

Proposed Hospital Development
15 McGettigans Lane, Ewingsdale
(Lot 2 on DP118960)

ENVIRONMENTAL NOISE IMPACT REPORT

Prepared for

Brunsmed Pty Ltd

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crgref: 16181 report rev.2

1.0 INTRODUCTION

This report is in response to a request from Brunsmed Pty Ltd for a revised environmental noise impact assessment of proposed Health and Wellness Hub development at Ewingsdale. Revisions to our original noise assessment dated 25/10/2016 were required to reflect changes in floor layouts and finished floor levels. This report (and the previous report dated October 2016) responds to Byron Shire Council's Information Request which was as follows:

"The following request for additional information has been made by Council's Environmental Officer:

Noise Impact Assessment

The applicant is requested to provide a Noise Impact Assessment, prepared by a suitably qualified environmental consultant identifying measures to ensure that:

- *future patients and staff at the proposed hospital are not subject to unacceptable road traffic noise;*
- *noise from activities associated with the development do not adversely impact sensitive receptors; and*
- *to include the provision of appropriate noise mitigation measures where necessary.*

The Noise Impact Assessment is to be undertaken having regard to NSW Road Noise Policy (2011) and the NSW Industrial Noise Policy (NSW Environment Protection Authority 2000).

It is also noted that SEPP (infrastructure) 2007 specifies in part:

101 Development with frontage to classified road

(2) The consent authority must not grant consent to development on land that has a frontage to a classified road unless it is satisfied that:

- (a) where practicable, vehicular access to the land is provided by a road other than the classified road, and*
- (b) the safety, efficiency and ongoing operation of the classified road will not be adversely affected by the development as a result of:*
 - (i) the design of the vehicular access to the land, or*
 - (ii) the emission of smoke or dust from the development, or*
 - (iii) the nature, volume or frequency of vehicles using the classified road to gain access to the land, and*
- (c) the development is of a type that is not sensitive to traffic noise or vehicle emissions, or is appropriately located and designed, or includes measures, to ameliorate potential traffic noise or vehicle emissions within the site of the development arising from the adjacent classified road."*

In undertaking the above, noise monitoring was conducted for the site and through modelling; predictions of the future road traffic noise impacts have been produced as well as onsite activity noise emissions.

Based upon the predicted noise impact levels, recommendations regarding acoustic treatment have been provided.

2.0 DESCRIPTION OF THE DEVELOPMENT

The parcel of land is described as Lot 2 on DP118960, No. 15 McGettigans Lane, Ewingsdale. The site is bounded by Ewingsdale Road to the north, McGettigans Lane to the southwest and Quarry Lane to the southeast and is currently occupied by a dwelling. For site location refer to Appendix A.

The proposal is to development the site into a health and wellness hub which includes at-grade and basement car parking, accommodation apartments (Units 1 to 12), a café, which also provides a bed service to inpatients with alfresco dining, and a health services hospital building. The health services hospital building will comprise car parking at basement level, reception / waiting room, pharmacy, administration room, staff & meeting room, procedure theatre, inpatient services, five procedure rooms and 14 consulting / client rooms; with a day surgery and Staff Recourse Centre at First Floor Level. For development plans refer to Appendix B.

The development is likely to be impacted by road traffic noise from the Ewingsdale Road; hence the site has been assessed in accordance with the State Environmental Planning Policy (Infrastructure) 2007. The State environmental planning policy (Infrastructure) 2007 (Infrastructure SEPP) “*sets internal noise criteria which must be met by new developments along some of the busiest transport corridors in NSW. This is a major initiative to ensure that sustainable higher density living can occur along major transport routes whilst maintaining an acceptable level of amenity for residents. Developers and councils should consider the recommended approaches outlined in the accompanying Development near rail corridors and busy roads – interim guideline.*” (Extract from the “*NSW Road Noise Policy*”, March 2011).

Onsite activity noise emissions from the proposed development (i.e. vehicle activity, patron’s outdoor activity, alfresco dining at the café, deliveries, waste collection and mechanical plant) have the potential to impact upon surrounding noise sensitive receivers and have been assessed in accordance with the “*NSW Industrial Noise Policy*” to ensure an acceptable level of acoustical amenity can be achieved. The nearest receivers to the proposed development include the following dwellings:

R1:	8//DP1170237	LAWLERS LANE
R2:	8//DP806855	8 PARKWAY DRIVE
R3:	13//DP816451	30 PARKWAY DRIVE
R4:	101//DP1140936	EWINGSDALE ROAD
R5:	4//DP848222	10 QUARRY LANE
R6:	7//DP7189	25 QUARRY LANE

For noise sensitive receiver refer to Figure 2 in Appendix A.

It is noted that specific mechanical plant requirements are unknown at this stage (Development Application) and that more detailed mechanical plant noise assessments will be required once final plant has been chosen. A preliminary assessment of mechanical plant has been undertaken (including noise impacts at offsite receivers and the nearest onsite noise sensitive habitable rooms) for the expected plant (i.e. kitchen exhaust fan and plant room air-conditioning units) to provide guidance on likely acoustic treatment requirements to mitigate noise emissions from mechanical plant.

3.0 AMBIENT NOISE SURVEY

3.1 Instrumentation

The following equipment was used to record ambient noise levels at the subject site locale.

- Rion NC 73 Calibrator; and
- Rion NL 21 Environmental Noise Logger.

All instrumentation used in this assessment hold current calibration certificate from a certified NATA calibration laboratory.

3.2 Background Noise Monitoring Methodology and Results

A logger was located at the northwest corner of the subject site and had an unobstructed line of sight to Ewingsdale Road. The microphone was within 1m of a solid fence (existing acoustic barrier) approximately 1.4m above ground and approximately 13m from the westbound lane of Ewingsdale Road. For logger location refer to Figure 2 of Appendix A.

The logger was set to record noise statistics in 15 minute blocks continually between Thursday 13/10/2016 and Wednesday 19/10/2016. All measurements were conducted generally in accordance with Australian Standard AS 1055:1997 - *“Acoustics-Description and measurement of environmental noise”*. The operation of the sound level logging equipment was field calibrated before and after the measurement session with no significant drift from the reference signal recorded.

Daily weather observations were obtained from the Bureau of Meteorology’s website at the Byron Bay weather station. Weather conditions during the noise monitoring period generally fine with a temperature range between approximately 12 and 25°C and relative humidity between approximately 40% and 75%.

3.3 Unattended Measurement Results

Table 1 presents the measured ambient noise levels at the unattended logger location. Graphical presentation of the measured noise levels is presented in the Appendix C to this report.

Road Traffic Noise	Time Period	Measured Level dB(A)			
		14/10	17/10	18/10	Average
L ₁₀ (18hr)	6am to Midnight	71	70	70	71
L _{eq} (24hr)	6am to 6am	68	68	67	68
L _{eq} (15hr)	7am to 10pm	69	69	68	69
L _{eq} (9hr)	10pm to 7am	65	64	64	64
L _{eq} (1hr) Daytime	7am to 10pm	71	71	70	71
L _{eq} (1hr) Night-time	10pm to 7am	71	70	70	70

Background Noise	Measured L _{90 15min} dB(A)		
	Daytime (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)
Thursday 13/10/16	-	42	-
Friday 14/10/16	60	49	36
Saturday 15/10/16	56	49	35
Sunday 16/10/16	56	46	34
Monday 17/10/16	61	45	41
Tuesday 18/10/16	56	42	35
RBL L_{A90}	56	45	35

Table 1: Measured ambient noise levels at the logger location.

4.0 NOISE CRITERION

4.1 Road Traffic Noise Criterion: Proposed Lots Impacted by Ewingsdale Road

In 1999, the Environment Protection Authority published the now superseded “*Environmental criteria for road traffic noise*” (ECRTN), which outlined the noise goals for noise sensitive developments impacted by road traffic noise. The ECRTN has now been replaced by the “*NSW Road Noise Policy*” since 1st July 2011.

Road traffic noise criterion for new residential developments is now specified in The State environmental planning policy (Infrastructure) 2007 (Infrastructure SEPP) as detailed below:

“102 Impact of road noise or vibration on non-road development

(1) This clause applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data published on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:

- (a) a building for residential use,*
- (b) a place of public worship,*
- (c) a hospital,*
- (d) an educational establishment or child care centre.*

(2) Before determining a development application for development to which this clause applies, the consent authority must take into consideration any guidelines that are issued by the Director-General for the purposes of this clause and published in the Gazette.

(3) If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:

- (a) in any bedroom in the building--35 dB(A) at any time between 10 pm and 7am,*
- (b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway)--40 dB(A) at any time.*

(4) In this clause, "freeway", "tollway" and "transitway" have the same meanings as they have in the Roads Act 1993."

Of particular importance, the Infrastructure SEPP prescribes internal noise goals (based on World Health Organisation guidelines) for proposed noise sensitive developments. The Infrastructure SEPP recognises that judicious land use planning, architectural design, building orientation and good internal layout can achieve acceptable acoustic amenity near busy transport corridors.

In response to Byron Shire Council's Information Request, for the proposed health services facility building we have applied the internal noise criterion of 40 dB(A) for the noise sensitive habitable rooms; given that the SEPP does not provide specific internal noise goals.

4.2 Onsite Commercial Activity Noise Criterion

Noise associated with the commercial premises is regulated by the “*NSW Industrial Noise Policy*”. The assessment procedure has the following components:

- Control of intrusive noise impacts – The limit criteria for this assessment is as follows:

$$L_{Aeq, 15 \text{ min}} \leq \text{rating background level}^1 + 5 \text{ dB};$$

- Maintaining noise level amenity for residential premises. This is achieved by ensuring that the proposed development complies with the noise limit criteria set in Table 2.1 of the Policy. If we assume that the area is within a Suburban Area (as defined in the Policy), the following limits apply:

Recommended L_{Aeq} noise levels from industrial noise sources				
Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{Aeq} Noise Level, dB(A) (see Note 8 in Section 2.2.1)	
(see Notes in Section 2.2.1)			Acceptable (See Note 11)	Recommended Maximum (See Note 11)
Residence	Suburban	Day	55	60
		Evening	45	50
		Night	40	45

Table 2: Amenity Criterion Prescribed in the “*NSW Industrial Noise Policy*”.

It is noted that the logger was positioned directly adjacent to Ewingsdale Road, with surrounding offsite noise sensitive receiver setback from the road; therefore, for assessment of onsite activity we have applied the “*Estimated Average Background A- Weighted Sound Pressure Levels*” presented in Appendix A of Australian Standard AS 1055.2:1997 - “*Acoustics-Description and measurement of environmental noise*”.

Based upon the night-time measured background L_{90} level of 35 dB(A) (less impacts by road noise) and the location of the surrounding receivers we have adopted the Noise Category Area R2 “*Areas with low density transportation*” which has a daytime L_{90} level of 45 dB(A), evening L_{90} of 40 dB(A) and a night-time L_{90} of 35 dB(A).

By considering the above criteria, and the Rating Background Levels, we recommend the following noise limits for the proposed use:

- Daytime (7am – 6pm Mon-Sat,
8am – 6pm Sun and Public Holidays): 50 (AS 45 L_{90} + 5dB) dB(A) L_{eq} ;
- Evening (6pm - 10pm): 45 (AS 40 L_{90} + 5dB) dB(A) L_{eq} ; and
- Night (10pm – 7am): 40 (35 L_{90} + 5dB) dB(A) L_{eq} .

¹ The rating background level is the overall single figure background level representing each assessment period (day/evening/night over the whole monitoring period).

5.0 PREDICTED NOISE IMPACTS

5.1 Ewingsdale Road Traffic Noise Impacts

5.1.1 Road Traffic Volumes

Surveyed year 2015 and predicted year 2027 traffic data for Ewingsdale Road was obtained from the Bitzios “Traffic Impact Assessment” report for the proposed development (report reference P2415.001R). The percentage of heavy vehicles was obtained from the Taylor Thomson Whitting “Transport and Accessibility” report for the Byron Shire Central Hospital completed in August 2014 (report reference 141233). The modelled traffic volumes for Ewingsdale Road are as follows:

2017 Traffic Volume:	AADT 24 hour:	17,440 vehicles, 5.6% heavy vehicles.
2027 Traffic Volume:	AADT 24 hour:	22,720 vehicles, 5.6% heavy vehicles.

5.1.2 Modelled Road Traffic Noise Levels – Existing Situation

Road traffic noise modelling was conducted using PEN3D, which is based upon the “CoRTN” (Control of Road Traffic Noise) method produced by the UK Department of Transport 1988. To verify the road traffic noise prediction model, the $L_{Aeq\ 24hr}$ traffic noise level was calculated and compared to the measured noise level. For PEN3D point calculation sheets refer to the Appendix.

The predicted free-field $L_{eq\ 24hr}$ existing noise level, approximately 13m from the nearest lane of Ewingsdale Road is 69.4 dB(A). Compared with the measured $L_{eq\ 24hr}$ level of 67.7 dB(A), the model is within the allowable 2 dB(A) deviation from measured levels.

5.1.3 Modelled Road Traffic Noise Levels – Ultimate Situation

Based upon the traffic volumes presented in Section 5.1.1 of this report, the PEN3D model predicts the following façade corrected traffic noise levels as presented in Table 3.

The following parameters were used in the PEN3D model for the proposed development:

- 2.5 dB(A) façade correction for building façade predictions.
- Existing 80 km/hr posted speed limit on Ewingsdale Road.
- 3 dB(A) adjustment to the model to determine the $L_{Aeq\ 24hr}$ from the $L_{A10\ 18hr}$ based on the measured differences between the $L_{Aeq\ 24hr}$ level as outlined in Table 1 of Section 3.3
- $L_{Aeq\ 15hr}$ and 9hr levels based on the measured differences between the $L_{Aeq\ 24hr}$ level as outlined in Table 1 of Section 3.3.
- Development plans as attached in Appendix B
- Building façade receiver height of 1.5m above finished floor levels.

Receiver	Façade	Predicted Road Noise Impacts - dB(A) Façade Corrected	
		L _{eq} 15hr	L _{eq} 9hr
Apartment 1	Lounge / Bed	68	63
	Side	67	62
Apartment 2	Lounge / Bed	67	62
	Side	61	56
Apartment 3	Lounge / Bed	63	58
	Side	61	56
Apartment 4	Lounge / Bed	63	58
Apartment 5	Lounge / Bed	62	57
	Side	58	53
Apartment 6	Lounge / Bed	60	55
Apartment 7	Lounge / Bed	61	56
	Side	57	52
Apartment 8	Lounge / Bed	56	51
	Side	60	55
Apartment 9	Lounge / Bed	46	41
	Side	56	51
Apartment 10	Lounge / Bed	69	64
	Side	70	65
Apartment 11	Lounge / Bed	69	64
	Side	63	58
Apartment 12	Lounge / Bed	65	60
	Side	63	58
Cons 1	West	63	58
Cons 2	West	64	59
Cons 3	West	66	61
Cons 4	West	67	62
Cons 5	North	69	64
Cons 6	East	57	52
Cons 7	East	57	52
Cons 8	East	58	53
Cons 9	East	58	53
Cons 10	East	60	55
Cons 11	East	61	56
Cons 12	East	61	56
Cons 13	East	62	57
Cons 14	North / East	62	57
Waiting Room A	West	61	56
Waiting Room B	East	58	53
Waiting Room C	North	69	64
Proc 5	East	58	53
Staff and Meeting	East	57	52
Staff Recourse Centre	South	56	51
	East	60	55
Day Surgery	North	71	66
	East	65	60
	West	69	64

Table 3: Predicted road traffic noise levels at the noise sensitive areas of the proposed development.

5.2 Predicted Onsite Activity Noise Emissions

All noise source levels used in the assessment have been collected from similar previous investigations. All noise levels have been corrected for impulsiveness or tonality as per Australian Standard AS 1055:1997 – “Acoustics-Description and measurement of environmental noise”.

Short-term measured L_{Aeq} levels have been converted to $L_{Aeq 15min}$ levels by estimating a worst case duration for which each piece of equipment is used during any 15 minute period.

For continuous noise sources, a 15 minute duration has been adopted as a worst case scenario. It should be stressed that mechanical plant selections have yet to be undertaken, for this reason; we have applied indicative noise levels from other similar sites.

The following activities and associated noise source levels are typical of the proposed development and have been assessed within this report:

Short Duration Noise Source	Distance [m]	Measured L_{eq} Adjusted [dB(A)]	Duration per 15 [Minutes]	Noise Level, SPL $L_{eq 15 min}$ [dB(A)]
Car door closures near	1m	80** (0.052 second)	50 events	55**
Car door closures centre	1m	80** (0.052 second)	50 events	55**
Car door closures far	1m	80** (0.052 second)	50 events	55**
Car bypass at 5km/hr	1m	66 (7 seconds)	12 (100 movements)	65
Patrons talking outside	1m	60 (15 minute)	15	60
Patron indoor / outdoor dining	1m	75 (15 minute)	15	75
Deliveries	1m	77 (15 minute)	10	75
Truck bypass	1m	82 (15 seconds)	2	73
Waste collection	1m	98** (6 seconds)	1	86**

* Denotes + 5 dB(A) correction due to tonality as per AS1055 – 1997 ** Denotes + 5 dB(A) correction due to impulsiveness as per AS1055 – 1997

Indicative Continuous Noise Source	Distance [m]	Measured L_{eq} Adjusted [dB(A)]	Duration per 15 [Minutes]	Noise Level, SPL $L_{eq 15 min}$ [dB(A)]
Residential A/C condensers	1m	52	15	52
Commercial A/C condensers	1m	60	15	60
Café exhaust unit	1m	62	15	62

* Denotes + 5 dB(A) correction due to tonality as per AS1055 – 1997 ; ** Denotes + 5 dB(A) correction due to impulsiveness as per AS1055 – 1997

Table 4: Typical noise source levels associated with the proposed development.

Based upon the location of the proposed development in relation to surrounding noise sensitive receivers (i.e. at the nearest building façades), we predict the following noise impact levels as presented in Table 5.

It is noted that the combined impacts for the daytime period include all noise source impacts with the exception of waste collection given that it would be an activity of short duration and infrequent occurrence. The evening period includes all noise source impacts with the exception of waste collection and delivery activities (including truck movements). The night-time period excludes waste collection, delivery activities (including truck movements) and car door closures at the greatest distance from the main facility building. It is noted that night-time vehicle movements would be much lower than daytime & evening movements.

The predicted levels assume that the recommended treatments detailed in Section 6.2 are incorporated into the development. For point source calculations refer to Appendix C.

Onsite Activity / Noise Source	Predicted Noise Impact, SPL L_{eq} 15min dB(A)
R1: 8//DP1170237 LAWLERS LANE	Nearest Façade to Onsite Activity
Car door closures near	27
Car door closures centre	25
Car door closures far	23
Car bypass at 5km/hr	39
Patrons talking outside	31
Patron outdoor dining	27
Patron indoor dining	24
Deliveries	43
Truck bypass	44
Waste collection	57
Residential A/C condensers	21
Commercial A/C condensers	28
Café exhaust unit	21
Combined impacts (daytime)	47
Combined impacts (evening)	40
Combined impacts (night-time)	40
R2: 8//DP806855 8 PARKWAY DRIVE	Nearest Façade to Onsite Activity
Car door closures near	<20
Car door closures centre	<20
Car door closures far	<20
Car bypass at 5km/hr	<20
Patrons talking outside	<20
Patron outdoor dining	<20
Patron indoor dining	<20
Deliveries	28
Truck bypass	27
Waste collection	39
Residential A/C condensers	<20
Commercial A/C condensers	<20
Café exhaust unit	<20
Combined impacts (daytime)	31
Combined impacts (evening)	23
Combined impacts (night-time)	22
R3: 13//DP816451 30 PARKWAY DRIVE	Nearest Façade to Onsite Activity
Car door closures near	<20
Car door closures centre	<20
Car door closures far	<20
Car bypass at 5km/hr	<20
Patrons talking outside	<20
Patron outdoor dining	<20
Patron indoor dining	<20
Deliveries	28
Truck bypass	26
Waste collection	38
Residential A/C condensers	<20
Commercial A/C condensers	<20
Café exhaust unit	<20
Combined impacts (daytime)	31
Combined impacts (evening)	22
Combined impacts (night-time)	22
Daytime 7am to 6pm Criterion	50
Evening 6pm to 10pm Criterion	45
Night-time 10pm to 7am Criterion	40

Table 5 (Cont.): Predicted onsite activity noise impacts at surrounding noise sensitive receivers.

Onsite Activity / Noise Source	Predicted Noise Impact, SPL L_{eq} 15min dB(A)
R4: 101//DP1140936 EWINGSDALE ROAD	Nearest Façade to Onsite Activity
Car door closures near	<20
Car door closures centre	<20
Car door closures far	<20
Car bypass at 5km/hr	24
Patrons talking outside	<20
Patron outdoor dining	<20
Patron indoor dining	<20
Deliveries	33
Truck bypass	32
Waste collection	43
Residential A/C condensers	<20
Commercial A/C condensers	<20
Café exhaust unit	<20
Combined impacts (daytime)	36
Combined impacts (evening)	28
Combined impacts (night-time)	28
R5: 4//DP848222 10 QUARRY LANE	Nearest Façade to Onsite Activity
Car door closures near	<20
Car door closures centre	<20
Car door closures far	<20
Car bypass at 5km/hr	22
Patrons talking outside	<20
Patron outdoor dining	32
Patron indoor dining	27
Deliveries	32
Truck bypass	30
Waste collection	43
Residential A/C condensers	<20
Commercial A/C condensers	<20
Café exhaust unit	<20
Combined impacts (daytime)	37
Combined impacts (evening)	34
Combined impacts (night-time)	34
R6: 7//DP7189 25 QUARRY LANE	Nearest Façade to Onsite Activity
Car door closures near	<20
Car door closures centre	<20
Car door closures far	<20
Car bypass at 5km/hr	<20
Patrons talking outside	<20
Patron outdoor dining	28
Patron indoor dining	23
Deliveries	28
Truck bypass	25
Waste collection	39
Residential A/C condensers	<20
Commercial A/C condensers	<20
Café exhaust unit	<20
Combined impacts (daytime)	33
Combined impacts (evening)	30
Combined impacts (night-time)	30
Daytime 7am to 6pm Criterion	50
Evening 6pm to 10pm Criterion	45
Night-time 10pm to 7am Criterion	40

Table 5 (Cont.): Predicted onsite activity noise impacts at surrounding noise sensitive receivers.

Based upon the assumed locations of future onsite mechanical plant in relation to nearest onsite noise sensitive habitable rooms (i.e. at the nearest building façades), we predict the following noise impact levels as presented in Table 6.

As noted previously, mechanical plant selections have yet to be undertaken, for this reason; we have applied indicative noise levels from other similar sites.

The predicted levels assume that the recommended treatments detailed in Section 6.2 are incorporated into the development, which show compliance with the criterion at the nearest noise sensitive receiver. For point source calculations refer to Appendix C.

Onsite Mechanical Plant Indicative Noise Source	Predicted Noise Impact, SPL $L_{eq\ 15min}$ dB(A)
NEAREST ACCOMODATION UNITS	Nearest Façade to Onsite Activity
Residential A/C condensers	28
Commercial A/C condensers	20
Café exhaust unit	36
Combined impacts (daytime)	37
Combined impacts (evening)	37
Combined impacts (night-time)	37
NEAREST CONSULTING ROOMS	Nearest Façade to Onsite Activity
Residential A/C condensers	29
Commercial A/C condensers	38
Café exhaust unit	36
Combined impacts (daytime)	40
Combined impacts (evening)	40
Combined impacts (night-time)	40
NEAREST DAY SURGERY ROOMS	Nearest Façade to Onsite Activity
Residential A/C condensers	29
Commercial A/C condensers	31
Café exhaust unit	36
Combined impacts (daytime)	38
Combined impacts (evening)	38
Combined impacts (night-time)	38
Daytime 7am to 6pm Criterion	50
Evening 6pm to 10pm Criterion	45
Night-time 10pm to 7am Criterion	40

Table 6: Predicted onsite mechanical plant noise impacts at the nearest onsite noise sensitive habitable rooms.

6.0 RECOMMENDED ACOUSTIC TREATMENTS

6.1 Road Traffic Noise Acoustic Treatments

To achieve the required indoor noise levels for road traffic noise (refer to Sections 4.1), we recommend the building shell treatments R_w ratings as detailed in Table 7.

Building treatments R_w ratings for traffic noise were determined by using the calculation methods detailed in Australian Standard AS3671 1989 “*Road Traffic Noise Intrusion – Building Siting and Construction*”. Calculations for building treatment determination are presented in Appendix C.

To allow occupants to close windows and doors and still have a supply of fresh air, provision of air conditioning or sealed mechanical ventilation is required to habitable rooms affected by traffic noise and which required specific building shell treatments (i.e. habitable rooms detailed in Table 7). The plant should not reduce the acoustic performance of the building shell.

Further, louvre style windows impacted by road traffic noise should be replaced with awning, casement or sliding style window frames. Louvre style windows typically have poor R_w ratings due to gaps and/or poor seals between the glass panes and the louvre frame.

Byron Health and Wellness Space	Building Component	R_w
Apartment 1		
Room	Glazing	34
Room	External Wall	36
Apartment 2		
Room	Glazing	33
Room	External Wall	35
Apartment 3		
Room	Glazing	27
Room	External Wall	32
Apartment 4		
Room	Glazing	28
Room	External Wall	30
Room	Roof / Ceiling	34
Apartment 5		
Room	Glazing	27
Room	External Wall	33
Room	Roof / Ceiling	33
Apartment 6		
Room	Glazing	25
Room	External Wall	27
Room	Roof / Ceiling	31
Apartment 7		
Room	Glazing	26
Room	External Wall	32
Room	Roof / Ceiling	32
Apartment 8		
Room	Glazing	26
Room	External Wall	28
Room	Roof / Ceiling	31

Table 7 (Cont.): Recommended building shell treatments for road traffic noise.

Byron Health and Wellness Space	Building Component	Rw
Apartment 9		
Room	Glazing	24
Room	External Wall	30
Room	Roof / Ceiling	27
Apartment 10		
Room	Glazing	38
Room	External Wall	40
Room	Roof / Ceiling	41
Apartment 11		
Room	Glazing	37
Room	External Wall	39
Room	Roof / Ceiling	40
Apartment 12		
Room	Glazing	30
Room	External Wall	36
Room	Roof / Ceiling	36
Day Surgery		
Day Surgery	West Glazing	34
Day Surgery	North Glazing	33
Day Surgery	External Wall	42
Day Surgery	Roof / Ceiling	46
Specialist Rooms		
Staff Recourse Centre	South Glazing	22
Staff Recourse Centre	External Wall	30
Staff Recourse Centre	Roof / Ceiling	34
C1		
C1	Glazing	32
C1	External Wall	32
C2		
C2	Glazing	33
C2	External Wall	33
C3		
C3	Glazing	35
C3	External Wall	35
C4		
C4	Glazing	36
C4	External Wall	36
C5		
C5	Glazing	38
C5	External Wall	44
C6		
C6	Glazing	26
C6	External Wall	26
C7		
C7	Glazing	26
C7	External Wall	26

Table 7 (Cont.): Recommended building shell treatments for road traffic noise.

Byron Health and Wellness Space	Building Component	Rw
C8		
C8	Glazing	27
C8	External Wall	27
C9		
C9	Glazing	27
C9	External Wall	27
C10		
C10	Glazing	29
C10	External Wall	31
C11		
C11	Glazing	30
C11	External Wall	32
C12		
C12	Glazing	30
C12	External Wall	30
C13		
C13	Glazing	31
C13	External Wall	31
C14		
C14	Glazing	30
C14	External Wall	45
Proc 5		
Proc 5	Glazing	27
Proc 5	External Wall	27
Waiting Room A, Fover and Reception		
Waiting Room A, Fover and Reception	Glazing	27
Waiting Room A, Fover and Reception	External Wall	29
Waiting Room B		
Waiting Room B	Glazing	26
Waiting Room B	External Wall	25
Waiting Room C		
Waiting Room C	Glazing	40
Waiting Room C	External Wall	38
Staff and Meeting Room		
Staff and Meeting Room	Glazing	26
Staff and Meeting Room	External Wall	26

Table 7 (Cont.): Recommended building shell treatments for road traffic noise.

6.2 Onsite Activity Noise Acoustic Treatments

Based upon the adopted noise source levels, the following acoustic treatments and management principles are recommended to mitigate onsite activity noise emissions:

- Café hours including alfresco dining be limited to between 7am and midnight.
- No amplified sound be undertaken inside or outside the café unless a specific amplified music noise assessment is conducted.
- The ceiling above the indoor and outdoor dining areas of the café should have an absorptive lining such as perforated plasterboard with insulation batts above.
- Waste collection and deliveries be limited to the daytime period between 7am and 6pm.
- Carpark and driveway hardstand areas be finished with surface coatings which prevent tyre squeal (an uncoated concrete or asphalt surface is acceptable).
- Drainage grating over trafficable areas be well secured to prevent rattling.
- Mechanical plant be designed and installed to comply with the noise criterion presented in Section 4.2. As final plant selection has not been completed, additional acoustic assessment/s should be undertaken once plant selections are finalised. Such assessments should be undertaken prior to Building Approval; and be conditioned within the Development Approval.
 - Based upon the assumed source levels, mechanical plant rooms (i.e. at basement level) and air-conditioning plant decks (i.e. at roof-top level) may require acoustical screens / louvres around the perimeters.
 - Commercial kitchen exhaust units (i.e. for the café) may require silencers / attenuators.

7.0 DISCUSSION

7.1 Road Traffic Noise Impacts

Road traffic noise has been assessed against the ten year horizon after the completion of the development.

Based upon ultimate traffic volumes and the development layout, road traffic noise levels are predicted to impact the nearest proposed building façades at levels above the external traffic noise criterion, hence acoustic treatments are required.

To show that compliance with the internal noise criterion can be achieved, we have recommended building shell treatments R_w performance ratings for noise affected habitable rooms. To allow occupants to close windows and doors provision of air conditioning or sealed mechanical ventilation is required to noise affected habitable rooms. The installed plant should not reduce the acoustic performance of the building shell.

7.2 Onsite Activity Noise Emissions

Onsite activity noise emissions from the proposed development (i.e. vehicle activity, patron's outdoor activity, alfresco dining at the café, deliveries, waste collection and mechanical plant) have the potential to impact upon surrounding noise sensitive receivers and have been assessed in accordance with the *"NSW Industrial Noise Policy"* to ensure an acceptable level of acoustical amenity can be achieved.

Based upon the assumed noise source levels and recommended acoustic treatments and management controls, external noise impacts at the offsite receivers are predicted to be at or below the relevant external *"Background +"* criterion except for waste collection at the nearest dwelling across Quarry Lane.

To minimise the potential of noise annoyance we have recommended that waste collection and delivery activities be limited to the daytime period between 7am and 6pm; and hours of operation for the café be limited to between 7am and midnight.

As previously noted, a preliminary assessment of mechanical plant has been undertaken (including noise impacts at offsite receivers and the nearest onsite noise sensitive habitable rooms) for the expected plant (i.e. kitchen exhaust fan and plant room air-conditioning units) to provide guidance on likely acoustic treatment requirements to mitigate noise emissions from mechanical plant. Given that specific mechanical plant requirements are unknown at this stage (Development Application) more detailed mechanical plant noise assessments will be required once final plant has been chosen. Such assessments should be undertaken prior to Building Approval; and be conditioned within the Development Approval. It should be stressed that noise from plant and equipment is of minor concern, given the separation distances to nearest dwellings, and the fact that there are a variety of noise control options available.

It is also noted that the final onsite mechanical plant will need to be designed to comply with the *"Background +"* criterion, with noise emissions from plant being much lower than existing noise impacts from road traffic noise along Ewingsdale Road. Building shell treatments recommended for noise sensitive habitable rooms to mitigate road traffic noise will also reduce noise impacts from onsite mechanical plant.

8.0 CONCLUSIONS

This report is in response to a request from Brunsméd Pty Ltd for a revised environmental noise impact assessment of proposed Health and Wellness Hub development at Ewingsdale. Revisions to our original noise assessment dated 25/10/2016 were required to reflect changes in floor layouts and finished floor levels.

Overall, the proposed development will generally be within acceptable levels of the adopted criterion, subject to the acoustic treatments recommended in Section 6 being integrated into the design, construction and operation of the development.

Report Reviewed By:



JAY CARTER BSc
Director

Report Compiled by:



Matthew Lopez BEng
Consultant

APPENDIX A

Subject Site, Logger Location and Surrounding Noise Sensitive Receivers

Figure No. 1: Subject Site Location (NSW Six Maps).

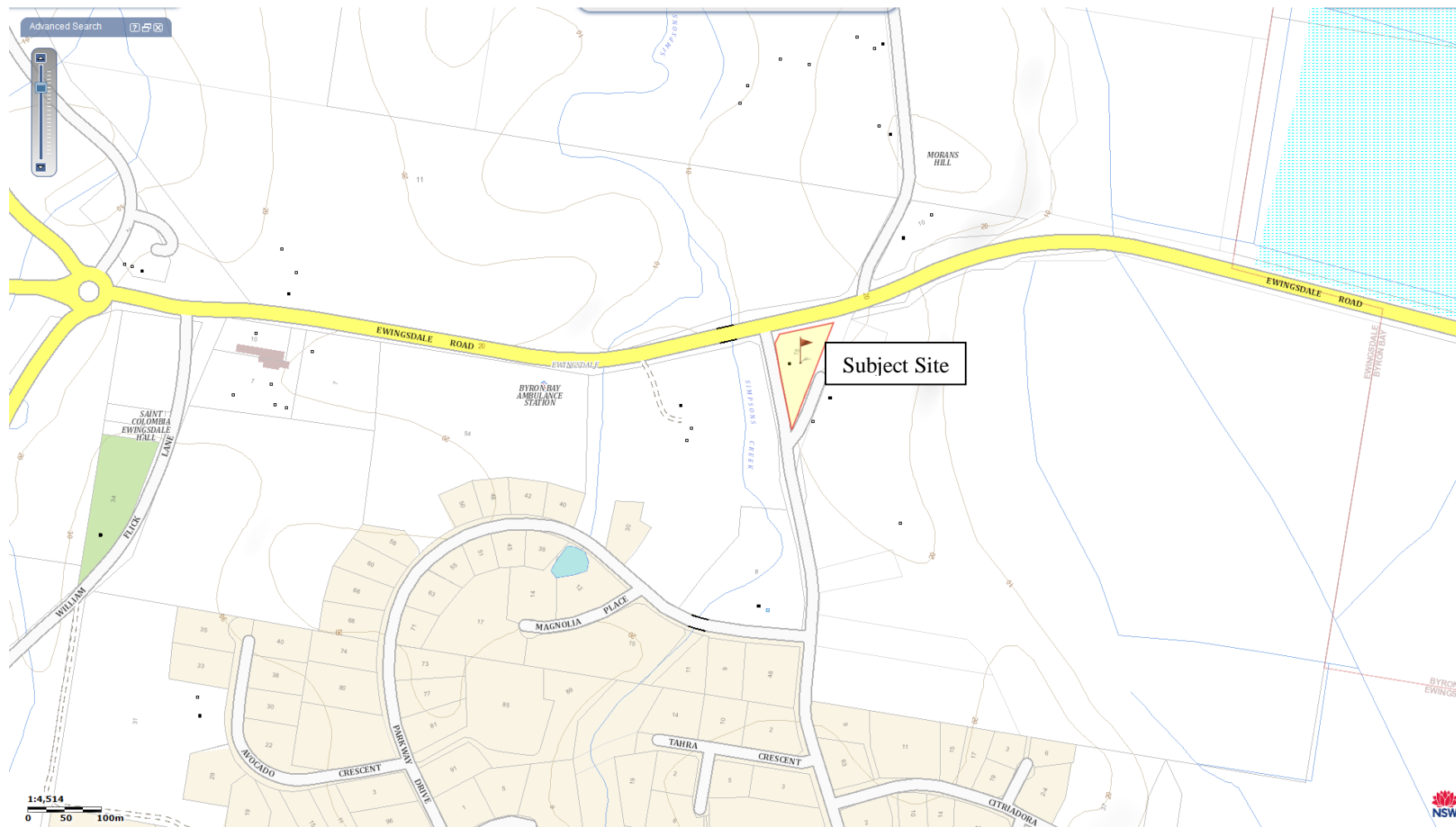
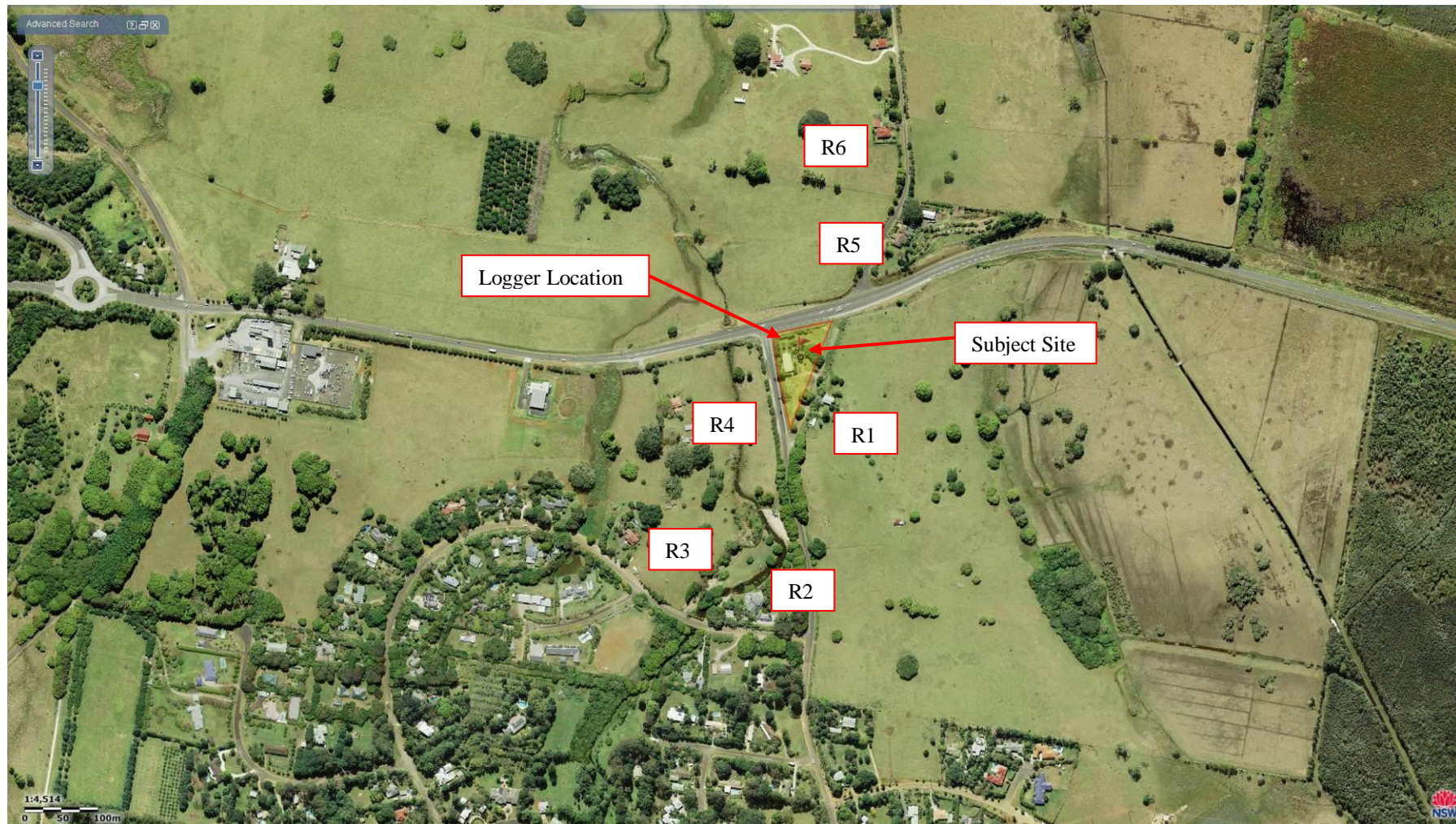


Figure No. 2: Subject Site, Logger Location, and Surrounding Noise Receivers (NSW Six Maps).



APPENDIX B

Development Plans

Notes:

Carparking

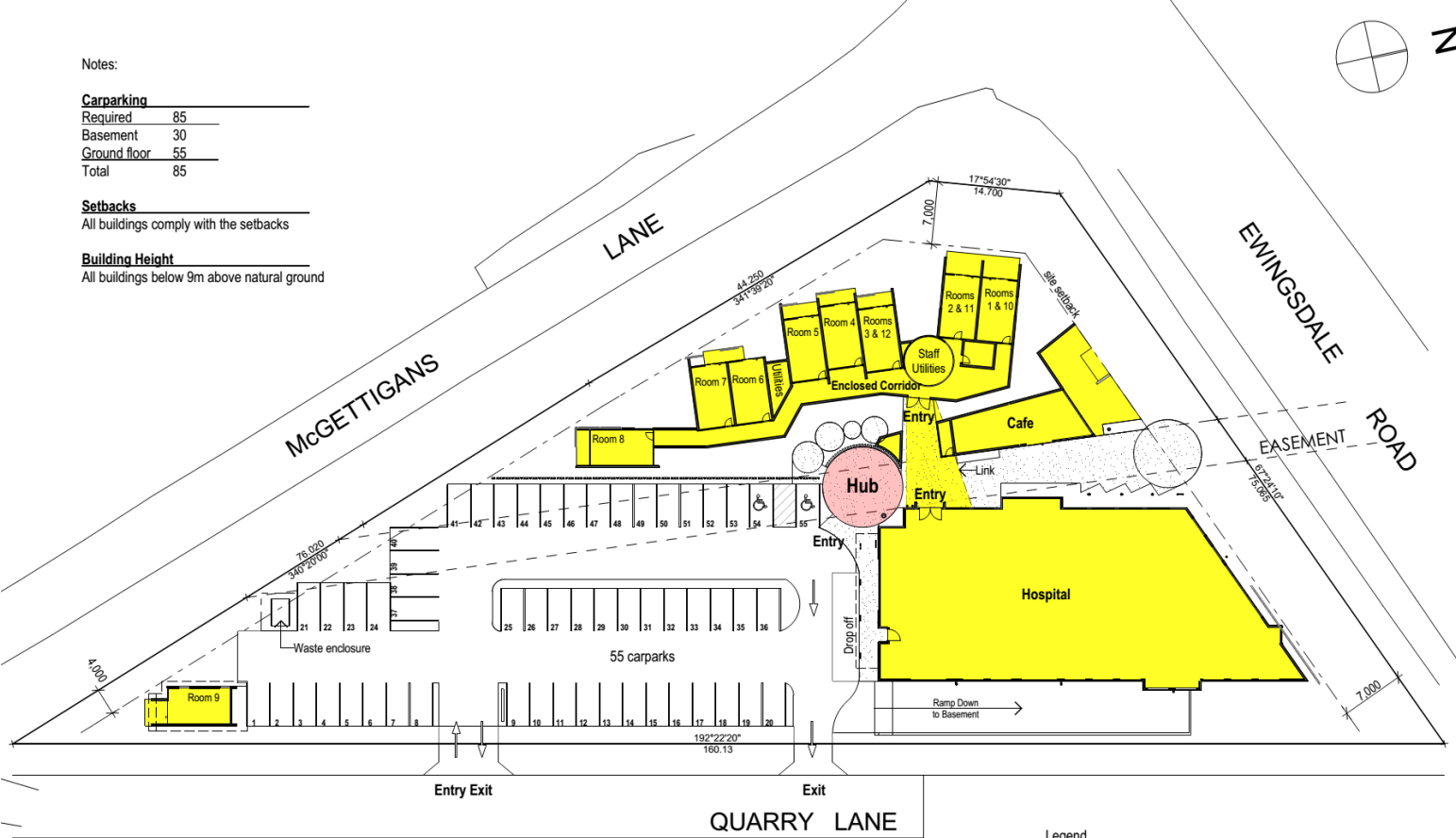
Required	85
Basement	30
Ground floor	55
Total	85

Setbacks

All buildings comply with the setbacks

Building Height

All buildings below 9m above natural ground



Legend

Yellow Hospital

armstrong&Co
Architects

e: 2/ 52 Griffith St, Coolangatta, QLD
p: 0755 366 339 e: theco@armstrongco.com.au w: armstrongco.com.au
nom architect: Andrew Armstrong, qld 2814, nsw 6321

Dwg No **A02**

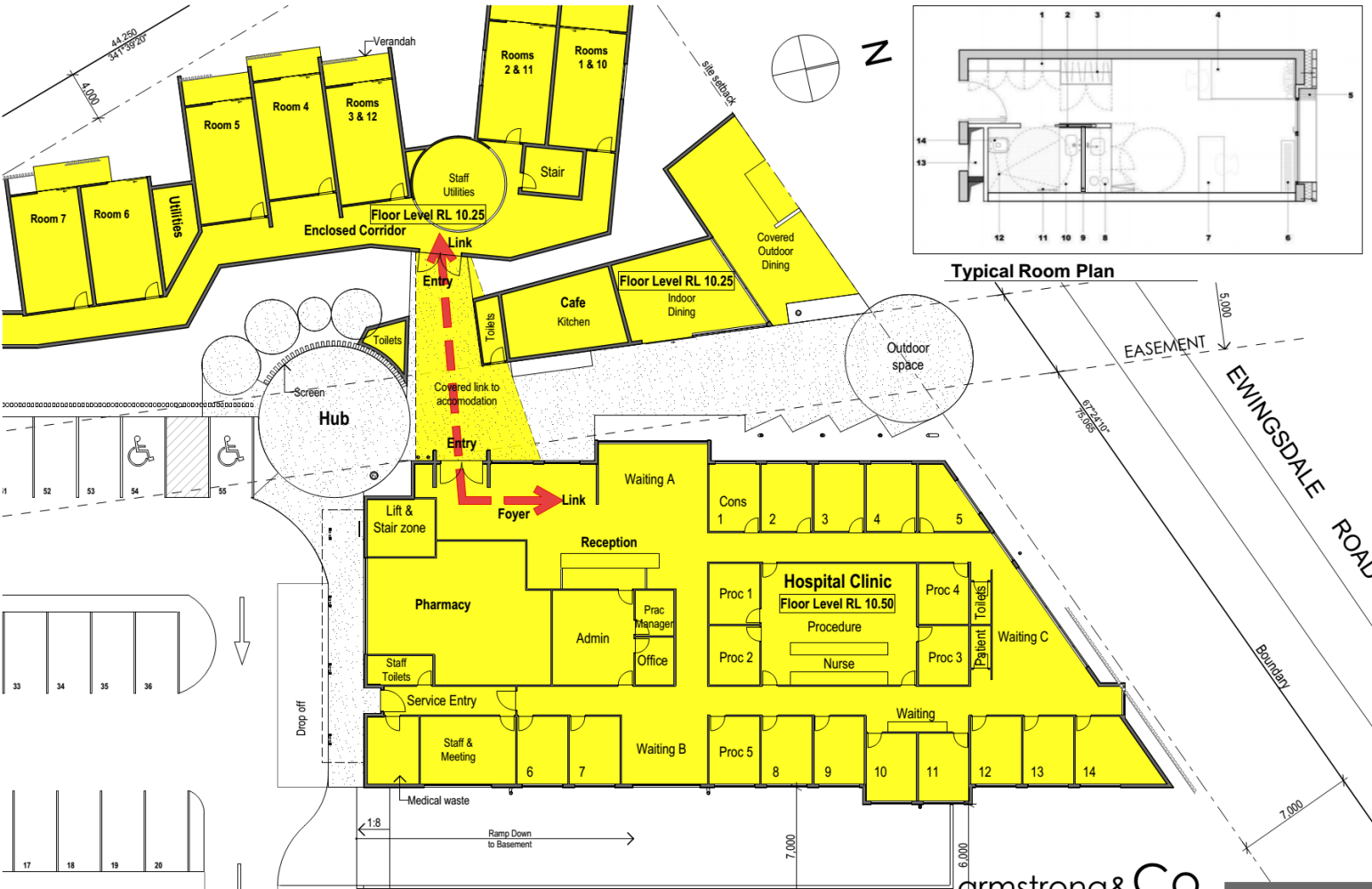
Issue: DA - D

Date: 15 Nov 2017

Byron Central Health & Wellness Hub

Site Plan

1:400 @A3



armstrong&Co
Architects

e: 2/ 52 Griffith St, Coolangatta, QLD
p: 0755 366 339 e: theco@armstrongco.com.au w: armstrongco.com.au
nom architect: Andrew Armstrong, qld 2814, nsw 6321

Dwg No **A03**

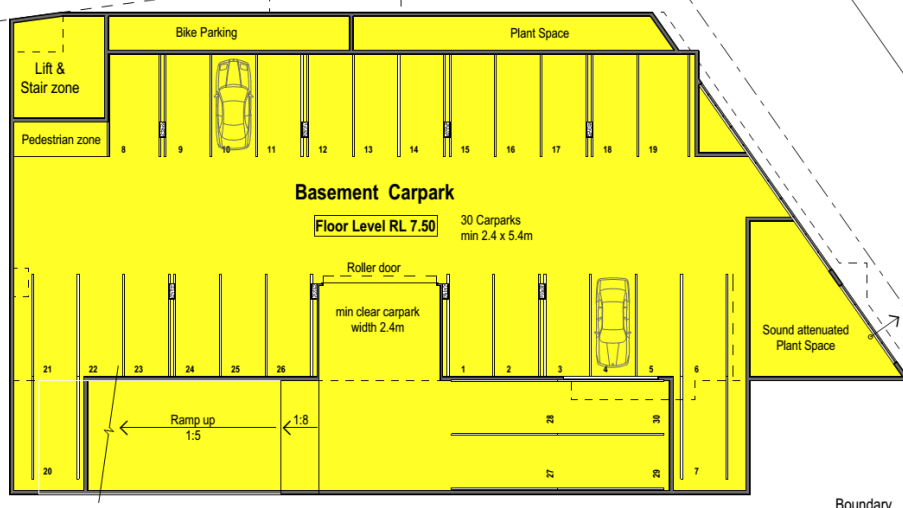
Issue: DA - D

Date: 15 Nov 2017

Byron Central Health & Wellness Hub

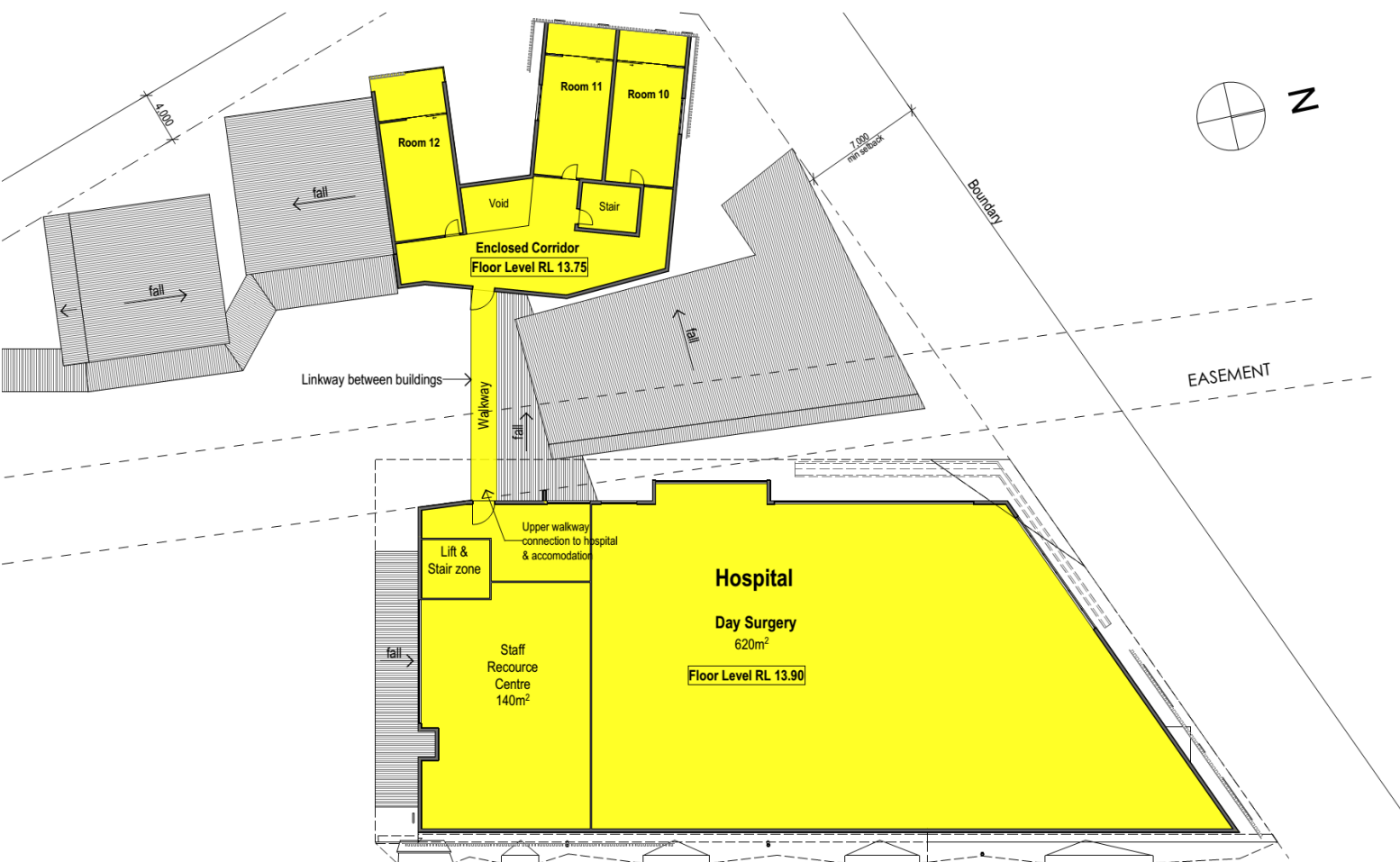
Ground Floor Plan

1:200 @A3



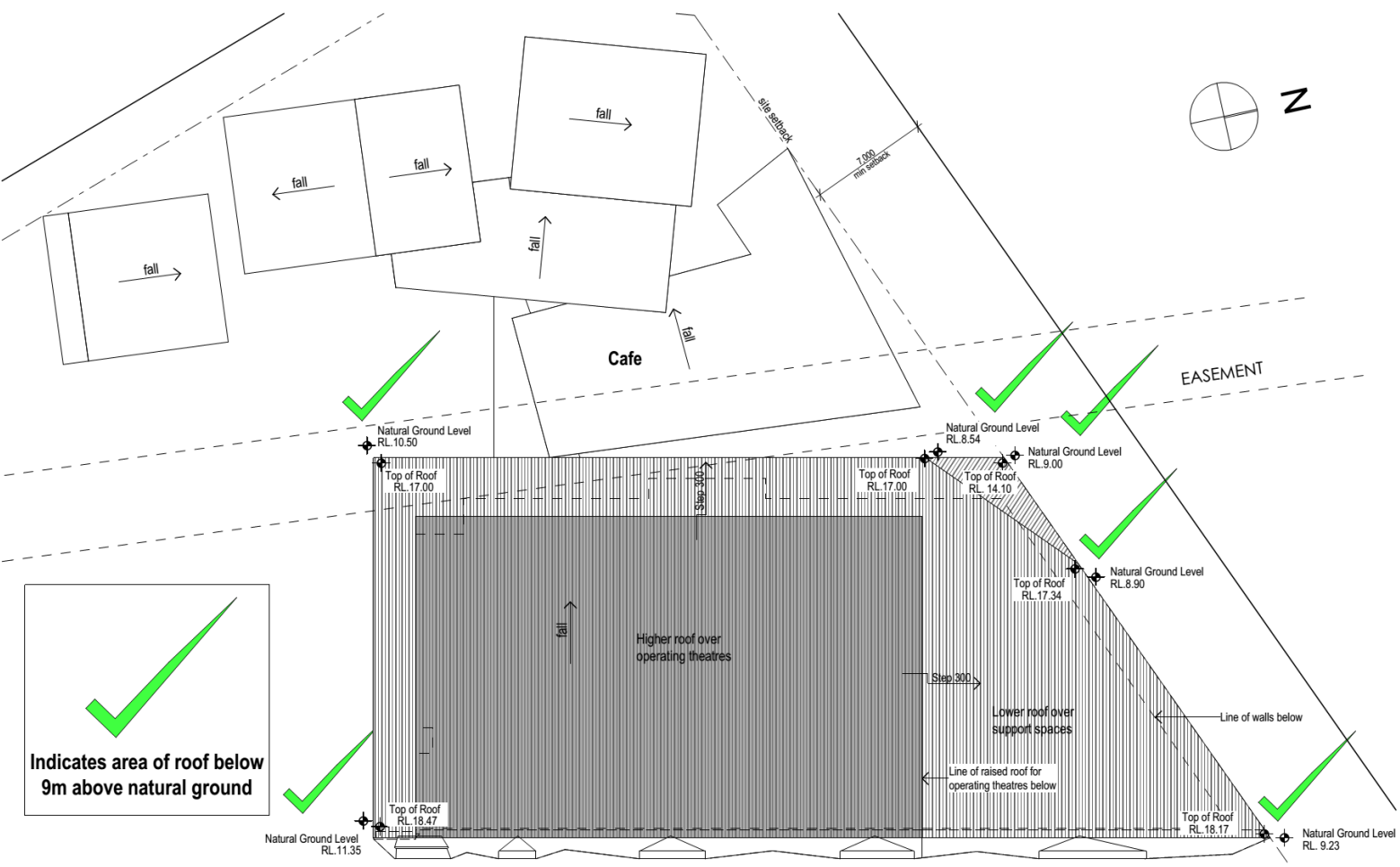
armstrong&Co
Architects

p: 0755 366 339 **e:** theco@armstrongco.com.au **w:** armstrongco.com.au
nom architect: Andrew Armstrong, qld 2814, nsw 6321



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Architects

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nom architect: Andrew Armstrong, qld 2814, nsw 6321



Indicates height above natural ground.
All roofs under 9m

Roof Plan
1:200 @A3

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nom architect: Andrew Armstrong, qld 2814, nsw 6321

Dwg No **A06**
Issue DA - D
Date: 15 Nov 2017



Site Elevations
1:200 @A3

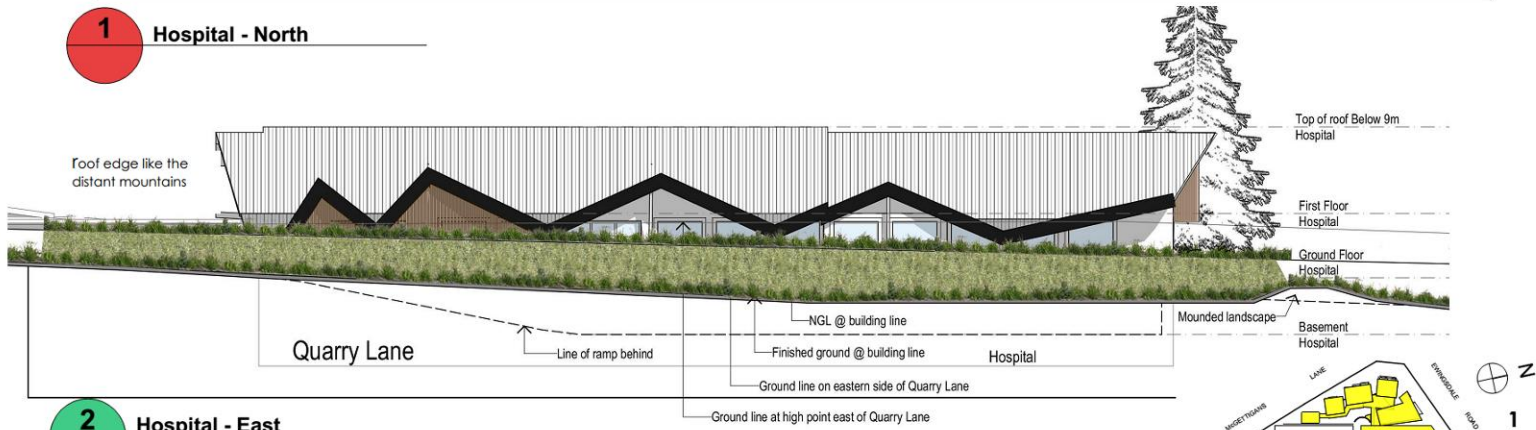
Byron Central Health & Wellness Hub

armstrong&Co Architects
a: 2/52 Griffith St, Coolangatta, QLD
p: 0755 366 339 e: theco@armstrongco.com.au w: armstrongco.com.au
nom architect: Andrew Armstrong, qld 2814, nsw 6321

Dwg No **A07**
Issue DA - D
Date: 15 Nov 2017



1 Hospital - North



2 Hospital - East

armstrong&Co
Architects

Health Services Facility Elevations 1

1:200 @ A3

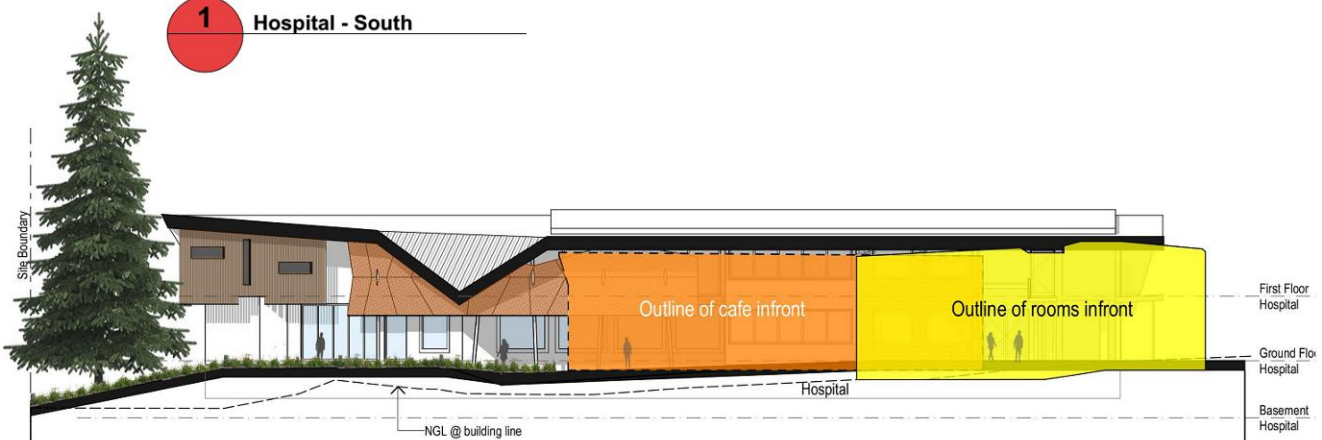
2/ 52 Griffith St, Coolangatta, QLD
p: 0755 366 339 e: theco@armstrongco.com.au w: armstrongco.com.au
nom architect: Andrew Armstrong, qld 2814, nsw 6321

Dwg No **A09**
Issue DA - D
Date: 15 Nov 2017

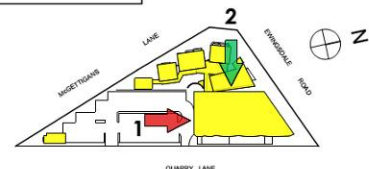
Byron Central Health & Wellness Hub



1 Hospital - South



2 Hospital - West



armstrong&Co
Architects

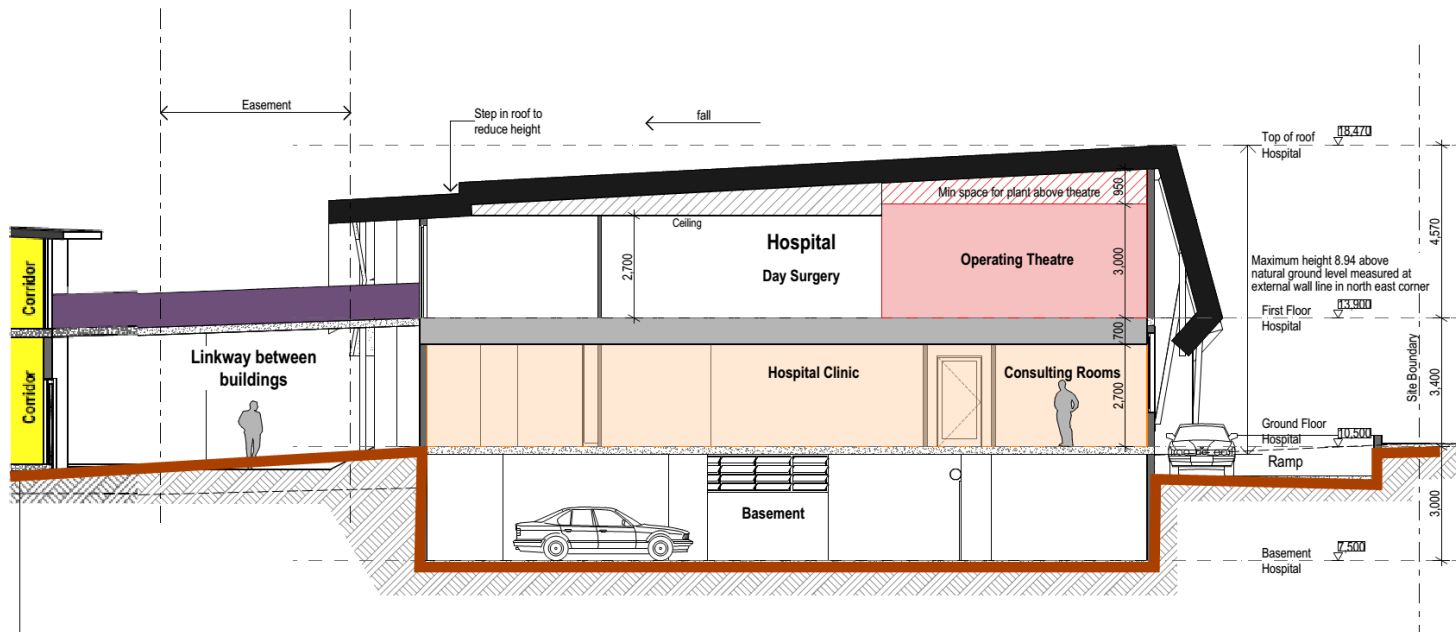
Health Services Facility Elevations 2

1:200 @ A3

2/ 52 Griffith St, Coolangatta, QLD
p: 0755 366 339 e: theco@armstrongco.com.au w: armstrongco.com.au
nom architect: Andrew Armstrong, qld 2814, nsw 6321

Dwg No **A10**
Issue DA - D
Date: 15 Nov 2017

Byron Central Health & Wellness Hub



Section A Detail

SCALE: 1:100

The link between the buildings is a critical part of the functional operation of the Hospital while also delineating the entry and providing covered outdoor space.

The height of the building has been adjusted so that all parts of the roof are under 9m above natural ground. This has been achieved by reducing the height between the ground and first floors and stepping the roof. The revised heights still meet the requirements of the AHFG.

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nom architect: Andrew Armstrong, qld 2814, nsw 6321

Dwg No **A11**

Issue: DA - D

Date: 17 Oct 2016

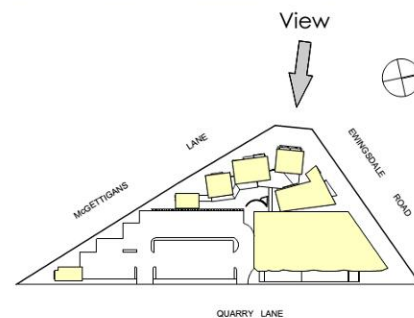
Section Detail

1:100 @A3

Byron Central Health & Wellness Hub



The various heights and roofs reflect the near and distant topography. Materials are taken from the landscape. The loosely placed units create a village which becomes part of the entry to ewingsdale.



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nom architect: Andrew Armstrong, qld 2814, nsw 6321

Dwg No **A12**

Issue: DA - D

Date: 15 Nov 2017

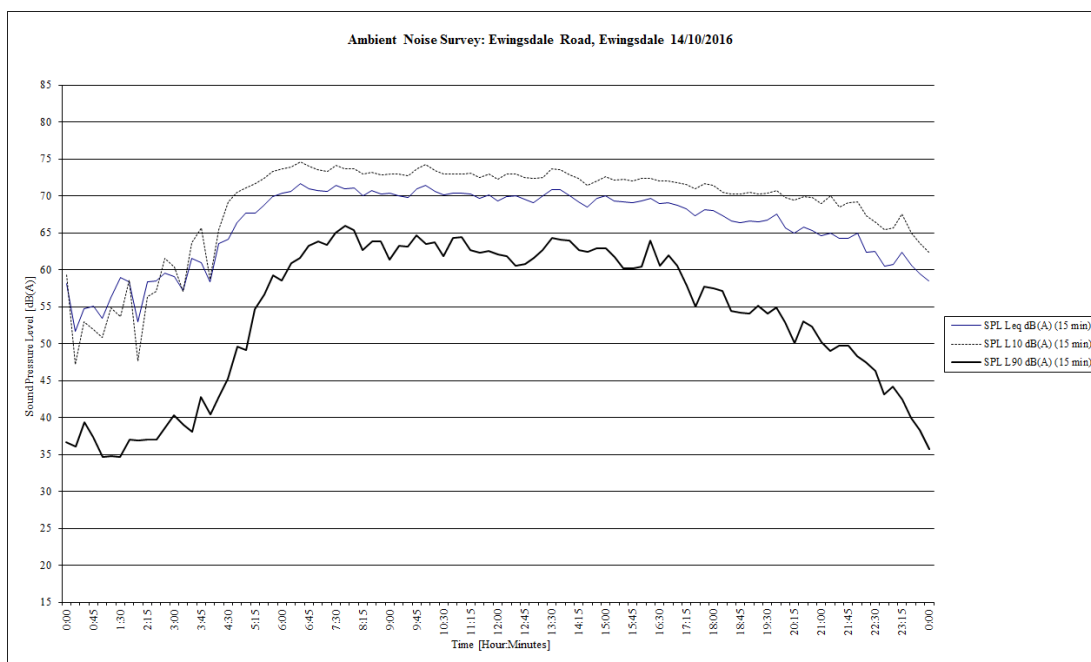
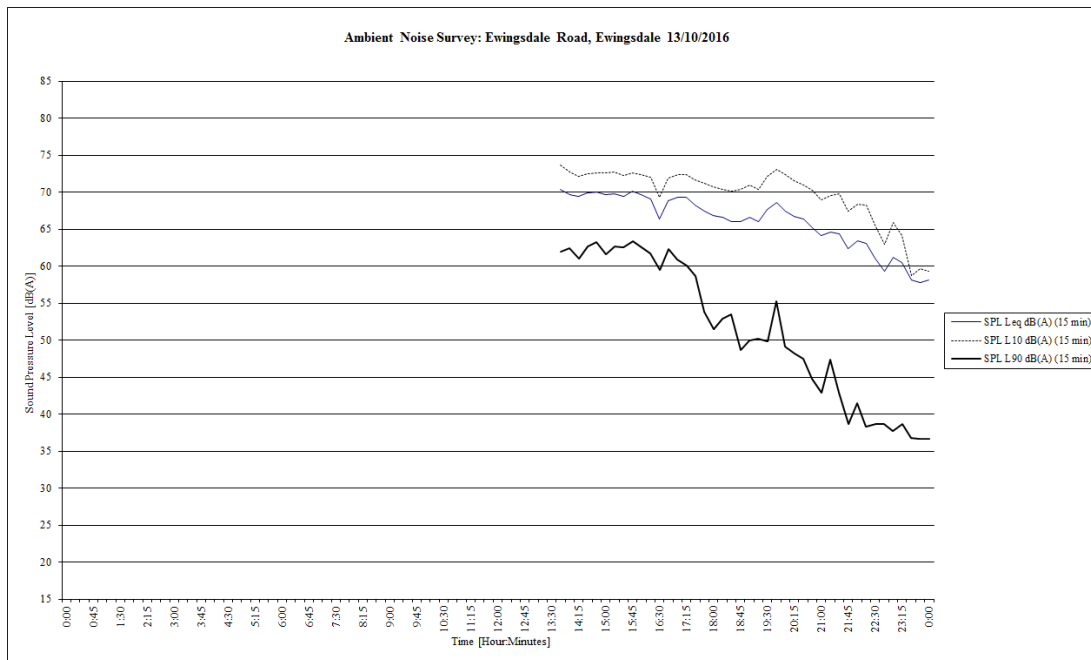
Streetscape 1

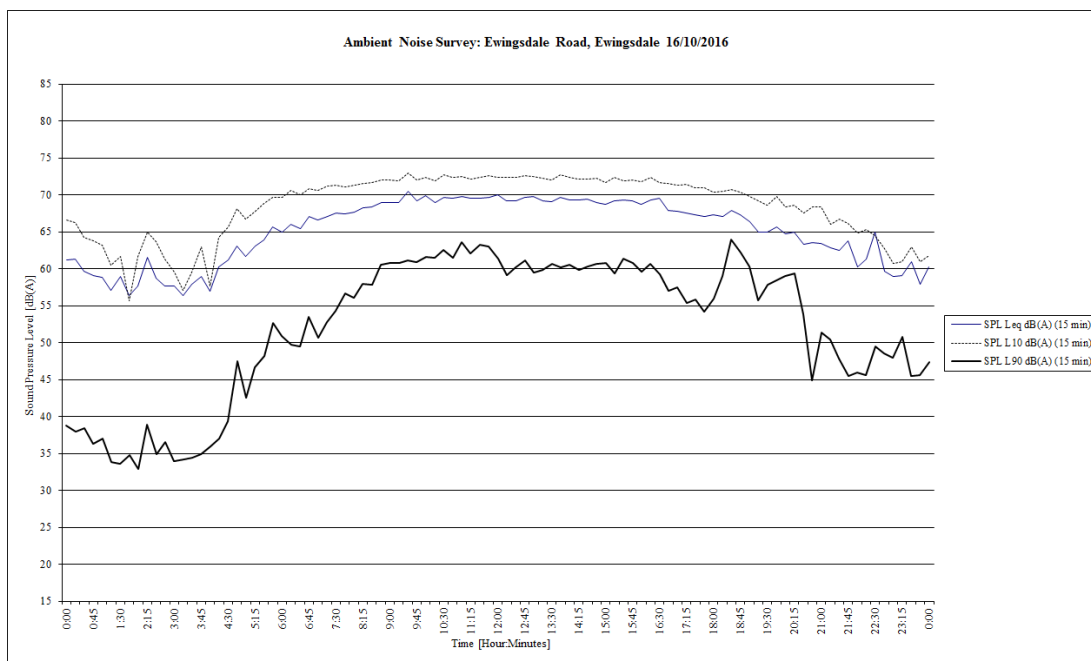
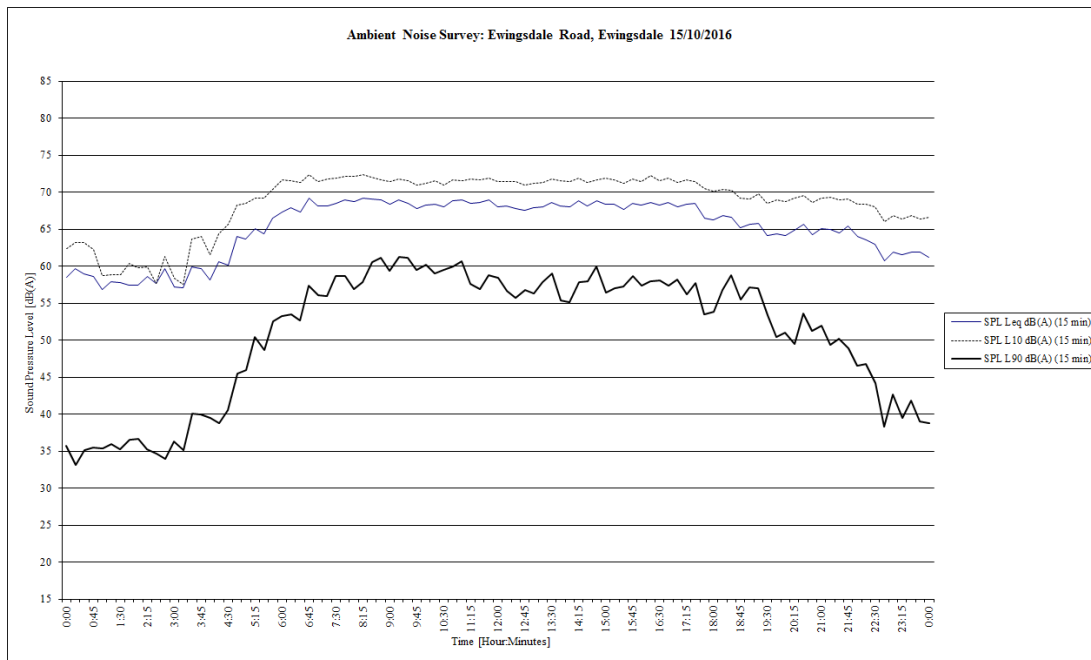
NTS

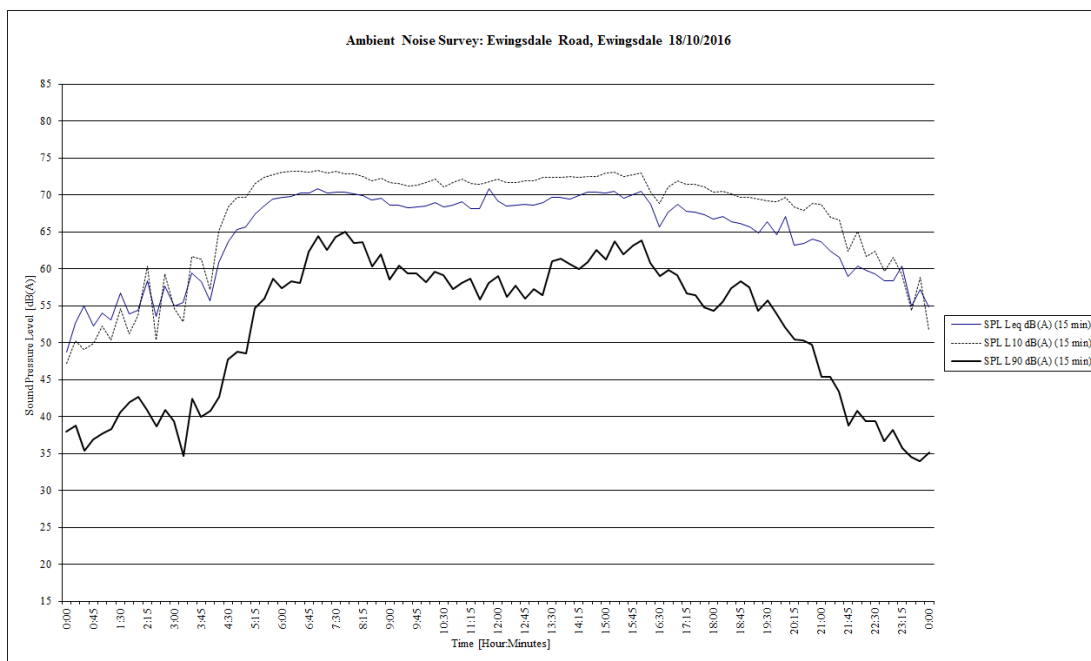
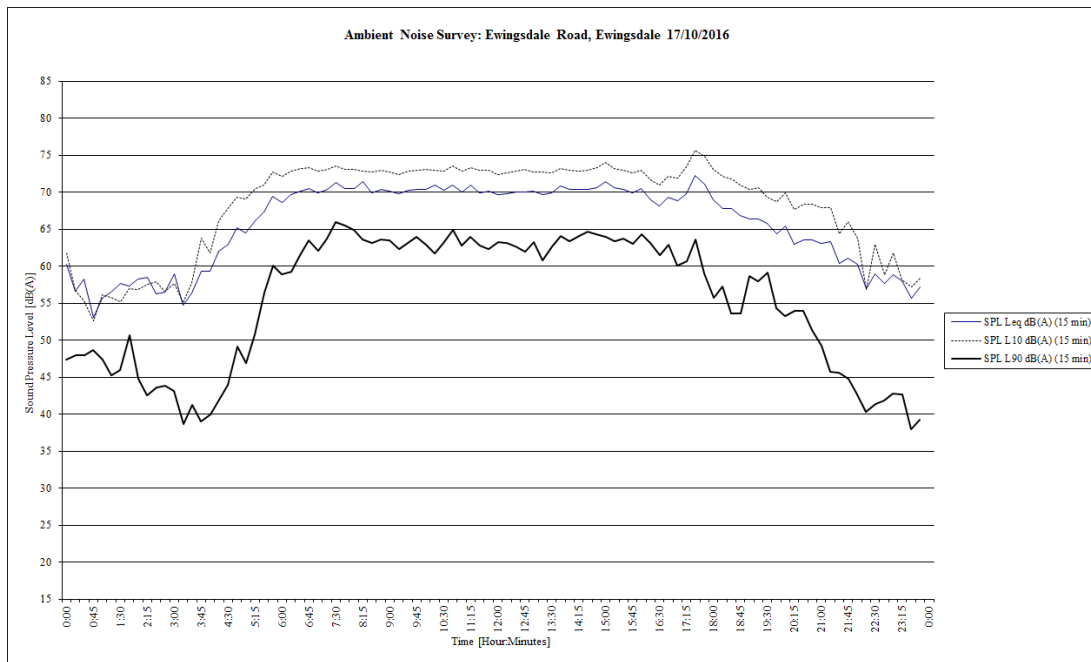
Byron Central Health & Wellness Hub

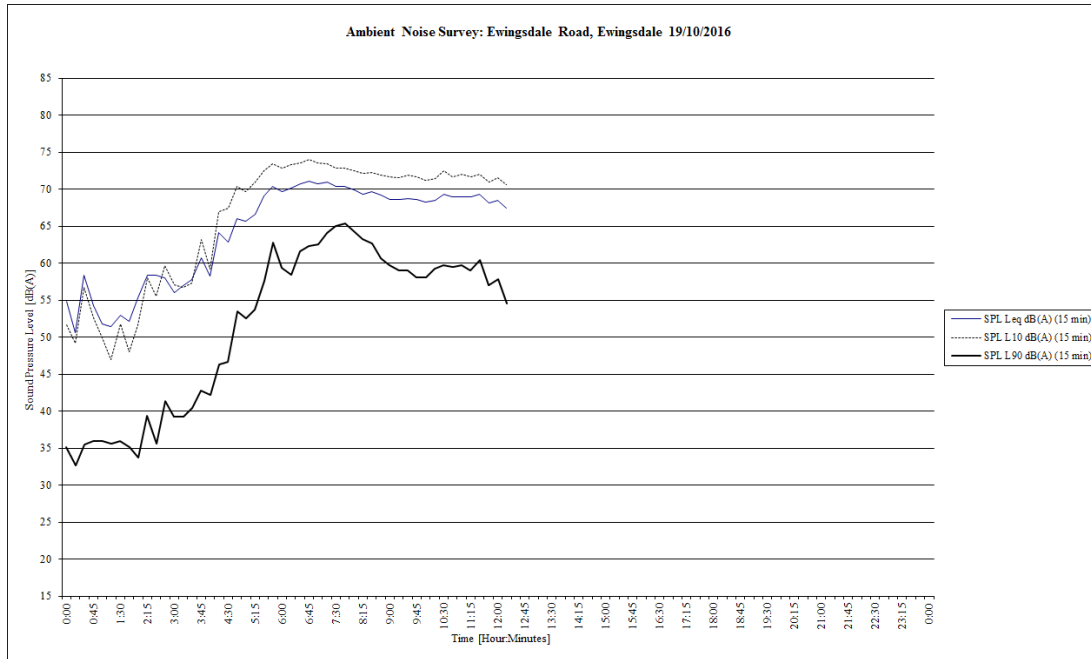
APPENDIX C

Measurement Results, Model Calculations / Predictions









ROAD NOISE MODEL VERIFICATION

Pen3D2000 V 1.10.0

Project Code:16181a

Project Description:Noise assessment of Byron Health and Wellness

File:G:\Users\Matty\CRGNAS\2016\16181 Byron Health and Wellness Hub\16181a_existing.PEN

Monday 24 Oct, 2016 at 11:59:41

CoRTN Calculations

All road segments included. Segmentation angle: 1degrees. Road elevations apply.

Receptor	X Posn (m)	Y Posn (m)	Height (m)	Leq(24hour) (dB(A))
logger	554790.5	6832129.6	1.4	69.4

ROAD NOISE MODEL ULTIMATE

File:G:\Users\Matty\CRGNAS\2016\16181 Byron Health and Wellness Hub\16181a_ultimate nov17.PEN

File Description:Data file covering nov17

Monday 20 Nov, 2017 at 09:54:27

CoRTN Calculations

All road segments included. Segmentation angle: 1degrees. Road elevations apply.

Receptor	X Posn (m)	Y Posn (m)	Height (m)	Leq(24hour) (dB(A))
A1 L	554798.5	6832122.3	1.5	66.6
A1 S	554802.5	6832123.1	1.5	65.7
A2 L	554796.8	6832118.6	1.5	65.6
A2 S	554798.3	6832115.1	1.5	60.2
A3 L	554796.4	6832108.4	1.5	62.2
A3 S	554799.1	6832110.3	1.5	59.9
A4	554794.6	6832104.6	1.5	62.2
A5 L	554794.4	6832100.3	1.5	60.8
A5 S	554795.8	6832097.5	1.5	56.6
A6	554796.5	6832093.1	1.5	59.1
A7 L	554795.5	6832088.9	1.5	59.7
A7 s	554798.2	6832085.6	1.5	55.6
a8 l	554799.3	6832073	1.5	55.3
a8 s	554797.8	6832075.9	1.5	58.5
a9 l	554809.1	6832019.1	1.5	45.3
a9 s	554807.2	6832022.1	1.5	55
a10 l	554798.5	6832122.3	5	68.4
a10 s	554802.5	6832123.1	5	68.8
a11 l	554796.8	6832118.6	5	67.6
a11 s	554798.4	6832115.1	5	62.1
a12 l	554796.4	6832108.4	5	64.3
a12 s	554799.1	6832110.2	5	62.4
day n	554839.8	6832134.7	5	70.4
day e	554850.7	6832131.5	5	63.7
day w	554828	6832128.6	5	68.2
c1	554825.1	6832120.6	1.5	61.8
c2	554826.1	6832123.4	1.5	63.3
c3	554827.3	6832126.4	1.5	64.6
c4	554828.3	6832129.1	1.5	65.9
c5	554832.2	6832132.9	1.5	68.4
c6	554839	6832102.8	1.5	56
c7	554840.2	6832105.7	1.5	56.3
c8	554844.5	6832116.2	1.5	57
c9	554845.9	6832118.9	1.5	56.5
c10	554847.6	6832121.5	1.5	59.1
c11	554848.7	6832124.5	1.5	59.8
c12	554849	6832127.5	1.5	60.1
c13	554850.1	6832130.4	1.5	60.7
c14	554851.2	6832133.3	1.5	61.4
wait a	554822.3	6832116.7	1.5	59.7
wait b	554841.8	6832109.6	1.5	56.7
wait c	554839.8	6832134.6	1.5	68.4
p5	554843.3	6832113.4	1.5	56.9
staff	554837.2	6832098.2	1.5	55.5
res s	554827.1	6832096.2	5	55.3
res e	554838	6832100.2	5	58.5

Proposed Health and Wellness Development											
Job no: 16181a											
Rw Calculations to AS3671											
Space	Building Component	Impact dB(A)	Criteria dB(A)	TNR dB(A)	Element Area (m2)	Floor Area (m2)	Height (m)	RT60 (s)	C	TNA	Rw
Apartment 1											
Room	Glazing	63	35	28.0	10.0	20.80	2.70	0.50	2	28.27	34
Room	External Wall	63	35	28.0	15.54	20.80	2.70	0.50	2	30.20	36
Apartment 2											
Room	Glazing	62	35	27.0	10.0	20.80	2.70	0.50	2	27.27	33
Room	External Wall	62	35	27.0	15.54	20.80	2.70	0.50	2	29.20	35
Apartment 3											
Room	Glazing	58	35	23.0	5.5	20.80	2.70	0.50	2	20.71	27
Room	External Wall	58	35	23.0	19.98	20.80	2.70	0.50	2	26.29	32
Apartment 4											
Room	Glazing	58	35	23.0	5.5	20.80	2.70	0.50	3	22.47	28
Room	External Wall	58	35	23.0	7.98	20.80	2.70	0.50	3	24.07	30
Room	Roof / Ceiling	58	35	23.0	20.80	20.80	2.70	0.50	3	28.23	34
Apartment 5											
Room	Glazing	57	35	22.0	5.5	20.80	2.70	0.50	3	21.47	27
Room	External Wall	57	35	22.0	19.98	20.80	2.70	0.50	3	27.05	33
Room	Roof / Ceiling	57	35	22.0	20.80	20.80	2.70	0.50	3	27.23	33
Apartment 6											
Room	Glazing	55	35	20.0	5.5	20.80	2.70	0.50	3	19.47	25
Room	External Wall	55	35	20.0	7.98	20.80	2.70	0.50	3	21.07	27
Room	Roof / Ceiling	55	35	20.0	20.80	20.80	2.70	0.50	3	25.23	31
Apartment 7											
Room	Glazing	56	35	21.0	5.5	20.80	2.70	0.50	3	20.47	26
Room	External Wall	56	35	21.0	19.98	20.80	2.70	0.50	3	26.05	32
Room	Roof / Ceiling	56	35	21.0	20.80	20.80	2.70	0.50	3	26.23	32
Apartment 8											
Room	Glazing	55	35	20.0	10.0	20.80	2.70	0.50	2	20.27	26
Room	External Wall	55	35	20.0	15.54	20.80	2.70	0.50	2	22.20	28
Room	Roof / Ceiling	55	35	20.0	20.80	20.80	2.70	0.50	3	25.23	31
Apartment 9											
Room	Glazing	51	35	16.0	9.9	20.80	2.70	0.50	3	18.01	24
Room	External Wall	51	35	16.0	41.08	20.80	2.70	0.50	3	24.18	30
Room	Roof / Ceiling	51	35	16.0	20.80	20.80	2.70	0.50	3	21.23	27
Apartment 10											
Room	Glazing	65	35	30.0	10.0	20.80	2.70	0.50	3	32.03	38
Room	External Wall	65	35	30.0	15.54	20.80	2.70	0.50	3	33.96	40
Room	Roof / Ceiling	65	35	30.0	20.80	20.80	2.70	0.50	3	35.23	41
Apartment 11											
Room	Glazing	64	35	29.0	10.0	20.80	2.70	0.50	3	31.03	37
Room	External Wall	64	35	29.0	15.54	20.80	2.70	0.50	3	32.96	39
Room	Roof / Ceiling	64	35	29.0	20.80	20.80	2.70	0.50	3	34.23	40
Apartment 12											
Room	Glazing	60	35	25.0	5.5	20.80	2.70	0.50	3	24.47	30
Room	External Wall	60	35	25.0	19.98	20.80	2.70	0.50	3	30.05	36
Room	Roof / Ceiling	60	35	25.0	20.80	20.80	2.70	0.50	3	30.23	36
Day Surgery											
Day Surgery	West Glazing	69	40	29.0	54.0	620.00	2.70	1.00	4	27.89	34
Day Surgery	North Glazing	71	40	31.0	26.3	620.00	2.70	1.00	4	26.77	33
Day Surgery	External Wall	71	40	31.0	215.49	620.00	2.70	1.00	4	35.90	42
Day Surgery	Roof / Ceiling	71	40	31.0	620.00	620.00	2.70	1.00	4	40.49	46
Specialist Rooms											
Staff Recourse Centre	South Glazing	56	40	16.0	21.6	140.00	3.00	1.00	3	15.66	22
Staff Recourse Centre	External Wall	60	40	20.0	65.10	140.00	3.00	1.00	3	24.46	30
Staff Recourse Centre	Roof / Ceiling	60	40	20.0	140.00	140.00	3.00	1.00	3	27.78	34

C1											
C1	Glazing	63	40	23.0	5.3	11.31	2.70	1.00	2	26.18	32
C1	External Wall	63	40	23.0	5.25	11.31	2.70	1.00	2	26.15	32
C2											
C2	Glazing	64	40	24.0	5.3	11.31	2.70	1.00	2	27.18	33
C2	External Wall	64	40	24.0	5.25	11.31	2.70	1.00	2	27.15	33
C3											
C3	Glazing	66	40	26.0	5.3	11.31	2.70	1.00	2	29.18	35
C3	External Wall	66	40	26.0	5.25	11.31	2.70	1.00	2	29.15	35
C4											
C4	Glazing	67	40	27.0	5.3	11.31	2.70	1.00	2	30.18	36
C4	External Wall	67	40	27.0	5.25	11.31	2.70	1.00	2	30.15	36
C5											
C5	Glazing	69	40	29.0	5.3	10.73	2.70	1.00	2	32.41	38
C5	External Wall	69	40	29.0	17.49	10.73	2.70	1.00	2	37.60	44
C6											
C6	Glazing	57	40	17.0	5.3	11.31	2.70	1.00	2	20.18	26
C6	External Wall	57	40	17.0	5.25	11.31	2.70	1.00	2	20.15	26
C7											
C7	Glazing	57	40	17.0	5.3	11.31	2.70	1.00	2	20.18	26
C7	External Wall	57	40	17.0	5.25	11.31	2.70	1.00	2	20.15	26
C8											
C8	Glazing	58	40	18.0	5.3	11.31	2.70	1.00	2	21.18	27
C8	External Wall	58	40	18.0	5.25	11.31	2.70	1.00	2	21.15	27
C9											
C9	Glazing	58	40	18.0	5.3	11.31	2.70	1.00	2	21.18	27
C9	External Wall	58	40	18.0	5.25	11.31	2.70	1.00	2	21.15	27
C10											
C10	Glazing	60	40	20.0	5.3	11.31	2.70	1.00	2	23.18	29
C10	External Wall	60	40	20.0	8.31	11.31	2.70	1.00	2	25.14	31
C11											
C11	Glazing	61	40	21.0	5.3	11.31	2.70	1.00	2	24.18	30
C11	External Wall	61	40	21.0	8.31	11.31	2.70	1.00	2	26.14	32
C12											
C12	Glazing	61	40	21.0	5.3	11.31	2.70	1.00	2	24.18	30
C12	External Wall	61	40	21.0	5.25	11.31	2.70	1.00	2	24.15	30
C13											
C13	Glazing	62	40	22.0	5.3	11.31	2.70	1.00	2	25.18	31
C13	External Wall	62	40	22.0	5.25	11.31	2.70	1.00	2	25.15	31
C14											
C14	Glazing	62	40	22.0	5.3	15.21	2.70	1.00	2	23.89	30
C14	External Wall	69	40	29.0	36.51	15.21	2.70	1.00	2	39.28	45
Proc 5											
Proc 5	Glazing	58	40	18.0	5.3	11.31	2.70	1.00	2	21.18	27
Proc 5	External Wall	58	40	18.0	5.25	11.31	2.70	1.00	2	21.15	27
Waiting Room A, Fover and Reception											
Waiting Room A, Fover and Re	Glazing	61	40	21.0	26.1	107.78	2.70	1.00	2	21.32	27
Waiting Room A, Fover and Re	External Wall	61	40	21.0	41.90	107.78	2.70	1.00	2	23.37	29
Waiting Room B											
Waiting Room B	Glazing	58	40	18.0	9.2	28.00	2.70	1.00	2	19.64	26
Waiting Room B	External Wall	58	40	18.0	7.80	28.00	2.70	1.00	2	18.93	25
Waiting Room C											
Waiting Room C	Glazing	69	40	29.0	29.7	45.56	2.70	1.00	2	33.63	40
Waiting Room C	External Wall	69	40	29.0	19.56	45.56	2.70	1.00	2	31.81	38
Staff and Meeting Room											
Staff and Meeting Room	Glazing	57	40	17.0	9.2	21.45	2.70	1.00	2	19.80	26
Staff and Meeting Room	External Wall	57	40	17.0	10.18	21.45	2.70	1.00	2	20.24	26

ONSITE ACTIVITY NOISE IMPACTING THE FAÇADES OF:
LAWLERS LANE

Car door closures (nearest spaces)	55	dB(A) @ 1m
Distance source to receiver	31	m
Distance attenuation	-29.8	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	27.3	dB(A)

8 PARKWAY DRIVE

Car door closures (nearest spaces)	55	dB(A) @ 1m
Distance source to receiver	266	m
Distance attenuation	-48.5	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	8.6	dB(A)

Car door closures (centre spaces)	55	dB(A) @ 1m
Distance source to receiver	42	m
Distance attenuation	-32.5	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	24.6	dB(A)

Car door closures (centre spaces)	55	dB(A) @ 1m
Distance source to receiver	290	m
Distance attenuation	-49.2	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	7.9	dB(A)

Car door closures (far spaces)	55	dB(A) @ 1m
Distance source to receiver	54	m
Distance attenuation	-34.6	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	22.5	dB(A)

Car door closures (far spaces)	55	dB(A) @ 1m
Distance source to receiver	310	m
Distance attenuation	-49.8	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	7.3	dB(A)

Car bypass	65	dB(A) @ 1m
Distance source to receiver	28	m
Distance attenuation	-28.9	dB(A)
Building screening	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	38.6	dB(A)

Car bypass	65	dB(A) @ 1m
Distance source to receiver	280	m
Distance attenuation	-48.9	dB(A)
Building screening	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	18.6	dB(A)

Patrons talking outside	60	dB(A) @ 1m
Distance source to receiver	40	m
Distance attenuation	-32.0	dB(A)
Building screening	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	30.5	dB(A)

Patrons talking outside	60	dB(A) @ 1m
Distance source to receiver	245	m
Distance attenuation	-47.8	dB(A)
Building screening	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	14.7	dB(A)

Dining outside of restaurant	75	dB(A) @ 1m
Distance source to receiver	87	m
Distance attenuation	-38.8	dB(A)
Onsite building screening	-12	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	26.7	dB(A)

Dining outside of restaurant	75	dB(A) @ 1m
Distance source to receiver	355	m
Distance attenuation	-51.0	dB(A)
Onsite building screening	-15	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	11.5	dB(A)

ONSITE ACTIVITY NOISE IMPACTING THE FAÇADES OF:
LAWLERS LANE

Dining inside at restaurant	75	dB(A) @ 1m
Distance source to receiver	82	m
Distance attenuation	-38.3	dB(A)
Inside to outside attenuation+ building screening	-15	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	24.2	dB(A)

Deliveries	75	dB(A) @ 1m
Distance source to receiver	55	m
Distance attenuation	-34.8	dB(A)
Building directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	42.9	dB(A)

Truck bypass	73	dB(A) @ 2m
Distance source to receiver	40	m
Distance attenuation	-32.0	dB(A)
Inside to outside attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	43.5	dB(A)

Waste collection	86	dB(A) @ 1m
Distance source to receiver	40	m
Distance attenuation	-32.0	dB(A)
Building directivity (solid roof over)	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	56.7	dB(A)

Residential A/C Condensers	52	dB(A) @ 1m
Distance source to receiver	45	m
Distance attenuation	-33.1	dB(A)
Parapet wall attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	21.4	dB(A)

Commercial A/C Condensers	60	dB(A) @ 1m
Distance source to receiver	55	m
Distance attenuation	-34.8	dB(A)
Parapet wall attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	27.7	dB(A)

Restaurant kitchen exhaust	62	dB(A) @ 1m
Distance source to receiver	75	m
Distance attenuation	-37.5	dB(A)
Attenuator	-6	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	21.0	dB(A)

Day combined plant impact	47.2	dB(A)
Evening combined plant impact	40.4	dB(A)
Night-time combined plant impact	40.1	dB(A)

8 PARKWAY DRIVE

Dining inside at restaurant	75	dB(A) @ 1m
Distance source to receiver	347	m
Distance attenuation	-50.8	dB(A)
Onsite building screening	-15	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	11.7	dB(A)

Deliveries	75	dB(A) @ 1m
Distance source to receiver	320	m
Distance attenuation	-50.1	dB(A)
Building directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	27.6	dB(A)

Truck bypass	73	dB(A) @ 2m
Distance source to receiver	280	m
Distance attenuation	-48.9	dB(A)
Inside to outside attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	26.6	dB(A)

Waste collection	86	dB(A) @ 1m
Distance source to receiver	320	m
Distance attenuation	-50.1	dB(A)
Building directivity (solid roof over)	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	38.6	dB(A)

Residential A/C Condensers	52	dB(A) @ 1m
Distance source to receiver	250	m
Distance attenuation	-48.0	dB(A)
Parapet wall attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	6.5	dB(A)

Commercial A/C Condensers	60	dB(A) @ 1m
Distance source to receiver	330	m
Distance attenuation	-50.4	dB(A)
Parapet wall attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	12.1	dB(A)

Restaurant kitchen exhaust	62	dB(A) @ 1m
Distance source to receiver	340	m
Distance attenuation	-50.6	dB(A)
Attenuator	-6	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	7.9	dB(A)

Day combined plant impact	30.8	dB(A)
Evening combined plant impact	22.5	dB(A)
Night-time combined plant impact	22.3	dB(A)

ONSITE ACTIVITY NOISE IMPACTING THE FAÇADES OF:
30 PARKWAY DRIVE

Car door closures (nearest spaces)	55	dB(A) @ 1m
Distance source to receiver	272	m
Distance attenuation	-48.7	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	8.4	dB(A)

Car door closures (centre spaces)	55	dB(A) @ 1m
Distance source to receiver	293	m
Distance attenuation	-49.3	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	7.8	dB(A)

Car door closures (far spaces)	55	dB(A) @ 1m
Distance source to receiver	315	m
Distance attenuation	-50.0	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	7.1	dB(A)

Car bypass	65	dB(A) @ 1m
Distance source to receiver	285	m
Distance attenuation	-49.1	dB(A)
Building screening	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	18.4	dB(A)

Patrons talking outside	60	dB(A) @ 1m
Distance source to receiver	260	m
Distance attenuation	-48.3	dB(A)
Building screening	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	14.2	dB(A)

Dining outside of restaurant	75	dB(A) @ 1m
Distance source to receiver	340	m
Distance attenuation	-50.6	dB(A)
Onsite building screening	-15	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	11.9	dB(A)

EWINGSDALE ROAD

Car door closures (nearest spaces)	55	dB(A) @ 1m
Distance source to receiver	143	m
Distance attenuation	-43.1	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	14.0	dB(A)

Car door closures (centre spaces)	55	dB(A) @ 1m
Distance source to receiver	156	m
Distance attenuation	-43.9	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	13.2	dB(A)

Car door closures (far spaces)	55	dB(A) @ 1m
Distance source to receiver	170	m
Distance attenuation	-44.6	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	12.5	dB(A)

Car bypass	65	dB(A) @ 1m
Distance source to receiver	147	m
Distance attenuation	-43.3	dB(A)
Building screening	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	24.2	dB(A)

Patrons talking outside	60	dB(A) @ 1m
Distance source to receiver	145	m
Distance attenuation	-43.2	dB(A)
Building screening	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	19.3	dB(A)

Dining outside of restaurant	75	dB(A) @ 1m
Distance source to receiver	178	m
Distance attenuation	-45.0	dB(A)
Onsite building screening	-15	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	17.5	dB(A)

ONSITE ACTIVITY NOISE IMPACTING THE FAÇADES OF:
30 PARKWAY DRIVE

Dining inside at restaurant	75	dB(A) @ 1m
Distance source to receiver	336	m
Distance attenuation	-50.5	dB(A)
Onsite building screening	-15	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	12.0	dB(A)

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EWINGSDALE ROAD

Dining inside at restaurant	75	dB(A) @ 1m
Distance source to receiver	178	m
Distance attenuation	-45.0	dB(A)
Onsite building screening	-15	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	17.5	dB(A)

Deliveries	75	dB(A) @ 1m
Distance source to receiver	325	m
Distance attenuation	-50.2	dB(A)
Building directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	27.5	dB(A)

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Deliveries	75	dB(A) @ 1m
Distance source to receiver	175	m
Distance attenuation	-44.9	dB(A)
Building directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	32.9	dB(A)

Truck bypass	73	dB(A) @ 2m
Distance source to receiver	285	m
Distance attenuation	-49.1	dB(A)
Inside to outside attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	26.4	dB(A)

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Truck bypass	73	dB(A) @ 2m
Distance source to receiver	147	m
Distance attenuation	-43.3	dB(A)
Inside to outside attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	32.2	dB(A)

Waste collection	86	dB(A) @ 1m
Distance source to receiver	335	m
Distance attenuation	-50.5	dB(A)
Building directivity (solid roof over)	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	38.2	dB(A)

##

Waste collection	86	dB(A) @ 1m
Distance source to receiver	192	m
Distance attenuation	-45.7	dB(A)
Building directivity (solid roof over)	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	43.1	dB(A)

Residential A/C Condensers	52	dB(A) @ 1m
Distance source to receiver	265	m
Distance attenuation	-48.5	dB(A)
Parapet wall attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	6.0	dB(A)

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Residential A/C Condensers	52	dB(A) @ 1m
Distance source to receiver	145	m
Distance attenuation	-43.2	dB(A)
Parapet wall attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	11.3	dB(A)

Commercial A/C Condensers	60	dB(A) @ 1m
Distance source to receiver	330	m
Distance attenuation	-50.4	dB(A)
Parapet wall attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	12.1	dB(A)

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Commercial A/C Condensers	60	dB(A) @ 1m
Distance source to receiver	175	m
Distance attenuation	-44.9	dB(A)
Onsite building screening	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	17.6	dB(A)

Restaurant kitchen exhaust	62	dB(A) @ 1m
Distance source to receiver	330	m
Distance attenuation	-50.4	dB(A)
Attenuator	-6	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	8.1	dB(A)

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Restaurant kitchen exhaust	62	dB(A) @ 1m
Distance source to receiver	175	m
Distance attenuation	-44.9	dB(A)
Attenuator	-6	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	13.6	dB(A)

Day combined plant impact	30.7	dB(A)
Evening combined plant impact	22.3	dB(A)
Night-time combined plant impact	22.2	dB(A)

Day combined plant impact	36.2	dB(A)
Evening combined plant impact	27.9	dB(A)
Night-time combined plant impact	27.7	dB(A)

ONSITE ACTIVITY NOISE IMPACTING THE FAÇADES OF:
10 QUARRY LANE

Car door closures (nearest spaces)	55	dB(A) @ 1m
Distance source to receiver	207	m
Distance attenuation	-46.3	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	10.8	dB(A)

Car door closures (centre spaces)	55	dB(A) @ 1m
Distance source to receiver	225	m
Distance attenuation	-47.0	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	10.1	dB(A)

Car door closures (far spaces)	55	dB(A) @ 1m
Distance source to receiver	245	m
Distance attenuation	-47.8	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	9.3	dB(A)

Car bypass	65	dB(A) @ 1m
Distance source to receiver	200	m
Distance attenuation	-46.0	dB(A)
Building screening	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	21.5	dB(A)

Patrons talking outside	60	dB(A) @ 1m
Distance source to receiver	170	m
Distance attenuation	-44.6	dB(A)
Building screening	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	17.9	dB(A)

Dining outside of restaurant	75	dB(A) @ 1m
Distance source to receiver	180	m
Distance attenuation	-45.1	dB(A)
Inside to outside attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	32.4	dB(A)

25 QUARRY LANE

Car door closures (nearest spaces)	55	dB(A) @ 1m
Distance source to receiver	330	m
Distance attenuation	-50.4	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	6.7	dB(A)

Car door closures (centre spaces)	55	dB(A) @ 1m
Distance source to receiver	345	m
Distance attenuation	-50.8	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	6.4	dB(A)

Car door closures (far spaces)	55	dB(A) @ 1m
Distance source to receiver	370	m
Distance attenuation	-51.4	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	5.7	dB(A)

Car bypass	65	dB(A) @ 1m
Distance source to receiver	330	m
Distance attenuation	-50.4	dB(A)
Building screening	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	17.1	dB(A)

Patrons talking outside	60	dB(A) @ 1m
Distance source to receiver	285	m
Distance attenuation	-49.1	dB(A)
Building screening	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	13.4	dB(A)

Dining outside of restaurant	75	dB(A) @ 1m
Distance source to receiver	295	m
Distance attenuation	-49.4	dB(A)
Inside to outside attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	28.1	dB(A)

ONSITE ACTIVITY NOISE IMPACTING THE FAÇADES OF:
10 QUARRY LANE

Dining inside at restaurant	75	dB(A) @ 1m
Distance source to receiver	190	m
Distance attenuation	-45.6	dB(A)
Inside to outside attenuation	-5	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	26.9	dB(A)

Deliveries	75	dB(A) @ 1m
Distance source to receiver	200	m
Distance attenuation	-46.0	dB(A)
Building directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	31.7	dB(A)

Truck bypass	73	dB(A) @ 2m
Distance source to receiver	200	m
Distance attenuation	-46.0	dB(A)
Inside to outside attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	29.5	dB(A)

Waste collection	86	dB(A) @ 1m
Distance source to receiver	200	m
Distance attenuation	-46.0	dB(A)
Building directivity (solid roof over)	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	42.7	dB(A)

Residential A/C Condensers	52	dB(A) @ 1m
Distance source to receiver	195	m
Distance attenuation	-45.8	dB(A)
Parapet wall attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	8.7	dB(A)

Commercial A/C Condensers	60	dB(A) @ 1m
Distance source to receiver	155	m
Distance attenuation	-43.8	dB(A)
Parapet wall attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	18.7	dB(A)

Restaurant kitchen exhaust	62	dB(A) @ 1m
Distance source to receiver	195	m
Distance attenuation	-45.8	dB(A)
Attenuator	-6	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	12.7	dB(A)

Day combined plant impact	36.9	dB(A)
Evening combined plant impact	34.1	dB(A)
Night-time combined plant impact	34.1	dB(A)

25 QUARRY LANE

Dining inside at restaurant	75	dB(A) @ 1m
Distance source to receiver	305	m
Distance attenuation	-49.7	dB(A)
Inside to outside attenuation	-5	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	22.8	dB(A)

Deliveries	75	dB(A) @ 1m
Distance source to receiver	325	m
Distance attenuation	-50.2	dB(A)
Building directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	27.5	dB(A)

Truck bypass	73	dB(A) @ 2m
Distance source to receiver	325	m
Distance attenuation	-50.2	dB(A)
Inside to outside attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	25.3	dB(A)

Waste collection	86	dB(A) @ 1m
Distance source to receiver	325	m
Distance attenuation	-50.2	dB(A)
Building directivity (solid roof over)	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	38.5	dB(A)

Residential A/C Condensers	52	dB(A) @ 1m
Distance source to receiver	305	m
Distance attenuation	-49.7	dB(A)
Parapet wall attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	4.8	dB(A)

Commercial A/C Condensers	60	dB(A) @ 1m
Distance source to receiver	275	m
Distance attenuation	-48.8	dB(A)
Parapet wall attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	13.7	dB(A)

Restaurant kitchen exhaust	62	dB(A) @ 1m
Distance source to receiver	310	m
Distance attenuation	-49.8	dB(A)
Attenuator	-6	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	8.7	dB(A)

Day combined plant impact	32.7	dB(A)
Evening combined plant impact	29.8	dB(A)
Night-time combined plant impact	29.8	dB(A)

ONSITE MECH PLANT NOISE IMPACTING THE FAÇADES OF:
NEAREST ACCOMODATION APARTMENTS

Residential A/C Condensers	52	dB(A) @ 1m
Distance source to receiver	8	m
Distance attenuation	-18.1	dB(A)
Solid wall screening	-8	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	28.4	dB(A)

NEAREST CONSULTING ROOMS

Residential A/C Condensers	52	dB(A) @ 1m
Distance source to receiver	20	m
Distance attenuation	-26.0	dB(A)
Parapet wall attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	28.5	dB(A)

Commercial A/C Condensers at plant room	60	dB(A) @ 1m
Distance source to receiver	42	m
Distance attenuation	-32.5	dB(A)
Restaurant building screening	-10	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	20.0	dB(A)

Commercial A/C Condensers at plant room	60	dB(A) @ 1m
Distance source to receiver	3	m
Distance attenuation	-9.5	dB(A)
Acoustic louvres	-15	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	38.0	dB(A)

Restaurant kitchen exhaust	62	dB(A) @ 1m
Distance source to receiver	9.5	m
Distance attenuation	-19.6	dB(A)
Attenuator	-9	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	35.9	dB(A)

Restaurant kitchen exhaust	62	dB(A) @ 1m
Distance source to receiver	10	m
Distance attenuation	-20.0	dB(A)
Attenuator	-9	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	35.5	dB(A)

Day combined plant impact	36.7	dB(A)
Evening combined plant impact	36.7	dB(A)
Night-time combined plant impact	36.7	dB(A)

Day combined plant impact	40.2	dB(A)
Evening combined plant impact	40.2	dB(A)
Night-time combined plant impact	40.2	dB(A)

NEAREST DAY SURGERY ROOMS

Residential A/C Condensers	52	dB(A) @ 1m
Distance source to receiver	20	m
Distance attenuation	-26.0	dB(A)
Parapet wall attenuation	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	28.5	dB(A)

Commercial A/C Condensers at plant room	60	dB(A) @ 1m
Distance source to receiver	6.4	m
Distance attenuation	-16.1	dB(A)
Acoustic louvres	-15	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	31.4	dB(A)

Restaurant kitchen exhaust	62	dB(A) @ 1m
Distance source to receiver	10	m
Distance attenuation	-20.0	dB(A)
Attenuator	-9	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	35.5	dB(A)

Day combined plant impact	37.5	dB(A)
Evening combined plant impact	37.5	dB(A)
Night-time combined plant impact	37.5	dB(A)