RAPT CONSULTING

Great River NSW Pty Ltd

Noise Assessment – Penrith Lakes, May - 2019

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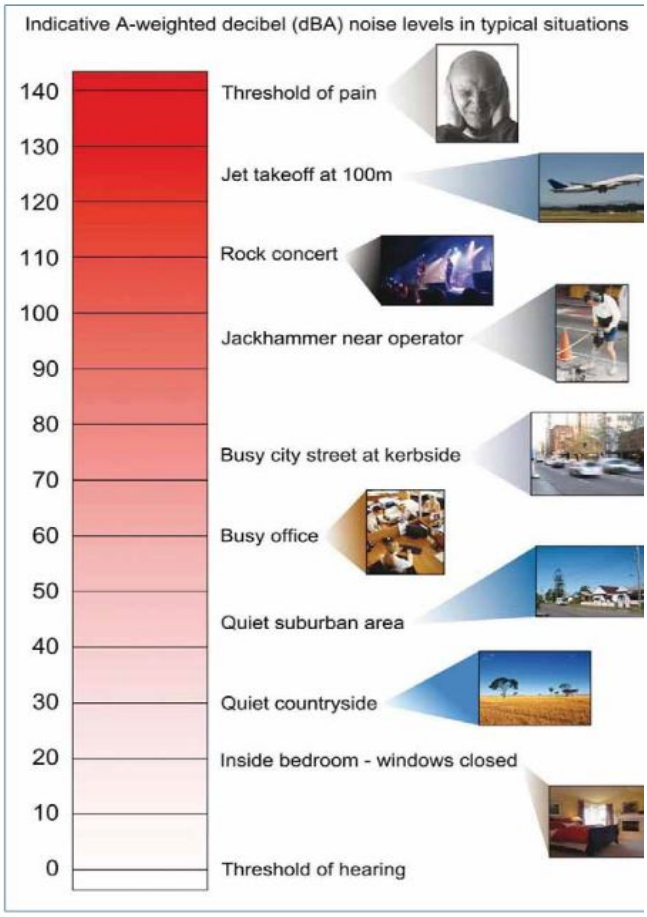
Glossary of Acoustic Terms

Term	Definition
dB	Decibel is the unit used for expressing the sound pressure level (SPL) or power level (SWL) in acoustics. The picture below indicates typical noise levels from common noise sources. 
dB(A)	Frequency weighting filter used to measure 'A-weighted' sound pressure levels, which conforms approximately to the human ear response, as our hearing is less sensitive at very low and very high frequencies.
$L_{Aeq(period)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$L_{A10(period)}$	The sound pressure level that is exceeded for 10% of the measurement period.
$L_{A90(period)}$	The sound pressure level that is exceeded for 90% of the measurement period.
L_{Amax}	The maximum sound level recorded during the measurement period.

Noise sensitive receiver	◷ An area or place potentially affected by noise which includes: ◷ A residential dwelling. ◷ An educational institution, library, childcare centre or kindergarten. ◷ A hospital, surgery or other medical institution. ◷ An active (e.g. sports field, golf course) or passive (e.g. national park) recreational area. ◷ Commercial or industrial premises. ◷ A place of worship.
Rating Background Level (RBL)	The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period.
Feasible and Reasonable (Noise Policy for Industry Definition)	**Feasible** mitigation measure is a noise mitigation measure that can be engineered and is practical to build and/or implement, given project constraints such as safety, maintenance and reliability requirements. Selecting **Reasonable** measures from those that are feasible involves judging whether the overall noise benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the mitigation measure. To make a judgement, consider the following: ◷ Noise impacts ◷ Noise mitigation benefits ◷ Cost effectiveness of noise mitigation ◷ Community views.
Sound power level (SWL)	The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in dB(A).

1. Introduction

Background

RAPT Consulting has been engaged to undertake a construction noise and vibration assessment for Great River NSW Pty Ltd to inform a Statement of Environmental Effects for the proposed Penrith Lakes Filling Development Application. The proposal is to receive VENM/ ENM material generated by the general civil market, Westconnex and other State Government tunnelling projects, and to receive it (if not also place, compact etc) on a 24/7 basis. The site is provided in Figure 1.

Figure 1 Site Location

1.1 Limitations

The purpose of this report is to provide an independent noise assessment for the proposed Penrith Lakes Filling Development Application.

It is not the intention of the assessment to cover every element of the acoustic environment, but rather to conduct the assessment with consideration to the prescribed work scope.

The findings of the noise assessment represent the findings apparent at the date and time of the assessment undertaken. It is the nature of environmental assessments that all variations in environmental conditions cannot be assessed and all uncertainty concerning the conditions of the ambient environment cannot be eliminated. Professional judgement must be exercised in the investigation and interpretation of observations.

In conducting this assessment and preparing the report, current guidelines for noise were referred to. This work has been conducted in good faith with RAPT Consulting's understanding of the client's brief and the generally accepted consulting practice.

No other warranty, expressed or implied, is made as to the information and professional advice included in this report. It is not intended for other parties or other uses.

2. Existing Environment

To establish background noise levels, noise monitoring was undertaken from 20 May to 27 May 2018 at the northern end of the site directly across Old Castlereagh Road from the nearest potentially affected residences located at 39 and 47-65 Old Castlereagh Road. This site also presented as a secure location whereby minimising the risk of theft or vandalism to the monitoring equipment.

During site visits it was noted that road traffic noise and wildlife sources primarily described the ambient noise environment and is indicative of a sub-urban environment. The monitoring location is shown in Figures 2 and 3. The two residential locations shown in Figure 2 are the only residences in the immediate vicinity of the proposal. All other nearest land uses are industrial and commercial.

Figure 2 Noise Monitoring Location

Figure 3 Noise Logger Location

The monitoring was conducted using a RION NL-42 type 2 integrated noise logger. These units are capable of measuring continuous sound pressure levels and are able to record LAmin, LA90, LA10, LAmax and LAeq noise descriptors.

Logged data was reviewed and filtered to exclude any extraneous data results during the monitoring period. The cumulative Rating Background Levels (RBL) and ambient levels (LAeq) are provided in Table 1.

Table 1 Background and Ambient Noise Monitoring Results

Descriptor	Noise Level dB(A)	Time Interval
$L_{A90(Day)}$	37	7:00am - 6:00pm
$L_{A90(evening)}$	37	6:00pm - 10:00pm
$L_{A90(night)}$	32	10:00pm - 7:00am
$L_{Aeq(15hr)}$	56	7:00am - 10:00pm
$L_{Aeq(9hr)}$	49	10:00pm – 7:00am
$L_{Aeq(24hr)}$	54	6:00am – 6:00am
$L_{Aeq(1hr)}$ Day	57	7:00am - 10:00pm
$L_{Aeq(1hr)}$ Night	50	10:00pm – 7:00am

3. Noise and Vibration Criteria

3.1 Construction Noise

Construction noise is assessed with consideration to DECCW *Interim Construction Noise Guidelines* (ICNG) (July 2009). The INCG is a non-mandatory guideline that is usually referred to by local councils and other NSW government entities when construction / demolition works require development approval. The ICNG recommend standard hours for construction activity as detailed in Table 2.

Table 2 ICNG Recommended Construction Hours

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 work on Sundays or Public Holidays.

The ICNG provides noise management levels for construction noise at residential and other potentially sensitive receivers. These management levels are to be calculated based on the adopted rating background level (RBL) at nearby locations, as shown in Table 3.

Table 3 ICNG Recommended Noise Management Levels

Period	Management Level $L_{Aeq(15\ min)}$
Residential Recommended standard hours	Noise affected level: RBL + 10 Highly noise affected level: 75 dB(A)
Residential Outside recommended standard hours	Noise affected level: RBL + 5
Classrooms at schools and other educational institutions	Internal Noise Level 45 dB(A) (applies when properties are being used)
Offices, retail outlets (external)	70 dB(A)
industrial premises (external)	75 dB(A)

The above levels apply at the boundary of the most affected residences / offices or within 30 m from the residence where the property boundary is more than 30 m from the residence.

The *noise affected level* represents the point above which there may be some community reaction to noise. Where the *noise affected level* is exceeded all feasible and reasonable work practices to minimise noise should be applied and all potentially impacted residents should be informed of the nature of the works, expected noise levels, duration of works and a method of contact. The *noise affected level* is the background noise level plus 10 dB(A)

during recommended standard hours and the background noise level plus 5 dB(A) outside of recommended standard hours.

The *highly noise affected level* represents the point above which there may be strong community reaction to noise and is set at 75 dB(A). Where noise is above this level, the relevant authority may require respite periods by restricting the hours when the subject noisy activities can occur, considering:

- Times identified by the community when they are less sensitive to noise (such as 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.

Based on the above and the RBL determined from site monitoring, construction noise goals have been derived, as shown in Table 4.

Table 4 ICNG Noise Goals Leq(15min) dB(A)

Receiver	Within Recommended Standard Hours	Outside Recommended Standard Hours	
		Evening (6pm-10pm)	Night (10pm-7am)
Residential (external)	47	42	37
Offices, retail outlets (external)	70	70	70
industrial premises (external)	75	75	75

3.2 Road Noise

Road noise generated by the proposal is evaluated separately to construction operational noise.

The NSW Road Noise Policy (RNP) recommends various criteria for different road developments and uses. Section 2.2.2 of the RNP also provides guidance for haulage routes along public roads. Where a principal haulage route is identified, the noise criteria for the route should match those for arterial/sub-arterial roads, recognising that they carry a different level and mix of traffic to local roads.

While this is not an RMS project, Section 9 of the RMS Construction Noise and Vibration Guideline provides further guidance and states for RMS projects an initial screening test should first be applied by evaluating whether noise levels will increase by more than 2dBA due to construction traffic or a temporary reroute due to a road closure. Where increases are 2dBA or less then no further assessment is required.

Road noise goals based on Table 3 of the NSW Road Noise Policy are provided in Table 5 below.

Table 5 Road Noise Goals

Situation	Day 7 am to 10 pm	Night 10 pm to 7 am
Land use development with potential to create additional traffic on Freeway/Arterial/Sub-Arterial Roads (external)	60 $L_{Aeq(15\ hour)}$	55 $L_{Aeq\ (9\ hour)}$

3.3 Construction Sleep Disturbance

The ICNG states that where construction works are planned to extend over more than two consecutive nights, the impact assessment should cover the maximum noise level from the proposed works. The ICNG recommends utilising guidance for the potential for sleep disturbance within the NSW Environmental Criteria for Road Traffic Noise (ECRTN) (EPA 1999). Appendix B5 of the ECRTN specifies that the LA1 level of any noise should not exceed the ambient LA 90 noise level by more than 15 dB(A). The NSW Road Noise Policy (RNP) (DECCW 2011) additionally utilises this guideline. The Construction sleep disturbance noise goals are provided in Table 6.

Table 6 Construction Sleep Disturbance Noise Goals

Situation	Time Period	Construction Sleep Disturbance Noise Goal L_{A1} (1min)
Residences Old Castlereagh Road	10:00pm – 7:00am	47 dB(A)

The RNP also states that from research on sleep disturbance to date it can be concluded that: maximum internal noise levels below 50–55 dB(A) are unlikely to awaken people from sleep one or two noise events per night, with maximum internal noise levels of 65–70 dB(A), are not likely to affect health and wellbeing significantly. Typical noise reduction through a window open for ventilation can be 10 dB(A). This would mean an external noise level of 65 dB(A) can correspond to an internal noise level of 55 dB(A) with windows open and would be unlikely to cause sleep disturbance.

3.4 Vibration Guidelines

Human Exposure

Vibration goals during the were sourced from the DECCW's *Assessing Vibration: a technical guideline*, which is based on guidelines contained in British Standard (BS) 6472–1992, *Evaluation of human exposure to vibration in buildings (1–80 Hz).*

Intermittent vibration is assessed using the vibration dose value (VDV), fully described in BS 6472 – 1992. Acceptable values of vibration dose are presented in Table 7.

Table 7 Acceptable Vibration Dose Values for Intermittent Vibration (m/s1.75)

Location	Daytime [1]		Nighttime [1]	
	Preferred value	Maximum value	Preferred value	Maximum value
Critical areas [2]	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

1 Daytime is 7:00 to 22:00 and nighttime is 22:00 to 7:00; and

2 Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be need to assess intermittent values against the continuous or impulsive criteria for critical areas.

Building Damage

Currently, there is no Australian Standard that sets the criteria for the assessment of building damage caused by vibration. Guidance of limiting vibration values is attained from reference to the following International Standards and Guidelines:

- British Standard BS7385.2 - 1993 *Evaluation and Measurement for Vibration in Buildings*, Part 2 - Guide to damage levels from ground borne vibration; and
- German Standard DIN 4150-3: 1999-02 Structural Vibration – Part 3: *Effects of vibration on structures*.

BS7385.2 – 1993 is utilised in this case in the assessment of potential building damage resulting from ground borne vibration produced by the proposed activity.

The recommended Peak Particle Velocity (PPV) guidelines for the possibility of vibration induced building damage are derived from the minimum vibration levels above which any damage has previously been encountered and are presented in Table 8.

Table 8 Transient Vibration Guideline Values for Potential Building - Cosmetic Damage

Building Type	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
Unreinforced or light framed structures. Residential or light commercial type buildings.	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

1 Values referred to are at the base of the building; and

2 For transient vibration effecting unreinforced or light framed structures at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded.

Unlike noise which travels through air, the transmission of vibration is highly dependent on substratum conditions between the source/s and receiver. Also dissimilar to noise travelling through air, vibration levels diminish quickly over distance, thus an adverse impact from vibration on the broader community is not typically expected. Vibration during works is considered an intermittent source associated with two main types of impact; disturbance at receivers and potential architectural/structural damage to buildings. Generally, if disturbance issues are controlled, there is limited potential for structural damage to buildings.

4. Assessment of Potential Impacts

4.1 Construction

Construction can occur in the vicinity of residences or other sensitive land uses and be variable in times of occurrence. These aspects of construction can exacerbate noise levels and their effects. Construction noise by its nature is temporary, may not be amenable to purpose-built noise control measures applied to industrial processes, and may move as construction progresses. With these constraints in mind, The ICNG was developed to focus on applying a range of work practices most suited to minimise construction noise impacts, rather than focusing only on achieving numeric noise levels. While some noise from construction sites is inevitable, the aim of the ICNG is to protect much of residences and other sensitive land uses from noise pollution most of the time.

Construction activities onsite are expected to include:

- Establish site and ancillary facilities, such as construction compound, parking areas, and install safety barriers and environmental controls (e.g erosion and sedimentation controls);
- Earthworks receival of fill, involving clearing of vegetation, dozing, compacting, grading.

Noise Generating Equipment

Plant and equipment needed for construction would be determined by the Construction Contractor. Likely equipment including typical sound levels are summarised in Table 9. Noise level data has been obtained from AS2436, the ENMM and RAPT Consulting internal database. Other equipment may be used however it is anticipated that they would produce similar noise emissions.

Table 9 Typical Construction Item Sound Power Levels

Plant and Equipment	Typical Sound Power Level dB(A)
Truck and Dog	103
Dozer	113
Grader	110
Compactor	108
Water Cart	109
Dump Truck	108
Light Vehicles	106
Scraper	107
Excavator 20t	105

Plant and Equipment	Typical Sound Power Level dB(A)
Road Sweeper	104

Construction Assessment approach

Acoustic modelling was undertaken using Bruel and Kjaer's "Predictor" to predict the effects of site noise. Predictor is a computer program for the calculation, assessment and prognosis of noise propagation. Predictor calculates environmental noise propagation according to ISO 9613-2, *"Acoustics – Attenuation of sound during propagation outdoors*". Terrain topography, ground absorption, atmospheric absorption and relevant shielding objects are taken into account in the calculations.

Modelling results are based on available information provided and should only be used as a guide for comparative purposes. Site layout and building structures were based on information provided at the time of the assessment. 4 scenarios have been modelled based on area of construction work. The scenarios are based on all items of plant operating simultaneously at their nominated sound power levels to simulate a worst-case scenario.

Results of the modelling are provided in Figures 4 – 7.

Figure 4 West Quadrant Construction dB(A) Leq(15min)

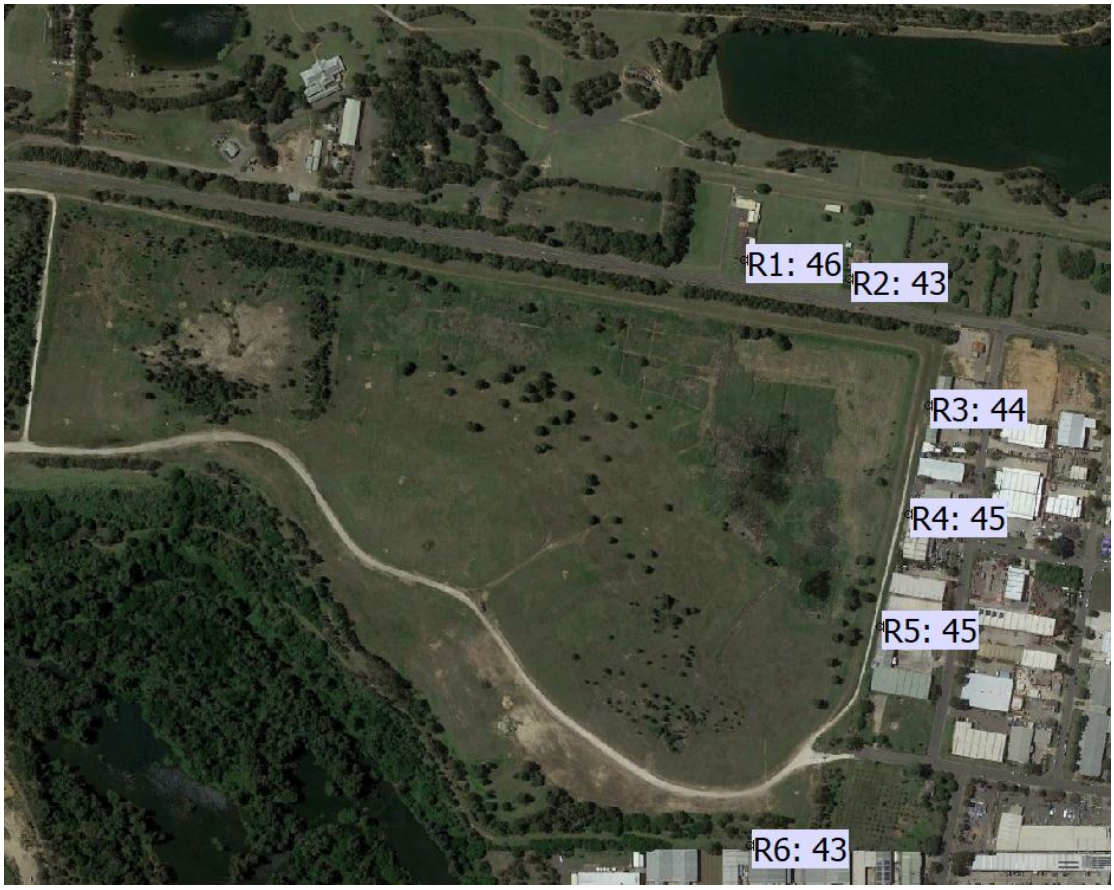


Figure 5 Central Quadrant Construction dB(A) Leq(15min)

Figure 6 East Quadrant Construction dB(A) Leq(15min)

Figure 7 South Quadrant Construction dB(A) Leq(15min)

Construction noise levels have been predicted based on the potential construction noise levels provided in Table 9. The different scenarios will occur from site establishment to re-finishing works. These noise levels represent different equipment noise levels and give an idea how noise levels may change across the proposal area with different activities being undertaken.

The magnitude of off-site noise impact associated with construction would be dependent upon several factors:

- The intensity of construction activities;
- The location of construction activities;
- The type of equipment used;
- Intervening terrain; and
- The prevailing weather conditions.

In addition, construction machinery would likely move about the study area, variously altering the directivity of the noise source with respect to individual receivers. During any given period, the machinery items to be used in the study area would be expected to operate at maximum sound power levels for only brief stages. At most other times, the machinery will produce lower sound levels while carrying out activities not requiring full power. It is highly unlikely that all construction equipment would be operating at their maximum sound power levels at any one time. Finally, certain types of construction machinery would be present in the study area for only brief periods during construction. During typical construction activities only a small number of machinery would be in use and for only brief periods operating at sound power levels much lower than their maximum sound power levels. Generally it is

expected that noise management levels can be complied with during construction of this project.

However, in the highly unlikely event of a worst-case scenario where all construction equipment is operating simultaneously at their maximum sound power levels, there is the possibility the nearest residential receptors to exceed the recommended noise management levels in certain instances. The highly affected noise level of 75 dB(A), is expected to be complied with. Table 10 provides results of noise assessment against noise goals.

Table 10 Predicted Construction Noise Levels dB(A) Leq(15min)

Receiver	West	Central	East	South	Standard Hours	Outside Standard hours	
						Evening 6pm-10pm	Night 10pm-7am
R1	39	46	52	42	47	42	37
R2	37	43	52	42	47	42	37
Offices, retail outlets (external)	< 70	< 70	< 70	< 70	70	70	70
industrial premises (external)	< 75	< 75	< 75	< 75	75	75	75

- Construction noise levels are expected to comply with all noise goals in the west quadrant during day, evening and night-time.
- Construction noise levels are expected to comply during daytime in the central quadrant.
- Construction noise levels may in a worst-case scenario exceed construction noise goals by 5 dB(A) during daytime at R1 and R2 while operating in the east quadrant.
- Construction noise levels are expected to comply during day and evening situations while operating in the south quadrant.
- All construction noise levels are expected to comply with industrial and commercial receptors.
- The highly effected noise level of 75 dB(A) is expected to be complied with.

- As all sources were modelled operating at their nominated sound power levels, sleep disturbance noise goals of 47 dB(A) $_{L1(1min)}$ are expected to be complied with at all quadrants with the exception of the east quadrant.

Construction Noise Mitigation

While noise levels are expected to comply, an unlikely worst-case scenario contains potential for construction noise levels to exceed the project noise goals particularly in the east quadrant. NSW EPA provides guidance for mitigation measures and may be used as to how to minimise the impacts on the community from noise and vibration.

It is recommended that the following standard noise mitigation measures described in Section 4.3 be implemented where feasible and reasonable and all potentially impacted residents should be informed of the nature of the works, expected noise levels, duration of works and provided a point of contact.

4.2 Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) would be prepared prior to the commencement of works and implemented through all phases of the proposed construction works. The PCEMP would provide the framework for the management of all potential noise impacts resulting from the construction works and would detail the environmental mitigation measures to be implemented throughout the construction works. The CEMP would incorporate as applicable the measures described in Section 4.3.

4.3 Planning and design of construction works

During the detailed planning, scheduling and design of the construction works the following noise management and mitigation measures are could be investigated and, as required, implemented prior to the commencement of noise generating works.

Notification before and during construction

- Potentially affected neighbours to the construction works would be advised of the proposed construction period at least 2 weeks prior to the commencement of works.
- Consultation and communication between the site and neighbours would assist in minimising uncertainty, misconceptions and adverse reactions to noise.
- All site workers (including subcontractors and temporary workforce) should be familiar with the potential for noise impacts upon residents and encouraged to take all practical and reasonable measures to minimise noise during their activities.
- The constructor or site supervisor (as appropriate) during construction works should provide a community liaison phone number and permanent site contact so that the noise related complaints, if any, can be received and addressed in a timely manner.
- The constructor (as appropriate) should establish contact with the residents and communicate, particularly when noisy activities are planned.

Utilising best practice measures when operating on construction site

- Construction works should adopt Best Management Practice (BMP) and Best Available Technology Economically Achievable (BATEA) practices as addressed in the ICNG. BMP includes factors discussed within this report and encouragement of a project objective to reduce noise emissions. BATEA practices involve incorporating the most advanced and affordable technology to minimise noise emissions.

- Where practical, simultaneous operation of dominant noise generating plant should be managed to reduce noise impacts, such as operating at contrasting times or increase the distance between plant and the nearest identified receiver.

- High noise generating activities should only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block.

- Where possible, reversing beepers on mobile equipment would be replaced with low-pitch tonal beepers (quackers). Alternatives to reversing beepers include the use of spotters and designing the site to reduce the need for reversing may assist in minimising the use of reversing beepers.

- Equipment which is used intermittently should be shut down when not in use.

- All engine covers should be closed while equipment is operating.

- The construction site would be arranged to minimise noise impacts by locating potentially noisy activities away from the nearest receivers wherever possible.

- Material dumps should be located as far as possible from the nearest receptors.

- Wherever possible, loading and unloading areas should be located as far as possible from the nearest receptors;

- Where possible, trucks associated with the work area should not be left standing with their engine operating in a street adjacent to a residential area.

- All vehicular movements to and from the site should comply with the appropriate regulatory authority requirement for such activities.

Complaints handling

- Noise and vibration monitoring should be undertaken upon receipt of a complaint once it is confirmed that the works at the site are the likely source and based on a review of works at the time of the complaint is substantiated. The monitoring would identify and quantify the issue and determine options to minimise impacts.

- If valid noise/vibration data for an activity is available for the complainant property, from works of a similar severity and location, it is not expected that monitoring will be repeated upon receipt of repeated complaints for these activities, except where vibration levels are believed to be potentially damaging to the building.

- Any noise and vibration monitoring should be undertaken by a qualified professional and with consideration to the relevant standards and guidelines. Attended noise and vibration monitoring should be undertaken in the following circumstances:

- Upon receipt of a noise and/or vibration complaint. monitoring should be undertaken and reported within a timely manner (say 3 to 5 working days). If exceedance is detected, the situation should be reviewed to identify means to reduce the impact to acceptable levels.

4.4 Construction Vibration

Vibration impacts discussed in this section essentially focus on potential structural damage to properties in close vicinity of the study area and/or potentially affected by construction activities.

Energy from construction equipment is transmitted into the ground and transformed into vibrations, which attenuates with distance. The magnitude and attenuation of ground vibration is dependent on the following:

- The efficiency of the energy transfer mechanism of the equipment (i.e. impulsive; reciprocating, rolling or rotating equipment)
- The Frequency content;
- The impact medium stiffness;
- The type of wave (surface or body)
- The ground type and topography.

Due to the above factors, there is inherent variability in ground vibration predictions without site-specific measurement data.

Due to the nature of the works the vibration risk is low.

Table 11 outlines typical vibration levels for different plant activities sourced from the NSW RMS Publication *Environmental Noise Management Manual*.

Table 11 Typical Vibration Levels - Construction Equipment

Item	Peak Particle Velocity at 10m (mm/s)
15 Tonne Compactor	7-8
7 Tonne Compactor	5-7
Roller	5-6
Dozer	2.5-4
Backhoe	1
Jackhammer	0.5

As there are no receptors within 10 metres of the project area impacts to residential receiver are expected to comply. While the nature of the works indicates the risk is low, it is important that this risk is captured and managed in the CEMP.

4.5 Road Noise

Based on information provided regarding the project, it is anticipated approximately 9 to 10 truck and dogs with a worst case of 29 will deliver material to site each hour. Site traffic is expected to have blended in with local traffic by the time it goes past the nearest sensitive receivers. To increase noise levels by 2dB(A) one would have to increase the cumulative traffic volume by 60% which is not expected. However, particularly during night-time deliveries it is recommended that the Lugard Street entrance be utilised to minimise any risk of impacts to the residences on Old Castlereagh Road.

5. Conclusion

This noise assessment has been undertaken by RAPT Consulting on behalf Great River NSW Pty Ltd to inform a Statement of Environmental Effects for the proposed Penrith Lakes Filling Development Application.

All calculations have assumed a worst-case scenario with no acoustic attenuation measures in place. Based on the monitoring results and the information provided regarding the development, compliance with all noise goals is expected for the development.

Construction

Given the distance to nearest receptors and the nature of the construction works, it is expected that construction noise and vibration will comply with adopted noise and vibration goals. However unlikely, a worst-case scenario of operations in has the potential to exceed construction noise goals during certain situations

During night-time deliveries it is recommended that the Lugard Street entrance be utilised to minimise any risk of impacts to the residences on Old Castlereagh Road. Daytime deliveries via Old Castlereagh Road should be acceptable.

A set of standard mitigation measures for construction noise and vibration have been provided based on anticipated requirements of the proposal. It is believed 24 hours site operation construction noise can be minimised and managed acceptable to the local community through the implementation of a CEMP similar to what has been recommended in this report.

Should you have any further questions regarding this report, please do not hesitate to contact Greg Collins on 0488512224 or greg@raptconsulting.com.au.

Thank you,

Greg Collins

Director – RAPT Consulting