

Mt Piper Power Station Ash Placement Project

ENVIRONMENTAL ASSESSMENT

CHAPTER 6 – NOISE

■ August 2010



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6. Noise

This chapter 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.

The Director-General's requirements request an assessment of the key environmental issue of noise impacts - 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).*

6.1. Existing environment

The noise study undertaken for the project is attached in **Appendix C**.

Background noise levels were measured at Blackmans Flat between 10 and 20 of December 2009 and at Wallerawang between 22 December 2009 and 8 January 2010. 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.

SINCLAIR KNIGHT MERZ

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 6-1**. An address and description of where the loggers were situated on the properties is given in **Table 6-1** below.

■ **Table 6-1 Receiver and 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. |

6.2. Environmental Noise Measurements

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

The unattended monitoring was undertaken 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 6-2**.

■ **Figure 6-1 Location of proposed ash placement areas and receiver locations.**



■ **Table 6-2 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 |

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.

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 6-3** presents a summary of the monitored noise levels and the various sources that comprised the noise environment for the survey.

■ **Table 6-3 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) - Trucks 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) |

Results of the attended monitoring show good agreement with the measured data from the unattended noise survey, with 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 Power Station or the Wallerawang Power Station during the monitoring period.

6.3. Environmental Noise Goals

Table 6-4 summarises the project specific noise goals outlined above at the potentially most affected residence.

■ **Table 6-4 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 6-4** the information from **Table 6-3** is used to develop the intrusiveness criteria. The amenity criteria are taken from the INP. The most stringent of the noise goals for each assessment period is then adopted as the project specific noise criteria and are used to assess compliance.

6.4. Operational Noise Assessment

A quantitative assessment was undertaken for the potential noise impacts associated with the operation of Lamberts North and Lamberts South ash placement sites.

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 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.

6.4.1. Sources of Noise Emissions

Operation of the ash placement areas involves the transportation, distribution and compaction of the ash within the placement area using dumpers, dozers, drum rollers and water carts. The operation is undertaken according to 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 during weekdays and 06:00 and 17:00 on weekends;
- 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.

6.4.2. 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 and 20:00.

During the morning shoulder periods, the noise levels in the area are generally increasing due to traffic movements on the Castlereagh 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 for the daytime period are shown for reference for each site.

Table 6-5 and **Table 6-6** present the results for the Lamberts North and Lamberts South placements for neutral weather conditions.

■ **Table 6-5 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 6-6 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 6-7 and **Table 6-8** present the results for the Lamberts North and Lamberts South placements for adverse weather conditions.

■ **Table 6-7 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 6-8 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 | | | |

6.4.3. 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 day time and evening periods. 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 at this location 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 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 that, without mitigation, there may be 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.

6.4.4. 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 considered.

Means by which mitigation measures would be applied will be addressed in the Construction and Operational Management Plans for the site.

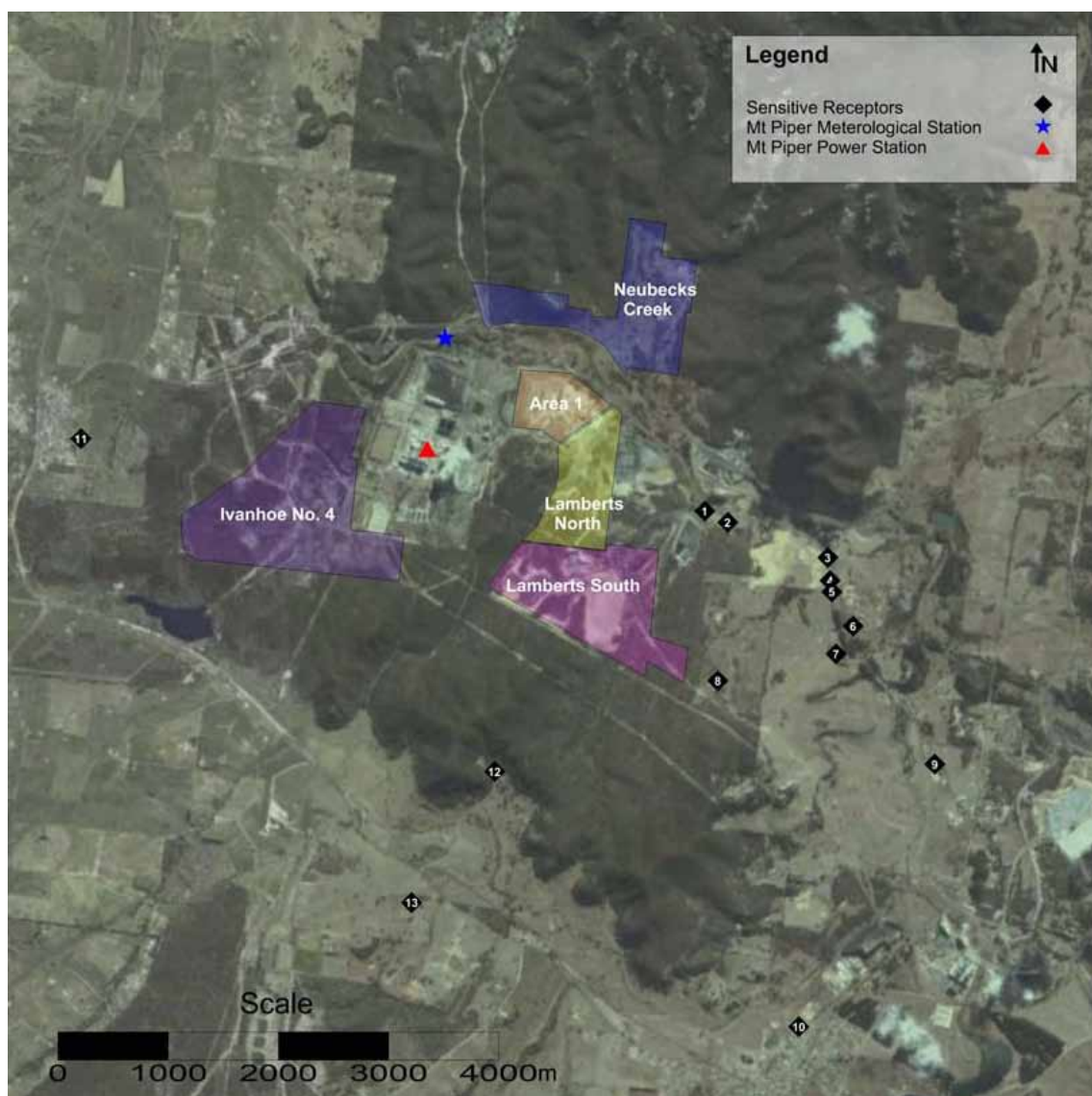
6.4.5. Ivanhoe No. 4 and Neubecks Creek Sites

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 6-2**. For the Neubecks Creek concept approval site, potentially 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 6-2 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;
- Establishing 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. These would include hours of operation.

6.5. Construction Noise Assessment

6.5.1. Methodology

The NSW DECCW has established an *Interim Construction Noise Guideline* (ICNG) 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 ICNG recommends standard hours for construction work as summarised in **Table 6-9** although these may be able to be varied in specific circumstances to undertake work for safety or accessibility reasons.

■ **Table 6-9 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:

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

Local residents and the DECCW would 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 6-10**. 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).

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.

6.5.2. 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 as 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.

■ **Table 6-10 Recommended construction 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 | <p>The noise affected level represents the point above which there may be some community reaction to noise.</p> <ul style="list-style-type: none"> Where the predicted or measured LAeq (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details. |
| | Highly noise affected 75 dB(A) | <ul style="list-style-type: none"> 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: <ol style="list-style-type: none"> times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences). if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times. |
| Outside recommended standard hours | Noise affected RBL + 5 dB | <ul style="list-style-type: none"> 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.

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 gully area known as Huons Gully to remove any existing stockpiles from current mining operations;
- Extension of haul roads from 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 and a geotextile drainage blanket would be installed in the invert of the Huons Gully.

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.

6.5.3. Construction Noise Impact Assessment

The predicted noise levels for construction activities for each of the placement areas are presented in **Table 6-11**.

■ **Table 6-11 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.

No construction noise mitigation measures would be required.

6.6. Management and Monitoring

Monitoring would need to be undertaken for specific equipment and overall construction noise levels on the project. Specific equipment levels will be measured and assessed against equipment types and overall noise levels assessed in consultation with relevant noise criteria.

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

- The DECCW's *Environmental Noise Control Manual*;
- The DECCW'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.

Equipment noise levels would 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
- At 12 month intervals.

Prior to commencement on site, a noise test would 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. Long term environmental noise monitoring using unattended noise monitoring equipment will be carried out to confirm actual operational noise levels at the sensitive receiver locations or where a noise complaint has been received. 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 would be conducted:

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