ACOUSTICS AND AIR

CSR HEBEL FACTORY EXTENSION

OPERATIONAL NOISE ASSESSMENT

REPORT NO. 16323
VERSION A

OCTOBER 2016

PREPARED FOR

CSR HEBEL
112 WISEMANS FERRY ROAD
SOMERSBY NSW 2250

WILKINSON MURRAY

DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
A	Final	31 October 2016	Roman Haverkamp	Rob Bullen

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Wilkinson Murray is an independent firm established in 1962, originally as Carr & Wilkinson. In 1976 Barry Murray joined founding partner Roger Wilkinson and the firm adopted the name which remains today. From a successful operation in Australia, Wilkinson Murray expanded its reach into Asia by opening a Hong Kong office early in 2006. 2010 saw the introduction of our Queensland office and 2011 the introduction of our Orange office to service a growing client base in these regions. From these offices, Wilkinson Murray services the entire Asia-Pacific region.

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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.

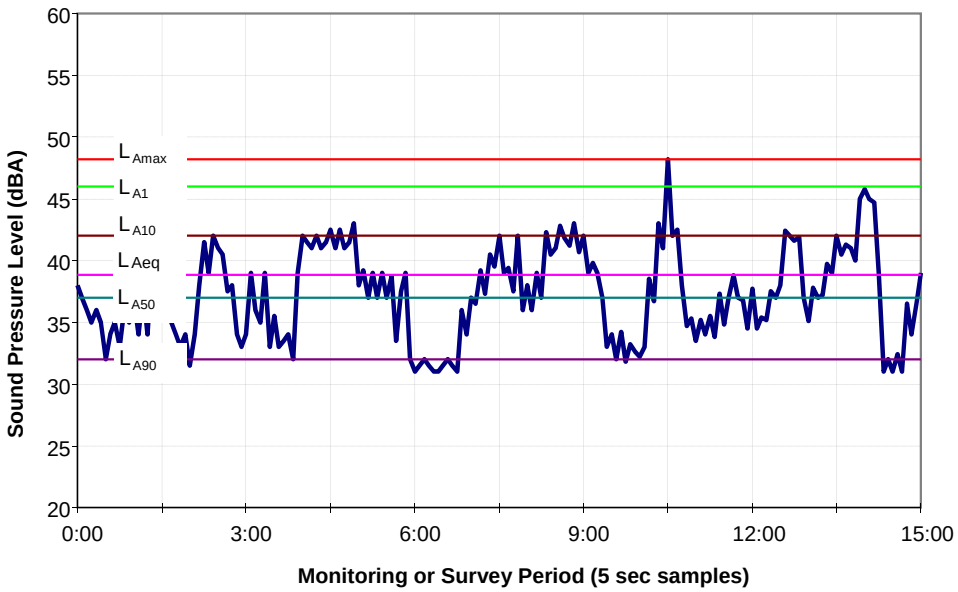
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

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 10th percentile (lowest 10th 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

CSR Building Products Limited (CSR) is proposing to extend the existing manufacturing plant for Hebel products at Somersby Industrial Park located at 98 and 112 Wisemans Ferry Road, Somersby (Lot 22 DP 873845 and Lot 1 DP 816083, respectively).

In accordance with Central Coast Council's request, Wilkinson Murray Pty Limited (WMPL) has been commissioned to undertake an operational noise assessment of the manufacturing plant with the proposed extension (the Project) to support the Development Application (DA).

This assessment has been undertaken in accordance with the relevant NSW State government policies and guidelines.

2 PROJECT DESCRIPTION

2.1 Locality

The site is situated at 98 and 112 Wisemans Ferry Road, Somersby, within the Gosford City Local Government Area.

The subject site is approximately five (5) kilometres to the west of Gosford city centre in the Somersby Industrial Park (SIP). SIP is located to the immediate west of the M1 Motorway which connects Newcastle to Sydney. It is an established industrial precinct, with the properties adjoining and in the vicinity of the subject site currently used for industrial/manufacturing purposes mostly. The land that adjoins the site on the southern and eastern boundaries is vegetated and not developed.

Figure 2-1 shows the site and the surrounding area.

2.2 Proposed Development

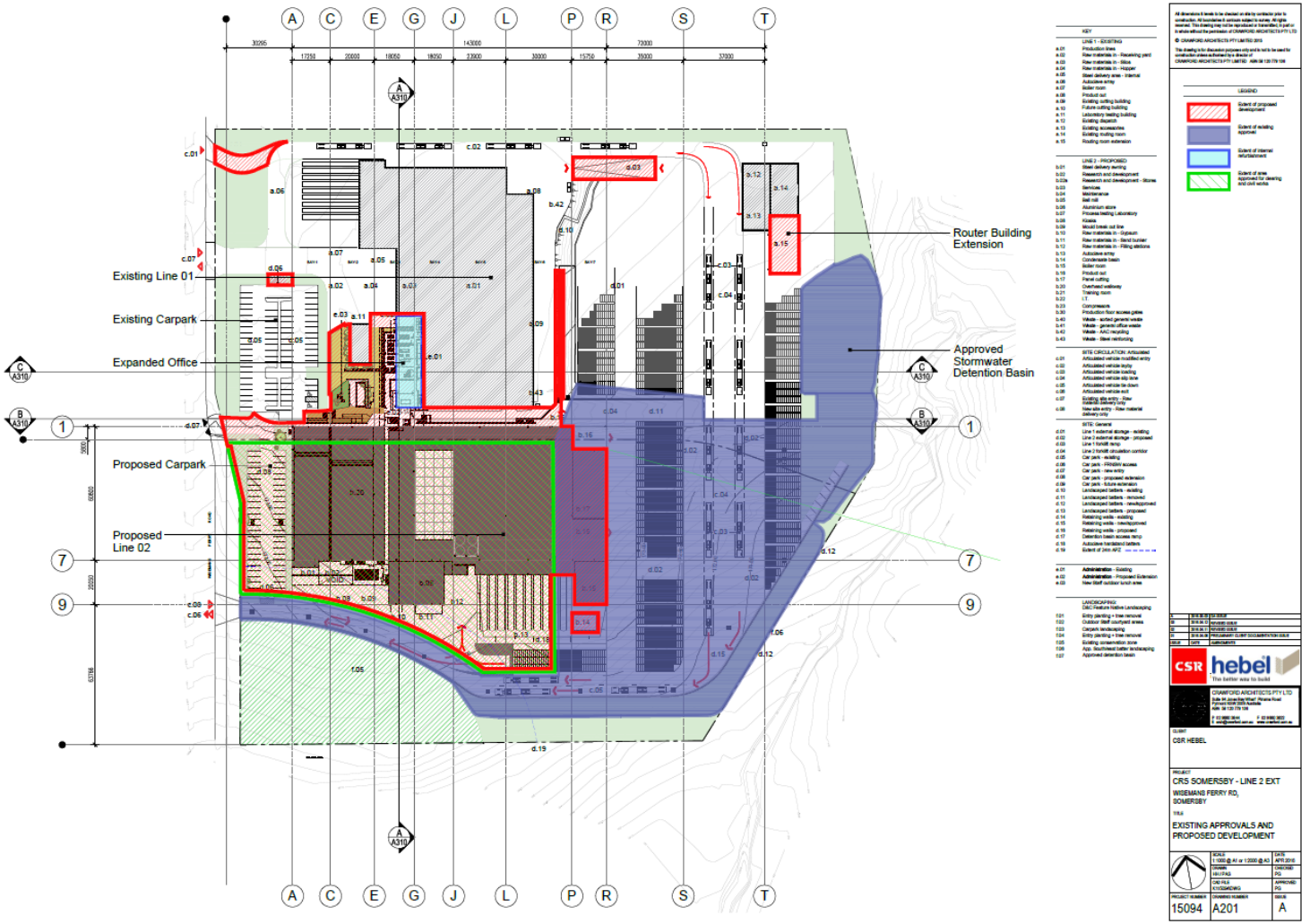
The proposed development involves the construction of an extension to the ongoing operation of an autoclave aerated concrete manufacturing facility (Hebel facility). The proposal consists of extending the existing Hebel plant facilities on the site by construction of:

- a production plant building including facilities for cutting, storage of raw materials, and a boiler room;
- hardstand storage areas and vehicle loading facilities;
- two new driveways and onsite car parking; and
- an extended administration building, staff amenities and landscaping.

Figure 2-2 shows the detailed design of the proposal.

Figure 2-1 Locality Area

Figure 2-2 Detailed Design of Proposal



The existing facility is approximately 9,624 square metres in size, while the proposed extension is approximately 10,911 square metres, meaning the facility (plus extension) will be approximately 20,535 square metres in size. It is understood that an additional 50 car parking spaces will be provided taking the total number of spaces (including disabled parking) to 122 spaces.

As part of the manufacturing process, the ongoing operations that will be carried out on the site will include:

- loading, storage and preparation of raw materials such as sand, lime, gypsum, and cement;
- concrete mixing, casting, cutting and curing (autoclave); and
- storage and loading of products for distribution.

There is no change proposed to the hours of operation that apply to the existing manufacturing plant, that is both the existing plant and extension will operate over a 24 hour period. If the extension is approved, it is anticipated that up to 24 additional staff will be employed at the facility.

The proposed extension will create approximately 320 vehicle movements per day.

Delivery and supply of materials to the plant will also continue to occur over a 24 hour period.

Truck movements associated with the site will continue to use the M1 Motorway, and as such will only travel along the motorway on- and off-ramps and the Wisemans Ferry Road section between the motorway and the site. Since the site will only be accessed through left-in/left-out intersections, trucks arriving to site will need to travel all the way to the Wisemans Ferry Road/Somersby Falls Road roundabout to U-turn.

No residential receivers are located along the motorway on- and off-ramps and the Wisemans Ferry Road section from the motorway to the Wisemans Ferry Road/Somersby Falls Road roundabout. For this reason truck movements associated with the site on those sections of public road are not expected to have any noise impact on residential receivers. Furthermore, truck movements generated by the site will result in a negligible increase in noise levels along the M1 Motorway due to the high traffic volumes using the motorway.

Similarly, noise generated by light vehicles from staff is expected to be negligible on the local road network.

Therefore, traffic noise on public roads associated with the site is not expected to impact on the surrounding community and road traffic noise is not further discussed as part of this assessment.

3 NOISE SENSITIVE RECEIVERS

The closest and potentially most exposed noise sensitive receivers are described in Table 3-1 and identified in Figure 3-1.

All identified receivers consist of free standing one-storey houses except for R11 which represents the Kariong Correctional Centre. For that particular receiver, the assessment location was conservatively selected to represent the most exposed location within the correctional centre.

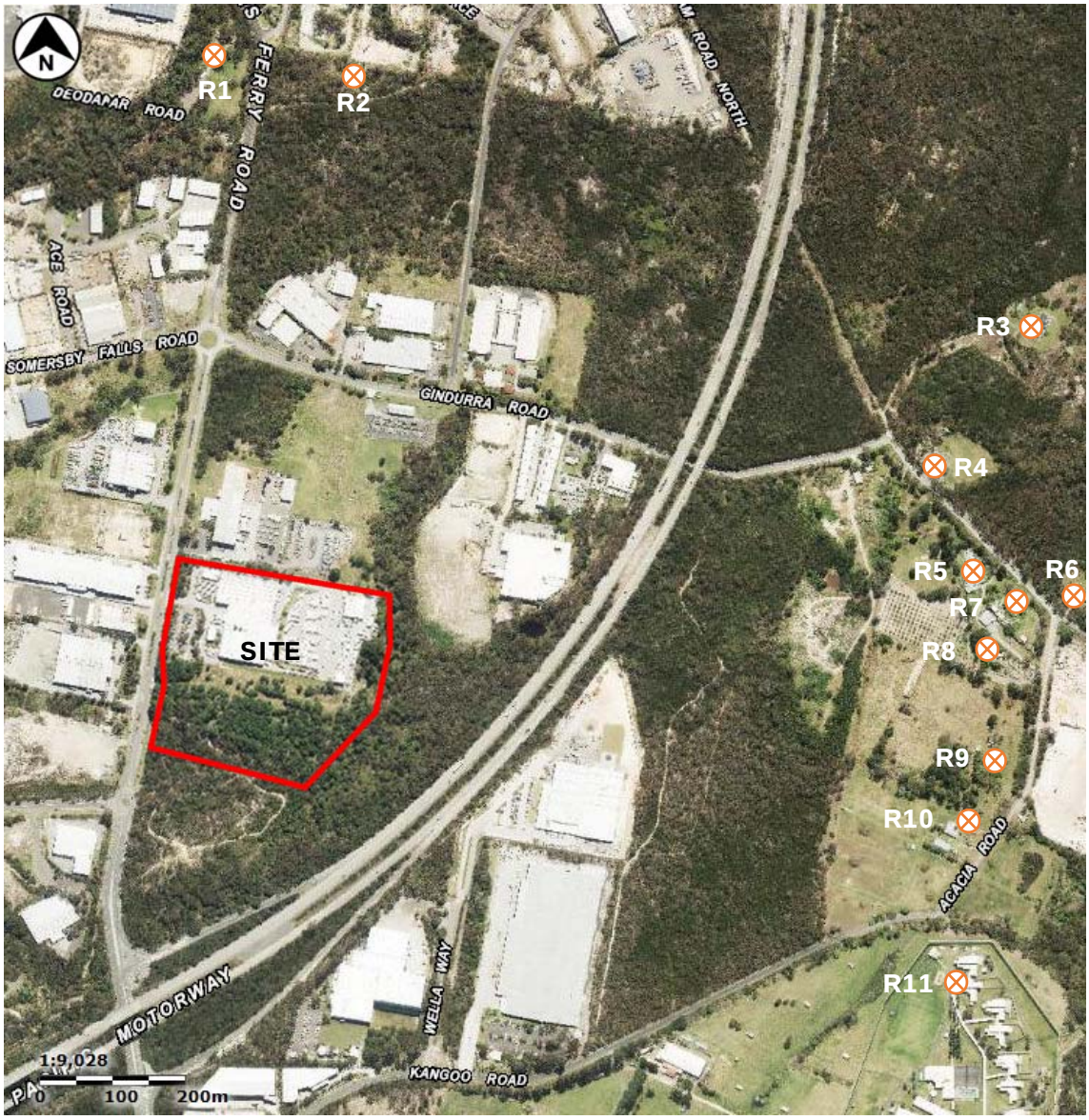
Most of the houses are located on the eastern side of the M1 Motorway. However, the closest residential receivers - R1 and R2 - are located on the western side of the M1 Motorway, within the SIP approximately 700m north of the site along Wisemans Ferry Road.

Due to the close proximity of the M1 Motorway, all identified receivers are affected by constant traffic noise dominating the acoustic environment.

Table 3-1 Closest & Most Exposed Noise Sensitive Receivers

Receiver ID	Receiver Address
R1	191 Wisemans Ferry Road, Somersby
R2	180 Wisemans Ferry Road, Somersby
R3	252 Debenham Road, South Somersby
R4	242 Debenham Road, South Somersby
R5	10 Acacia Road, Somersby
R6	223 Debenham Road, South Somersby
R7	214 Debenham Road, South Somersby
R8	12 Acacia Road, Somersby
R9	16 Acacia Road, Somersby
R10	32 Acacia Road, Somersby
R11	Kariong Correctional Centre

Figure 3-1 Closest & Most Exposed Noise Sensitive Receivers



4 EXISTING ENVIRONMENT

Unattended noise measurements were conducted to establish background noise levels relevant to the assessment. Attended noise monitoring was also carried out to estimate the existing industrial noise in the vicinity of the site.

This section describes the noise measurement methodology and equipment, and provides a summary of the measured noise levels.

4.1 Background Noise Monitoring

4.1.1 Noise Measurement Methodology

In order to evaluate existing background noise levels experienced by surrounding receivers, a noise logger was established at R6 between Thursday, 20 and Thursday, 27 October 2016.

Based on site observations, background noise levels in the area are controlled mainly by distant traffic noise emanating from the M1 Motorway, with noise associated with the local fauna also affecting background noise levels. It is possible that distant vehicle movements on the local road network may at times affect the background noise levels at some of the receiver locations.

The distance separating R6 and the motorway is comparable to that separating the other identified receivers from the M1, and for this reason the background noise levels measured at R6 are considered to be representative of those at the other receivers. For some of the identified receivers located closer to the motorway, and therefore exposed to higher background noise levels, the measured levels at R6 may be conservative.

These noise measurements were undertaken in general accordance with Australian Standard *AS1055:1997 Acoustics – Description and Measurement of Environmental Noise* and the NSW *Industrial Noise Policy (INP).*

Meteorological data was obtained from the Bureau of Meteorology weather station located at Gosford to ensure periods of strong winds and rain were excluded when determining background noise levels.

The monitored noise levels are shown in graphical format in Appendix A.

4.1.2 Noise Monitoring Equipment

The noise monitoring equipment used for these measurements consisted of an environmental noise logger (Acoustic Research Laboratories EL-215) set to A-weighted, fast response, continuously monitoring over 15-minute sampling periods. This equipment is capable of remotely monitoring and storing noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift was noted.

The logger determines L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1}, L_{A10} and L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see Glossary of Acoustic Terms for definitions). The L_{A1} is indicative of maximum noise levels due to individual noise events such as the occasional pass-by of a heavy vehicle. This is used for the assessment of sleep disturbance. The L_{A90} level is normally taken as the background noise level during the relevant period.

4.1.3 Measured Background Noise Levels

Table 4-1 summarises the background noise levels, expressed as Rating Background Levels (RBLs) for the daytime (7.00am-6.00pm), evening (6.00pm-10.00pm), and night time (10.00pm-7.00am) assessment periods. The RBL represents the background noise in the area, and is determined from measurement of L_{A90} noise levels. Importantly, noise from the source(s) subject to assessment must be absent to determine the RBL. The full methodology for calculating RBL values from measured L_{A90} levels is set out in the *INP.*

Table 4-1 Measured RBLS

Monitoring Location	Measured RBL (dBA)		
	Day (7am–6pm)	Evening (6pm–10pm)	Night Time (10pm–7am)
R6	40	38	38

For the purpose of the assessment, the above RBLs are considered to be representative of all identified receivers.

4.2 Existing Industrial Noise Monitoring

Attended noise monitoring was conducted with the intent to establish existing industrial noise (other than that generated by the site) in the vicinity of the site. This is relevant for the amenity noise assessment discussed in Section 5.

In accordance with the *INP*, transportation noise does not qualify as industrial noise. As such, noise monitoring was conducted at night to minimise noise generated by traffic on the M1 Motorway and the local road network.

Based on late night spot measurements conducted between 11.00pm and 12 Midnight on Wednesday, 19 October 2016, industrial noise at the identified receivers to the east of the motorway has been estimated at approximately 33dBA, and was found to be primarily controlled by noise emanating from the West Gosford light industrial area. Spot measurements were also carried out at various locations within the SIP and based on those, industrial noise at R1 and R2 – which was found to be controlled by noise generated by the SIP - was also estimated at approximately 33dBA. Care was taken to ensure that the estimated industrial noise level associated with the SIP was not affected by noise generated by the existing CSR manufacturing plant.

Based on daytime spot measurements conducted on Thursday, 29 September 2016 industrial noise was determined to be less than 40dBA during the day.

5 NOISE CRITERIA

5.1 Operational Noise Criteria

5.1.1 NSW *Industrial Noise Policy*

The current Environment Protection Licence (EPL 3427) does not prescribe any noise limits for the existing manufacturing plant.

The NSW *Industrial Noise Policy (INP)* provides the framework for deriving noise limits for consents and licences that enables the EPA to regulate premises that are scheduled under the Protection of the Environment Operations Act 1997 (POEO Act). This policy seeks to promote environmental well-being through preventing and minimising noise.

The *INP* provides a method for assessing noise impact from industrial noise sources at residences and commercial receivers.

There are two noise criteria which should be satisfied under the *INP*. The first is the "intrusiveness" criterion which assesses the likelihood of noise being intrusive above the ambient noise level. The intrusiveness criterion applies for residential receivers only.

The second noise criterion, known as the "amenity" criterion, ensures the total industrial noise from all sources in the area does not rise above a maximum acceptable level.

The *INP* stipulates that intrusiveness and amenity criteria are determined for the daytime (7.00am-6.00pm), evening (6.00pm-10.00pm) and night time (10.00pm-7.00am) periods, as relevant. The determined criteria apply at the most affected point on or within the receiver property boundary.

Both intrusiveness and amenity criteria rely on determination of existing noise levels at the receiver location.

5.1.2 *INP* Intrusiveness Criteria

The intrusiveness criterion requires that the L_{Aeq} noise level from the source being assessed, when measured over 15 minutes, should not exceed the Rating Background Noise Level (RBL) by more than 5dB.

Based on the assumed RBLs set out in Table 4-1, Table 5-1 summarises the intrusiveness noise criteria which apply to the identified receivers.

Table 5-1 Project-Specific Intrusiveness Criteria

Receiver ID	$L_{Aeq,15min}$ Intrusiveness Criterion (dBA)		
	Day (7am–6pm)	Evening (6pm–10pm)	Night Time (10pm–7am)
R1 - R11	45	43	43

5.1.3 *INP* Amenity Criteria

The amenity criteria, set limits on the total noise level from all industrial noise sources affecting a receiver. Different amenity criteria apply for different types of receiver (e.g. residential, commercial, industrial – or for areas specifically reserved for passive recreation) and different areas (e.g. urban, suburban, rural). The *INP* classifies all identified residential receivers surrounding the subject site as "rural".

Table 5-2 summarises the amenity noise criteria which apply to rural residential receivers.

Table 5-2 Amenity Criteria for Rural Residential Receivers

Receiver ID	$L_{Aeq,Period}$ Amenity Criterion (dBA)		
	Day (7am–6pm)	Evening (6pm–10pm)	Night Time (10pm–7am)
R1 - R11	50	45	40

The noise level to be compared with the amenity criterion is the L_{Aeq} noise level, measured over the relevant day, evening or night time period, due to all industrial noise sources, but excluding non-industrial sources such as off-site transportation, i.e. on public roads.

Where a new noise source is proposed in an area with negligible existing industrial noise, the amenity criterion for that source may be taken as being equal to the overall amenity criterion. However, where noise levels from existing industrial sources are already close to or above the acceptable amenity criterion, the *INP* requires that the acceptable amenity criterion for any further proposed industrial noise source is commensurately lowered, in the interest of preserving noise amenity. This provision is aimed at preventing against cumulative noise increases over time due to industrialisation.

As described in Section 4, noise measurements were conducted in order to establish existing industrial noise in the vicinity of the site (excluding noise generated by the existing CSR manufacturing plant). Existing industrial noise was determined to be approximately 33dBA at night at all identified receivers. The same industrial noise level is assumed during the evening period. Daytime industrial noise levels are hard to estimate due to motorway noise dominating the local acoustic environment but were determined to be less than 40dBA at any of the receivers.

Table 5-3 summarises the relevant amenity criteria for the Project, considering the existing industrial noise already present in the area.

Table 5-3 Project-Specific Amenity Criteria

Receiver ID	$L_{Aeq,Period}$ Amenity Criterion (dBA)		
	Day (7am–6pm)	Evening (6pm–10pm)	Night Time (10pm–7am)
R1-R11	50	45	40

5.2 Sleep Disturbance Criteria

To help protect residents from sleep disturbance, the EPA recommends as a screening criterion that 1-minute L_{A1} noise levels (effectively, the L_{Amax} maximum noise level) should not exceed the background noise level (assessed by the RBL) by more than 15dBA when measured or predicted at the location of a building façade. The "sleep disturbance" criterion is only applicable to night time (10.00pm to 7.00am) operations.

On the basis that the night time RBL in the area was measured at 38dBA, the sleep disturbance criterion when assessed external to the residence is 53dBA $L_{A1,1min}$.

6 ASSESSMENT OF IMPACTS

The assessment of potential operational noise impacts on nearby receivers is detailed in the following sections:

- Section 6.1 - Noise Modelling Methodology & Assumptions
- Section 6.2 - Operational Noise Assessment

6.1 Noise Modelling Methodology & Assumptions

6.1.1 Noise Prediction Software

Operational noise emissions from the site have been modelled using the "Cadna A" acoustic noise prediction software. Factors that are addressed in the noise modelling are:

- Equipment noise level emissions and location;
- Screening from structures;
- Receiver locations;
- Ground topography;
- Noise attenuation due to geometric spreading;
- Ground absorption;
- Atmospheric absorption; and
- Influence of meteorology.

6.1.2 Meteorology

At relatively large distances from a source, the resultant noise levels at receivers can be influenced by meteorological conditions, particularly wind and temperature gradients, and can therefore vary from hour to hour and night to night. Where these factors are a feature of an area their effect on resultant noise levels is required to be taken into account.

The procedures described in the *INP* are directed toward finding a single set of meteorological conditions, representing generally adverse conditions for noise propagation, which should be used in noise assessment. The procedures of the *INP* have been adopted for this assessment.

Wind

Wind can increase noise at a receiver when it blows from the direction of the noise source. An increase in wind strength results in a corresponding increase in wind noise at the receiver which masks noise from the source under investigation.

The effect of wind should be considered when wind is a feature of the area under consideration. The *INP* defines this as where wind blows at speeds up to 3m/s for more than 30% of the time in any season. For the purpose of this assessment, winds are conservatively considered to be a feature of the area during the daytime and evening periods and noise predictions are given both with 3m/s source to receiver winds ("Adverse") and under calm conditions ("Calm").

Temperature Inversion

Temperature inversions can increase noise levels at surrounding receivers by the refraction of sound waves through warmer upper layers of air. Temperature inversions occur predominantly at night. For a temperature inversion to be a significant characteristic of the area it needs to occur for approximately 30% of the total night time period during a season, typically winter.

Temperature inversions of 3 degrees per 100m are expected to be a feature of the area under consideration. As such night time noise predictions are given both with temperature inversions of 3 degrees per 100m ("adverse conditions") and under calm isothermal conditions ("calm conditions").

6.1.3 Operational Noise Scenarios

For the purpose of assessment, two (2) scenarios have been developed for each of the assessment periods (day, evening, and night time) – one (1) scenario representing the current operations; and the second representing the extended manufacturing plant with extension.

For each scenario and each assessment period, the reported noise predictions were made to represent the busiest and loudest 15 minute period (to assess against the *INP* intrusiveness criteria) and the average energy generated by the site over the whole assessment period (to assess against the *INP* amenity criteria).

6.1.4 Noise Source Assumptions

Tables 6-1 to 6-10 provide a summary of the operational assumptions based on information provided by CSR.

Tables 6-1 and 6-2 summarise volumes of trucks accessing the site to collect Hebel product for the existing and extended operations, respectively. Trucks movements will generally triple with the proposed extension.

Table 6-1 Volumes of Product Truck Dispatch – Existing Operations

Truck Description	Hours of Operation	Day (7am–6pm)		Evening (6pm–10pm)		Night Time (10pm–7am)	
		Peak Hour	Total	Peak Hour	Total	Peak Hour	Total
B-Double	4.00am-8.00pm	1	5	0	0	0	0
Table-Top	4.00am-8.00pm	4	7	2	5	5	12

Table 6-2 Volumes of Product Truck Dispatch – Extended Operations

Truck Description	Hours of Operation	Day (7am–6pm)		Evening (6pm–10pm)		Night Time (10pm–7am)	
		Peak Hour	Total	Peak Hour	Total	Peak Hour	Total
B-Double	4.00am-8.00pm	3	15	1	2	0	0
Table-Top	4.00am-8.00pm	10	24	5	13	13	36

Tables 6-3 and 6-4 summarise the number of forklifts used on site and the percentage of time they are assumed to be in operation for the existing and extended operations, respectively. The extended operation is expected to have three (3) additional forklifts.

Table 6-3 Forklifts – Existing Operations

Description of Activity	Hours of Operation	Number of Forklifts	Percentage of Time in Operation
Loading up Trucks	4.00am-8.00pm	5	50%
Maintenance	24 hours	1	20%
Management of Warehouse	24 hours	2	50%
Transfer of Product to Warehouse	24 hours	1	100%

Table 6-4 Forklifts – Extended Operations

Description of Activity	Hours of Operation	Number of Forklifts	Percentage of Time in Operation
Loading up Trucks	4.00am-8.00pm	6	50%
Maintenance	24 hours	1	20%
Management of Warehouse	24 hours	3	50%
Transfer of Product to Warehouse	24 hours	2	100%

Tables 6-5 and 6-6 provide volumes of trucks accessing the site to deliver raw materials for the existing and extended operations, respectively. Trucks movements will generally triple with the upgrade.

Table 6-5 Raw Material Deliveries – Existing Operations

Raw Material	Truck Description	Hours of Operation	Number of Deliveries
Sand	Truck and Dog	6.00am-6.00pm	8
Gypsum	Truck and Dog	6.00am-6.00pm	1

Raw Material	Truck Description	Hours of Operation	Number of Deliveries
Cement	Tanker (with truck mounted Compressor)	24 hours	3
Lime	B-Double (with truck mounted Compressor)	6.00am-10.00am	1
Steel	Semi-Trailer	6.00am-6.00pm	1
Other Raw Material	Semi-Trailer *	6.00am-6.00pm	6

*Note: Forklift is used to unload truck

Table 6-6 Raw Material Deliveries – Extended Operations

Raw Material	Truck Description	Hours of Operation	Number of Deliveries
Sand	Truck and Dog	6.00am-6.00pm	20
Gypsum	Truck and Dog	6.00am-6.00pm	2
Cement	Tanker (with truck mounted Compressor)	24 hours	9
Lime	B-Double (with truck mounted Compressor)	6.00am-10.00am	3
Steel	Semi-Trailer	6.00am-6.00pm	3
Other Raw Material	Semi-Trailer *	6.00am-6.00pm	8

*Note: Forklift is used to unload truck

Some raw material deliveries - part of sand deliveries and all gypsum deliveries - are assumed to be made at a stockpile located in the northwest corner of the site when the loadings bins are full. Therefore, both the existing and extended operations make use of a front end loader to shift material from the stockpile to the loading bins on an as needed basis. Table 6-7 summarises the usage of the front end loader. Note that the same number of movements is expected for the existing and extended operations.

Table 6-7 Management of Raw Material by Front End Loader

Raw Material	Hours of Operation	Usage
Gypsum	24 hours	20 return movements
Sand	2.00am-6.00am	Constant use

Noise generated by cars arriving and leaving the on-site parking area during shift changes may also contribute to noise generated by the site and needs to be included in the assessment.

Tables 6-8 and 6-9 provide the number of car movements for each of the shift change for the existing and extended operations, respectively. Car movements during shift change will generally increase by over 50% with the upgrade.

Table 6-8 Light Vehicle Movements – Existing Operations

Description of Movements associated with Parking Area	Shift Change
50 cars arriving + 30 cars leaving	6.00am
30 cars arriving + 50 cars leaving	2.00pm
30 cars arriving + 30 cars leaving	10.00pm

Table 6-9 Light Vehicle Movements – Extended Operations

Description of Movements associated with Parking Area	Shift Change
80 cars arriving + 50 cars leaving	6.00am
50 cars arriving + 80 cars leaving	2.00pm
50 cars arriving + 50 cars leaving	10.00pm

In addition to noise from mobile plant, other infrastructure items and outdoor activities associated with the existing and extended operations are expected to generate noise which may contribute to the overall noise levels. The noise model has only addressed infrastructure items and outdoor activities which may potentially contribute to overall site noise. While other noise sources are present on site, they are considered to generate negligible noise levels and as such are not included in the noise modelling process.

The main infrastructure item generating noise is the stack outlet associated with the autoclave array. The extended facility will include a second stack similar to the existing one. Both stacks are assumed to be in constant 24 hour operation.

Three (3) outdoor air compressors also need to be considered with the extended operations (no outdoor air compressors are used for the existing operation). These will be located in between the existing and new buildings. The modelling of the extended facility assumes only two (2) of the units will be operating as the third one is only used as a backup. Both air compressors are assumed to be in constant 24 hour operation.

Panel cutting is a very sporadic activity taking place outside but partly shielded by surrounding structures and an awning. Table 6-10 summarises the frequency of panel cutting during the day, evening and night time assessment periods.

Table 6-10 Panel Cutting – Existing and Extended Operations

Description of Activity	Percentage of Time in Operation		
	Day (7am–6pm)	Evening (6pm–10pm)	Night Time (10pm–7am)
Panel Cutting	15%	15%	20%

6.1.5 Sound Power Levels Assumed in Noise Model

Table 6-11 presents the plant sound power levels (SWLs) used in the noise modelling. The SWLs given in Table 6-11 are conservative in that they are based on plant operating at maximum capacity for an entire 15 minutes.

Table 6-11 Sound Power Levels Assumed in Noise Model

Mobile Plant / Infrastructure Item / Outdoor Activity	Sound Power Level per Item (dBA)	Reference
B-Double Truck (travelling at 15 km per hour)	102	Wilkinson Murray database
Table-Top Truck (travelling at 15 km per hour)	100	Wilkinson Murray database
Truck and Dog (travelling at 15 km per hour)	102	Wilkinson Murray database
Cement Tanker (with truck mounted Compressor on)	113	Wilkinson Murray database
B-Double (with truck mounted Compressor on)	113	Wilkinson Murray database and measurements on site (29/9/16)
Semi-Trailer (travelling at 15 km per hour)	100	Wilkinson Murray database
Forklift	100	Measurements on site (29/9/16)
Car (travelling at 15 km per hour)	72	Wilkinson Murray database
Autoclave Array Stack Outlet	108	Measurements on site (29/9/16)
Outdoor Air Compressor (running at 100% capacity)	80	On-site measurements of identical units used indoors for current operations (29/9/16)
Panel Cutting	109	Measurements on site (29/9/16)

6.2 Operational Noise Assessment

6.2.1 Intrusiveness Noise Assessment

Based on the above assumptions, worst case $L_{Aeq,15min}$ noise levels at the identified receivers have been predicted under calm and adverse meteorological conditions, for both existing and extended operations. The results for the three (3) assessment periods are summarised in Tables 6-12 to 6-14.

Table 6-12 Predicted Operational $L_{Aeq,15min}$ Noise Levels (dBA) - Daytime

Receiver ID	Existing Operation		Extended Operation	
	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions
R1	33	36	36	39
R2	38	39	39	41
R3	21	24	24	28
R4	28	31	32	34
R5	25	28	28	31
R6	20	23	25	28
R7	21	25	27	30
R8	24	27	30	33
R9	26	29	31	34
R10	27	30	31	34
R11	24	27	28	32

Table 6-13 Predicted Operational $L_{Aeq,15min}$ Noise Levels (dBA) - Evening

Receiver ID	Existing Operation		Extended Operation	
	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions
R1	33	35	36	38
R2	37	39	39	41
R3	20	24	23	27
R4	28	31	31	34
R5	24	27	28	31
R6	19	22	23	26
R7	21	24	25	29
R8	24	27	29	32
R9	26	29	30	33
R10	27	30	30	33
R11	23	26	27	30

Table 6-13 Predicted Operational $L_{Aeq,15min}$ Noise Levels (dBA) – Night Time

Receiver ID	Existing Operation		Extended Operation	
	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions
R1	33	36	36	39
R2	38	39	39	41
R3	21	24	24	28
R4	28	31	32	34
R5	25	28	28	31
R6	20	23	25	28
R7	21	25	27	30
R8	24	27	30	33
R9	26	29	31	34
R10	27	30	31	34
R11	24	27	28	32

Based on Tables 6-12 to 6-14, noise predictions associated with both the existing and extended operations are found to comply with the Project-specific intrusiveness noise criteria for all three (3) assessment periods.

$L_{Aeq,15min}$ noise levels are found to increase by 2-5dB under "calm" weather conditions with the extended operation. Under "adverse" conditions, noise levels increase by 2-6dB. It is important to note that noise generated by the existing operation are generally expected to be inaudible at all identified receivers and this is not anticipated to change with the extended operation. Only during peak site activity which is expected to be relatively short in duration and under adverse weather conditions will site noise associated with the extended operation be audible at R1-R2 although such levels are not expected to be intrusive. Noise generated by the extended operation during peak site activity would only be barely audible if at all audible at R3-R11 under the same conditions.

6.2.2 Amenity Noise Assessment

$L_{Aeq,period}$ noise levels at the identified receivers have been predicted under calm and adverse meteorological conditions, for both existing and extended operations. The results for the three (3) assessment periods are summarised in Tables 6-15 to 6-17.

Table 6-14 Predicted Operational $L_{Aeq,Period}$ Noise Levels (dBA) - Daytime

Receiver ID	Existing Operation		Extended Operation	
	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions
R1	32	33	36	37
R2	37	38	39	40
R3	19	21	22	24
R4	27	29	31	32
R5	23	25	27	28
R6	17	19	21	23
R7	19	21	23	25
R8	23	25	27	29
R9	26	27	29	31
R10	26	28	29	31
R11	22	24	25	27

Table 6-15 Predicted Operational $L_{Aeq,Period}$ Noise Levels (dBA) - Evening

Receiver ID	Existing Operation		Extended Operation	
	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions
R1	32	33	36	37
R2	37	38	39	40
R3	18	20	22	24
R4	27	29	31	32
R5	23	25	26	28
R6	16	18	20	22
R7	19	21	22	24
R8	23	25	26	28
R9	25	27	29	30
R10	26	28	29	31
R11	22	24	25	27

Table 6-16 Predicted Operational $L_{Aeq,Period}$ Noise Levels (dBA) – Night Time

Receiver ID	Existing Operation		Extended Operation	
	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions
R1	32	34	36	37
R2	37	38	39	40
R3	19	21	22	24
R4	27	29	31	32
R5	23	25	26	28
R6	17	19	20	22
R7	19	21	23	25
R8	23	25	27	29
R9	26	27	29	31
R10	26	28	29	31
R11	22	24	25	27

Based on Tables 6-15 to 6-17, noise predictions associated with both the existing and extended operations are found to comply with the Project-specific amenity noise criteria at all identified receivers.

$L_{Aeq,period}$ noise levels are found to increase by 2-4dB with the extended operation. However, such increase is not expected to be noticeable at any of the identified receivers due to the relatively high traffic noise levels in the area.

6.2.3 Sleep Arousal Noise Assessment

$L_{A1,1min}$ noise levels at the identified receivers have been predicted under calm and adverse meteorological conditions, for both existing and extended operations. The results are summarised in Table 6-18.

Table 6-18 Predicted $L_{A1,1min}$ Noise Levels (dBA) – Night Time

Receiver ID	Existing Operation		Extended Operation	
	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions
R1	33	36	36	39
R2	38	39	39	41
R3	21	25	24	28

Receiver ID	Existing Operation		Extended Operation	
	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions	Under "Calm" Meteorological Conditions	Under "Adverse" Meteorological Conditions
R4	28	31	32	34
R5	25	28	28	31
R6	20	23	25	28
R7	22	25	27	30
R8	25	28	30	33
R9	26	29	31	34
R10	27	30	31	34
R11	24	27	28	32

Review of the results summarised in Table 6-18 indicates that $L_{A1,1min}$ noise levels are very similar to the night time $L_{Aeq,15min}$ noise levels reported in Table 6-13 with a small 1dB increase for some of the receivers. This is due to the fact that noise generated by the site is very constant in nature with panel cutting representing the main source of intermittent noise.

Based on Table 6-18, $L_{A1,1min}$ noise levels are found to comply with the Project-specific sleep arousal noise criteria at all identified receivers.

7 CONCLUSION

CSR Building Products Limited is proposing to extend the existing manufacturing plant for Hebel products at Somersby Industrial Park located at 98 and 112 Wisemans Ferry Road, Somersby.

In accordance with Central Coast Council's request, Wilkinson Murray Pty Limited has been commissioned to undertake an operational noise assessment of the manufacturing plant with the proposed extension to support the Development Application.

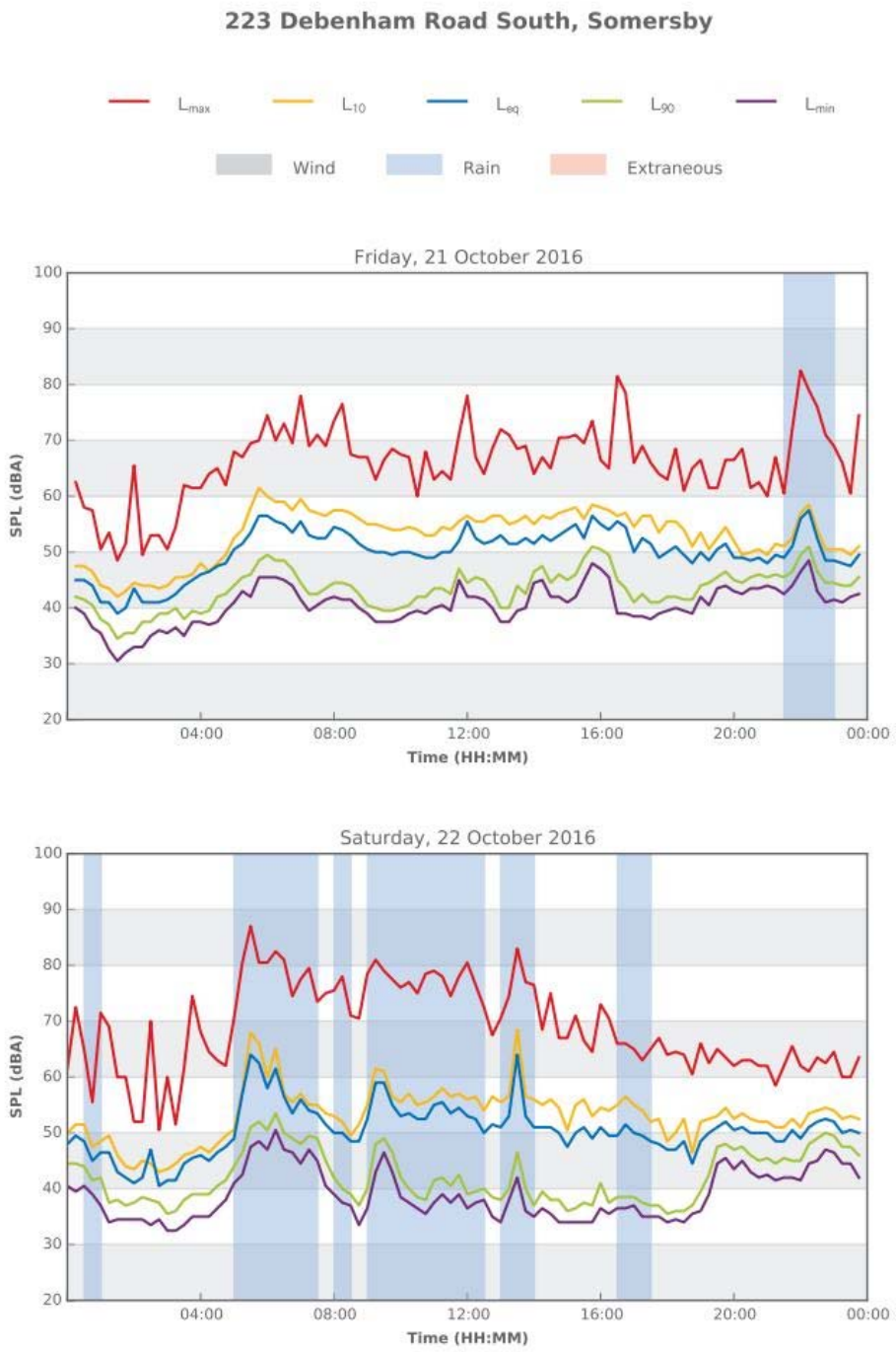
This assessment has been undertaken in accordance with the relevant NSW State government policies and guidelines.

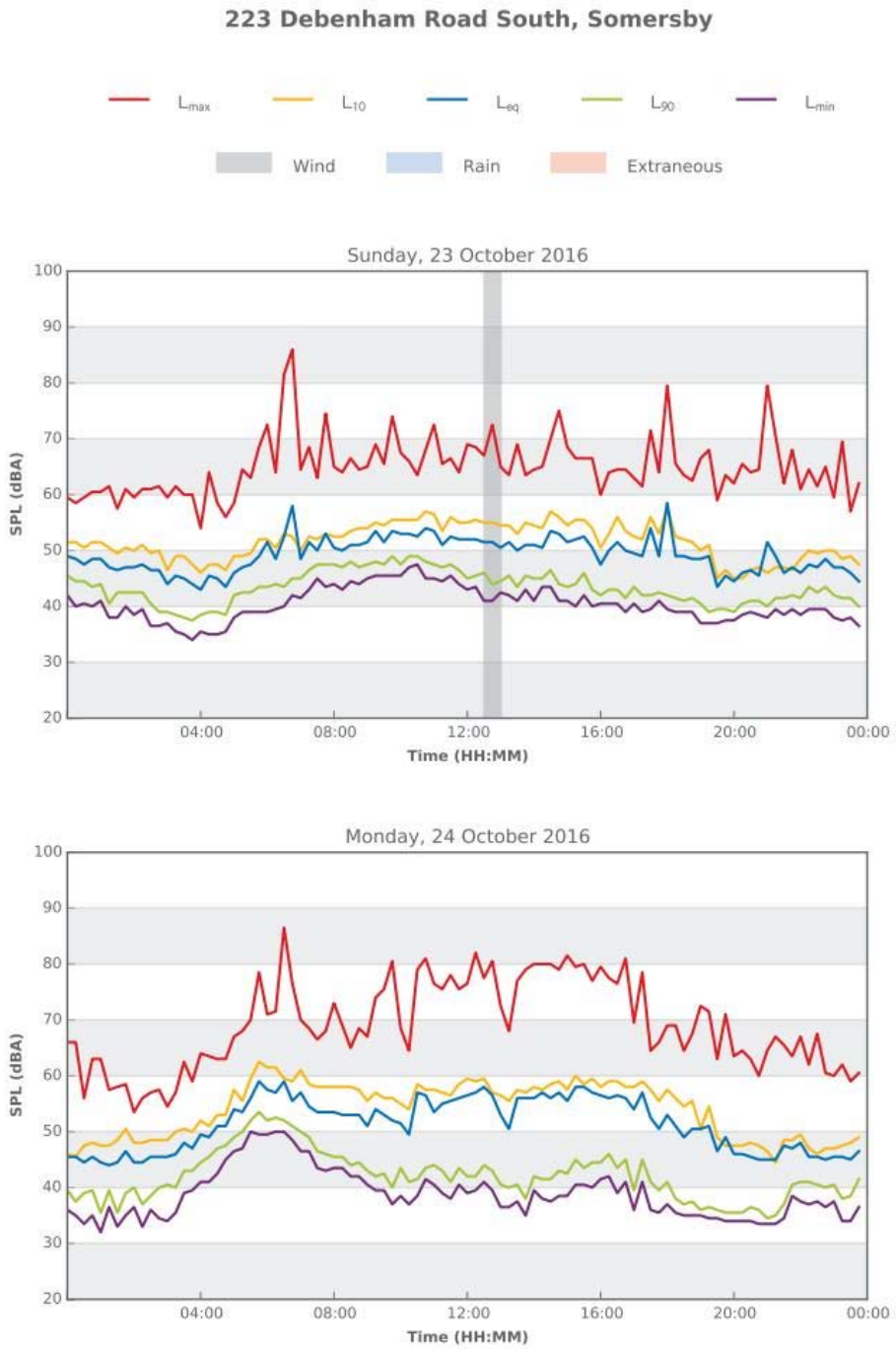
The findings of this assessment are as follows.

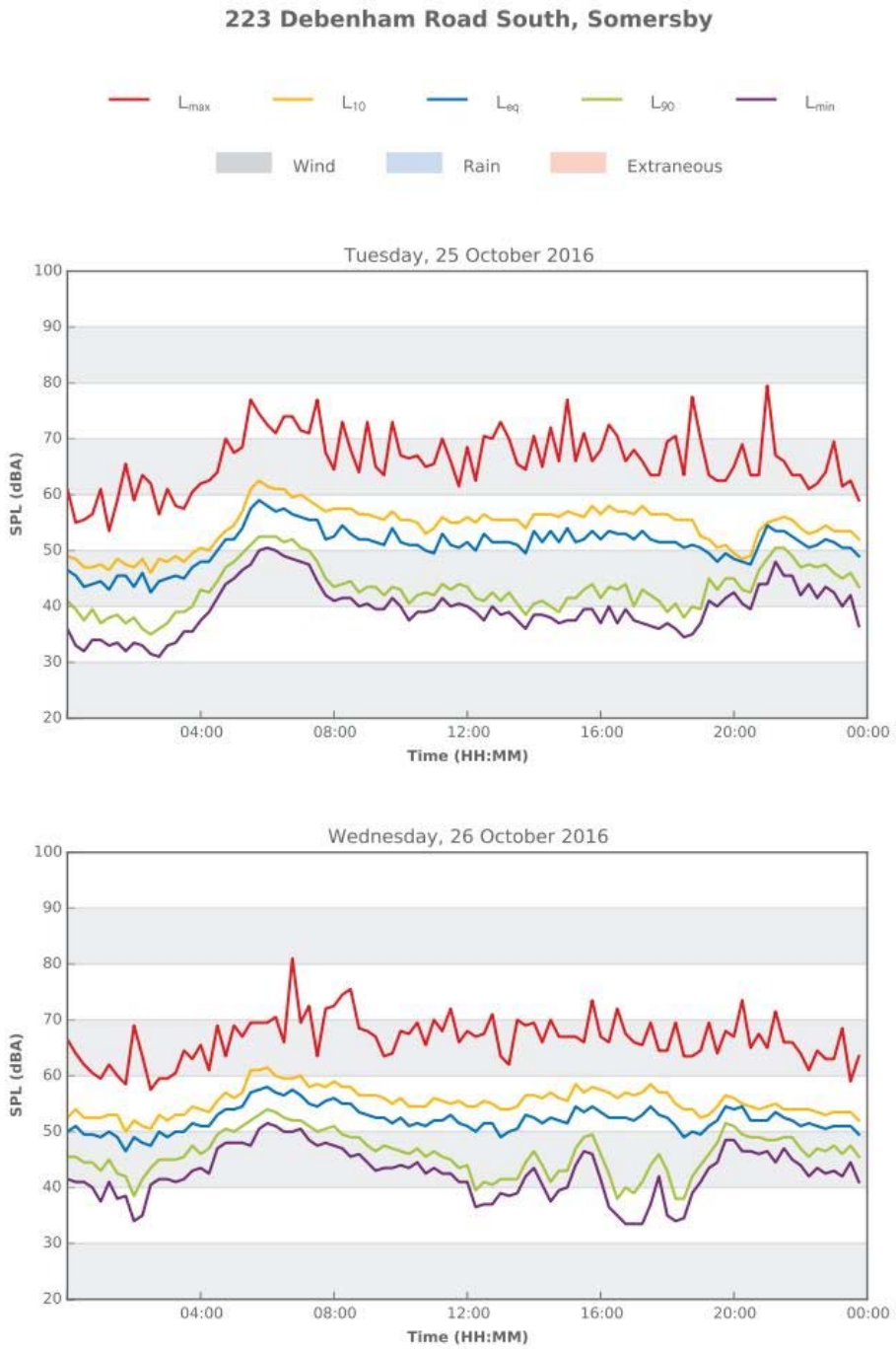
- $L_{Aeq,15min}$ noise predictions associated with both the existing and extended operations are found to comply with the Project-specific intrusiveness noise criteria at all identified receivers for all three (3) assessment periods.
- $L_{Aeq,period}$ noise predictions associated with both the existing and extended operations are found to comply with the Project-specific amenity noise criteria at all identified receivers for all three (3) assessment periods.
- $L_{A1,1min}$ noise levels are found to comply with the Project-specific sleep arousal noise criteria at all identified receivers.
- Traffic noise on public roads associated with the site is not expected to impact on the surrounding community.
- Noise from the proposed extension is only likely to be slightly audible under adverse meteorological conditions and during peak site activity which is expected to be relatively short in duration. Therefore, although a slight increase in noise levels is expected with the proposed extension, this is unlikely to result in significant noise impact at the identified receivers.

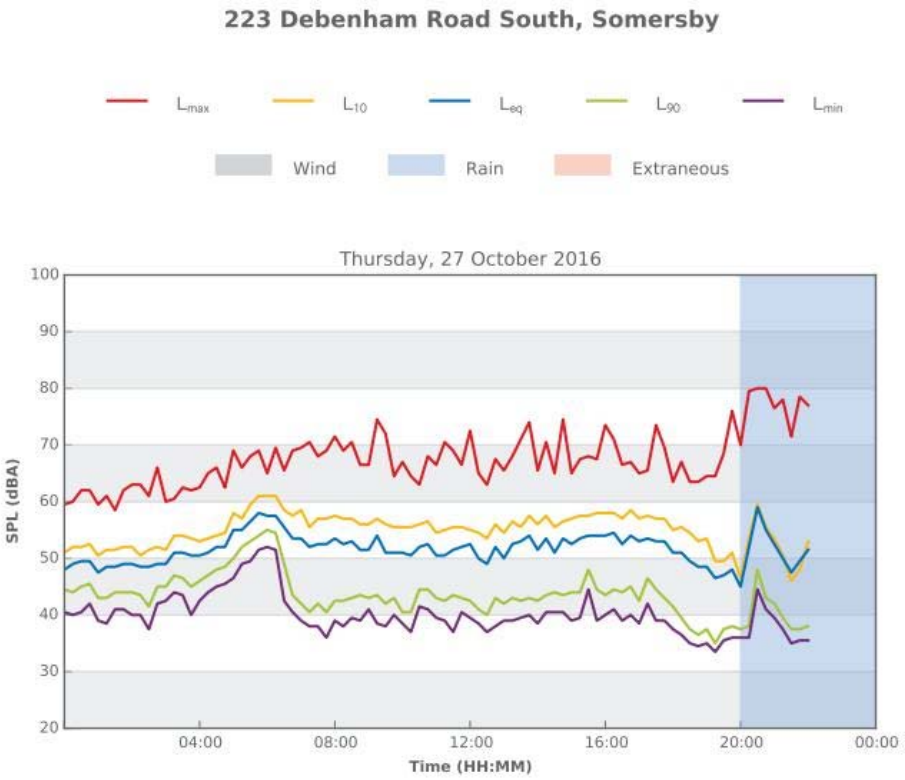
APPENDIX A

NOISE MEASUREMENT RESULTS


223 Debenham Road South, Somersby
L_{max}
L_{10}
L_{eq}
L_{90}
L_{min}
Wind
Rain
Extraneous
Friday, 21 October 2016
SPL (dBA)
Time (HH:MM)
Saturday, 22 October 2016
SPL (dBA)
Time (HH:MM)


223 Debenham Road South, Somersby
L_{max}
L_{10}
L_{eq}
L_{90}
L_{min}
Wind
Rain
Extraneous
Sunday, 23 October 2016
SPL (dBA)
Time (HH:MM)
Monday, 24 October 2016
SPL (dBA)
Time (HH:MM)


223 Debenham Road South, Somersby
L_{max}
L_{10}
L_{eq}
L_{90}
L_{min}
Wind
Rain
Extraneous
Tuesday, 25 October 2016
SPL (dBA)
100
90
80
70
60
50
40
30
20
04:00
08:00
12:00
16:00
20:00
00:00
Time (HH:MM)
Wednesday, 26 October 2016
SPL (dBA)
100
90
80
70
60
50
40
30
20
04:00
08:00
12:00
16:00
20:00
00:00
Time (HH:MM)


223 Debenham Road South, Somersby
Lmax
L10
Leq
L90
Lmin
Wind
Rain
Extraneous
Thursday, 27 October 2016
SPL (dBA)
100
90
80
70
60
50
40
30
20
04:00
08:00
12:00
16:00
20:00
00:00
Time (HH:MM)