ACOUSTICS AND AIR

PENRITH LAKES DEVELOPMENT CORPORATION

ENVIRONMENTAL NOISE COMPLIANCE MONITORING

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PREPARED FOR

PENRITH LAKES DEVELOPMENT CORPORATION
LOCKED BAG 2000
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DOCUMENT CONTROL

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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

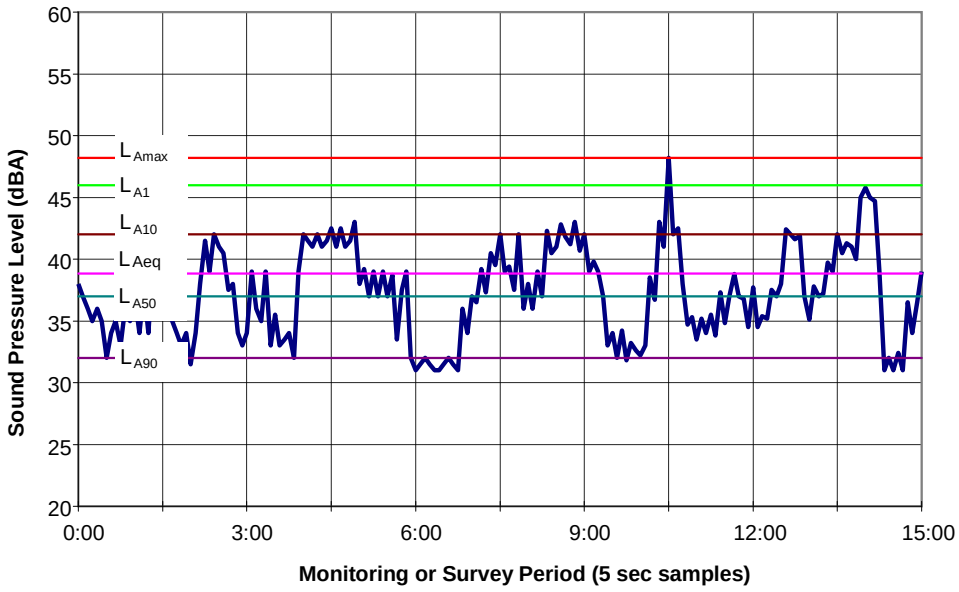
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10^{th} percentile (lowest 10^{th} percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period **–** daytime, evening and night time.

Typical Graph of Sound Pressure Level vs Time



1 INTRODUCTION

Penrith Lakes Development Corporation Limited (PLDC) operates a quarry in Castlereagh on the western fringes of Sydney as shown in Figure 3-1. Under Condition No. M7.2 attached to Licence No. 002956 issued by the Environment Protection Authority (EPA), annual measurements of the noise emanating from the overall quarry and rehabilitation operations are required.

The environmental measurements were also required by the Minister for Planning in requirement DA4 S65 (a) which specifies monitoring on a six monthly basis, at the nearest residential neighbours, particularly those on Church Lane.

Wilkinson Murray was commissioned to assess PLDC's compliance with the above conditions. This report gives the results of noise compliance monitoring carried out in March 2014.

2 OPERATIONAL NOISE CRITERIA

There are two sets of conditions with respect to noise emitted from the development, one from the EPA licence, the other from the Minister for Planning DA Consent.

2.1 EPA Conditions

The EPA, in issuing Licence No. 002956, has set the following conditions in respect of noise emitted from the development:

L6.1 Noise from the premises must not exceed the following noise emission criterion for the duration specified:

a) L_{AMAX} – 70dB(A) at any time;
b) $L_{A10,15minutes}$ – 65dB(A) for any continuous 4 weeks at any residential premises specified in L6.2;
c) $L_{A10,15minutes}$ – 60dB(A) for any continuous 3 months at any residential premises specified in L6.2;
d) $L_{A10,15minutes}$ – 55dB(A) for any continuous 2 years at any residential premises specified in L6.2;
e) Less than 55dB(A) for the remainder of the time.

L6.2 Noise from the premises is to be measured at any point within one metre of the boundary of any residential premises, excluding residential premises on Castlereagh Escarpment as shown on map titles 'Figure 2: important Features on and Adjacent to site' dated 4/4/2001, to determine compliance with condition L6.1.

L6.3 Noise from the premises must not exceed the following noise emission criterion for the duration specified:

a) L_{AMAX} – 70dB(A) at any time;
b) $L_{A10,15minutes}$ – 65dB(A) for 3 months;
c) $L_{A10,15minutes}$ – 55dB(A) for any continuous 30 months at any residential premises specified in L6.4;
d) Less than 55dB(A) for the remainder of the time.

L6.4 Noise from the premises is to be measured at any point within one metre of the boundary of any residential premises on the Castlereagh Escarpment shown on 'Figure 2: Important features on and Adjacent to site' dated 4/4/01, to determine compliance with condition L6.3.

Environmental noise level measurements were carried out at seven residential locations in the near vicinity of the quarrying and rehabilitation operations of the Penrith Lakes site as shown in Figure 3-1. The monitoring locations have been chosen to be representative of receivers falling within Conditions L6.2 and L6.4.

It should be noted that monitoring at the Salmons residence (Location 8) is no longer required as the resident has now moved out.

2.2 Minister of Planning Conditions

The Minister of Planning, as the consent authority, has set the following conditions with respect to noise emitted from the development.

The Applicant shall not exceed the following maximum noise levels in those areas designated.

29a) Cranebrook Village and other Dwellings outside the Scheme area (but not on the Escarpment)

(i) Maximum Noise Levels

Noise levels as measured at any one dwelling in Cranebrook or any other dwelling outside the Scheme area (but not including residences along Castlereagh Escarpment) are not to exceed the following criteria.

Maximum Noise Limits (L_{A10})

Absolute maximum	*- 70dBA*
Greater than	*- 65dBA for 1 month*
Greater than	*- 60dBA for 3 months*
Greater than	*- 55dBA for 30 months*
Less than	*- 55dBA for remainder of time*

The above absolute maximum may be exceeded as a result of the construction of noise control works, e.g. noise bunds.

29b) <u>Dwellings on the Castlereagh Escarpment</u>

(i) Maximum Noise Levels

Noise levels as measured at any one dwelling on the escarpment are not to exceed the following criteria.

Maximum Noise Limit (L_{A10})

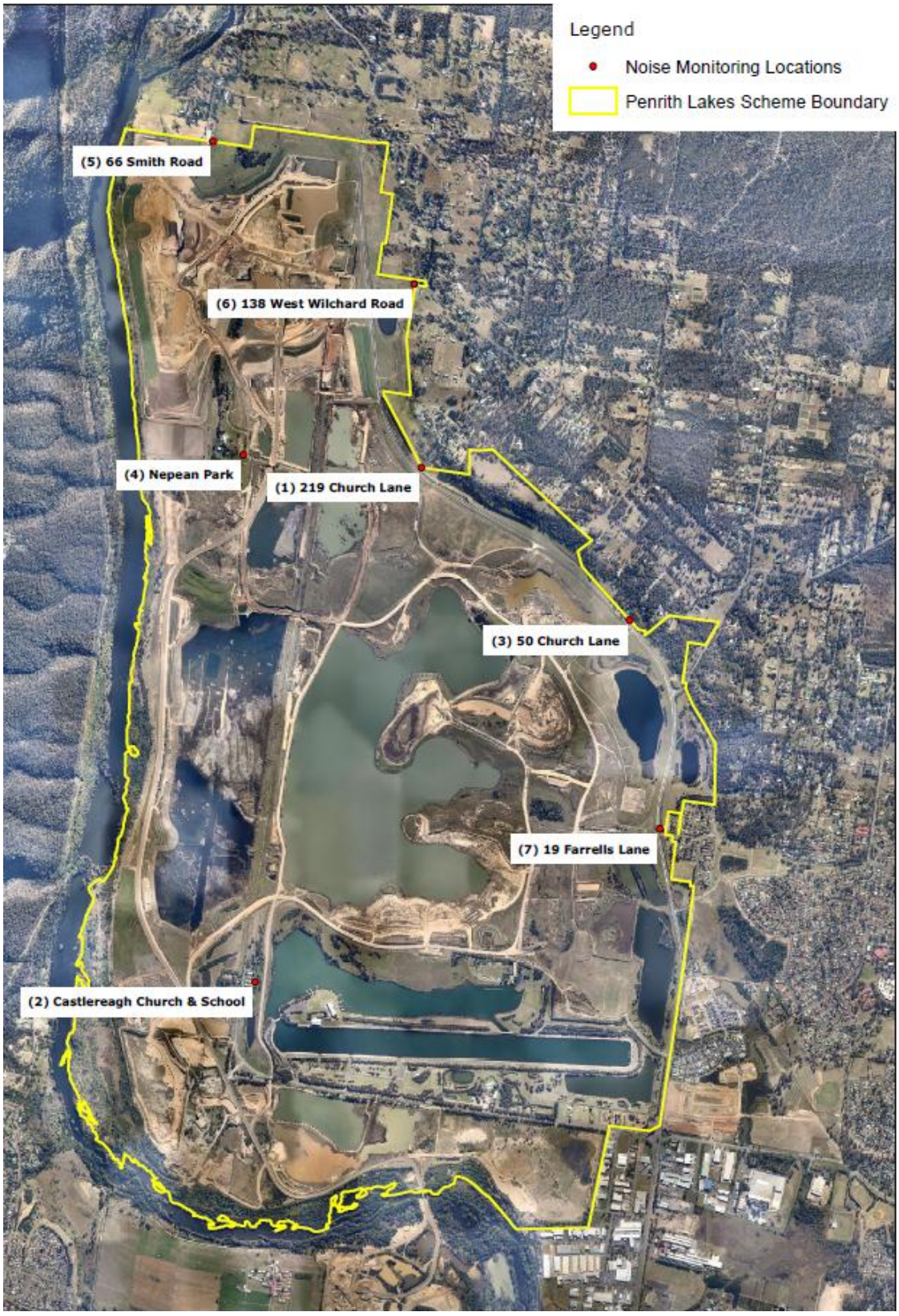
Absolute maximum	*- 70dBA*
Greater than	*- 65dBA for 1 month*
Greater than	*- 55dBA for 30 months*
Less than	*- 55dBA for remainder of time*

3 MONITORING LOCATIONS

Monitoring was carried out at seven residential locations around the site. All the monitored residences are shown in Figure 3-1.

- **Location 1:** 219 Church Lane, at the rear of the building.
- **Location 2:** Uniting Church on Castlereagh Road, on the eastern boundary of the current PLDC work area.
- **Location 3:** 50 Church Lane on Castlereagh escarpment.
- **Location 4:** Nepean Park, south east of the fine sand extraction area and west of the fine sand haul route.
- **Location 5:** 66 Smith Road, on the northern boundary of the current PLDC extraction work area.
- **Location 6:** 138 West Wilchard Road north of Castlereagh escarpment and east of Castlereagh Road.
- **Location 7:** 21 Farrells Lane, the residence at the western end of Farrells Lane, beside Gate 10 on the eastern boundary of the current PLDC work area.

Figure 3-1 Noise Monitoring Locations



4 SURVEY PROCEDURE & RESULTS

4.1 Survey Procedure

The survey was conducted on Tuesday, 18 March 2014.

Measurement of noise was carried out in accordance with Australian Standard AS 1055.1–1997 "*Description and Measurement of Environmental Noise"*. The measurements at each location were carried out over a 15-minute period. Various noise parameters were measured including the $L_{A1,}$ $L_{A10,}$ L_{A90} and L_{Aeq}. The $L_{A1,}$ L_{A10} and L_{A90} levels are the levels exceeded for 1%, 10% and 90% of the sample time respectively. The L_{Aeq} level is the Equivalent Continuous Sound Level and has the same sound energy over the sampling period as the actual noise environment with its fluctuating sound levels.

In this case the L_{A10} noise level from the Penrith Lakes Development Corporation quarrying operations is the relevant noise assessment parameter. Where noise from other sources has been of significant influence during a measurement period the L_{A10} level from the Penrith Lakes Development Corporation quarrying operations has been estimated based on observed meter levels and interpolation of the other various recorded noise parameters.

Noise levels were measured with a Bruel & Kjaer Type 2236 Sound Level Meter. This Sound Level Meter conforms to Australian Standard 1259 *"Acoustics – Sound Level Meters"* as Class 1 Precision Sound Level Meter which has an accuracy suitable for laboratory use. The A-Weighting filter of the meter was selected and the time weighting was set to "Fast". The meter was then field calibrated both before and after the measurements with a Sound Level Calibrator. A calibration reading of 94.1dBA was recorded before the survey. No significant system drift was noted at the end of the survey.

The B&K 2236 and the Calibrator have been laboratory calibrated within the previous two years in accordance with Wilkinson Murray Quality Assurance procedures.

4.2 Survey Results

The contribution of PLDC operations to the overall L_{A10} noise levels and overall ambient L_{A90} noise levels are shown in Table 4-1.

Table 4-1 Results of PLDC Noise Compliance Monitoring – Tuesday, 18 March 2014

Location No. (Figure 3-1)	Location	GPS Coordinates (ISG)	Time	EPA Licence Condition	Long-Term L_{A10} Criterion (dBA)	PLDC L_{A10} Noise Level (dBA)	Background L_{A90} Noise Level (dBA)	Comments (L_{Amax} criterion =70dBA)
2	Uniting Church	269081, 1267280	10.03am - 10.18am	L6.1	55	49	45	PLDC L_{A10} noise level dominated by construction activities on Old Castlereagh Road; mobile plant engine noise 46-52dBA; impact noise L_{max} 50-64dBA. Light vehicles (PLDC) passing on haul road audible briefly, L_{max} 61dBA.
7	21 Farrells Lane	271627, 1268193	10.28am - 10.43am	L6.1	55	n/a [1]	43	PLDC inaudible throughout measurement. Traffic on Castlereagh Road L_{max} 75-78dBA for cars and L_{max} 80-86dBA for trucks.
6	138 West Wilchard Rd	270154, 1271646	10.55am - 11.10am	L6.1	55	n/a [1]	35	PLDC inaudible throughout measurement. Traffic on Castlereagh Road L_{max} 37-40dBA for cars and L_{max} 42-44dBA for trucks.
5	66 Smith Road	268951, 1272546	11.17am - 11.32am	L6.1	55	n/a [1]	40	PLDC inaudible throughout measurement. Distant traffic on Castlereagh Road L_{max} 37-40dBA. Insect noise constant throughout measurement, 40-41dBA.
4	Nepean Park	269069, 1270616	11.40am - 11.55am	L6.1	55	n/a [2]	34	Distant PLDC mobile plant engine and reversing alarm audible briefly, estimated 25-28dBA. Insect noise constant throughout measurement, 30-41dBA. Distant dog barking frequently, 40-41dBA.
1	219 Church Lane	270131, 1270581	12.01pm - 12.16pm	L6.3	55	48	60	PLDC grader audible for 11mins, estimated 47-49dBA. Traffic on Castlereagh Road L_{max} 46-48dBA. Loud insect noise nearby 56-65dBA.

Location No. (Figure 3-1)	Location	GPS Coordinates (ISG)	Time	EPA Licence Condition	Long-Term L_{A10} Criterion (dBA)	PLDC L_{A10} Noise Level (dBA)	Background L_{A90} Noise Level (dBA)	Comments (L_{Amax} criterion =70dBA)
3	50 Church Lane	271435, 1269547	12.19pm - 12.34pm	L6.3	55	n/a [2]	38	Distant PLDC horn audible very briefly, estimated L_{max} 22-23dBA. Traffic on Castlereagh Road L_{max} 62-67dBA for cars and L_{max} 78dBA for trucks.

Notes: 1) Noise associated with PLDC found to be inaudible throughout whole measurement
2) Noise associated with PLDC did not last long enough to generate an L_{A10} noise level.

5 CONCLUSION

Noise emission from the Penrith Lakes Development Corporation operations was surveyed on Tuesday, 18 March 2014.

The measured noise levels comply with the requirements of both the EPA and the Minister for Planning long-term noise level criterion at all monitored residential locations. Levels also complied with the EPA L_{AMax} criterion of 70dBA at all monitored locations.