

23 January 2013

610.11655-R1 Addendum-02 20130123.doc

Johnstaff
Level 8
16 O'Connell Street
SYDNEY NSW 2000

Attention: Ben Crompton

Dear Ben

**Bega Hospital Redevelopment
Environmental Noise Impact Assessment
Addendum to SLR Consulting Report 610.11655-R1**

SLR Consulting Australia Pty Ltd (SLR Consulting) has been engaged by Johnstaff to assess potential noise and vibration impacts during construction and operation of the proposed Bega Hospital redevelopment. The impacts have previously been assessed in SLR Consulting Report 610.11655-R1 *Bega Hospital Redevelopment, Environmental Noise Impact Assessment, Construction and Operation*, dated 3 September 2012.

This letter report acts as an addendum to that report and is required to include an assessment of noise and vibration impacts from the proposed geothermal system.

Noise and vibration predictions for the relevant works have been undertaken, where appropriate. The predictions indicate that some of the proposed construction activities are likely to exceed the construction noise goals at the surrounding receivers by margins consistent with those already assessed at other nearby locations. The additional impacts should therefore be managed in accordance with mitigation measures as already detailed within SLR Consulting Report 610.11655-R1 together with the procedures contained in the *Interim Construction Noise Guideline* (ICNG).

Based on available data, operational noise impacts associated with the geothermal system have the potential to exceed the noise goals at the nearest sensitive receiver and an allowance in the design should be made for acoustic treatment of the Valve/Pumproom including upgraded acoustic louvres, absorptive treatment and acoustic seals to external doors as outlined in this report.

Please contact me on 9428 8100 if you have any further questions in relation to this assessment.

Yours sincerely



ROBERT HALL
Associate

Report Details

Reviewed by: ALW
Review Date: 23/01/2013

1 Receiver Location

An aerial view of the project area is shown in **Figure 1**. The description of nearby sensitive receivers is presented in **Table 1**.

Figure 1 Project Area Showing Project Site, Representative Receiver Locations & Noise Monitoring Locations

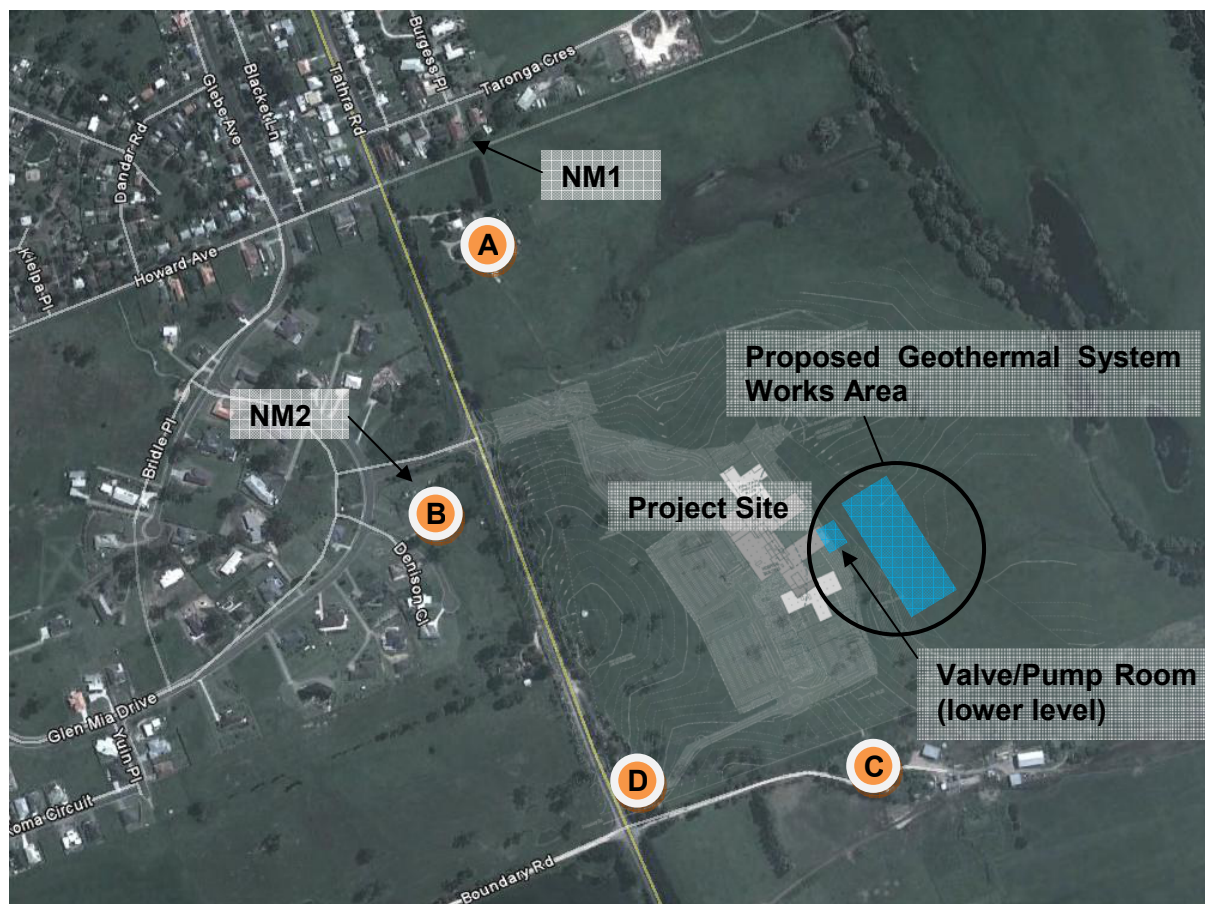


Image Courtesy of Google

Table 1 Representative Noise Sensitive Receivers

Receiver	Address	Brief Description
A	Tathra Road	Residential – North of site
B	23 Glen Mia Drive	Residential – West of site
C	Boundary Road	Residential – South of site
D	1556 Tathra Road	Residential – South west of site

From the aerial view shown in **Figure 1** it is noted that the Boundary Street receiver (receiver C) is the closest receiver to the proposed geothermal system and also benefits least from any screening effect afforded by the proposed hospital building. Consequently, the noise and vibration impact assessment will be controlled by the predicted impacts at this receiver.

2 Construction Noise and Vibration

2.1 Construction Noise Impacts

2.1.1 Construction Works

In order to minimise the potential noise impacts upon nearby sensitive receivers, construction works are proposed to mainly be undertaken during standard daytime periods (7.00 am to 6.00 pm Monday to Friday and 8.00 am to 1.00 pm on Saturdays).

The proposed equipment for the major proposed works scenarios is shown in **Table 2**. The table also contains Sound Power Level data for individual items of plant together with the combined Sound Power Level for each scenario.

Table 2 Construction Works

Ref	Scenario	Equipment ¹	No of items	Max LAeq Power (dBA)	Sound Level
				Individual Item	Activity
Geothermal System Installation					
G1	Services Trenching	Excavator (up to 40t)	1	109	112
		Backhoe	1	102	
		Truck & Dog	1	98	
		Small Roller (Smooth Drum)* for compacting trench backfill	1	100	
		Wacker Packer* for compacting small areas	1	108	
G2	Installing Pipework	Hand Tools	1	94	109
		Piling Rig*	1	108	
		Excavator (20T)	1	99	
		Compressor	1	95	
G3	Landscaping	Truck (10 tonne)	1	98	105
		Bobcat	1	104	
		Hand Tools	1	94	

Note 1: * denotes "annoying" item of equipment, as defined in the ICNG, and as such includes a +5 dBA penalty to predictions.

The *Interim Construction Noise Guideline* (ICNG) lists a number of construction activities which have been proven to be "annoying" and which require to have a 5 dB penalty applied to them. Annoying characteristics may include tones, impulses, low frequency noise and intermittent noise. The ICNG identifies the following proposed activities as being particularly annoying and as such, a 5 dB correction has been incorporated into the noise modelling process for them.

- Piling
- Rolling/compacting

2.1.2 Assessment of Construction Works

Based on the scenarios and the sound power levels outlined in **Table 2**, construction noise levels have been predicted at the nearest receivers. The resultant daytime LAeq(15minute) noise level predictions, where appropriate, are presented in **Table 3** for the various activities and compared with the relevant Noise Management Levels (NMLs).

In practice, noise levels will depend on the number of plant items and equipment operating at any one time and their precise location relative to the receiver of interest. Noise levels will vary due to the movement of plant and equipment about the worksites and the concurrent operation of plant. In some cases, reductions in noise levels will occur when plant are located in cuttings or behind embankments, buildings or other items of equipment.

The predictions in **Table 3** are representative of the worst-case scenario with all equipment operating simultaneously and continuously for the full 15 minute assessment period.

Table 3 Construction Noise Predictions

Ref	Scenario	Representative Receiver	Noise Level - LAeq(15minute) (dBA) at Most Affected Receiver		
			Worst-case Predicted	Daytime NML	Exceedance
Geothermal System Installation					
G1	Services Trenching	A	48	42	6
		B	50	45	5
		C	61	45	16
		D	54	45	9
G2	Installing Pipework	A	45	42	3
		B	46	45	1
		C	57	45	12
		D	51	45	6
G3	Landscaping	A	41	42	-
		B	42	45	-
		C	54	45	9
		D	47	45	2

2.1.3 Discussion

Geothermal System Installation

Exceedance of the daytime (standard construction hours) LAeq(15minute) noise goal of up to 16 dB is predicted at the most affected sensitive receiver location. This level of exceedance is common for these types of construction activities. While the overall duration of each activity is not confirmed at this stage, the predicted noise impacts at any single receiver are only expected to be present for a relatively short period due to movement of the construction works within the site.

2.1.4 Highly Noise Affected Receivers

Predicted noise levels at the identified noise-sensitive receivers during the proposed construction scenarios do not exceed 75 dBA and are therefore not considered to be *'highly noise affected'*, as defined by the ICNG.

2.2 Mitigation Measures

The predicted construction noise impacts during installation of the geothermal system are generally consistent (within 3 dB) with those already assessed at nearby locations and should therefore be managed in accordance with mitigation measures as detailed within SLR Consulting Report 610.11655-R1 and procedures contained in the ICNG.

2.3 Construction Vibration Impacts

The proposed activities are considered to either contain plant items that are not significantly vibration intensive and/or the separation distance from the nearest receivers is sufficient to mitigate the potential impacts, and as such have not been considered further in this assessment.

3 Operational Noise and Vibration Assessment

3.1 Geothermal System

3.1.1 Noise Generating Plant

The noise generating equipment associated with operation of the geothermal system is limited to a heat pump chiller and pumps and is understood to be consistent with noise generated by a typical chilled water system (excluding cooling towers). From information provided by Johnstaff, the overall sound power level of a typical unit is approximately 101 dBA. This equipment is proposed to be located on the south western wing of the hospital (lower level) as shown in **Figure 1**.

3.1.2 Noise Goals

The noise goals at nearby receivers are based on the *NSW Industrial Noise Policy* (INP). Project specific noise goals for nearby receiver are presented in SLR Consulting Report 610.11655-R1. The controlling noise goal is the 35 dBA INP night-time intrusiveness noise goal at surrounding residential receivers.

3.1.3 Noise Impact Assessment

From the aerial view shown in **Figure 1** it is noted that receiver C (approximately 200 m to the south of the proposed valve/pump room) is the closest receiver to the noise generating plant of the proposed geothermal system and also benefits least from any screening effect afforded by the proposed hospital building. Consequently, the noise and vibration impact assessment will be controlled by predicted impacts at this receiver.

Based on the assumed sound power level for the chiller/pumps associated with the geothermal system unmitigated noise levels at receiver C during periods of operation are predicted to be in the region of 48 dBA. This would exceed the 35 dBA noise goal by 13 dBA.

3.1.4 Noise Control Recommendations

The following noise control measures are required:

- A high performance acoustic louvre (eg, NAP Silentflo 600H, or Fantech Sound Bar Louvre SBL-2) will likely be required for the Valve/Pumproom. The louvre should be located away from the south facade of the Valve/Pumproom in order to direct sound away from the nearby residential receivers.
- Absorptive treatment to the Valve/Pumproom will be required (eg. 50 mm to 100mm thick, 32 kg/m³ acoustically absorbent fibrous insulation, with perforated foil or other protective facing, to 50% – 75% of the walls and ceiling).
- Any external doors to the Valve/Pumproom should be fitted with acoustic seals.
- A standard steel deck roof will likely adequately control breakout noise to the environment.

3.1.5 Vibration Assessment

With regard to vibration impacts on nearby receivers due to the operation of the proposed geothermal system, items are considered to be not significantly vibration intensive and/or the separation distance from the nearest receivers is sufficient to mitigate the potential impacts, and as such have not been considered further in this assessment.

It is noted that the impact of vibration from the geothermal Valve/Pumproom equipment on the hospital areas is to be assessed as part of the acoustic design of the hospital and would likely require consideration of mounting design as part of the detailed design.