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North Harbour

North Harbour Stages 7-11

Road Traffic Noise Impact Assessment

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Rev. 00	Original issue	13 Jun 2024	
Rev. 01	Revised Barrier Design	21 Jun 2024	PD
Rev. 02	Updated Plans	30 Sep 2024	PD

Executive Summary

Vipac has completed a traffic noise impact assessment for Stages 7 to 11 of the North Harbour Development in Burpengary East, Queensland. Compliance with the Moreton Bay Planning Scheme Policy (Noise) is expected to be achieved with the implementation of a 2m noise barrier on the southern boundary of lots 1193 – 1206, 1226 – 1252 and 1425, and façade treatments in line with the predicted QDC MP4.4 noise categories.

Details of the acoustic barriers can be found in Section 6.1 of this report. The QDC MP4.4 Noise Categories for ground and first floor for each proposed lot are listed in Appendix B.2.

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1 Introduction

Vipac Engineers & Scientists Ltd (Vipac) was commissioned by North Harbour to provide a traffic noise impact assessment for the North Harbour Stages 7 to 11 in Burpengary East, Queensland.

This traffic noise assessment includes the following:

- Description of the development
- Discussion of the applicable noise criteria
- Measurement of existing background noise levels
- Prediction of future traffic noise levels for the lots in the proposed development
- Assessment of predicted traffic noise levels against applicable noise criteria
- Discussion of noise barrier requirements, and
- Recommendations and conclusion.

1.1 References

This report refers to the following documents:

- Queensland Department of Transport and Main Roads (DTMR) *Transport Noise Management Code of Practise, Volume 1 – Road Traffic Noise* (referred to as CoP)
- Queensland Department of Transport and Main Roads (DTMR) *Development Affected by Environmental Emissions from Transport Noise Policy*, Version 4
- Moreton Bay Regional Council (MBRC) Planning Scheme Policy – Noise
- Queensland Development Code MP 4.4 – Buildings in a Transport Noise Corridor
- Bitzios Consulting *North Harbour Mixed Industry Business Area and Next Generation Neighbourhood Masterplan Transport and Traffic Impact Assessment* dated 25/09/2023 and sent to Vipac 23/01/2024
- North Harbour Design Contours received 22/05/2024
- Lot layouts for Proposal Stage 7, 8, 9, 10, 11, dated 22/08/2024
- Lot layouts in x13-154_base_RNA.dwg received 13/06/2024

2 Description of the Development

The proposed Stages 7 to 11 of North Harbour will consist of 173 residential lots and one public park lot (Lot 3001) to be built North-East of North Harbour Boulevard. Figure 2-1 to Figure 2-5 shows the site layout for each stage.

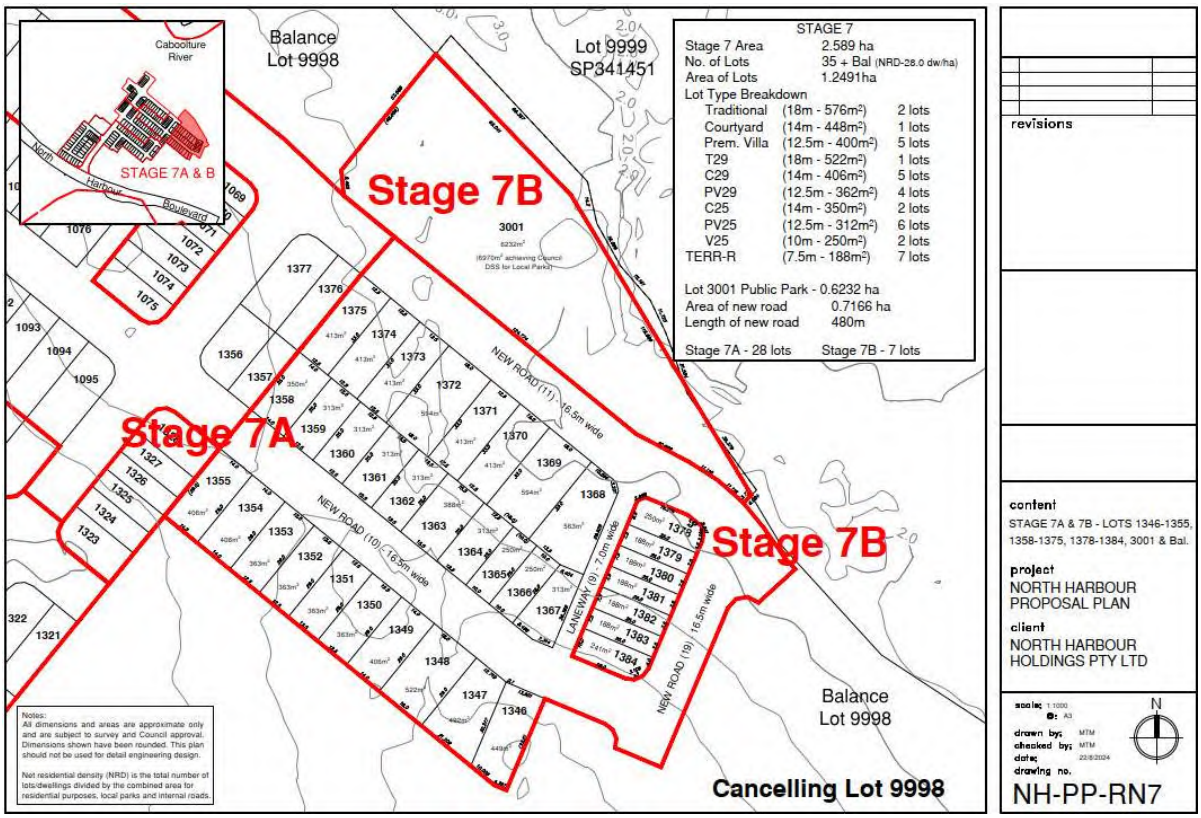

Figure 2-1: Layout for Stage 7

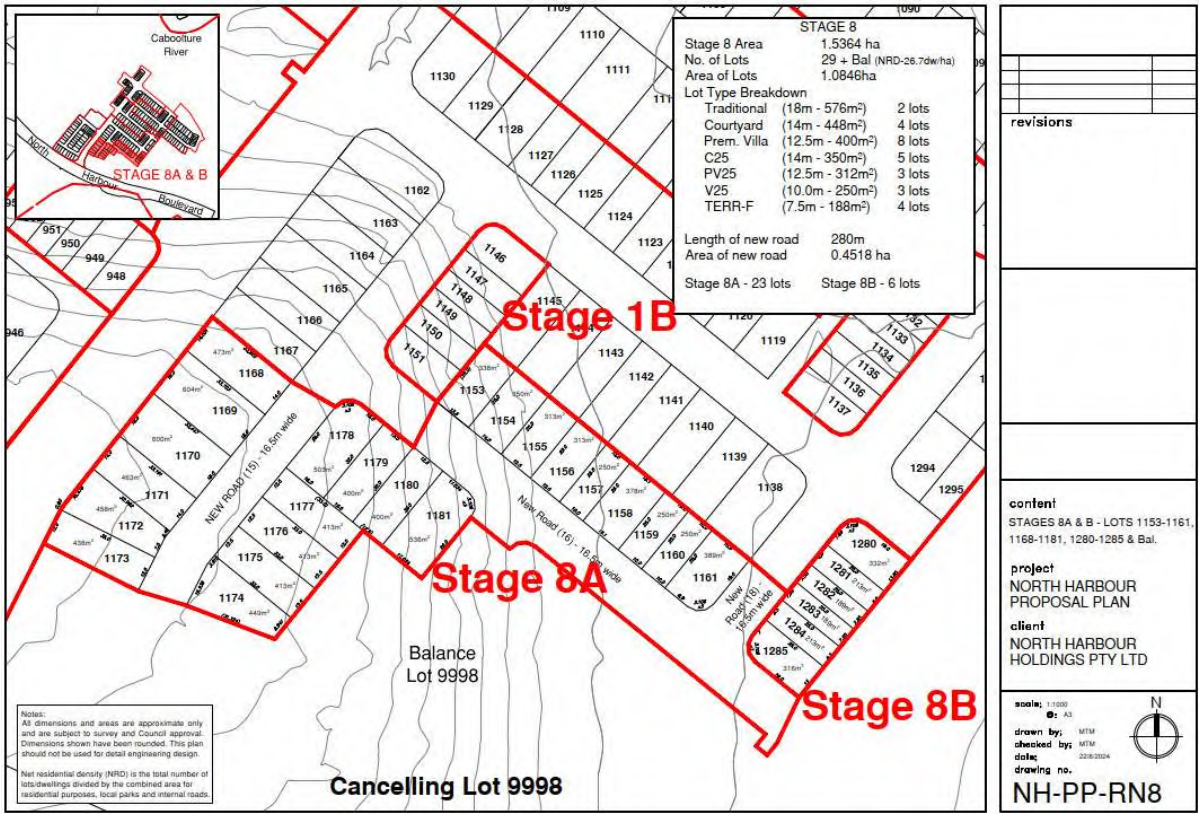

Figure 2-2: Layout for Stage 8

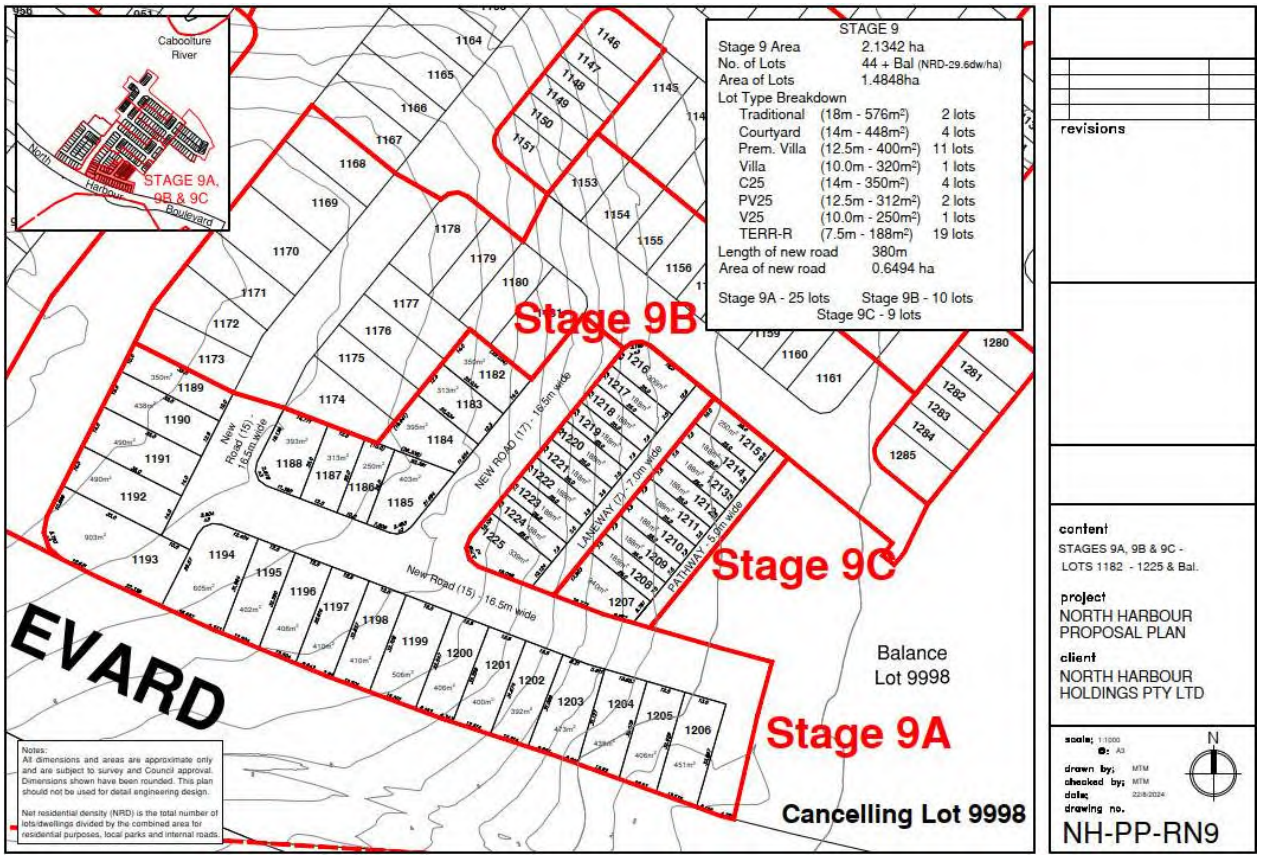

Figure 2-3: Layout for Stage 9

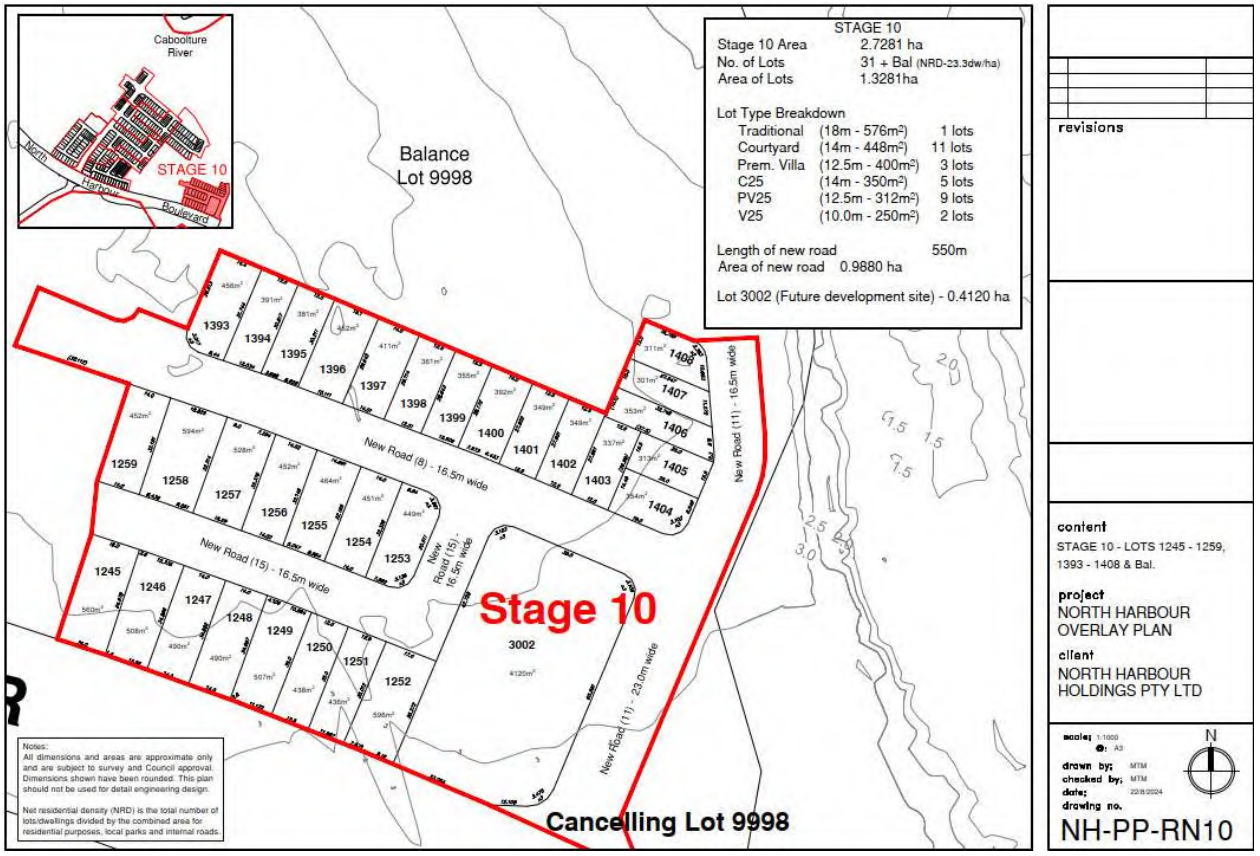

Figure 2-4: Layout for Stage 10

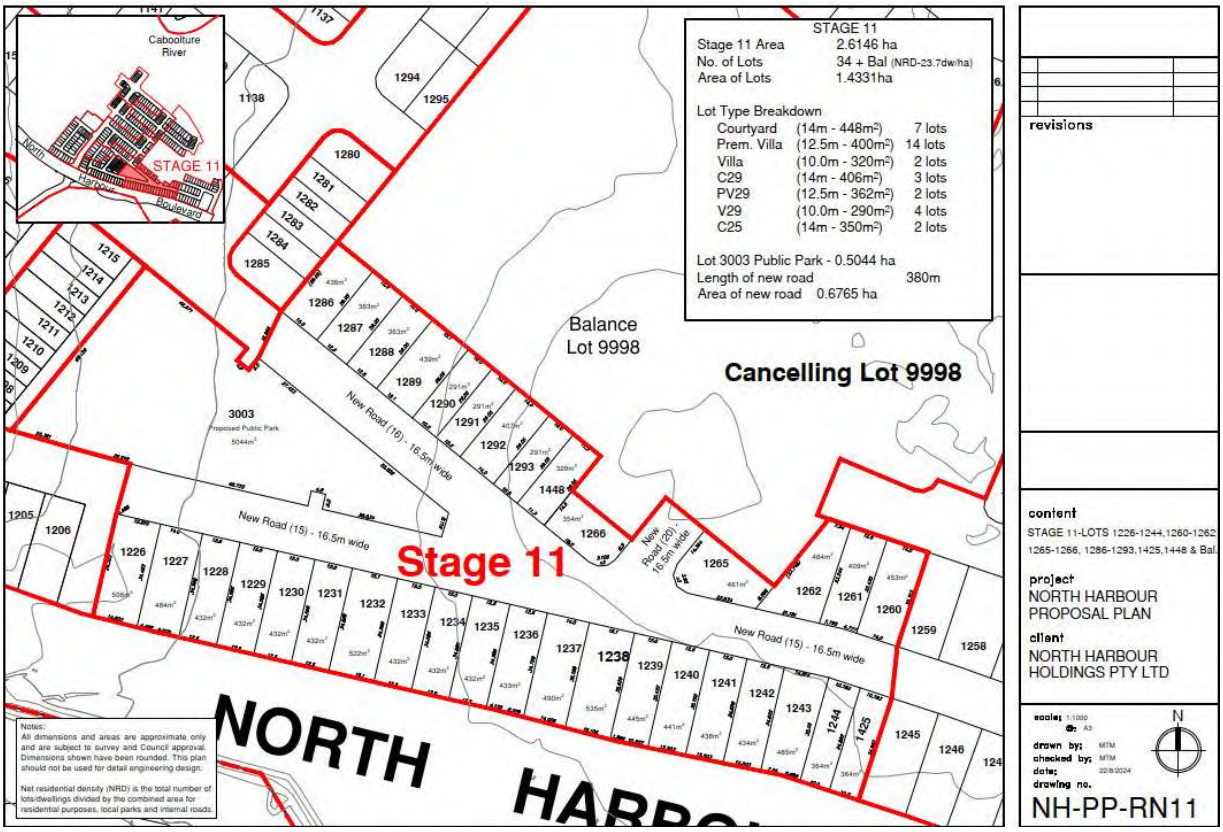

Figure 2-5: Layout for Stage 11

3 Noise Criteria

3.1 Moreton Bay Regional Council Planning Scheme Policy – Noise

The 'MBRC Planning Scheme Policy – Noise' outlines the process for establishing acceptable acoustic amenity at locations impacted by road and railway induced noise. Section 8.1 of the Policy states that a transport noise impact assessment report is to be provided where development involves reconfiguring a lot in the general Residential zone where:

1. Proposed lots are located within:
    a. 50m of a current of future designated sub arterial road; or
    b. 100m of a current or future designated arterial road; or
    c. 150m of a highway or railway; or
    d. Extractive resource transport buffer.
2. Where otherwise requested by Council.

The assessment is to be in accordance with Queensland Development Code (QDC) MP4.4 and identify the applicable noise category for each lot for both ground and first floor levels.

In addition to the above assessment, residential developments are required to have Private Open Spaces (POS) that meet the external noise criteria as outlined in TMR's Policy for Development Affected by Environmental Emissions from Transport.

3.2 Queensland Development Code MP4.4

The QDC MP4.4 document specifies external building construction requirements based on the external transport noise levels to achieve acceptable indoor noise levels. The road traffic noise level categories, as specified in Schedule 3 of QDC MP4.4, are provided in Table 3-1. The required acoustic ratings for building components for each noise category are also listed in Table 3-1.

Table 3-1: MP4.4 Road Traffic Noise Category Levels and Required Building Construction Acoustic Ratings

Free-field Noise Category	**Level of Traffic Noise $L_{A10\ (18hr)}$ (façade corrected)**	**Required Acoustic Ratings (R_w)**			
		Glazing and Frames		**External Walls**	**Ceiling and Roofs**
		Room Façade Glazing Area ≥ 1.8m²	**Room Façade Glazing < 1.8m²**		
Category 4	≥ 73 dB(A)	R_w 43	R_w 43	R_w 52	R_w 45
Category 3	68-72 dB(A)	R_w 38	R_w 35	R_w 47	R_w 41
Category 2	63-67 dB(A)	R_w 35	R_w 32	R_w 41	R_w 38
Category 1	58-62 dB(A)	R_w 27	R_w 24	R_w 35	R_w 35
Category 0	≤ 57 dB(A)	None	None	None	None

3.3 Private Open Space Criteria

Table 3 of TMR's policy for Development Affected by Environmental Emissions from Transport contains noise limits for POS's in new sensitive developments. These criteria are dependent on the existing ambient noise level and have been reproduced below:

Table 3-2: Private Open Space Criteria (Source: Development Affected by Environmental Emissions from Transport)

Development Type	**Location within Development**	**Environmental Criteria**
Accommodation Activities	Private and communal open space	≤ 57 dB(A) L_{10} (18hr) free field (measured L_{90} (18hr) free field between 6am and midnight ≤ 45dB(A))
		≤ 60 dB(A) L_{10} (18hr) free field (measured L_{90} (18hr) free field between 6am and midnight > 45dB(A))

4 Noise Monitoring

Unattended noise monitoring was conducted to establish the background noise levels for the private open space criteria. Noise measurements were conducted by Vipac between Tuesday 16th January and Monday 22nd January in a free-field location 1.5m above ground. The monitor location was positioned north of Stages 7 to 11 as shown in Figure 4-1. Attended noise measurements confirmed that construction noise during the monitoring period was not audible from the noise monitoring location.

Figure 4-1: Noise Monitoring Location

4.1 Equipment

The following equipment was used to measure background noise levels at North Harbour:

Table 4-1: Equipment List

Instrument	Serial Number	Next Calibration Date
Rion NL-42 Type 2 Environmental Noise Logger	01186132	11/02/2024
Pulsar Model 106 Sound Calibrator	96816	15/11/2024
Brüel & Kjær 2250 Type 1 Sound Level Meter	302997	04/07/2025

The calibrations of the noise monitoring equipment were checked using an acoustic calibrator before and after the measurements with no significant drift from the reference signal observed. Noise monitoring was conducted in accordance with Australian Standard AS1055:2018 – Description and Measurement of Environmental Noise. The noise monitors were set to measure statistical noise levels in 'A' weighting with 'Fast' response over 15 minute intervals.

4.2 Weather Observations

Weather during the monitoring period was mostly fine, with some periods of adverse weather (rainfall) observed. Monitoring data during adverse weather conditions has been excluded from the assessment in accordance with the CoP.

Rainfall and temperature data was sourced from the Bureau of Meteorology (BoM) Redcliffe Weather Station (station ID: 040958), approximately 15.8km away. Wind data was sourced from Beerburrum BoM Weather Station (station ID: 040284) approximately 16.5km away from the noise monitoring site. Daily weather observations are shown in Table 4-2:

Table 4-2: Weather Observations During the Monitoring Period (Source: Redcliffe & Beerburrum BoM, 2023)

Date	Temp (°C)		Rain (mm)	9:00 AM			3:00 PM		
	Min	Max		Temp (°C)	Wind Direction	Wind Speed (km/h)	Temp (°C)	Wind Direction	Wind Speed (km/h)
Tue 16/01	23.3	29.5	14	28.1	S	6	26.7	SE	4
Wed 17/01	23.3	29.2	14.2	26.6	SE	2	28.5	E	7
Thu 18/01	25.1	32.1	0.2	28.8	NW	6	29.8	ENE	9
Fri 19/01	23.6	31.4	9	27.6	NNE	2	30.8	E	6
Sat 20/01	25.5	30.3	0	27	SSW	4	29.6	SE	7
Sun 21/01	24.6	31.5	0.2	29.2	N	2	30.4	ENE	7
Mon 22/01	24.7	36.0	0	29.8	NNE	9	32.1	ENE	7

4.3 Measured Ambient Noise Levels

Table 4-3 presents the measured background noise levels and the resultant private open space criteria detailed in Section 3.3. Full unattended noise monitoring results can be found in Appendix C.

Table 4-3: Ambient Noise Level Results

Monitoring Period	Free Field $L_{90,\ 18\ hour}$	Private Open Space Criteria
17/01 to 21/01, 6am to midnight	47 dB(A)	L_{10} (18 hour) free field **≤ 60 dB(A)**

5 Road Traffic Noise Assessment

5.1 Modelling Methodology

Traffic noise calculations were carried out using SoundPLAN v8.2 noise modelling software. The data and assumptions used in traffic noise modelling are presented in Table 5-1.

Table 5-1: Data and Assumptions Used in Traffic Noise Modelling

Parameter	Data
Future Residence Receiver Heights	• Ground Floor: 1.8m above ground level as obtained from terrain data (façade corrected). • Outdoor Spaces for Passive Recreation: 1.5m above ground level as obtained from terrain data (free field) • First Floor: 4.6m above ground level as obtained from terrain data (assuming height of floors as 2.8m, façade corrected)
Terrain Data	0.1m Contour Lines drawing by KN Group (ref: INT CONTS.dxf) received on 22/05/2024.
Angle Increment	1°
Grid Spacing (noise contour maps)	2m Squares.
Lot Layout	Civil Base drawings by KN Group (ref: x13 -154 base_RNA.dwg), Received by Vipac on 13/06/2024
Calculation Method	UK's Calculation of Road Traffic Noise (CoRTN)
Road Surface	• Dense graded asphalt (DGA) was modelled for the road surface of North Harbour Boulevard. As per Table 4.3.4.1 of the CoP, no correction is required for DGA. • A correction of -0.7 dB(A) has been applied for free field receptors, and a correction of -1.7dB(A) has been applied for façade corrected receptors for Queensland conditions (Department of Transport and Main Roads, Transport Noise Management Code of Practice 2013).
Existing Noise Barriers	N/A

5.2 Traffic Volumes

Traffic volumes for the North Harbour Boulevard extension are based on Annual Average Daily Traffic (AADT) estimates supplied by Bitzios Consulting which have been reproduced below. Note construction of the road is yet to be completed so verification of any existing traffic noise emissions is not applicable.

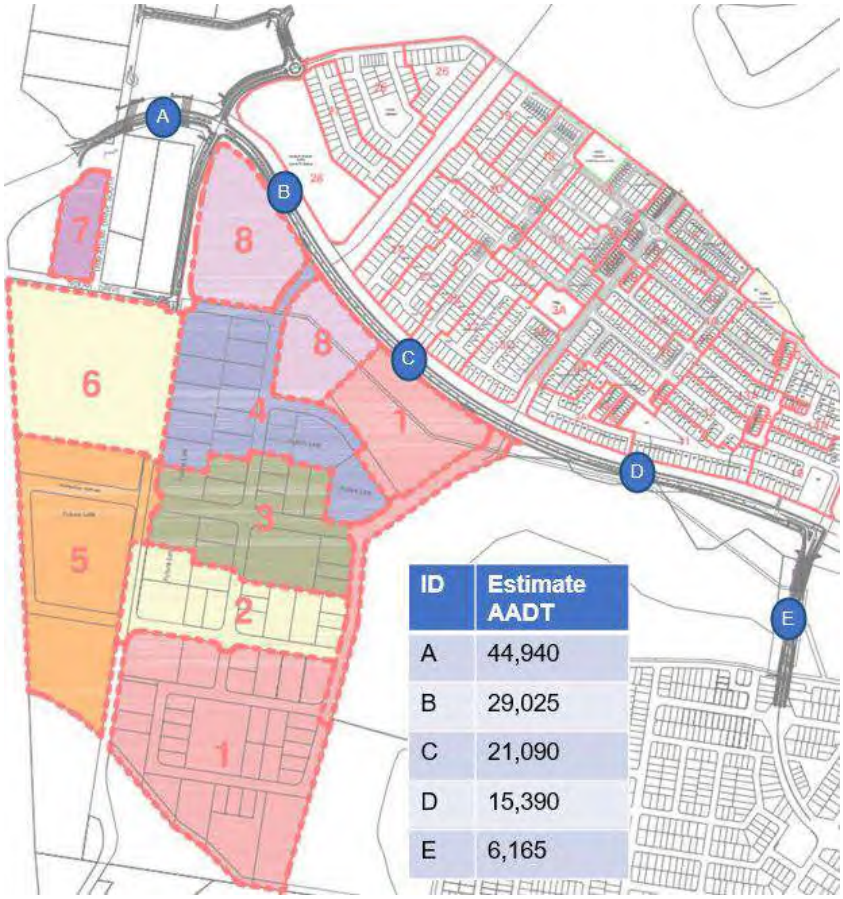

Figure 5-1: North Harbour Boulevard AADT (reproduced from Bitzio Consulting)

Table 5-2 presents the assumptions used for modelling North Harbour Boulevard in the noise prediction model. AADT traffic volumes from Bitzios Consulting in Figure 5-1 are representative of the ultimate traffic volumes in 2041, therefore predictions have been conducted to the ultimate traffic volume to 2041. The 18 hour traffic volume from 6am to midnight to be used in the noise model are taken to be 95% of the AADT as per the CoRTN calculation method.

Table 5-2: Traffic Volumes

North Harbour Boulevard Section	AADT	18hr Traffic Volume	Speed*	Heavy Vehicles*
A	44,940	42,693	70 km/h	5%
B	29,025	27,574		
C	21,090	20,036		
D	15,390	14,621	70 km/h but slowing to 40 km/h approaching intersection	
E	6,165	5,857		

* Speed and heavy vehicle data have been confirmed by North Harbour.

5.3 Noise Modelling Against Private Open Space Criteria

This section contains noise modelling results for comparison against the POS Criteria. Only the lots most exposed to road traffic noise are presented and the results will be used to determine if noise mitigation measures are required. Predicted road traffic noise levels for the remaining lots exposed to lower road traffic noise levels are presented in Appendix B.1

5.3.1 Predicted Noise Levels without Mitigation

Figure 5-2 presents the predicted road traffic noise levels compared to the private open space criteria for the most exposed lots of North Harbour Stages 7 to 11. Lots not included in the grid noise map are expected to comply with the criteria as North Harbour Boulevard is the only source of road traffic noise modelled in this assessment.

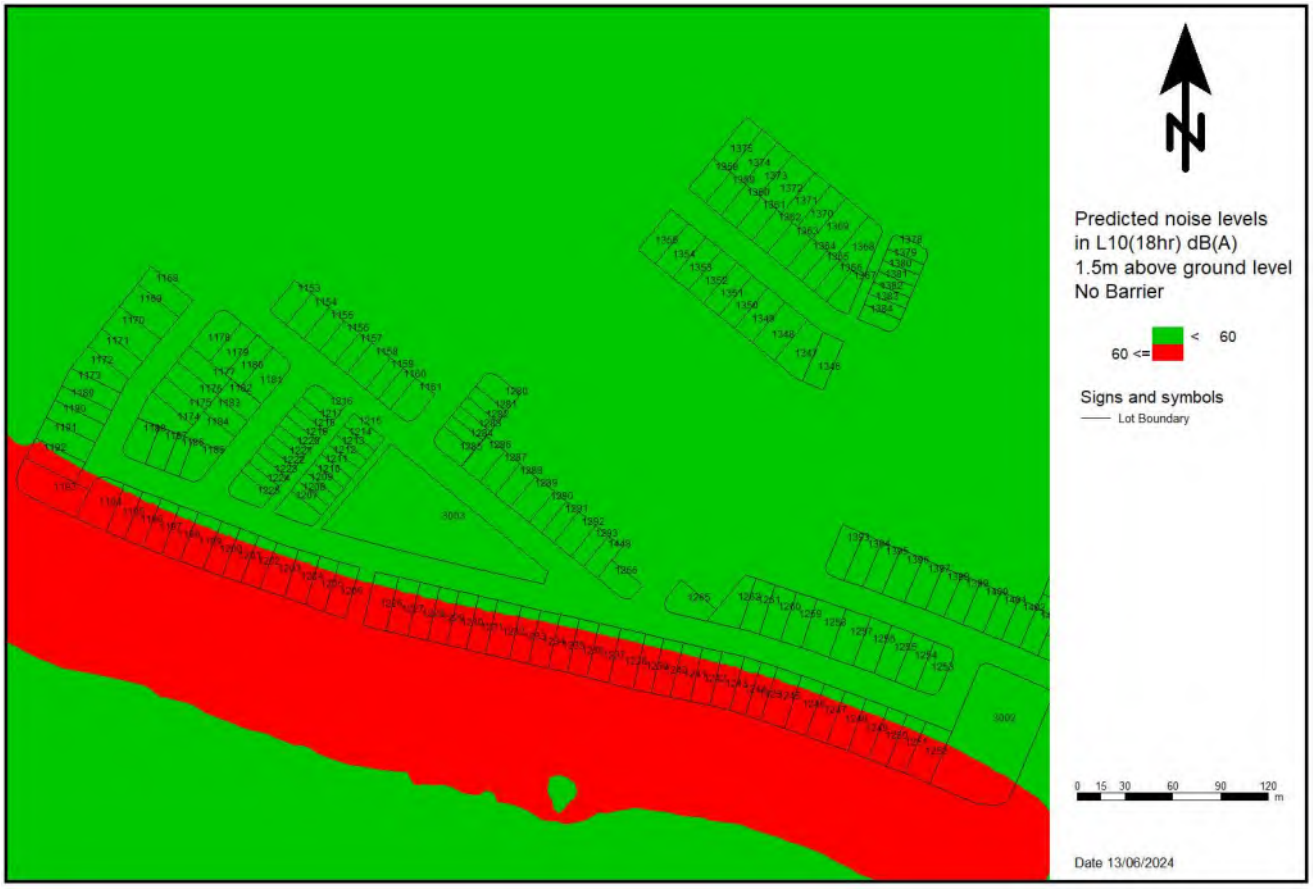

Figure 5-2: Private Open Space Criteria Grid Noise Map without Mitigation

Predicted traffic noise levels for several lots that are nearest to North Harbour Boulevard are predicted to exceed the private open space criteria. Lots predicted to exceed the noise limit are shown in Table 5-3.

Table 5-3 Lots Predicted to Exceed the Private Open Space Limit

Noise Limit	Lots Exceeding Noise Limits	Location
$L_{A10,18hr}$ 60 dB(A) – Free-field	1192 – 1206 1226 – 1252 1425	Private Open Space (1.5m above ground)

Refer to Section 6.1 for details of the recommendations for predicted compliance of the exceeding lots.

Note – Lot 3002 is not included as part of this assessment as it is expected to be purposed for a non-residential use under a future development application.

5.3.2 Predicted Noise Levels with Mitigation Measures

Figure 5-3 contains the predicted road traffic noise from North Harbour with a 2m acoustic barrier on the lot boundaries facing North Harbour Boulevard. The barrier includes appropriate returns down the side boundaries of lots 1206, 1226 and 1252. Details of the noise barrier are in Section 6.1.

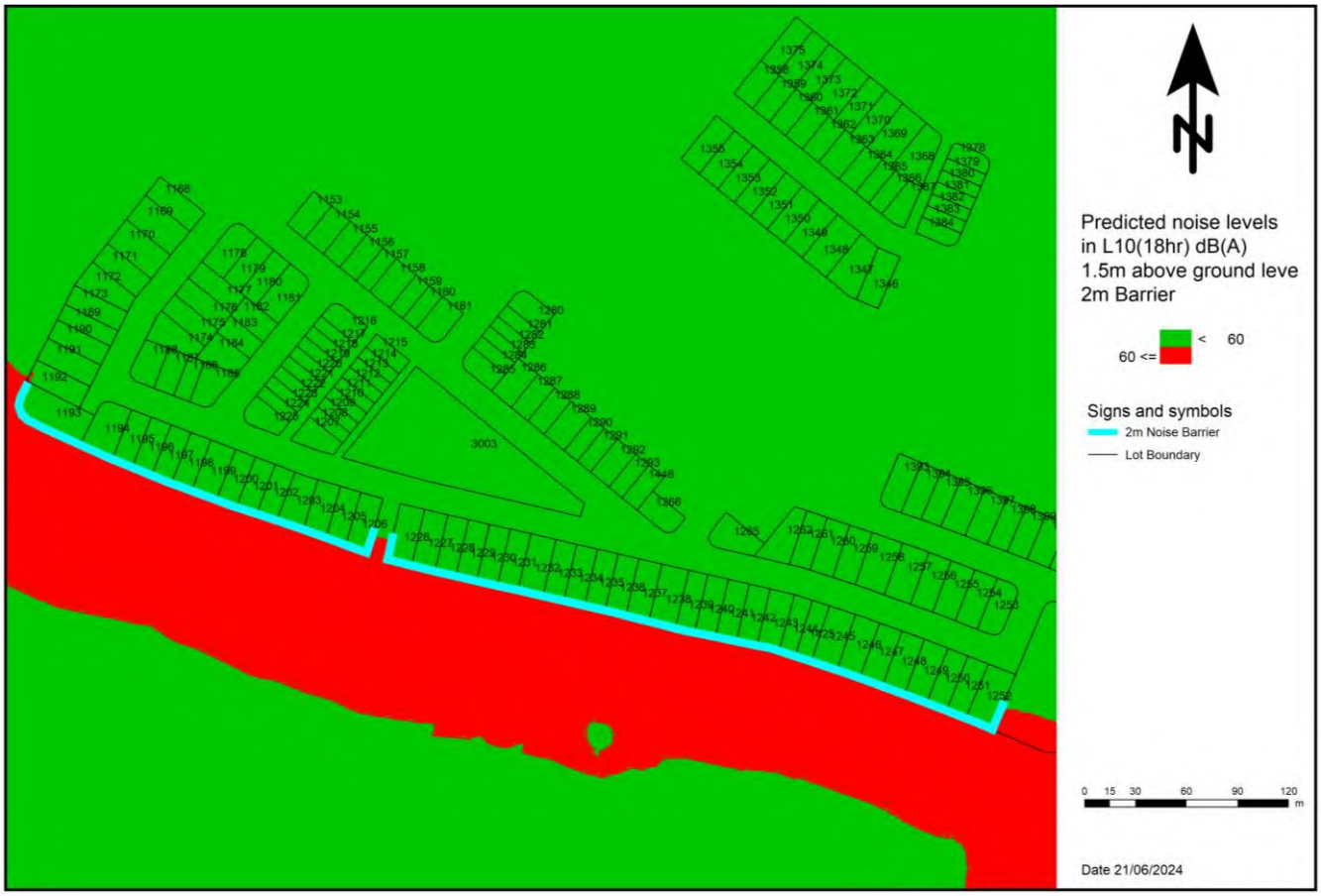

Figure 5-3: Private Open Space Criteria Grid Noise Map with Mitigation

Predicted traffic noise levels at all lots are predicted to comply with the private open space criteria with the inclusion of the recommended acoustic barrier.

6 Recommendations

6.1 Noise Barrier

A noise barrier is recommended for all lots fronting North Harbour Boulevard to achieve predicted compliance with the private open space criteria as modelled in Section 5.3.2. Details of the height and location of the proposed noise barrier can be found in Table 6-1:

Table 6-1: Details of Recommended Noise Barrier

Lot Numbers	Barrier Location	Height
1193 – 1206 1226 – 1252 1425	• Along boundary fronting North Harbour Boulevard at finished pad level	2m
1252	• Includes a return up the eastern boundary of lot 1252 for approximately 18m from the corner of the lot.	
1206,1226	• Includes a return up the side boundaries shared with the access road for 16m from the corner of both lots.	

In addition to the location and height requirements in Table 6-1, the acoustic barrier should also be:

- 2m high (as per Table 6-1) relative to the modelled ground contour levels provided by KN Group
  - Optional: the section of the acoustic barrier on Lot 1193 facing the access street to the west may be 1.8m high.
- Of solid construction and have no gaps or holes for the extent shown (inclusive of between the ground and bottom of barrier)
- Any gaps surrounding access gates for landscaping/maintenance are to be overlapped sufficiently so that there are no visible holes above, below or on the sides of the gate
- Constructed in accordance with:
  - Chapter 7 integrated noise barrier design of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013
  - Technical Specification-MRTS15 Noise Fences, Transport and Main Roads, 2019
  - Technical Specification-MRTS04 General Earthworks, Transport and Main Roads, 2020
- The construction may consist of a barrier in combination with an earth mound to achieve the desired height if required.

6.2 Building Façade Requirements

Acoustic treatment is required for ground and first floor building facades near North Harbour Boulevard that are impacted by noise equivalent to QDC MP4.4 categories 1 to 2. **It should be noted that where buildings are within 10m or less from the noise barrier, category 3 may be applicable for the first floors of buildings facing North Harbour Boulevard.** This is shown in the noise map in Appendix A Figure A-2 where the edges of lots near the noise barrier are shown as category 3.

Details of the construction requirements for each category can be found in Section 3.2.

The QDC MP4.4 noise categories for all lots, including an upper and lower level, are listed in Appendix B.2. A summary of lots affected by road traffic noise equivalent to category 1 or higher are listed in Table 6-2. Note that these noise categories have been calculated with the inclusion of an acoustic barrier as detailed Section 6.1.

Table 6-2: Summary of QDC MP4.4 Noise Categories

QDC MP4.4 Noise Category*	Floors Affected	Lots Affected
Category 2	First Floor	1192 – 1206 1226 – 1252 1425
Category 1	Ground Floor	1190 – 1206 1226 – 1252 1425
	First Floor	1189 - 1191
Category 0	All remaining floors / lots	

* Includes noise mitigation barrier as detailed in Section 6.1

7 Conclusion

Vipac has completed a traffic noise impact assessment for Stages 7 to 11 of the North Harbour Development. Compliance with the Moreton Bay Planning Scheme Policy (Noise) is expected to be achieved with the implementation of the recommendations in Section 6 of this report.

These recommendations include noise barriers for compliance with the private open space criteria and façade treatments in line with the predicted QDC MP4.4 noise categories listed in Appendix B.2.

Appendix A QDC MP4.4 Transport Noise Contour Map

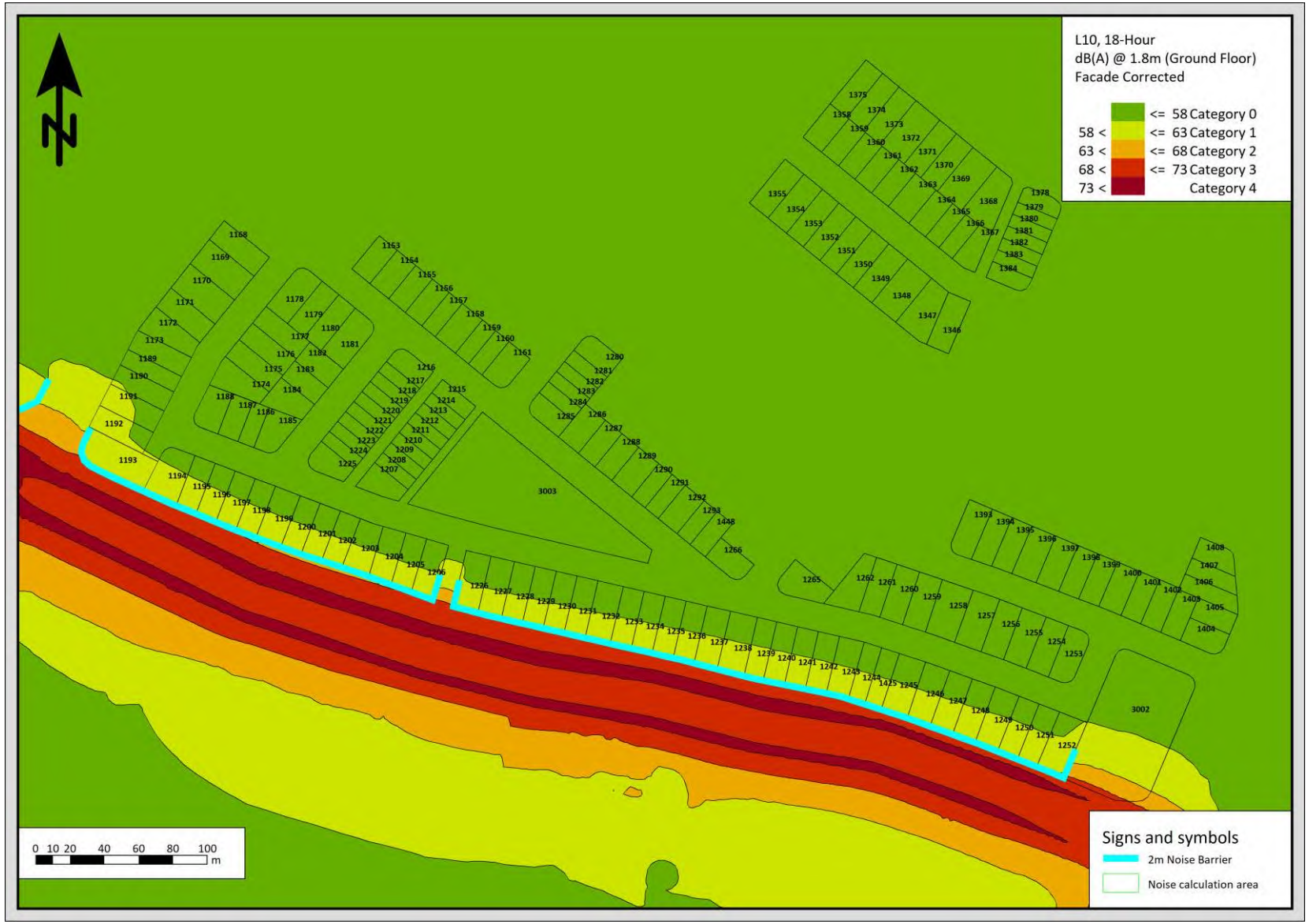

Figure A-1: Ground Floor Noise Contour Map with QDC MP4.4 Categories (Façade Corrected)

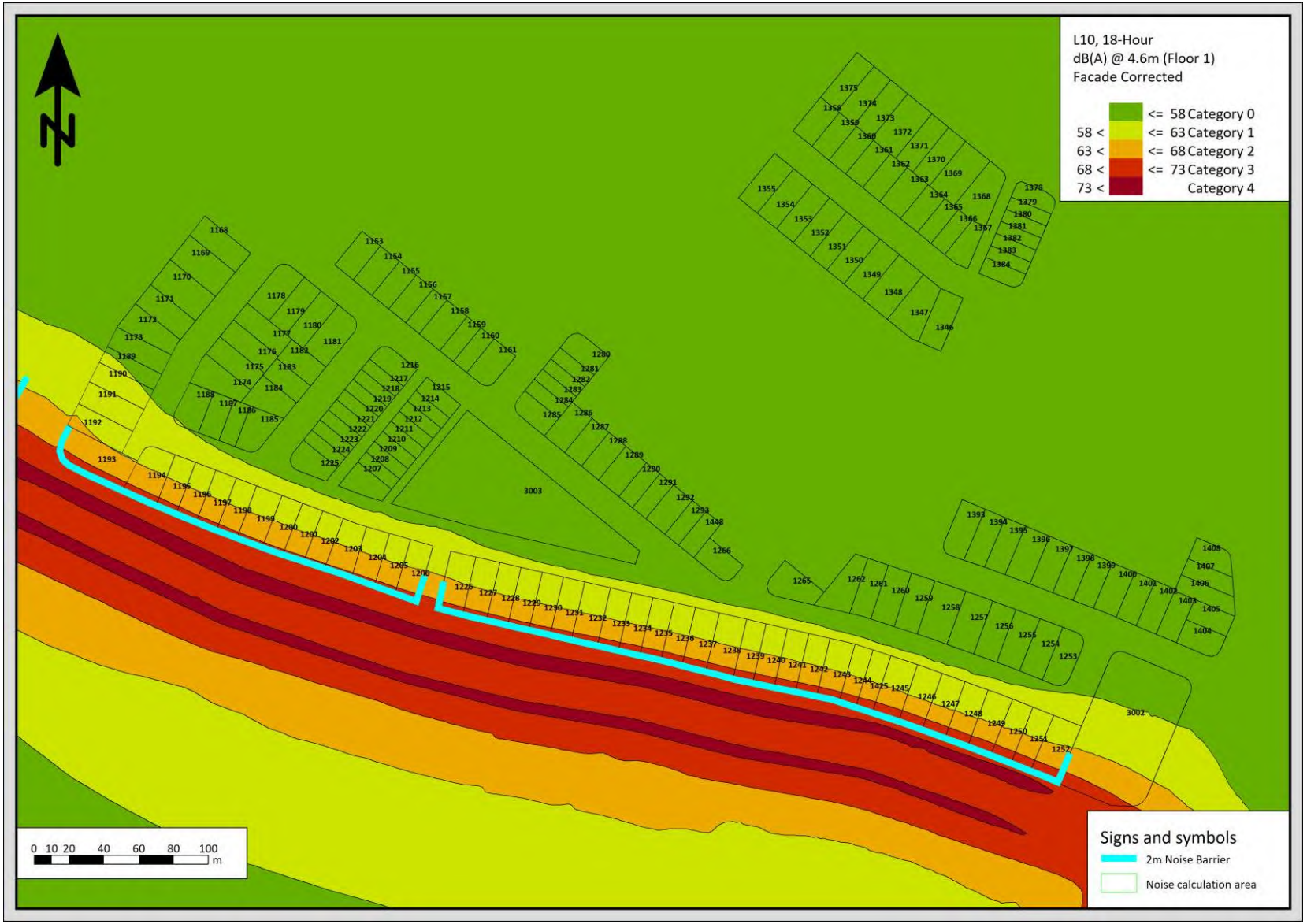

Figure A-2: First Floor Noise Contour Map with QDC MP4.4 Categories (Façade Corrected)

Appendix B Predicted Traffic Noise Levels

B.1 Predicted Free-Field Traffic Noise Levels for Private Open Space Criteria

Table B-1:Predicted Free-Field Traffic Noise Levels in Private Open Spaces (for all lots)

Lot No.	No Barrier	With Noise Barrier	
	$L_{10(18h)}$ dB(A)	$L_{10(18h)}$ dB(A)	Complies with $L_{10(18h)}$ 60 dB(A) Criteria
1153	49.6	49	✓
1154	50.1	49	✓
1155	50.4	49.1	✓
1156	50.6	49.2	✓
1157	50.9	49.3	✓
1158	51	49.3	✓
1159	51.1	49.4	✓
1160	51.3	49.4	✓
1161	51.4	49.5	✓
1168	51.3	50.4	✓
1169	52	51	✓
1170	52.9	51.8	✓
1171	53.7	52.5	✓
1172	54.6	53.4	✓
1173	55.5	54.2	✓
1174	55.2	52.8	✓
1175	54.4	52.3	✓
1176	53.8	51.8	✓
1177	53.1	51.3	✓
1178	52.1	50.6	✓
1179	52.3	50.7	✓
1180	52.4	50.7	✓
1181	52.6	50.7	✓
1182	53.2	51.2	✓
1183	53.8	51.7	✓
1184	54.5	52.2	✓
1185	56.2	53.1	✓
1186	56.3	53.3	✓
1187	56.4	53.5	✓
1188	56.4	53.8	✓
1189	56.4	55.1	✓
1190	57.5	56	✓
1191	59	57.3	✓
1192	61	58.1	✓
1193	66.7	59.7	✓
1194	65.9	59.1	✓
1195	65.7	59	✓
1196	65.6	59	✓
1197	65.4	58.9	✓
1198	65.2	58.7	✓
1199	65	58.8	✓

1200	65	58.7	✓
1201	65	58.6	✓
1202	65	58.6	✓
1203	65	58.5	✓
1204	65.2	58.6	✓
1205	65.3	58.6	✓
1206	65.5	58.6	✓
1207	56.5	53	✓
1208	55.9	52.6	✓
1209	55.3	52.3	✓
1210	54.8	51.9	✓
1211	54.3	51.6	✓
1212	53.8	51.3	✓
1213	53.4	51	✓
1214	53.1	50.7	✓
1215	52.7	50.5	✓
1216	52.4	50.3	✓
1217	52.8	50.6	✓
1218	53.2	50.9	✓
1219	53.5	51.2	✓
1220	53.9	51.4	✓
1221	54.4	51.7	✓
1222	54.9	52.1	✓
1223	55.4	52.4	✓
1224	56	52.8	✓
1225	56.9	53.3	✓
1226	65.7	58.7	✓
1227	65.7	58.6	✓
1228	65.7	58.8	✓
1229	65.7	58.7	✓
1230	65.7	58.6	✓
1231	65.8	58.8	✓
1232	66	58.8	✓
1233	66.2	58.8	✓
1234	66.4	59	✓
1235	66.4	59	✓
1236	66.5	59.1	✓
1237	66.5	59.2	✓
1238	66.5	59.3	✓
1239	66.4	59.2	✓
1240	66.3	59.3	✓
1241	66.2	59.2	✓
1242	66.1	59.3	✓
1243	66	59.2	✓
1244	66.2	59.3	✓
1245	65.5	58.7	✓
1246	65.3	58.6	✓

1247	64.9	58.5	✓
1248	65.3	58.8	✓
1249	65.5	59.2	✓
1250	65.6	59.2	✓
1251	65.4	59	✓
1252	65.4	59.1	✓
1253	56	52.2	✓
1254	55.7	52	✓
1255	55.8	52.2	✓
1256	55.7	52.2	✓
1257	55.7	52.3	✓
1258	55.8	52.3	✓
1259	55.7	52.3	✓
1260	55.8	52.3	✓
1261	55.7	52.3	✓
1262	55.9	52.3	✓
1265	56.7	52.9	✓
1266	56.1	52.4	✓
1280	50.7	49	✓
1281	51.2	49.3	✓
1282	51.5	49.5	✓
1283	51.7	49.7	✓
1284	52.1	49.9	✓
1285	52.5	50.2	✓
1286	52.6	50.2	✓
1287	52.9	50.4	✓
1288	53.2	50.5	✓
1289	53.4	50.7	✓
1290	53.7	50.9	✓
1291	54	51.1	✓
1292	54.4	51.3	✓
1293	54.7	51.6	✓
1346	47.9	47.2	✓
1347	47.8	47.1	✓
1348	47.6	47	✓
1349	47.4	46.9	✓
1350	47.4	46.8	✓
1351	47.3	46.8	✓
1352	47.2	46.7	✓
1353	47.1	46.7	✓
1354	47	46.6	✓
1355	46.8	46.3	✓
1358	45.7	45.4	✓
1359	46	45.5	✓
1360	46	45.6	✓
1361	46	45.7	✓
1362	46.1	45.7	✓

1363	46.1	45.7	✓
1364	46.1	45.7	✓
1365	46.2	45.8	✓
1366	46.3	45.8	✓
1367	46.3	45.9	✓
1368	45.7	45	✓
1369	45.6	44.9	✓
1370	45.5	44.9	✓
1371	45.6	44.9	✓
1372	45.4	44.9	✓
1373	45.4	44.9	✓
1374	45.4	44.9	✓
1375	45.4	44.8	✓
1378	45.3	44.7	✓
1379	45.4	44.8	✓
1380	45.6	45	✓
1381	45.8	45.2	✓
1382	46	45.5	✓
1383	46.3	45.7	✓
1384	46.6	46.1	✓
1393	52.4	49.9	✓
1394	52.4	49.8	✓
1395	52.3	49.7	✓
1396	52.4	49.7	✓
1397	52.4	49.6	✓
1398	52.4	49.6	✓
1399	52.4	49.4	✓
1400	52.3	49.4	✓
1401	52.3	49.2	✓
1402	52.2	49	✓
1403	52.2	48.8	✓
1404	53.1	49.8	✓
1405	52.5	49.3	✓
1406	51.9	48.8	✓
1407	51.4	48.6	✓
1408	51	48.2	✓
1425	66.4	59.4	✓
1448	55.1	51.8	✓
3001	44.7	44.1	✓
3003	55.2	52	✓

B.2 Building Receptor Traffic Noise Levels & QDC MP4.4 Categories

Table B-2: Façade Corrected Traffic Noise Levels and MP4.4 Categories (for all lots)

Lot No.	Floor	No Barrier	With Noise Barrier	
		$L_{10(18h)}$ dB(A)	$L_{10(18h)}$ dB(A)	QDC MP4.4 Transport Noise Category
1153	GF	51.1	50.5	0
1153	F 1	53.3	51.5	0
1154	GF	51.7	50.5	0
1154	F 1	53.7	51.6	0
1155	GF	52	50.6	0
1155	F 1	54	51.6	0
1156	GF	52.1	50.7	0
1156	F 1	54.2	51.7	0
1157	GF	52.3	50.8	0
1157	F 1	54.4	51.7	0
1158	GF	52.5	50.8	0
1158	F 1	54.5	51.8	0
1159	GF	52.6	50.9	0
1159	F 1	54.6	51.8	0
1160	GF	52.8	50.9	0
1160	F 1	54.8	51.9	0
1161	GF	52.9	51	0
1161	F 1	54.9	51.9	0
1168	GF	52.9	51.9	0
1168	F 1	54.7	53.1	0
1169	GF	53.5	52.5	0
1169	F 1	55.4	53.7	0
1170	GF	54.3	53.3	0
1170	F 1	56.1	54.5	0
1171	GF	55.2	54	0
1171	F 1	57	55.4	0
1172	GF	56.1	54.9	0
1172	F 1	58	56.3	0
1173	GF	57	55.7	0
1173	F 1	58.9	57.2	0
1174	GF	56.6	54.3	0
1174	F 1	58.7	55.7	0
1175	GF	55.9	53.8	0
1175	F 1	57.9	55.1	0
1176	GF	55.2	53.3	0
1176	F 1	57.2	54.6	0
1177	GF	54.6	52.8	0
1177	F 1	56.5	54	0
1178	GF	53.6	52.1	0
1178	F 1	55.5	53.3	0
1179	GF	53.8	52.2	0
1179	F 1	55.7	53.3	0
1180	GF	53.9	52.2	0

1180	F 1	55.8	53.3	0
1181	GF	54.1	52.2	0
1181	F 1	56	53.3	0
1182	GF	54.6	52.7	0
1182	F 1	56.5	53.9	0
1183	GF	55.2	53.2	0
1183	F 1	57.2	54.4	0
1184	GF	56	53.7	0
1184	F 1	58.2	55.1	0
1185	GF	57.7	54.6	0
1185	F 1	59.5	56.2	0
1186	GF	57.8	54.8	0
1186	F 1	59.6	56.4	0
1187	GF	57.9	55	0
1187	F 1	59.7	56.6	0
1188	GF	57.9	55.3	0
1188	F 1	59.7	56.9	0
1189	GF	57.9	56.6	0
1189	F 1	59.7	58.1	1
1190	GF	59.6	58.3	1
1190	F 1	61.3	59.9	1
1191	GF	60.5	58.8	1
1191	F 1	62.2	60.6	1
1192	GF	63.1	59.2	1
1192	F 1	64.8	63.3	2
1193	GF	66.7	60.2	1
1193	F 1	67.9	67.2	2
1194	GF	65.5	59.2	1
1194	F 1	66.9	65.3	2
1195	GF	65.4	59.1	1
1195	F 1	66.7	65.2	2
1196	GF	65.3	59.1	1
1196	F 1	66.6	65.1	2
1197	GF	65.1	59	1
1197	F 1	66.5	65.1	2
1198	GF	65	58.9	1
1198	F 1	66.3	65	2
1199	GF	64.9	58.9	1
1199	F 1	66.2	64.9	2
1200	GF	64.8	58.8	1
1200	F 1	66.1	64.9	2
1201	GF	64.8	58.8	1
1201	F 1	66.1	64.8	2
1202	GF	64.7	58.7	1
1202	F 1	66	64.7	2
1203	GF	64.7	58.7	1
1203	F 1	66.1	64.7	2

1204	GF	64.8	58.7	1
1204	F 1	66.2	64.7	2
1205	GF	64.9	58.7	1
1205	F 1	66.3	64.8	2
1206	GF	65.1	58.7	1
1206	F 1	66.4	64.9	2
1207	GF	58	54.5	0
1207	F 1	59.9	56.2	0
1208	GF	57.3	54.1	0
1208	F 1	59.4	55.7	0
1209	GF	56.7	53.8	0
1209	F 1	58.8	55.2	0
1210	GF	56.3	53.4	0
1210	F 1	58.4	54.7	0
1211	GF	55.8	53.1	0
1211	F 1	57.8	54.3	0
1212	GF	55.3	52.8	0
1212	F 1	57.3	54	0
1213	GF	55	52.5	0
1213	F 1	56.9	53.6	0
1214	GF	54.6	52.2	0
1214	F 1	56.6	53.3	0
1215	GF	54.2	52	0
1215	F 1	56.1	53	0
1216	GF	53.9	51.8	0
1216	F 1	55.8	52.8	0
1217	GF	54.3	52.1	0
1217	F 1	56.3	53.2	0
1218	GF	54.7	52.4	0
1218	F 1	56.6	53.5	0
1219	GF	55	52.7	0
1219	F 1	57	53.8	0
1220	GF	55.4	52.9	0
1220	F 1	57.4	54.1	0
1221	GF	55.9	53.2	0
1221	F 1	57.9	54.5	0
1222	GF	56.4	53.6	0
1222	F 1	58.5	55	0
1223	GF	56.9	53.9	0
1223	F 1	59	55.4	0
1224	GF	57.5	54.3	0
1224	F 1	59.5	55.9	0
1225	GF	58.4	54.8	0
1225	F 1	60.3	56.7	0
1226	GF	65.2	58.7	1
1226	F 1	66.6	64.9	2
1227	GF	65.2	58.7	1

1227	F 1	66.5	64.8	2
1228	GF	65.1	58.7	1
1228	F 1	66.5	64.8	2
1229	GF	65.1	58.7	1
1229	F 1	66.5	64.8	2
1230	GF	65.2	58.7	1
1230	F 1	66.5	64.8	2
1231	GF	65.2	58.7	1
1231	F 1	66.6	64.8	2
1232	GF	65.3	58.8	1
1232	F 1	66.7	64.9	2
1233	GF	65.5	58.9	1
1233	F 1	66.9	64.9	2
1234	GF	65.6	58.9	1
1234	F 1	67	65	2
1235	GF	65.6	59	1
1235	F 1	67.1	65.1	2
1236	GF	65.7	59	1
1236	F 1	67.1	65.1	2
1237	GF	65.8	59.1	1
1237	F 1	67.1	65.2	2
1238	GF	65.8	59.2	1
1238	F 1	67.1	65.4	2
1239	GF	65.8	59.3	1
1239	F 1	67.2	65.4	2
1240	GF	65.7	59.2	1
1240	F 1	67.1	65.3	2
1241	GF	65.6	59.2	1
1241	F 1	67.1	65.3	2
1242	GF	65.5	59.2	1
1242	F 1	67.1	65.2	2
1243	GF	65.2	59.1	1
1243	F 1	67.1	65	2
1244	GF	65.4	59.1	1
1244	F 1	67.3	65.1	2
1245	GF	64.6	58.7	1
1245	F 1	66.9	64	2
1246	GF	64.5	58.7	1
1246	F 1	66.7	64.1	2
1247	GF	64.3	58.6	1
1247	F 1	66.5	63.7	2
1248	GF	64.6	58.9	1
1248	F 1	66.7	64	2
1249	GF	64.8	59.1	1
1249	F 1	66.9	64.3	2
1250	GF	64.9	59.1	1
1250	F 1	66.9	64.5	2

1251	GF	64.7	58.9	1
1251	F 1	66.8	64.3	2
1252	GF	64.7	59	1
1252	F 1	66.8	64.5	2
1253	GF	57.4	53.7	0
1253	F 1	59.2	55.9	0
1254	GF	57.2	53.5	0
1254	F 1	59	55.5	0
1255	GF	57.2	53.7	0
1255	F 1	59	55.6	0
1256	GF	57.3	53.7	0
1256	F 1	59.1	55.4	0
1257	GF	57.2	53.8	0
1257	F 1	58.9	55.5	0
1258	GF	57.3	53.8	0
1258	F 1	59.2	55.4	0
1259	GF	57.3	53.8	0
1259	F 1	59.1	55.4	0
1260	GF	57.3	53.8	0
1260	F 1	59.1	55.4	0
1261	GF	57.3	53.8	0
1261	F 1	59.1	55.3	0
1262	GF	57.4	53.8	0
1262	F 1	59.2	55.3	0
1265	GF	58.2	54.4	0
1265	F 1	60	56.1	0
1266	GF	57.5	53.9	0
1266	F 1	59.4	55.5	0
1280	GF	52.1	50.5	0
1280	F 1	54.2	51.4	0
1281	GF	52.7	50.8	0
1281	F 1	54.7	51.7	0
1282	GF	53	51	0
1282	F 1	55	51.9	0
1283	GF	53.3	51.2	0
1283	F 1	55.3	52.1	0
1284	GF	53.6	51.4	0
1284	F 1	55.5	52.4	0
1285	GF	54.1	51.7	0
1285	F 1	56	52.7	0
1286	GF	54.1	51.7	0
1286	F 1	55.9	52.7	0
1287	GF	54.4	51.9	0
1287	F 1	56.2	52.8	0
1288	GF	54.6	52	0
1288	F 1	56.4	53	0
1289	GF	54.9	52.2	0

1289	F 1	56.7	53.2	0
1290	GF	55.2	52.4	0
1290	F 1	57	53.4	0
1291	GF	55.6	52.6	0
1291	F 1	57.3	53.7	0
1292	GF	55.9	52.8	0
1292	F 1	57.7	54	0
1293	GF	56.2	53.1	0
1293	F 1	58.1	54.3	0
1346	GF	49.4	48.7	0
1346	F 1	51.6	49.6	0
1347	GF	49.2	48.6	0
1347	F 1	51.5	49.6	0
1348	GF	49	48.5	0
1348	F 1	51.3	49.5	0
1349	GF	48.9	48.4	0
1349	F 1	51.2	49.4	0
1350	GF	48.8	48.3	0
1350	F 1	51.1	49.3	0
1351	GF	48.7	48.3	0
1351	F 1	51	49.2	0
1352	GF	48.7	48.2	0
1352	F 1	50.9	49.2	0
1353	GF	48.6	48.2	0
1353	F 1	50.8	49.1	0
1354	GF	48.5	48.1	0
1354	F 1	50.7	49.1	0
1355	GF	48.3	47.8	0
1355	F 1	50.5	48.9	0
1358	GF	47.2	46.9	0
1358	F 1	49.3	48	0
1359	GF	47.4	47	0
1359	F 1	49.5	48.1	0
1360	GF	47.5	47.1	0
1360	F 1	49.6	48.2	0
1361	GF	47.5	47.2	0
1361	F 1	49.7	48.2	0
1362	GF	47.5	47.2	0
1362	F 1	49.7	48.2	0
1363	GF	47.6	47.2	0
1363	F 1	49.8	48.3	0
1364	GF	47.6	47.2	0
1364	F 1	49.9	48.3	0
1365	GF	47.7	47.3	0
1365	F 1	49.9	48.4	0
1366	GF	47.8	47.3	0
1366	F 1	50	48.4	0

1367	GF	47.8	47.4	0
1367	F 1	50	48.5	0
1368	GF	47.2	46.5	0
1368	F 1	48.9	47.8	0
1369	GF	47.1	46.4	0
1369	F 1	48.8	47.8	0
1370	GF	47	46.4	0
1370	F 1	48.8	47.7	0
1371	GF	47	46.4	0
1371	F 1	48.7	47.8	0
1372	GF	46.9	46.4	0
1372	F 1	48.7	47.7	0
1373	GF	46.9	46.4	0
1373	F 1	48.7	47.7	0
1374	GF	46.9	46.4	0
1374	F 1	48.7	47.7	0
1375	GF	46.9	46.3	0
1375	F 1	48.5	47.6	0
1378	GF	46.8	46.2	0
1378	F 1	48.7	47.6	0
1379	GF	46.8	46.3	0
1379	F 1	49	47.8	0
1380	GF	47	46.5	0
1380	F 1	49.3	47.9	0
1381	GF	47.2	46.7	0
1381	F 1	49.5	48.1	0
1382	GF	47.5	47	0
1382	F 1	49.8	48.3	0
1383	GF	47.8	47.2	0
1383	F 1	50.1	48.5	0
1384	GF	48.1	47.6	0
1384	F 1	50.4	48.7	0
1393	GF	53.8	51.4	0
1393	F 1	55.6	52.4	0
1394	GF	53.8	51.3	0
1394	F 1	55.6	52.4	0
1395	GF	53.8	51.2	0
1395	F 1	55.5	52.5	0
1396	GF	53.8	51.2	0
1396	F 1	55.5	52.5	0
1397	GF	53.9	51.1	0
1397	F 1	55.6	52.6	0
1398	GF	54	51.1	0
1398	F 1	55.6	52.6	0
1399	GF	53.9	50.9	0
1399	F 1	55.6	52.6	0
1400	GF	53.9	50.9	0

1400	F 1	55.5	52.6	0
1401	GF	53.8	50.7	0
1401	F 1	55.5	52.6	0
1402	GF	53.7	50.5	0
1402	F 1	55.3	52.4	0
1403	GF	53.7	50.3	0
1403	F 1	55.4	52.3	0
1404	GF	54.6	51.3	0
1404	F 1	56.1	53.5	0
1405	GF	53.8	50.8	0
1405	F 1	55.2	52.9	0
1406	GF	53.5	50.3	0
1406	F 1	54.9	52.2	0
1407	GF	52.8	50.1	0
1407	F 1	54.3	51.9	0
1408	GF	52.6	49.7	0
1408	F 1	54	51.4	0
1425	GF	65.4	59.2	1
1425	F 1	67.5	65.3	2
1448	GF	56.6	53.3	0
1448	F 1	58.5	54.6	0
3003	GF	56.7	53.5	0
3003	F 1	58.8	54.8	0

Appendix C Unattended Noise Monitoring Results