

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2022/1305/02

Date: 29 April 2024



Queensland
Government



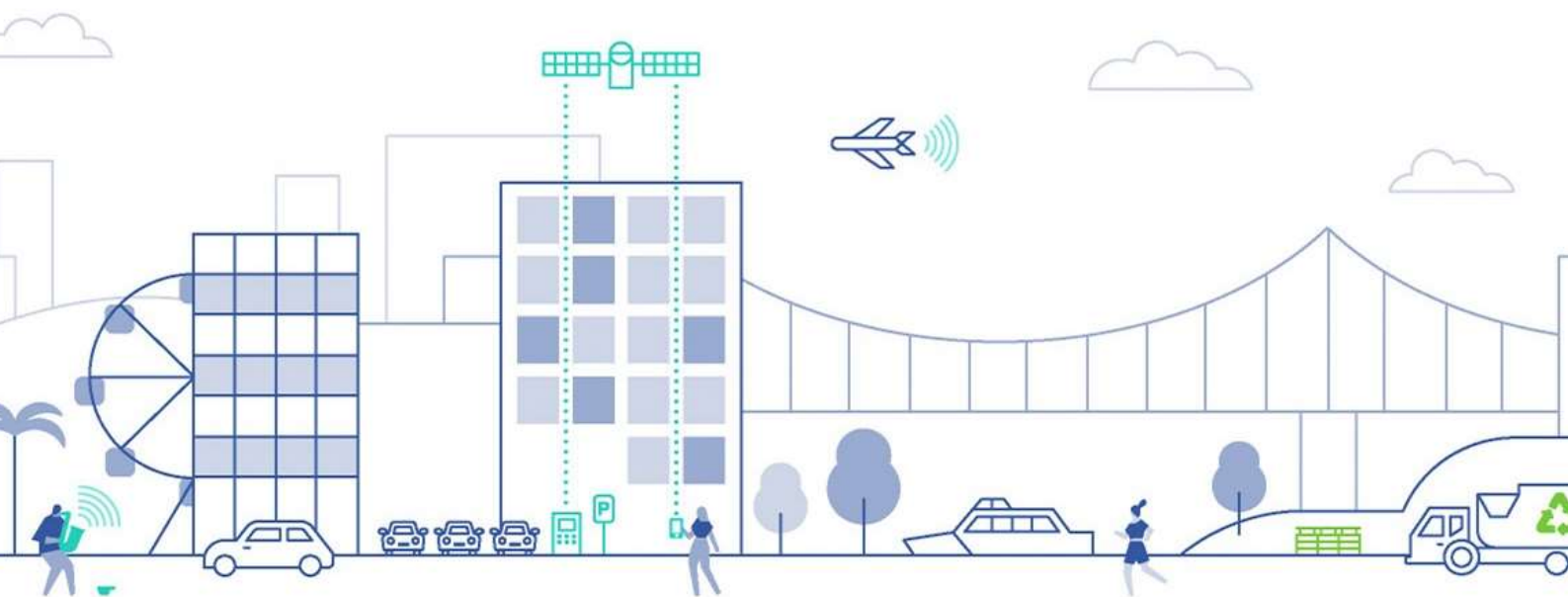
Environmental Noise Assessment Report

Proposed Commercial Development

At Site 6B Corner of Hill Street and Frazer Street, Southport

On behalf of Niecon Developments Pty Ltd

20GCA0143 R01_5



PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL



Approval no: DEV2022/1305/02

Date: 29 April 2024

About TTM

For 30 years, we've been at the centre of the Australian development and infrastructure industry. Our unique combination of acoustics, data, traffic and waste services is fundamental to the success of any architectural or development project.

We have over 50 staff, with an unrivalled depth of experience. Our industry knowledge, technical expertise and commercial insight allow us to deliver an exceptional and reliable service.

T: (07) 5514 8000

F: (07) 5514 8144

E: ttmgc@ttmgroup.com.au



Revision Record

No.	Author	Reviewed/Approved	Description	Date
A.	J. Fox		Draft Report	03/06/2022
0.	J. Fox		Acoustic report	16/06/2022
1.	J. Fox		Revision 1	20/06/2022
2.	J. Fox		Revision 2	23/06/2022
3.	J. Fox		Revision 3	18/08/2022
4.	J. Fox		Revision 4	29/11/2023
5.	J. Fox		Revision 5	19/12/2023



Executive Summary

TTM conducted an environmental noise assessment of the proposed commercial development at Site 6B on the corner of Hill Street and Frazer Street, Southport.

Noise measurements were undertaken to establish the existing ambient noise levels and the criteria for onsite noise emissions. Noise generated by the development was assessed and recommendations made for compliance with the applicable noise criteria.

Compliance with the criteria outlined in Section 5 is predicted to be achieved based on the implementation of the recommendations outlined in Section 7 of this report.

Contents

1	Introduction	6
1.1	Background	6
1.2	References.....	6
1.3	Scope.....	6
2	Site Description	7
2.1	Site Location.....	7
2.2	Description of Surrounding Area	7
3	Proposed Development	8
3.1	Development Description.....	8
4	Measurements	9
4.1	Equipment.....	9
4.2	Unattended Noise Monitoring	9
4.3	Noise Source Measurements	10
4.4	Results of Measurements.....	10
4.4.1	Ambient Noise Levels	10
5	Noise Criteria.....	11
5.1.1	Acoustic Quality Objectives (EPP 2008 and 2019).....	11
5.1.2	Background Creep (EPP 2008).....	12
6	Assessment of Onsite Noise Impacting Noise Sensitive Receivers	13
6.1	Noise Sensitive Receivers	13
6.2	Noise Source Levels.....	14
6.3	Onsite Noise Calculation Assumptions	14
6.4	Predicted Onsite Noise Levels at Receivers.....	15
6.4.1	Acoustic Quality Objective Predictions.....	15
6.4.2	Background Creep Predictions (15-minute Duration)	17
6.4.3	Background Creep Predictions (Duration of Noise Source)	17
6.5	Preliminary Mechanical Plant Advice	18
7	TTM Recommendations.....	19
7.1	Onsite Noise	19
7.1.1	Management Strategies	19

7.1.2 Mechanical Plant Noise	19
8 Conclusion.....	20
Appendix A Sample of Development Plans	21
Appendix B Unattended Noise Monitoring Graphs	28
Appendix C Sample Calculations.....	32

Table Index

Table 1: Details of the Proposed Development	8
Table 2: Measured Ambient Noise Levels	10
Table 3: Acoustic Quality Objectives at Noise Sensitive Receivers.....	11
Table 4: Background Creep Noise Limits at Noise Sensitive Properties	12
Table 5: Typical Onsite Transient Noise Source Levels.....	14
Table 6: Assumptions used for Onsite Noise Calculations	15
Table 7: Acoustic Quality Objectives Onsite Noise Predictions – Residential Receiver	15
Table 8: Acoustic Quality Objective Onsite Noise Predictions – Commercial Receivers	16
Table 9: Acoustic Quality Objective Onsite Noise Predictions – Hospital Receiver	16
Table 10: Background Creep Onsite Noise Predictions (15-minute Duration)	17
Table 11: Background Creep Onsite Noise Predictions (Duration of Noise Source).....	17
Table 12: Mechanical plant noise limit for compliance without acoustic treatment	18

Figure Index

Figure 1: Site Locality	7
Figure 2: Proposed Site Plan	8
Figure 3: Noise Monitoring Location.....	9
Figure 4: Noise Sensitive Receivers	13

1 Introduction

1.1 Background

TTM was engaged by Niecon Developments Pty Ltd to undertake an environmental noise assessment of the proposed commercial development at Site 6B on the corner of Hill Street and Frazer Street, Southport. The report will form part of a development application for consideration by Economic Development Queensland and the Council of the City of Gold Coast.

1.2 References

This report is based on the following:

- Parklands PDA Development Scheme;
- City of Gold Coast *City Plan, Version 10*;
- *Environmental Protection (Noise) Policy*;
- Development plans provided by Kris Kowalski Architects, dated December 2023;
- Operational details provided by Niecon Developments Pty Ltd;
- Site inspection, noise measurements, analysis and calculations conducted by TTM.

1.3 Scope

The assessment includes the following:

- Description of the site;
- Measurement of existing ambient noise levels and statement of assessment criteria relating to mitigating environmental noise emissions;
- Assessment of noise generated by the development onto nearby noise sensitive receivers;
- Analysis of predicted noise levels;
- Details of noise control recommendations to be incorporated to achieve predicted compliance.

2 Site Description

2.1 Site Location

The site is described by the following:

- Lot 12 on SP275512
- Site 6B within Lot 12 Hill Street, Southport

The site locality is shown in Figure 1.

Figure 1: Site Locality



2.2 Description of Surrounding Area

The site is bound by Hill Street to the west, Frazer Street to the north and future developments to the east and south. The acoustic environment at the site is primarily comprised of local road traffic noise and mechanical noise associated with the surrounding hospitals and commercial premises.

3 Proposed Development

3.1 Development Description

The proposal is for a commercial development comprising of the following:

Table 1: Details of the Proposed Development

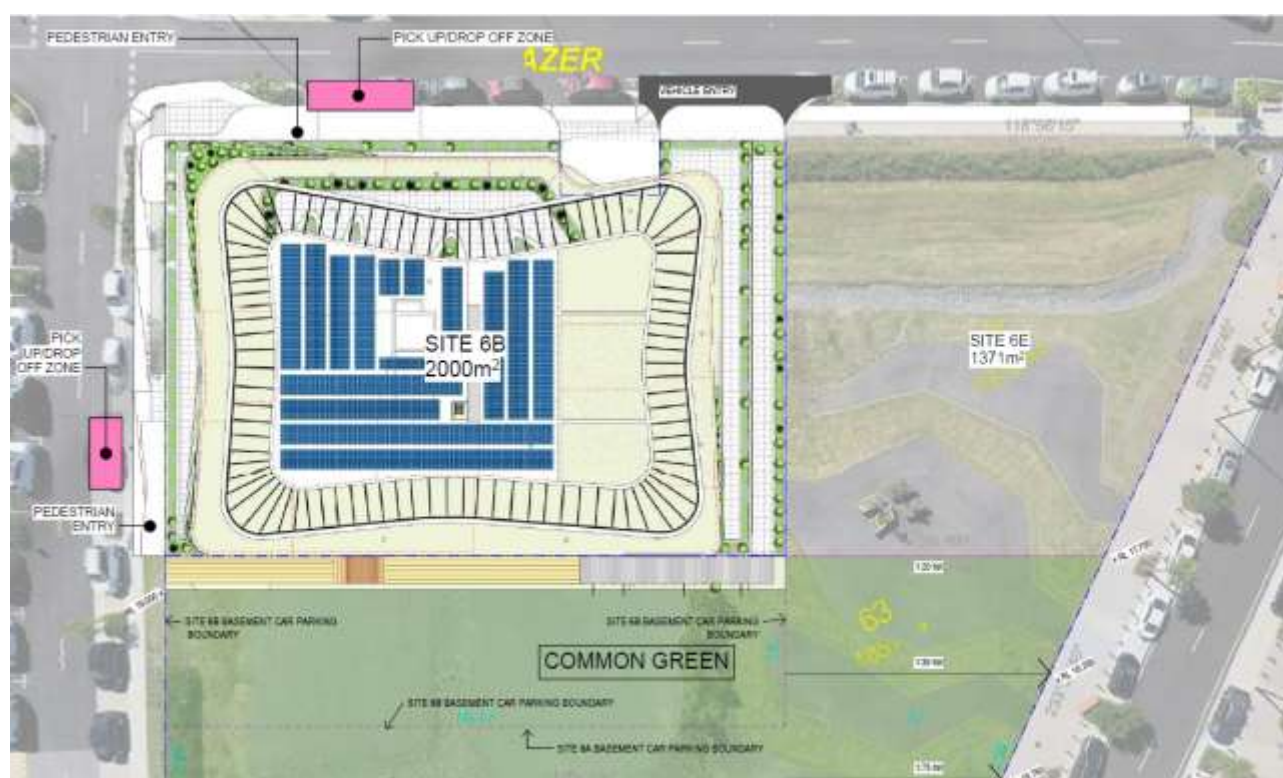
Floor	Proposed Use
Basement levels	Car parking
Level 1	Foyer, car park entry, loading zone, bin store, tenancy
Level 2 to Level 8	Tenancies
Level 9 (Services deck)	AC Plant, water storage, generator

Vehicular and pedestrian access is proposed via Frazer Street, bounding the site to the north.

24-hour operation is assumed for the purposes of the noise assessment.

The proposed site plan is shown in Figure 2 with other relevant development plans shown in Appendix A.

Figure 2: Proposed Site Plan



4 Measurements

4.1 Equipment

The following equipment was used to measure existing noise levels:

- ARL EL316 environmental noise monitor (SN# 16-707-040)
- Norsonic Nor140 sound level meter (SN# 1406506)
- SVAN SV31 acoustical calibrator (SN# 38174)

All equipment was calibrated by a National Association of Testing Authorities (NATA) accredited laboratory. The equipment was field calibrated before and after the measurement session. No significant drift from the reference signal was recorded.

4.2 Unattended Noise Monitoring

Unattended noise monitoring was conducted to establish the existing ambient noise levels between Monday 16th and Friday 20th May 2022. The noise monitor was placed on the western boundary of the site (refer to Figure 2) in a position considered representative of the ambient noise levels experienced at the nearest noise sensitive properties, with consideration to limited property access and security reasons.

Figure 3: Noise Monitoring Location



The microphone was in a free-field location and 1.5m above ground level. The noise monitor was set to measure statistical noise levels in 'A'-weighting, 'Fast' response, over 15-minute intervals. Ambient noise levels were measured in accordance with Australian Standard AS1055¹.

Weather during the monitoring period was generally fine with temperatures ranging between 11-26°C (source: Bureau of Meteorology, Gold Coast Seaway weather station).

4.3 Noise Source Measurements

Noise levels associated with typical onsite and offsite activities were taken from similar investigations conducted by TTM. All measurements were conducted generally in accordance with AS1055.

4.4 Results of Measurements

4.4.1 Ambient Noise Levels

Table 2 presents the measured ambient noise levels. The Rating Background Level (RBL) was determined in accordance with the requirements of Council. Graphical presentation of the measured levels is shown in Appendix B.

Table 2: Measured Ambient Noise Levels

Time Period	Measured Noise Levels, dB(A)	
	RBL L ₉₀	L _{eq}
Daytime (7am – 6pm)	50	57
Evening (6pm – 10pm)	48	53
Night time (10pm – 7am)	47	52

¹ Australian Standard AS1055:2018 Acoustics – Description and Measurement of Environmental Noise

5 Noise Criteria

PO2 of the *General Development Provisions Code* (City Plan) requires that the proposed development prevents loss of amenity and threats to health and safety, having regard to noise. No specific noise criteria is stated. Therefore, assessment of noise emissions from onsite noise sources is considered to be pursuant to the *Environmental Protection (Noise) Policy (EPP)*. Council requires the 2008 version of the Noise Policy to be used to include an assessment using the Background Creep criteria which was removed from the 2019 version. The Acoustic Quality Objectives criteria remains the same in both 2008 and 2019 versions. Details of the criteria and established noise limits are presented below.

5.1.1 Acoustic Quality Objectives (EPP 2008 and 2019)

Table 3 presents the acoustic quality objectives at noise sensitive receivers as detailed in Schedule 1 of the *Environmental Protection (Noise) Policy*. The nearest noise sensitive receivers include residential, educational, commercial and hospital land uses; therefore, the following criteria will be applied to the noise assessment.

Table 3: Acoustic Quality Objectives at Noise Sensitive Receivers

Sensitive Receiver	Time of Day	Acoustic Quality Objectives, dB(A)		
		L _{Aeq,adj,1hr}	L _{A10,adj,1hr}	L _{A1,adj,1hr}
Residence (Outdoors)	Day and Evening (7am – 10pm)	50	55	65
Residence (Indoors)	Day and Evening (7am – 10pm)	35	40	45
	Night (10pm – 7am)	30	35	40
Educational institution (Indoors)	When open for business or when classes are being offered	35	-	-
Hospital, surgery or other medical institution	During visiting hours / Outside of visiting hours	35 / 30	-	-
Commercial and retail activity	When open for business	45	-	-

5.1.2 Background Creep (EPP 2008)

The Background Creep criteria forms part of the *Environmental Protection (Noise) Policy 2008* and is included in this report for completeness. This criterion is to prevent background noise progressively increasing or creeping higher over time with the establishment of new developments in a locality. EPP2008 states that:

- 2) *To the extent that it is reasonable to do so, noise from an activity must not be—*
- *for noise that is continuous noise measured by $L_{A90,T}$ —more than nil dB(A) greater than the existing acoustic environment measured by $L_{A90,T}$; or*
 - *for noise that varies over time measured by $L_{Aeq,adj,T}$ —more than 5dB(A) greater than the existing acoustic environment measured by $L_{A90,T}$.*

In accordance with the Environmental Protection Regulation 2008, the time period (T) is considered to be a time interval of at least 15 minutes, or if the noise continues for less than 15 minutes, the duration of the noise source.

The Background Creep criteria for steady-state and transient noise sources are stated in Table 4.

Table 4: Background Creep Noise Limits at Noise Sensitive Properties

Time Period	Steady-State Noise Emission Criteria, dB(A)	Time Varying Noise Emission Criteria, dB(A)
	$L_{A90,T}$	$L_{Aeq,T}$
Day (7am – 6pm)	50	55
Evening (6pm – 10pm)	48	53
Night (10pm – 7am)	47	52

The above steady-state criterion levels are quoted as a measured level, not a component level; hence, for mechanical plant, all plant proposed must be included in the assessment. By designing plant noise to a measured level rather than a component level, the additive effect of multiple plant is taken into account.

6 Assessment of Onsite Noise Impacting Noise Sensitive Receivers

An assessment of activities associated with the proposed development was conducted to determine potential impacts at the nearest noise sensitive receivers. Details of the analysis is presented below.

6.1 Noise Sensitive Receivers

This section of the assessment will focus on the nearest noise sensitive receivers as outlined below and shown in Figure 4. If compliance can be achieved at these nearest receivers, then all remaining noise sensitive locations are expected to comply.

- Receiver 1: Residential apartments across Frazer Street and Stanley Lane to the north
- Receiver 2: Commercial development to the north
- Receiver 3: Retail and commercial to the east
- Receiver 4: Gold Coast Private Hospital to the west

Figure 4: Noise Sensitive Receivers



6.2 Noise Source Levels

Table 5 presents the typical noise sources generated by the development and the respective measured noise levels in $L_{Aeq,T}$, $L_{A10,T}$, and $L_{A1,T}$. The noise source levels were calculated to one metre and include corrections for tonality and impulsiveness as per AS1055.

Table 5: Typical Onsite Transient Noise Source Levels

Noise Source Description	Noise Level at 1m, dB(A)			Measured Duration (sec)
	$L_{Aeq,T}$	$L_{A10,T}$	$L_{A1,T}$	
Car door closure	75*	77*	83*	2
Car bypass @ 5km/h	69	75	75	6
Car engine ignition	72	74	74	3
Conversations (external areas)	65	68	72	Long term avg.
MRV with refrigeration plant	85#	86#	86#	120
Unloading deliveries	80	83	85	60
Waste collection	93*	94*	105*	40

*Includes 2dB(A) adjustment to account for impulsiveness characteristics in accordance with AS1055.

Includes 5dB(A) adjustment to account for tonal noise characteristics in accordance with AS1055.

6.3 Onsite Noise Calculation Assumptions

Noise predictive calculations in accordance with *Environmental Protection (Noise) Policy* are based on the number of events occurring over a worst-case time period. The following assumptions have been made for noise calculations:

- Site traffic generation rate of 269 cars in the peak hour as advised by Bitzios traffic engineers;
- Site car parking noise level predictions are taken from the nearest car park relative to each noise sensitive receiver;
- Conversation noise was based on 'raised voice' speech levels as per published data contained in Harris CM, Handbook of Acoustical Measurements and Noise Control – 3rd ed. Ch 16.3, Mc Graw-Hill Inc. Conversations were predicted from the nearest outdoor terrace relative to each noise sensitive receiver and were assumed to occur for 80% of the assessment period;
- Deliveries were predicted from the internal loading area on Level 1;
- Waste collection was predicted from bin storage area adjacent to the site entrance;
- Noise attenuation provided by intervening building structures was included where applicable;

Table 6 presents the expected proportion of time / number of noise events for the basis of the calculations. These have then been assumed to be the same across all time periods (day, evening and night).

Table 6: Assumptions used for Onsite Noise Calculations

Noise Source Description	Prediction Location	Day / Evening / Night Period
		Events per hour or % of Assessment Period
Car door closure	Basement car park	538 events (based on 2 events per vehicle)
Car bypass @ 5km/h	Car park entrance	269 events (based on traffic generation rate described above)
Car engine ignition	Basement car park	269 events
Conversations	Nearest outdoor terrace	80% of the time
Refrigerated deliveries	Level 1 loading area	2 events per hour
Unloading a delivery vehicle	Level 1 loading area	2 events per hour
Waste collection	Refuse area	2 events

6.4 Predicted Onsite Noise Levels at Receivers

Predicted noise levels are based on the noise source levels presented in Table 5, calculation assumptions listed in Section 6.3 and Table 6, distance loss to the nearest receiver, and noise reduction from intervening structures where applicable. Sample calculations are shown in Appendix C.

6.4.1 Acoustic Quality Objective Predictions

Table 7 below presents the predicted acoustic quality objective noise levels at the nearest residential receivers. The criteria for day/evening periods is specified in the table heading, with the night time indoor criteria shown in brackets. Noise level exceedances are shown in bold and underline text.

Table 7: Acoustic Quality Objectives Onsite Noise Predictions – Residential Receiver

Receiver	Noise Source	Predicted Noise Level, dB(A)					
		L _{Aeq} , 1hr		L _{A10} , 1 hr		L _{A1} , 1hr	
		Outdoors	Indoors	Outdoors	Indoors	Outdoors	Indoors
	Criteria	50	35 (30)	55	40 (35)	65	45 (40)
1	Car door closure	13	<10	15	<10	21	11
	Car bypass	29	19	35	25	35	25
	Car engine ignition	<10	<10	11	<10	11	<10
	Conversations	28	18	31	21	35	25
	Refrigerated deliveries	25	15	26	16	26	16
	Unloading a delivery vehicle	17	<10	20	10	22	12
	Waste collection	40	30	41	31	52	<u>42</u>

Noise levels are generally predicted to comply at the nearest residential receiver without the need for acoustic treatment. A minor exceedance of the L₁ descriptor is predicted for waste collection in the night-time period. Therefore, waste collection will be recommended to occur in line with the surrounding precinct to minimise annoyance.

Table 8 presents the predicted acoustic quality objective noise levels at the commercial receivers.

Table 8: Acoustic Quality Objective Onsite Noise Predictions – Commercial Receivers

Receiver	Noise Source	Predicted Noise Level, dB(A)					
		L _{Aeq} , 1hr		L _{A10} , 1 hr		L _{A1} , 1hr	
		Outdoors	Indoors	Outdoors	Indoors	Outdoors	Indoors
	Criteria	n/a	45	n/a	n/a	n/a	n/a
2	Car door closure	22	12	-	-	-	-
	Car bypass	38	28	-	-	-	-
	Car engine ignition	18	<10	-	-	-	-
	Conversations	36	26	-	-	-	-
	Refrigerated deliveries	33	23	-	-	-	-
	Unloading a delivery vehicle	25	15	-	-	-	-
	Waste collection	51	41	-	-	-	-
3	Car door closure	13	<10	-	-	-	-
	Car bypass	29	19	-	-	-	-
	Car engine ignition	<10	<10	-	-	-	-
	Conversations	28	18	-	-	-	-
	Refrigerated deliveries	16	<10	-	-	-	-
	Unloading a delivery vehicle	<10	<10	-	-	-	-
	Waste collection	39	29	-	-	-	-

Noise levels are predicted to comply at the nearest commercial receivers without the need for acoustic treatment.

Table 9 presents the predicted acoustic quality objective noise levels at the nearest hospital receiver.

Table 9: Acoustic Quality Objective Onsite Noise Predictions – Hospital Receiver

Receiver	Noise Source	Predicted Noise Level, dB(A)					
		L _{Aeq} , 1hr		L _{A10} , 1 hr		L _{A1} , 1hr	
		Outdoors	Indoors	Outdoors	Indoors	Outdoors	Indoors
	Criteria	n/a	35 / 30	n/a	n/a	n/a	n/a
4	Car door closure	16	<10	-	-	-	-
	Car bypass	32	22	-	-	-	-
	Car engine ignition	12	<10	-	-	-	-
	Conversations	31	21	-	-	-	-
	Refrigerated deliveries	16	<10	-	-	-	-
	Unloading a delivery vehicle	<10	<10	-	-	-	-
	Waste collection	17	<10	-	-	-	-

Noise levels are predicted to comply at the nearest hospital receiver without the need for acoustic treatment.

6.4.2 Background Creep Predictions (15-minute Duration)

Table 10 presents the background creep noise predictions averaged over a 15-minute duration. Commercial and retail receivers are excluded from the assessment as Background Creep criteria are not relevant to commercial receivers.

Table 10: Background Creep Onsite Noise Predictions (15-minute Duration)

Receiver	Noise Source	Predicted External Noise Level, $L_{eq,15mins}$ dB(A)	Complies with Criteria: (Yes/No)		
			Day 55 dB(A)	Evening 53 dB(A)	Night 52 dB(A)
1	Car door closure	13	✓	✓	✓
	Car bypass	29	✓	✓	✓
	Car engine ignition	<10	✓	✓	✓
	Conversations	28	✓	✓	✓
	Refrigerated deliveries	28	✓	✓	✓
	Unloading a delivery vehicle	20	✓	✓	✓
	Waste collection	43	✓	✓	✓
4	Car door closure	16	✓	✓	✓
	Car bypass	32	✓	✓	✓
	Car engine ignition	12	✓	✓	✓
	Conversations	31	✓	✓	✓
	Refrigerated deliveries	19	✓	✓	✓
	Unloading a delivery vehicle	11	✓	✓	✓
	Waste collection	20	✓	✓	✓

Noise levels are predicted to comply with the background creep criteria and no further acoustic treatment is required.

6.4.3 Background Creep Predictions (Duration of Noise Source)

Table 11 presents the background creep predictions assessed against the duration of each noise source. The noise levels are provided as a source of additional information showing the maximum expected noise levels at noise sensitive receivers during an onsite noise event. Commercial and retail receivers are excluded from the assessment as Background Creep criteria are not relevant to commercial receivers.

Table 11: Background Creep Onsite Noise Predictions (Duration of Noise Source)

Receiver	Noise Source	Predicted External Noise Level, $L_{eq, period}$ dB(A)	Complies with Criteria: (Yes/No)		
			Day 55 dB(A)	Evening 53 dB(A)	Night 52 dB(A)
1	Car door closure	18	✓	✓	✓
	Car bypass	33	✓	✓	✓

Receiver	Noise Source	Predicted External Noise Level, $L_{eq, period}$ dB(A)	Complies with Criteria: (Yes/No)		
			Day 55 dB(A)	Evening 53 dB(A)	Night 52 dB(A)
	Car engine ignition	15	✓	✓	✓
	Conversations	29	✓	✓	✓
	Refrigerated deliveries	37	✓	✓	✓
	Unloading a delivery vehicle	32	✓	✓	✓
	Waste collection	57	✗	✗	✗
4	Car door closure	21	✓	✓	✓
	Car bypass	35	✓	✓	✓
	Car engine ignition	18	✓	✓	✓
	Conversations	32	✓	✓	✓
	Refrigerated deliveries	27	✓	✓	✓
	Unloading a delivery vehicle	22	✓	✓	✓
	Waste collection	33	✓	✓	✓

Background Creep noise levels assessed over the duration of the noise source are generally predicted to comply except for waste collection which will be recommended to daytime hours in order to minimise annoyance. Details of the recommended noise management strategies are described in Section 7.1.

6.5 Preliminary Mechanical Plant Advice

A reverse calculation was conducted to determine the allowable noise source level of onsite mechanical equipment prior to the inclusion of acoustic treatment. This type of assessment was conducted as plant has not been selected during DA stage and it provides guidance around the design of mechanical equipment.

Based on the steady-state Background Creep criteria and distance attenuation from the nearest potential locations to the nearest receiver, the allowable mechanical noise levels are presented in Table 12.

Table 12: Mechanical plant noise limit for compliance without acoustic treatment

Plant location	Allowable noise level at 1m from the nearest piece of plant to receiver to achieve compliance, L_{eq} dB(A)		
	Day (7am – 6pm)	Evening (6pm – 10pm)	Night (10pm – 7am)
Rooftop	81	79	78

Acoustic treatment or screening of the plant may allow a higher noise limit. Compliance with the noise limits and design criteria should be checked once plant selections are finalised.

7 TTM Recommendations

The recommended acoustic treatments are presented in the sections below to achieve predicted compliance with the relevant assessment criteria.

7.1 Onsite Noise

7.1.1 Management Strategies

The following management strategies are recommended to minimise noise annoyance:

- a. Waste collection should occur in line with surrounding commercial premises within the precinct.
- b. Any speed humps should be bitumen, concrete (as part of the slab) or rubber, not metal.
- c. Any grates or other protective covers in the handstand and access driveway must be rigidly fixed in position to eliminate clanging, and be maintained.

7.1.2 Mechanical Plant Noise

Because detailed plant selections are not available at this stage, it is not possible to carry out a detailed examination of the noise control measures that may be required to achieve the noise targets for mechanical plant.

A preliminary assessment of allowable plant noise limits to achieve compliance was conducted in Section 6.5.

Plant may need to be acoustically treated to achieve the criteria detailed in Section 5 to prevent noise emissions from adversely impacting the surrounding properties. This may include selecting the quietest plant possible, or treating the plant equipment with enclosures, barriers, duct lining and silencers, etc.

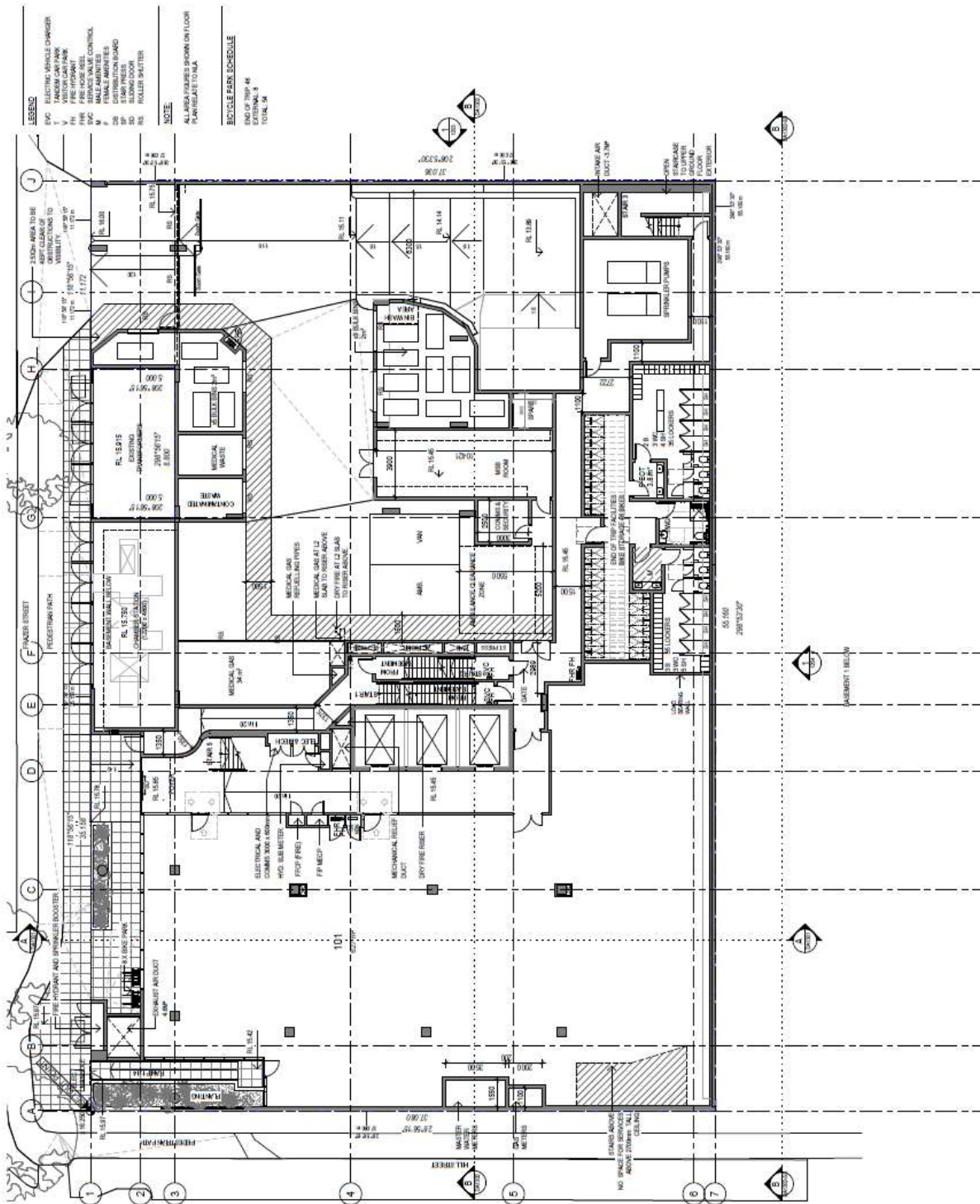
A mechanical plant noise assessment should be conducted by a suitably qualified acoustic consultant once plant selections are finalised. Noise criteria compliance measurements should then be conducted after the equipment is installed.

8 Conclusion

An environmental noise assessment was undertaken of the proposed commercial development at Site 6B on the corner of Hill Street and Frazer Street, Southport.

Compliance with the criteria outlined in Section 5 is predicted to be achieved based on the implementation of the recommendations outlined in Section 7 of this report.

Appendix A Sample of Development Plans

[illegible]

[illegible]

PROJECT:

CENTRE OF EXCELLENCE
FOR CLINICAL CARE,
RESEARCH, INNOVATION AND
INDUSTRY

AT:

LUMINA SITE 6B
CORNER OF HILL STREET &
FRAZER STREET
SOUTHPORT

DRAWING TITLE:

LEVEL 2

DATE:

05.12.2023

SCALE:

1:500 (B-A3)

REV

1

DATE

05.12.2023

BY

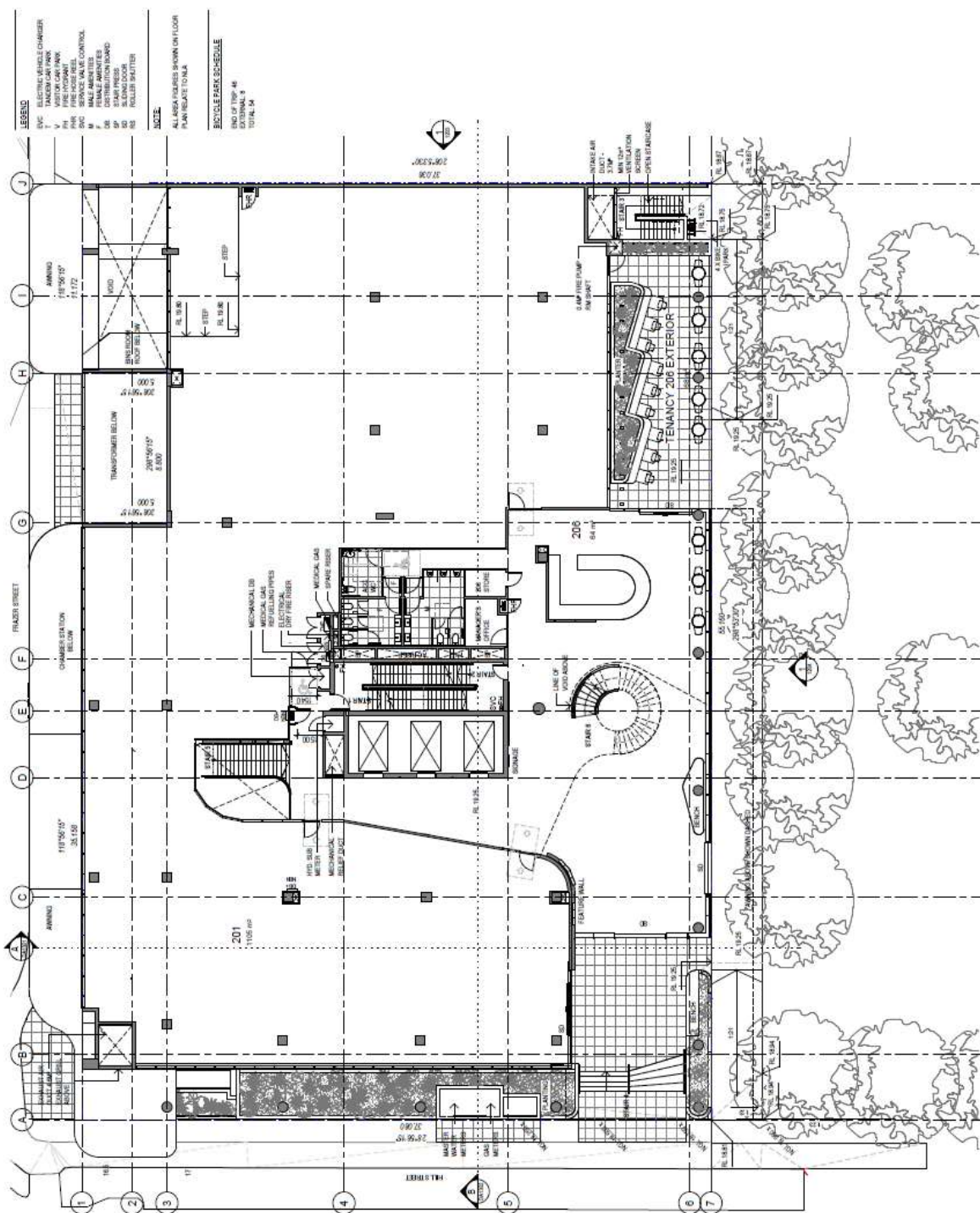
DA 1101

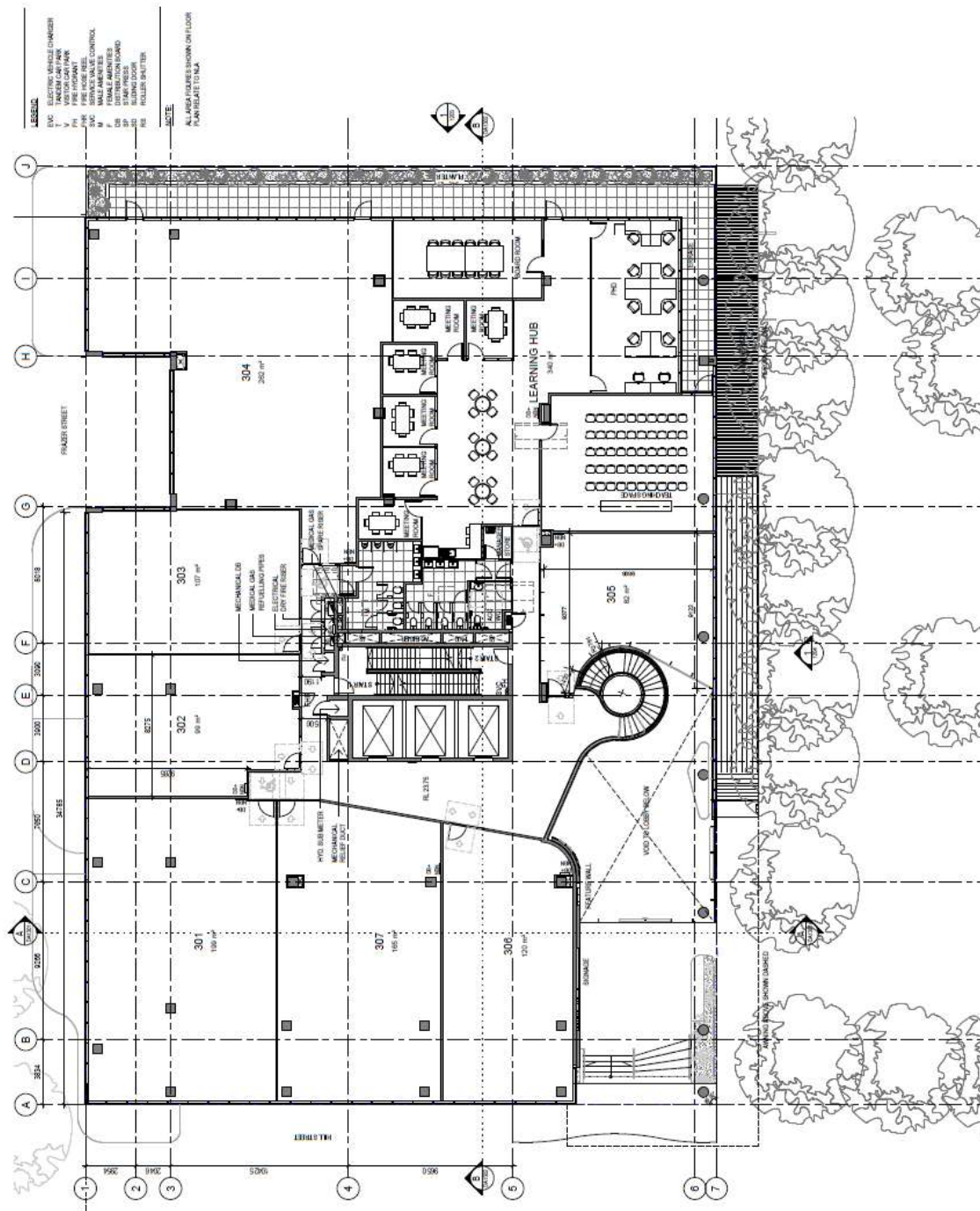
1703

DA 1101

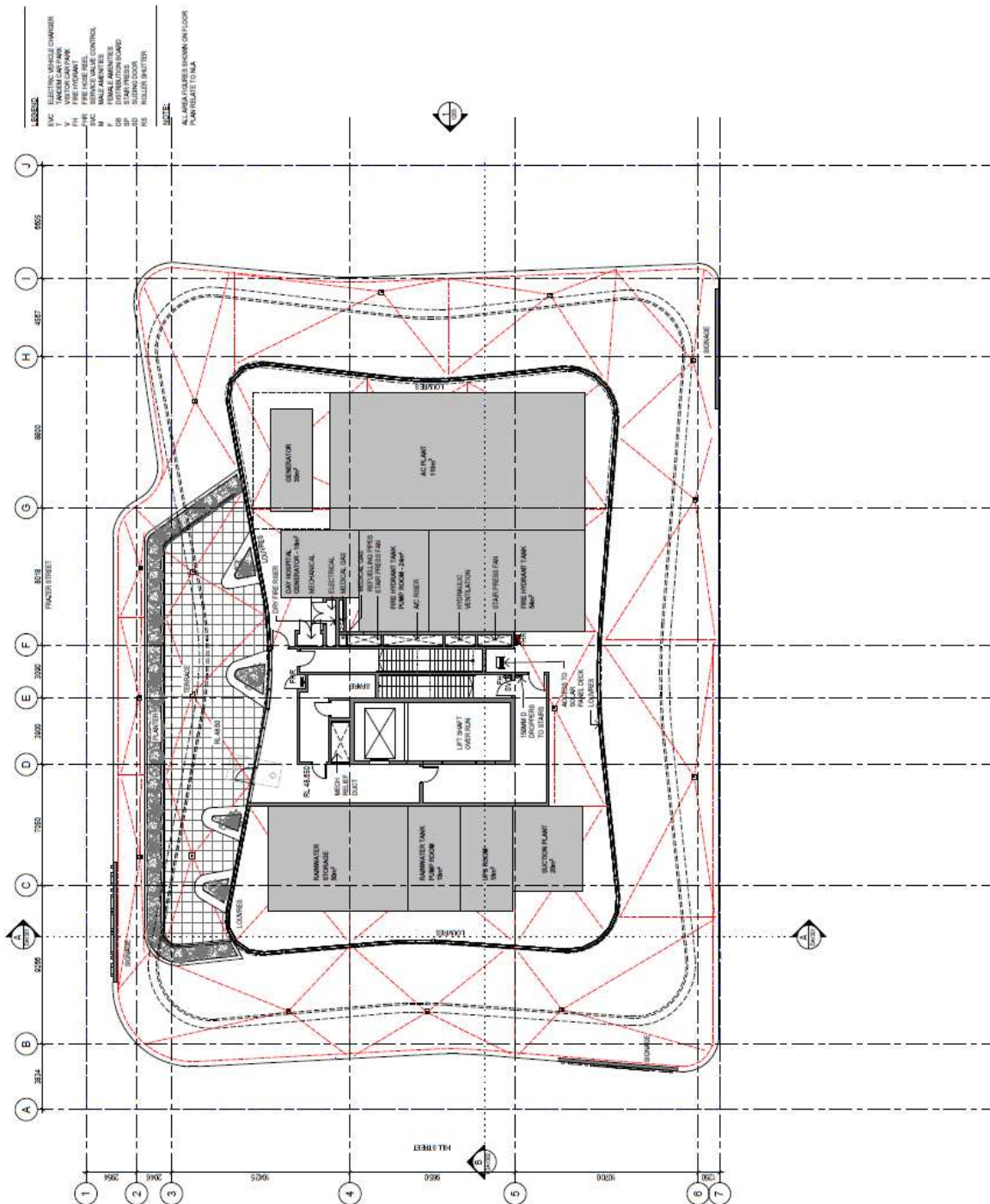
1703

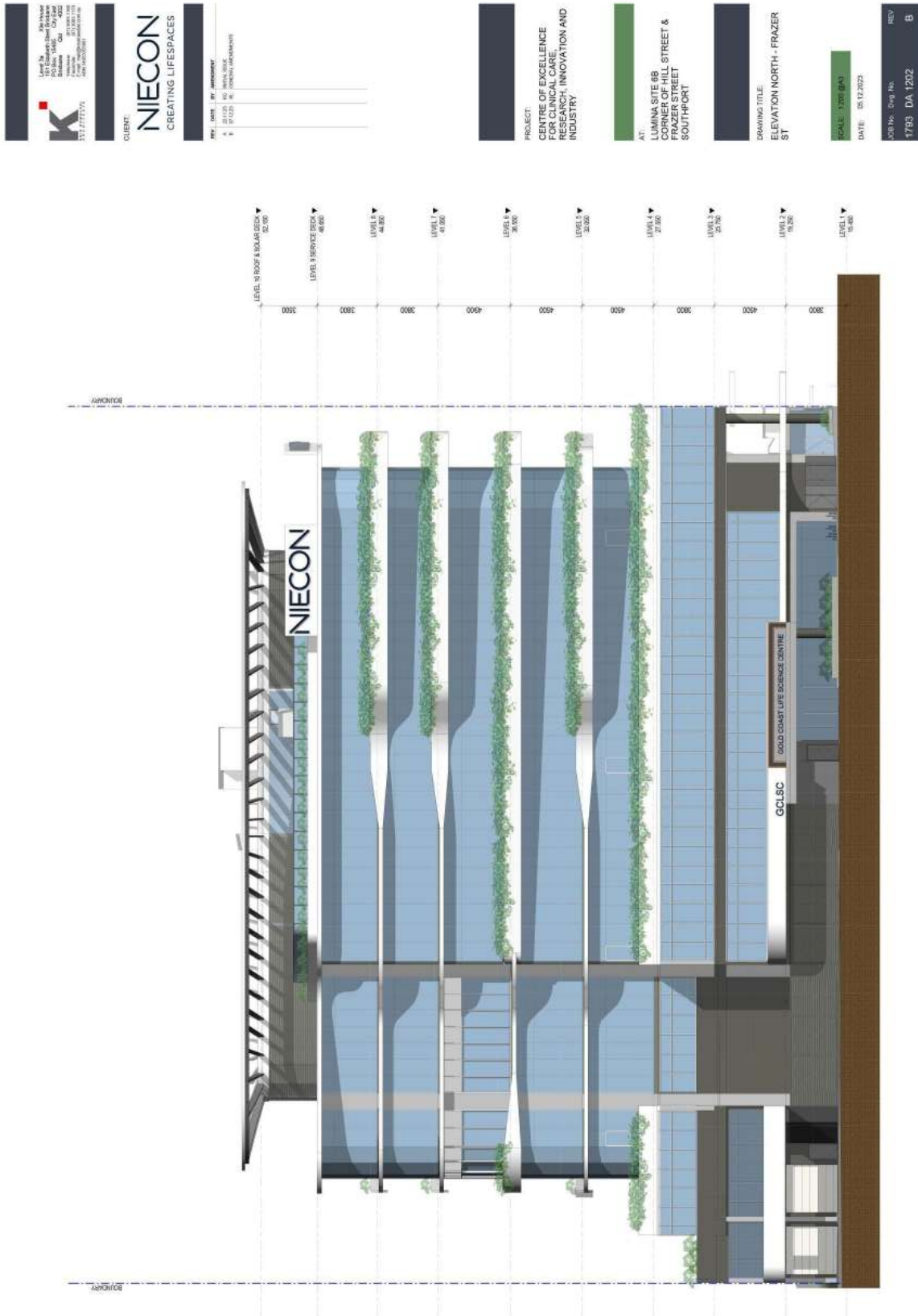
DA 1101



[illegible]

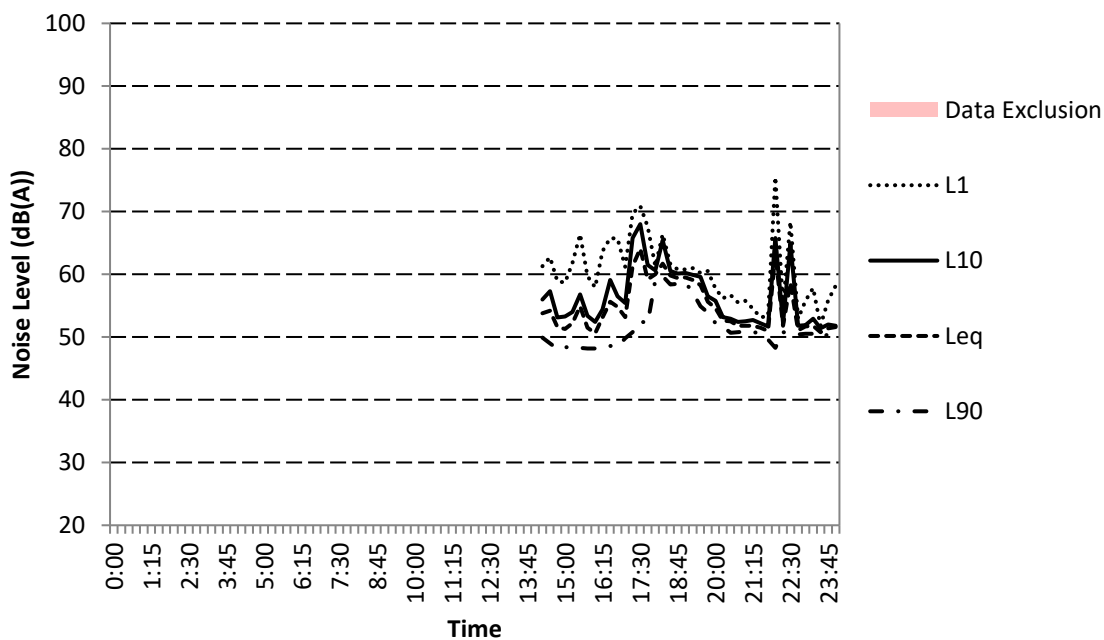


[illegible]

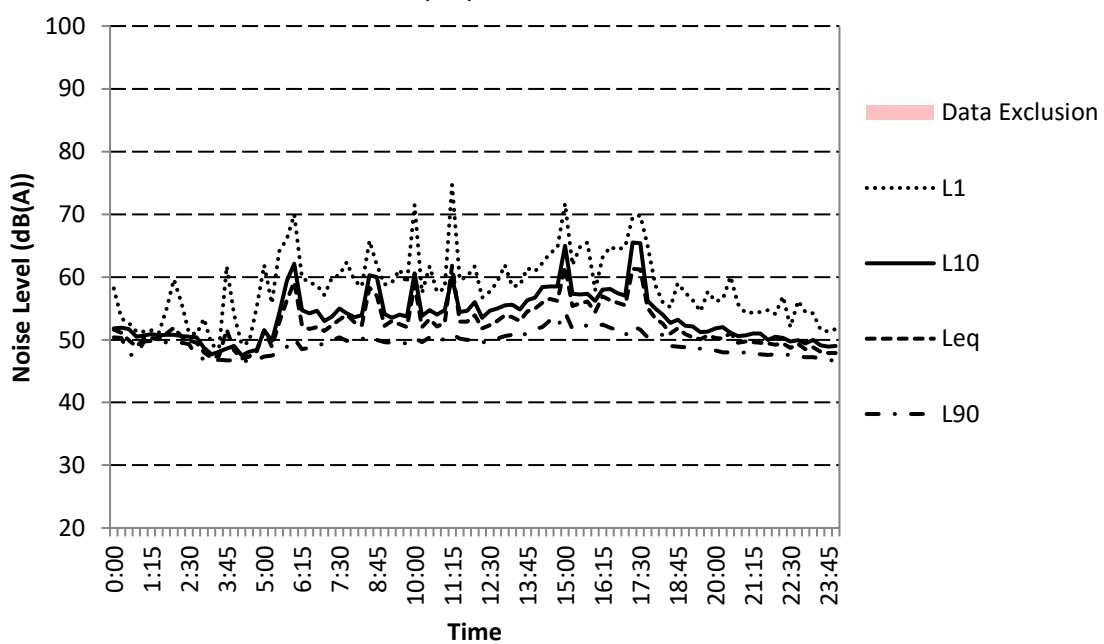


Appendix B Unattended Noise Monitoring Graphs

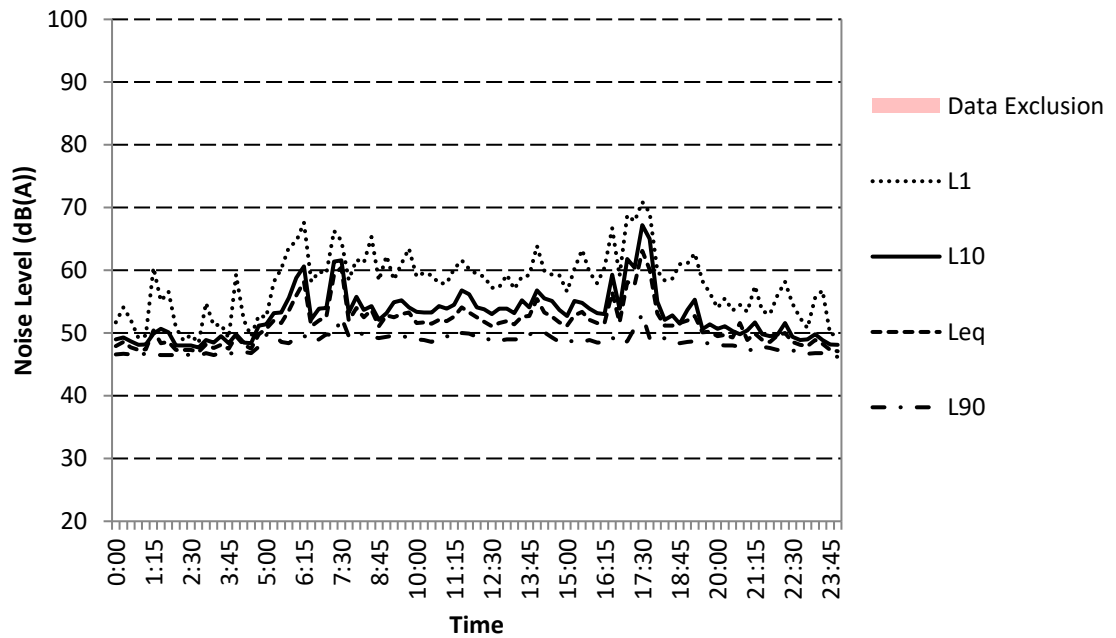
Ambient Noise Survey - Hill Street, Southport
16/05/2022



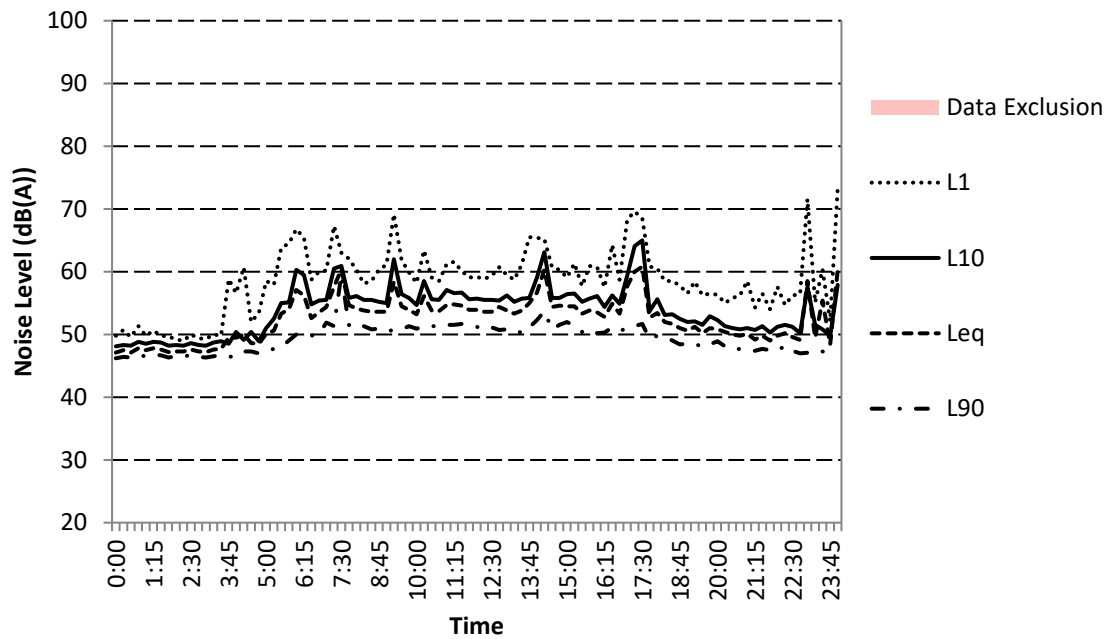
Ambient Noise Survey - Hill Street, Southport
17/05/2022



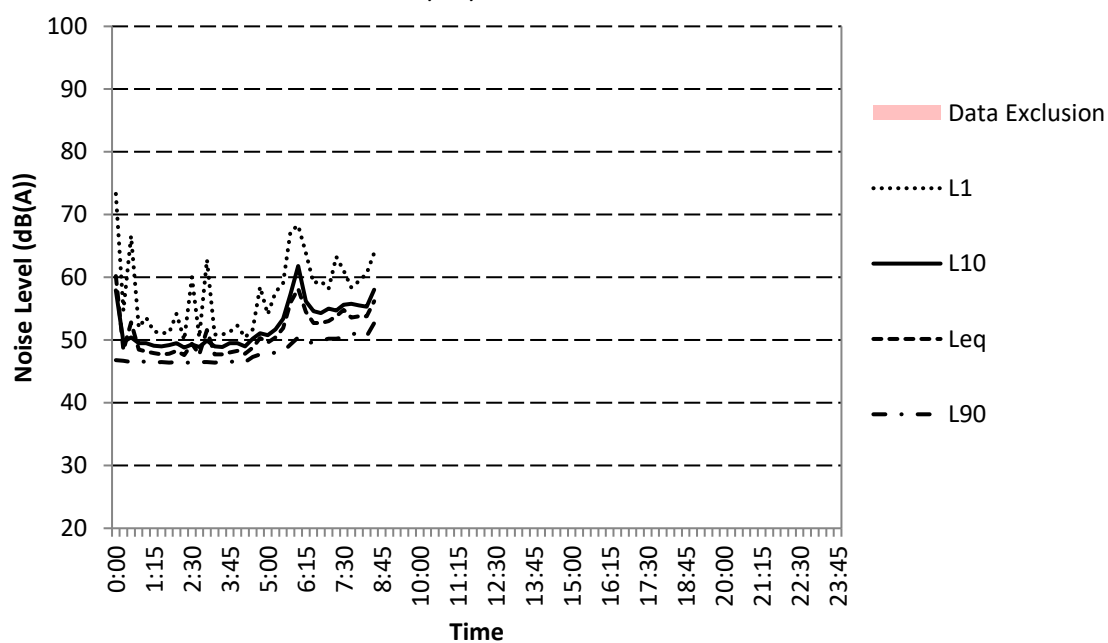
Ambient Noise Survey - Hill Street, Southport
18/05/2022



Ambient Noise Survey - Hill Street, Southport
19/05/2022



Ambient Noise Survey - Hill Street, Southport 20/05/2022



Appendix C Sample Calculations

ONSITE NOISE CALCULATIONS – AQO Leq

Noise Source	Duration	Leq	Leq 1 hour	Distance to Receivers			
				R1	R2	R3	R4
				N resi	N comm	E	W
Car door closure	2	75	42	70	25	70	50
Car bypass	6	69	41	66	25	66	50
Car engine	3	72	41	70	25	70	50
Conversations	720	65	58	66	25	65	45
MRV with refrigeration	120	85	70	80	34	75	75
Unloading deliveries	60	80	62	80	34	75	75
Waste collection	40	93	73	62	18	76	96
Noise level after Distance loss							
Car door closure				6	14	6	8
Car bypass				5	13	5	7
Car engine				4	13	4	7
Conversations				22	30	22	25
MRV with refrigeration				32	40	33	33
Unloading deliveries				24	32	25	25
Waste collection				38	48	36	34
	0			#NUM!	#NUM!	#NUM!	#NUM!
	0			#NUM!	#NUM!	#NUM!	#NUM!
Shielding Losses							
Car door closure				20	20	20	20
Car bypass				0	0	0	0
Car engine				20	20	20	20
Conversations				0	0	0	0
MRV with refrigeration				10	10	20	20
Unloading deliveries				10	10	20	20
Waste collection				0	0	0	20
	0			0	0	0	0
	0			0	0	0	0
Sub Total - at Receiver							
				R1	R2	R3	R3
Car door closure				-14	-6	-14	-12
Car bypass				5	13	5	7
Car engine				-16	-7	-16	-13
Conversations				22	30	22	25
MRV with refrigeration				22	30	13	13
Unloading deliveries				14	22	5	5
Waste collection				37	48	36	14
	0			#NUM!	#NUM!	#NUM!	#NUM!
	0			#NUM!	#NUM!	#NUM!	#NUM!
CALC							
Activity	Events	Duration	R1	R2	R3	R3	
Car door closure	538	2	19	151	19	38	
Car bypass	209	6	818	5698	818	1424	
Car engine	269	3	7	57	7	14	
Conversations	4	720	581	4048	599	1249	
MRV with refrigeration	2	120	329	1824	37	37	
Unloading deliveries	2	60	52	288	6	6	
Waste collection	2	40	11015	136849	7676	48	
	0	0	#NUM!	#NUM!	#NUM!	#NUM!	
	0						
External Noise Level at Receiver							
			R1	R4	R2	R3	
Car door closure			13	22	13	16	
Car bypass			29	36	29	32	
Car engine			9	18	9	12	
Conversations			28	36	28	31	
MRV with refrigeration			25	33	16	16	
Unloading deliveries			17	25	8	8	
Waste collection			40	51	39	17	