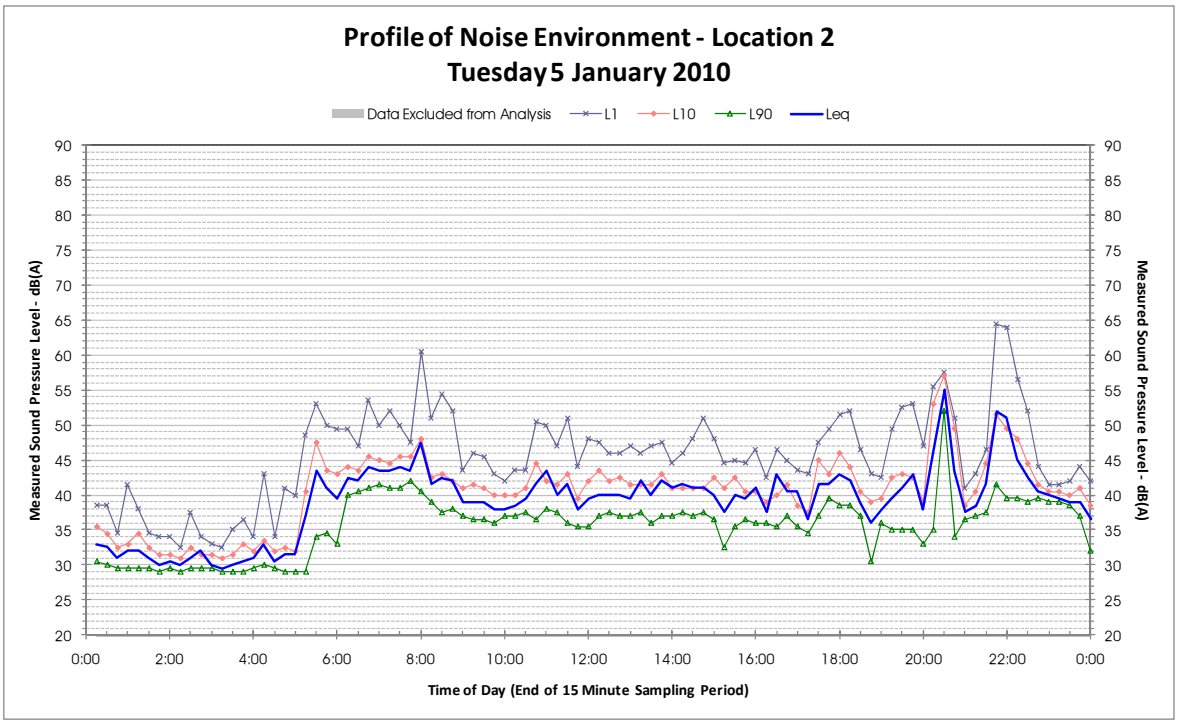
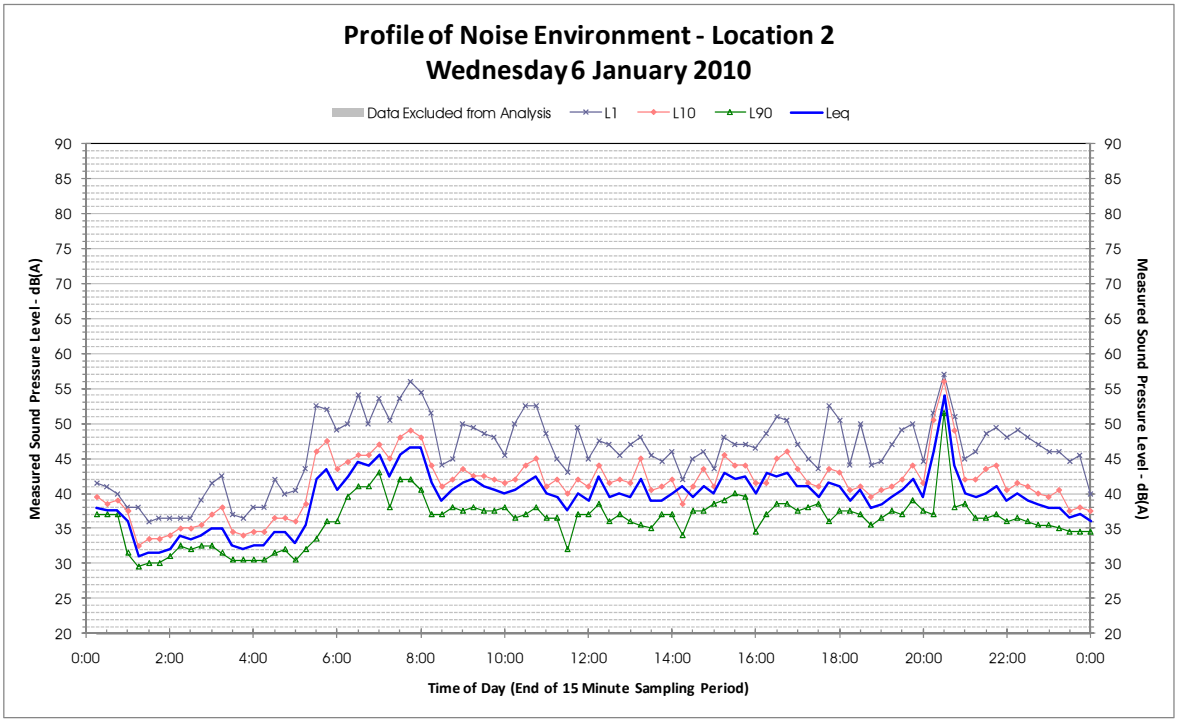
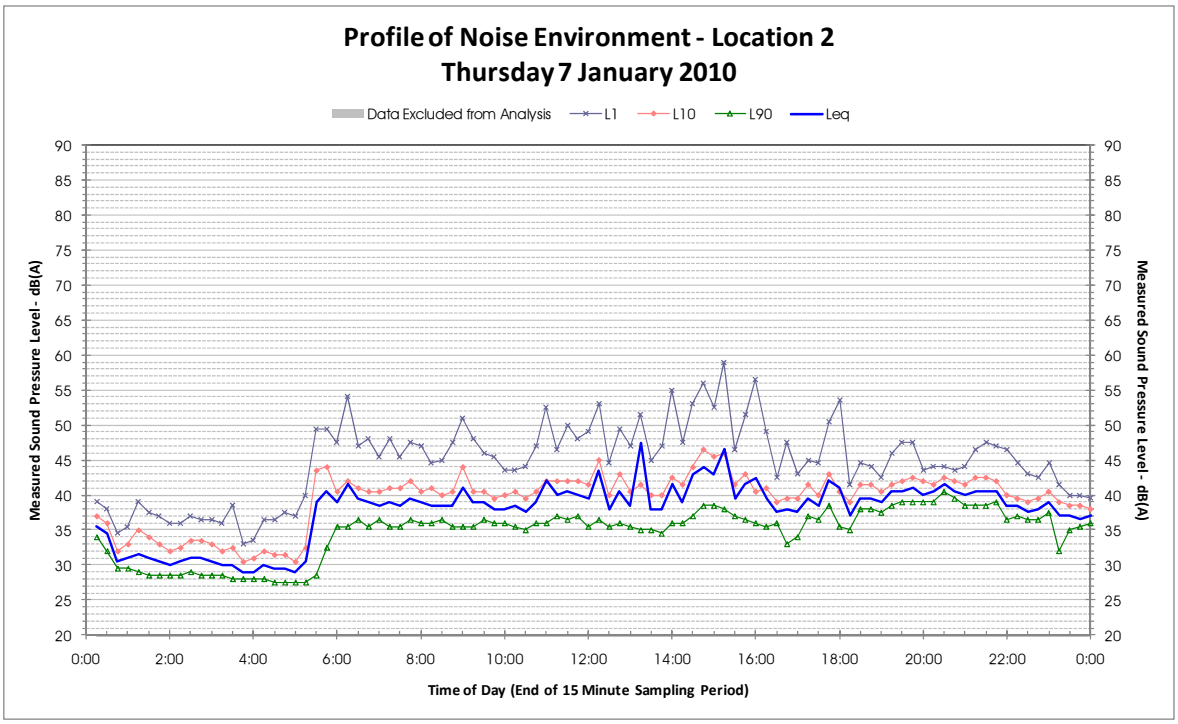
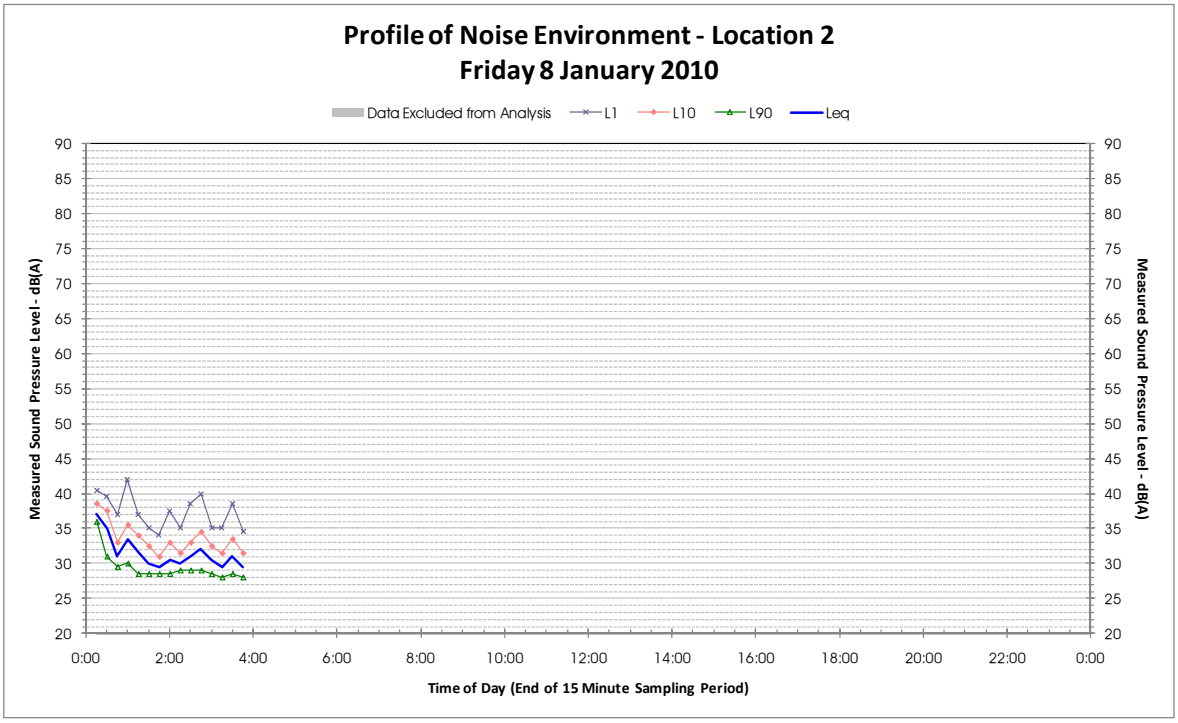
L90
Leq
Measured Sound Pressure Level - dB(A)
Time of Day (End of 15 Minute Sampling Period)


Profile of Noise Environment - Location 2
Tuesday 5 January 2010
Data Excluded from Analysis
L1
L10
L90
Leq
Measured Sound Pressure Level - dB(A)
Time of Day (End of 15 Minute Sampling Period)


Profile of Noise Environment - Location 2
Wednesday 6 January 2010
Data Excluded from Analysis
L1
L10
L90
Leq
Measured Sound Pressure Level - dB(A)
Time of Day (End of 15 Minute Sampling Period)


Profile of Noise Environment - Location 2
Thursday 7 January 2010
Data Excluded from Analysis
L1
L10
L90
Leq
Measured Sound Pressure Level - dB(A)
Time of Day (End of 15 Minute Sampling Period)


Profile of Noise Environment - Location 2
Friday 8 January 2010
Data Excluded from Analysis
L1
L10
L90
Leq
Measured Sound Pressure Level - dB(A)
Measured Sound Pressure Level - dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Time of Day (End of 15 Minute Sampling Period)