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Vipac Engineers & Scientists

Peet No. 119 Pty Ltd

Eden's Crossing

Stage 24 to 26 Noise Assessment

70Q-16-0182-TRP-8551163-5

3 April 2020

Report Title: Stage 24 to 26 Noise Assessment **Job Title: Eden's Crossing**	
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REVISION HISTORY

Revision No.	Date Issued	Reason/Comments
0	12/07/2019	Initial Issue
1	2/08/2019	Client Review Comments
2	6/08/2019	Client Review Comments
3	17/09/2019	Ipswich Council Comments
4	2/04/2020	Revised Lot Layout
5	3/04/2020	Lot Number Update

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1 INTRODUCTION

Vipac Engineers & Scientists Ltd (Vipac) was commissioned by Peet to provide a traffic noise impact assessment for Eden's Crossing Stages 24 to 26 in Redbank Plains. This traffic noise assessment includes the following:

- Description of the development;
- Discussion of the applicable noise criteria;
- 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.

2 DESCRIPTION OF THE DEVELOPMENT

The proposed Stages 24 to 26 will consist of 119 lots and a sports park. Mount Juillerat Drive is a sub arterial road that will run south of these lots. The expected year of completion for Stages 24 to 26 is 2024. The noise assessment has been carried out for an ultimate year of 2034.

Stages 24 to 26 and the surrounding area are shown in Figure 2-1.

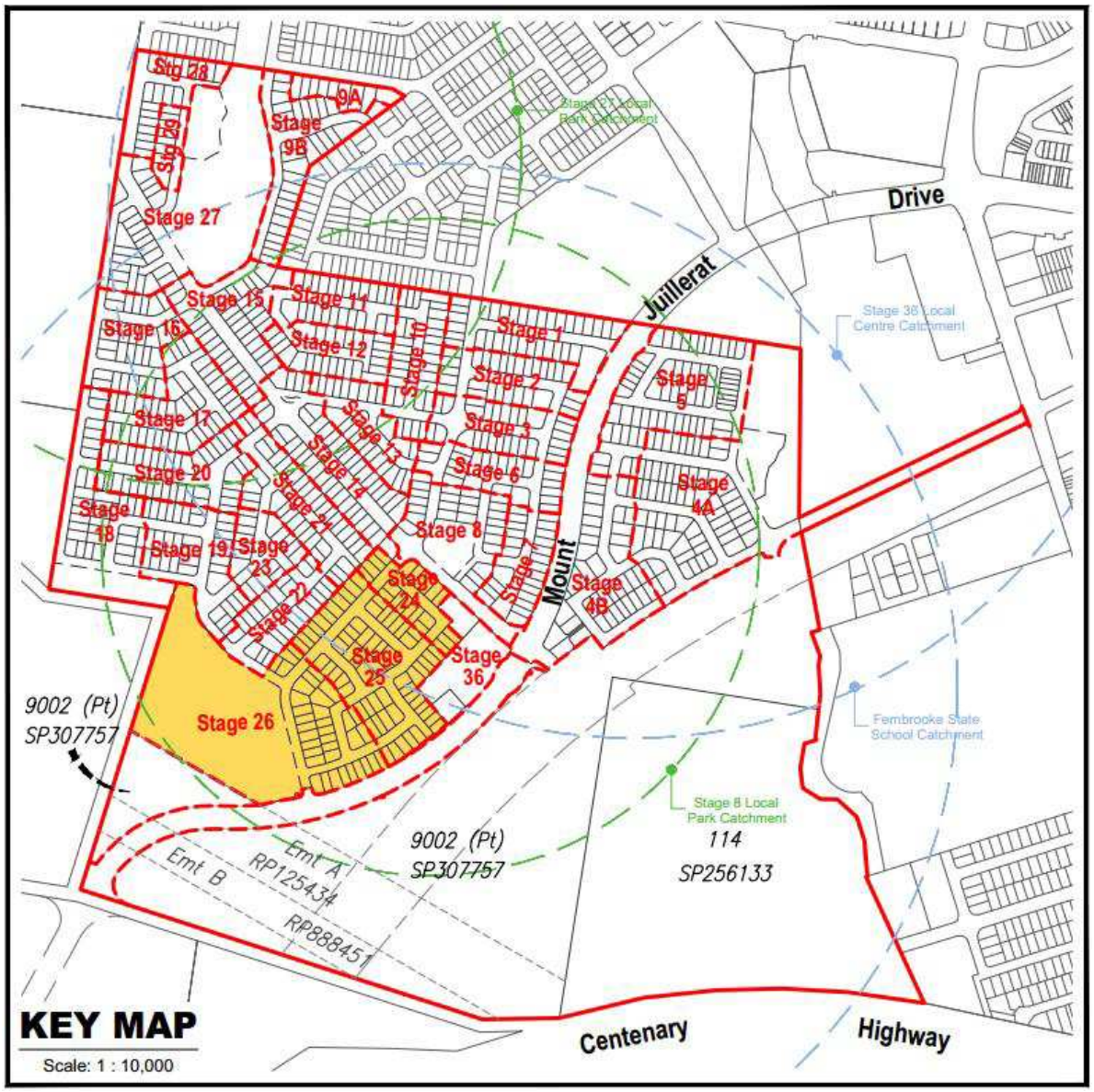

Figure 2-1 Eden's Crossing Stages 24 to 26 (Highlighted in Orange)

3 NOISE CRITERIA

3.1 STATE DEVELOPMENT ASSESSMENT PROVISIONS

The Department of State Development Infrastructure and Planning's "State Development Assessment Provisions" (SDAP) State Code 1 has been used to assess traffic noise impacts on the development. The noise criteria as per State Code 1 have been reproduced in Table 3-1. The development has been assessed according to noise limits for residences in a transport corridor, due to its proximity to a proposed future sub-arterial road Mount Juillerat Drive running northeast to southwest through the development.

Table 3-1: SDAP State Code 1 Noise Criteria

Performance outcomes	Acceptable outcomes
Noise	
Accommodation activities	
PO23 Development involving an **accommodation activity** or land for a future **accommodation activity** minimises noise intrusion from a **state-controlled road** or **type 1 multi-modal corridor** in **habitable rooms**.	**AO23.1** A noise barrier or earth mound is provided which is designed, sited and constructed: 1. to meet the following external noise criteria at all facades of the building envelope: a. ≤60 dB(A) L_{10} (18 hour) façade corrected (measured L_{90} (8 hour) free field between 10pm and 6am ≤40 dB(A)) b. ≤63 dB(A) L_{10} (18 hour) façade corrected (measured L_{90} (8 hour) free field between 10pm and 6am >40 dB(A)) 2. 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. Note: To demonstrate compliance with the acceptable outcome, it is recommended that a RPEQ certified noise assessment report is provided, prepared in accordance with the SDAP Supporting Information: Environmental emissions in a state-controlled road environment, Department of Transport and Main Roads, 2017. If the building envelope is unknown, the deemed-to-comply setback distances for buildings stipulated by the local planning instrument or relevant building regulations should be used. In some instances, the design of noise barriers and mounds to achieve the noise criteria above the ground floor may not be reasonable or practicable. In these instances, any relaxation of the criteria is at the discretion of the Department of Transport and Main Roads. OR all of the following acceptable outcomes apply: **AO23.2** Buildings which include a **habitable room** are setback the maximum distance possible from a **state-controlled road** or **type 1 multi-modal corridor**. AND **AO23.3** Buildings are designed and oriented so that **habitable rooms** are located furthest from a **state-controlled road** or **type 1 multi-modal corridor**. AND **AO23.4** Buildings (other than a **relevant residential building** or **relocated building**) are designed and constructed using materials which ensure that **habitable rooms** meet the following internal noise criteria: 1. ≤35 dB(A) L_{eq} (1 hour) (maximum hour over 24 hours). Note: Noise levels from a **state-controlled road** or **type 1 multi-modal corridor** are to be measured in accordance with AS1055.1–1997 Acoustics – Description and measurement of environmental noise. To demonstrate compliance with the acceptable outcome, it is recommended that a RPEQ certified noise assessment report is provided, prepared in accordance with the SDAP Supporting Information: Environmental emissions in a state-controlled road environment, Department of Transport and Main Roads 2017. **Habitable rooms** of **relevant residential buildings** located within a **transport noise corridor** must comply with the Queensland Development Code MP4.4 Buildings in a transport noise corridor, Queensland Government, 2015. **Transport noise corridors** are mapped on the State Planning Policy interactive mapping system.

PO24 Development involving an **accommodation activity** or land for a **future accommodation activity** minimises noise intrusion from a **state-controlled road** or **type 1 multi-modal corridor** in **outdoor spaces for passive recreation**.	**AO24.1** A noise barrier or earth mound is provided which is designed, sited and constructed: 1. to meet the following external noise criteria in **outdoor spaces for passive recreation**: a. ≤57 dB(A) L_{10} (18 hour) free field (measured L_{90} (18 hour) free field between 6am and 12 midnight ≤45 dB(A)) b. ≤60 dB(A) L_{10} (18 hour) free field (measured L_{90} (18 hour) free field between 6am and 12 midnight >45 dB(A)) 2. 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. Note: To demonstrate compliance with the acceptable outcome, it is recommended that a RPEQ certified noise assessment report is provided, prepared in accordance with the SDAP Supporting Information: Environmental emissions in a state-controlled road environment, Department of Transport and Main Roads 2017 OR **AO24.2** Each dwelling has access to an **outdoor space for passive recreation** which is shielded from a **state-controlled road** or **type 1 multi-modal corridor** by a building, solid gap-free fence, or other solid gap-free structure. AND **AO24.3** Each dwelling with a balcony directly exposed to noise from a **state-controlled road** or **type 1 multi-modal corridor** has a continuous solid gap-free balustrade (other than gaps required for drainage purposes to comply with the Building Code of Australia).

3.2 QUEENSLAND DEVELOPMENT CODE MP4.4

The Queensland Development Code (QDC) MP4.4 document specifies external building construction requirements based on the external road traffic noise levels to achieve acceptable indoor noise levels. The road traffic noise level categories, as specified in Schedule 3 of MP4.4, are given in Table 3-2. The required building construction acoustic ratings for each noise category are also listed in Table 3-2.

Table 3-2: 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 CRITERIA USED IN THIS ASSESSMENT

The development stages are near the future Mount Juillerat Drive which will be a major road. The following noise limits have been adopted for Stages 24 to 26 where future background noise levels are expected to be above 40 dB(A) $L_{90, 8hr}$ and 45 dB(A) $L_{90, 18hr}$

As a result, the relevant criteria for this development are:

- Noise at the external façade of a residence: ≤ 63 dB(A) $L_{10, 18hr}$ façade corrected;
- Noise inside private open space on Lots (for passive recreation): ≤ 60 dB(A) $L_{10, 18hr}$ free field; and
- Development Code MP4.4 for habitable rooms of residential buildings.

4 NOISE IMPACT ASSESSMENT

Noise impact assessment has been conducted using the SoundPlan noise modelling software. The following are discussed in this section:

- Modelling methodology and assumptions;
- Traffic data;
- Scenarios modelled;
- Predicted road traffic noise levels; and
- Noise barrier specifications.

4.1 TRAFFIC NOISE MODELLING METHODOLOGY

Traffic noise calculations were carried out using SoundPlan noise modelling software. The data and assumptions used in traffic noise modelling are presented in Table 4-1.

Table 4-1: 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) Private Open Space: 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	Stages 24 to 26 terrain data from Peet, "x18-134_cont_des_200402", received 02/04/2020 Surrounding terrain contours and Centenary Highway contours as used for previous stages of Eden's Crossing development
Lot Layout	Stages 24 to 26 layout from Peet, "x18-134_base_kng_200402", received 02/04/2020
Calculation Method	UK's Calculation of Road Traffic Noise (CoRTN)
Road Surface	Dense Graded Asphalt was modelled as the road surface for all roads. • A correction of -1.7 dB(A) has been applied for façade corrected receivers for Queensland conditions (Department of Transport and Main Roads, Transport Noise Management Code of Practice 2013); and • A correction of -0.7 dB(A) has been applied for free field locations for Queensland conditions (Department of Transport and Main Roads, Transport Noise Management Code of Practice 2013).
Existing Noise Barriers	2m Noise Barriers as per the noise assessment report for Stages 1 to 3, and 6 to 8 (Report number 70Q-16-0182-TRP 540531-2, dated 28 June 2017)

The above data has been incorporated into an existing SoundPlan noise model and future traffic noise levels predicted. The expected year of completion for Stages 24 to 26 is 2024, and traffic noise has been assessed for an ultimate year of 2034 (10 years post completion). The traffic volumes adopted for this assessment are presented in Table 4-2. Traffic data for Mount Juillerat Drive have been extrapolated from the assessment of previous stages using a growth rate of 3% per annum. Traffic data for Centenary Motorway have been extrapolated from the Department of Transport and Main Roads traffic count at site 136152, also using a growth rate of 3% per annum. It has been assumed that commercial vehicle percentages will remain the same.

Table 4-2: Traffic Data Used in Traffic Noise Modelling

Road	Scenario	Year	AADT	18hr Traffic Volumes	%CV	Speed	Growth Rate
Centenary Motorway	Traffic Count (Site 136152)	2018	14,095	13,249	8.92%	100	3%
	Ultimate	2034	22618	21,261	8.92%	100	
Mount Juillerat Drive	Ultimate	2034	18,448	17,341	5%	70	

*2034 traffic volumes were extrapolated using data from the Department of Transport and Main Roads and TTM.

4.1 PREDICTED TRAFFIC NOISE LEVELS

4.1.1 PREDICTED FAÇADE CORRECTED TRAFFIC NOISE LEVELS WITH NO NOISE MITIGATION

Predicted traffic noise levels are shown as noise maps in Appendix A. Traffic noise levels for a number of lots that are nearest to Mount Juillerat Drive are predicted to exceed the noise criteria on the ground floor and the upper floor. Lots predicted to exceed the noise limit are shown in Table 4-3.

Table 4-3 Lots Predicted to Exceed the External Noise Limit

Noise Limit	Lots Exceeding Noise Limits	Location
$L_{A10,18hr}$ 63 dB(A) – Façade corrected	1163 to 1176, 1228, 1229	Ground Floor
	1162 to 1176, 1228, 1229	Upper Floor

4.1.2 PREDICTED PRIVATE OPEN SPACE NOISE LEVELS WITH NO NOISE MITIGATION

Predicted traffic noise levels for private open spaces are shown as noise maps in Appendix A. Without a noise barrier, the lots that exceed the private open space noise criteria are tabulated in Table 4-4.

Table 4-4 Lots Predicted to Exceed the Private Open Space Limit

Noise Limit	Lots Exceeding Noise Limits	Location
$L_{A10,18hr}$ 60 dB(A) – Free-field	1162 to 1176, 1228, 1229	Private Open Space

5 NOISE BARRIER REQUIREMENTS

The exceedances of the $L_{A10,18hr}$ 63 dB(A) façade noise limit and $L_{A10,18hr}$ 60 dB(A) private open space noise limit are caused by traffic noise from Mount Juillerat Drive. Noise barriers would be required to be constructed on the boundary of the subdivision on lots 1164 to 1176, 1228 and 1229 as shown in Figure 5-1 to reduce the traffic noise levels. Ipswich City Council's 'Guideline No. 21 - Appropriate Visual and Acoustic Treatment of Roadways' specifies a maximum height of 2m for acoustic fencing, and this has been applied in modelling.

Figure 5-1 2m Noise Barrier for Lots Adjacent to Mount Juillerat Drive

5.1 PREDICTED FAÇADE CORRECTED TRAFFIC NOISE LEVELS WITH NOISE BARRIERS

With noise barriers as per Figure 5-1, the predicted results in Appendix A show future traffic noise levels for all lots in the development will be $L_{A10,18hr}$ 63 dB(A) or less (facade corrected) for the ground floor, except for a number of lots facing Mount Juillerat Drive where traffic noise levels may exceed the criteria depending on the building setback distance from the road. Lots that are predicted to exceed the criteria are summarised in Table 5-1 below.

Table 5-1: Lots Predicted to Exceed the External Noise Limit with Noise Mitigation

Noise Limit	Lots Exceeding Noise Limits	Floor
$L_{A10,18hr}$ 63 dB(A) – Façade corrected	1165 to 1167, 1169, 1172 to 1176, 1228 and 1229	Ground
	1163 to 1176, 1228 and 1229	Upper

5.2 PREDICTED PRIVATE OPEN SPACE NOISE LEVELS WITH NOISE BARRIERS

The predicted noise results in Appendix A show future traffic noise levels for the lots in the development will be $L_{A10,18hr}$ 60 dB(A) or less in private open spaces and traffic noise levels are predicted to comply with the noise criteria in Table 3-1. Lots 1164 to 1170, 1172 to 1176, 1228 and 1229 are predicted to have areas within the lots where traffic noise levels may be greater than $L_{A10,18hr}$ 60 dB(A), however it is expected that these lots will

contain adequate areas for use as private outdoor living spaces (see Figure A-6 in Appendix A). For these lots, it is also recommended that building designs should take into consideration any opportunities to provide further reduction of traffic noise to outdoor living spaces.

6 BUILDING CONSTRUCTION ACOUSTIC REQUIREMENTS

MP4.4 categories applicable to building construction has been summarised in Table 6-1 showing categories of 0 to 3. Where a lot is not listed in this table, category 0 would be applicable to the Lot (that is, no acoustic treatment would be required). As noise levels may vary within a lot, the specific MP4.4 category for a building may depend on the final location of the building on a given lot. Where MP4.4 categories are predicted to vary within a lot, the worst case category has been shown.

Noise maps showing predicted noise levels for the purpose of demonstrating the applicable MP4.4 categories have been included in Appendix B.

Table 6-1 MP4.4 Categories

Lot No	Floor	QDC MP4.4 Categories with Noise Barrier
1136	Ground	1
	Upper	1
1137	Ground	1
	Upper	1
1138	Ground	1
	Upper	1
1139	Ground	1
	Upper	1
1140	Ground	1
	Upper	1
1141	Ground	1
	Upper	1
1142	Ground	1
	Upper	1
1143	Ground	1
	Upper	1
1157	Ground	0
	Upper	1
1158	Ground	1
	Upper	1
1159	Ground	1
	Upper	1
1160	Ground	1
	Upper	1
1161	Ground	1

Lot No	Floor	QDC MP4.4 Categories with Noise Barrier
	Upper	1
1162	Ground	1
	Upper	2
1163	Ground	1
	Upper	2
1164	Ground	2
	Upper	3
1165	Ground	2
	Upper	3
1166	Ground	2
	Upper	3
1167	Ground	2
	Upper	3
1168	Ground	2
	Upper	3
1169	Ground	2
	Upper	3
1170	Ground	2
	Upper	3
1171	Ground	2
	Upper	3
1172	Ground	2
	Upper	3
1173	Ground	2
	Upper	3
1174	Ground	2
	Upper	3
1175	Ground	2
	Upper	3
1176	Ground	2
	Upper	3
1177	Ground	1
	Upper	1
1178	Ground	1
	Upper	1
1179	Ground	1

Lot No	Floor	QDC MP4.4 Categories with Noise Barrier
	Upper	1
1180	Ground	0
	Upper	1
1181	Ground	0
	Upper	1
1182	Ground	0
	Upper	1
1185	Ground	0
	Upper	1
1186	Ground	0
	Upper	1
1187	Ground	0
	Upper	1
1188	Ground	0
	Upper	1
1189	Ground	0
	Upper	1
1190	Ground	0
	Upper	1
1191	Ground	1
	Upper	1
1192	Ground	1
	Upper	1
1193	Ground	1
	Upper	1
1194	Ground	1
	Upper	1
1195	Ground	1
	Upper	1
1196	Ground	1
	Upper	1
1223	Ground	0
	Upper	1
1224	Ground	0
	Upper	1
1225	Ground	1

Lot No	Floor	QDC MP4.4 Categories with Noise Barrier
	Upper	1
1226	Ground	1
	Upper	1
1227	Ground	1
	Upper	1
1228	Ground	2
	Upper	3
1229	Ground	2
	Upper	3

The minimum transport noise reductions applicable to each MP4.4 category are shown in Section 6.1.

6.1 TRANSPORT NOISE REDUCTION REQUIREMENTS

The minimum transport noise reductions applicable to each MP4.4 category are shown below in Figure 6-1 (reproduced from QDC MP4.4 Schedule 1). QDC MP4.4 Schedule 2 (not included in this report) may be referred to for examples of construction that would achieve the noise reductions.

Noise category	Minimum *transport noise reduction (dB (A))* required for *habitable rooms*	Component of building's *external envelope*	Minimum R_w required for each component
Category 3	35	Glazing	38 (where total area of glazing for a *habitable room* is greater than 1.8m^2)
			35 (where total area of glazing for a *habitable room* is less than or equal to 1.8m^2)
		External walls	47
		Roof	41
		Floors	45
		Entry doors	33
Category 2	30	Glazing	35 (where total area of glazing for a *habitable room* is greater than 1.8m^2)
			32 (where total area of glazing for a *habitable room* is less than or equal to 1.8m^2)
		External walls	41
		Roof	38
		Floors	45
		Entry doors	33
Category 1	25	Glazing	27 (where total area of glazing for a *habitable room* is greater than 1.8m^2)
			24 (where total area of glazing for a *habitable room* is less than or equal to 1.8m^2)
		External walls	35
		Roof	35
		Entry Doors	28
Category 0	No additional acoustic treatment required – standard building assessment provisions apply.		

Figure 6-1 Minimum Transport Noise Reductions (Reproduced from QDC MP4.4 Schedule 1)

6.2 VENTILATION REQUIREMENTS

Acceptable indoor noise levels according to MP4.4 can be achieved. However, for the habitable rooms of future residences on Lots where the MP4.4 traffic noise categories are 1 or greater, doors and windows would require to be closed. Alternative ventilation may include air-conditioning, borrowed ventilation, mechanical assisted ventilation or other suitable methods.

7 CONCLUSION AND RECOMMENDATIONS

Vipac has completed a traffic noise impact assessment for the proposed Eden's Crossing Stages 24 to 26.

Traffic noise modelling shows noise levels are predicted to exceed the SDAP State Code 1 noise limits at some of the lots within the proposed development. The following noise mitigation measures are recommended:

- Construction of 2m high noise barriers adjacent to Mount Juillerat Drive is required as presented in Figure 5-1. Barriers should have no gaps between palings, or between palings and posts and ground. A minimum surface density of 12.5kg/m^2 should be used;

- Where noise levels are predicted to impact on future residential buildings, building construction should be built to provide traffic noise reductions as per Section 6; and
- For habitable rooms of future residences on Lots where the MP4.4 Traffic Noise Category is 1 or greater, doors and windows must be closed to achieve acceptable indoor noise levels. Under these conditions, alternative ventilation will be required in affected rooms. Alternative ventilation may include air-conditioning, borrowed ventilation, mechanically assisted ventilation or other suitable methods.

Appendix A NOISE CONTOUR MAPS

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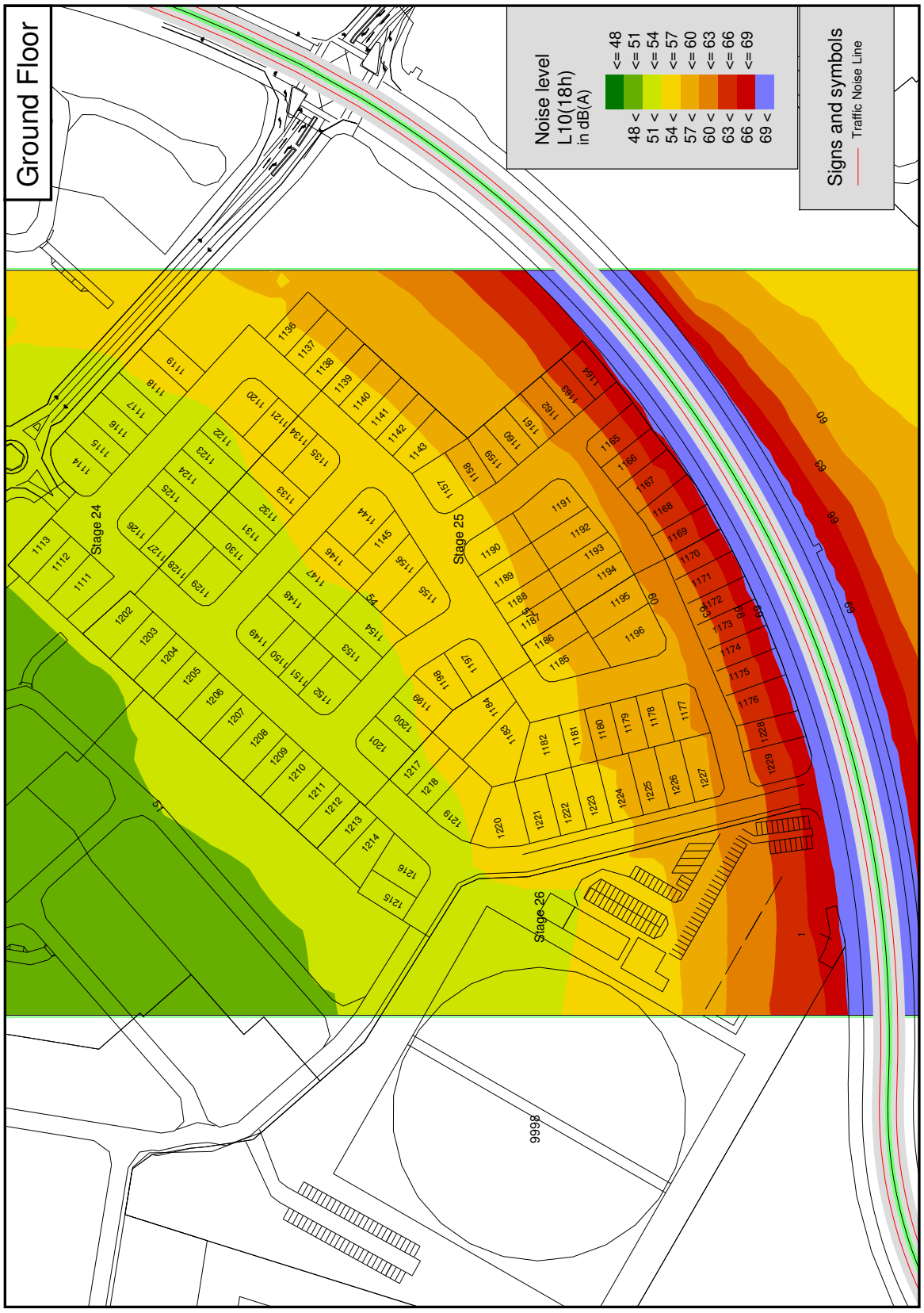

Figure A-1 Predicted Noise Levels for Ground Floor (Including Façade Correction)

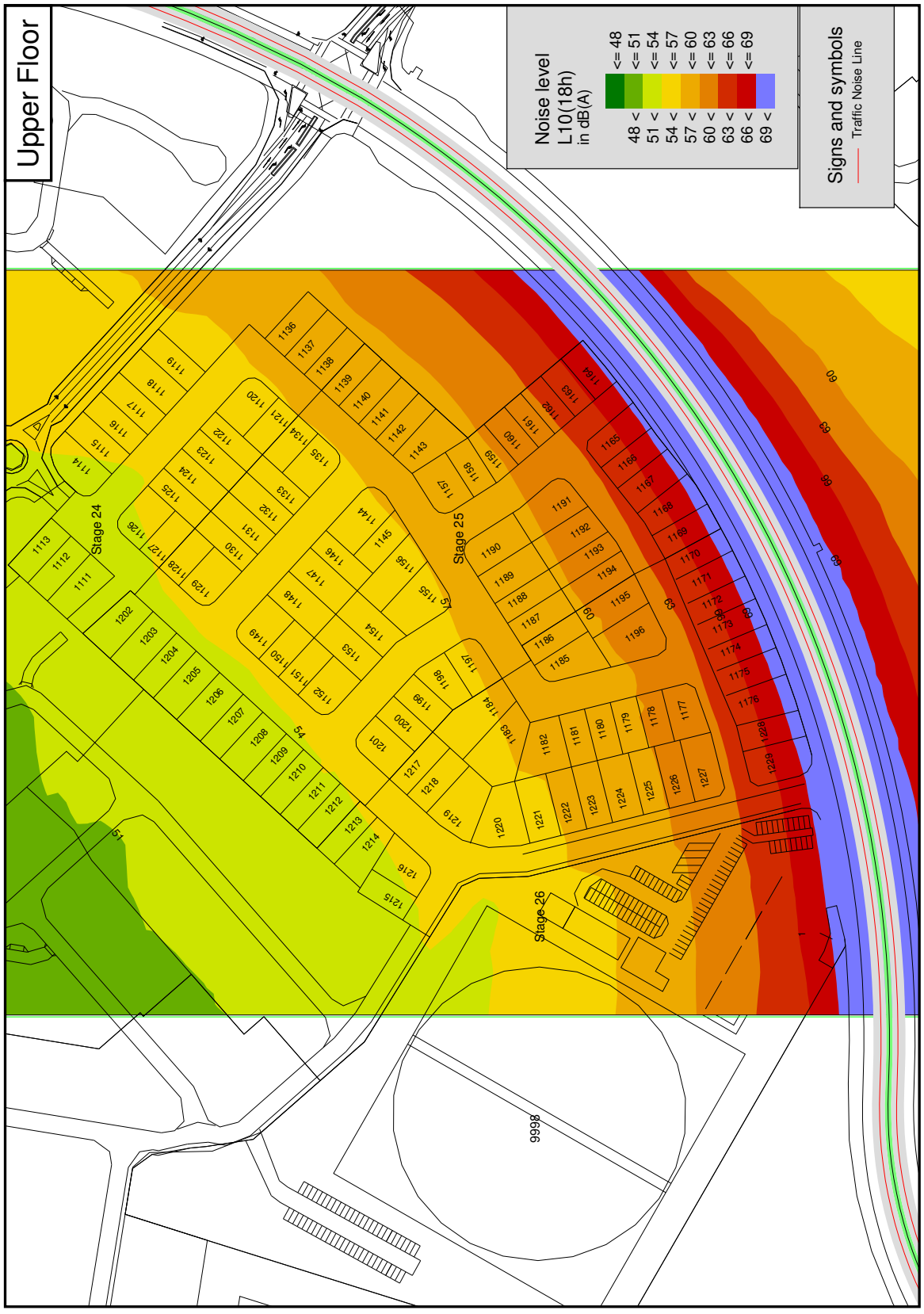

Figure A-2 Predicted Noise Levels for Upper Floor (Including Façade Correction)

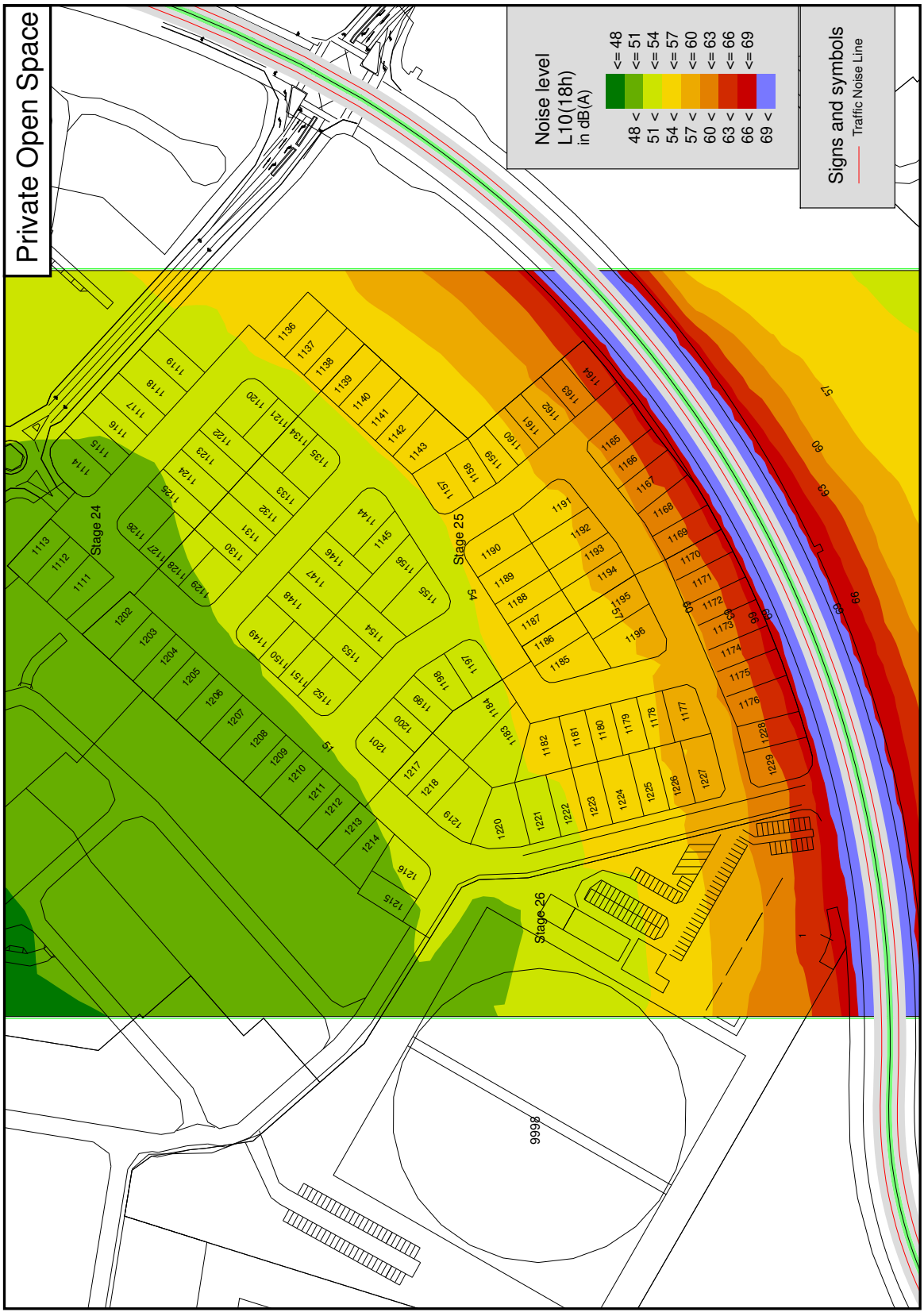

Figure A-3 Predicted Noise Levels for Private Open Space (Free Field)

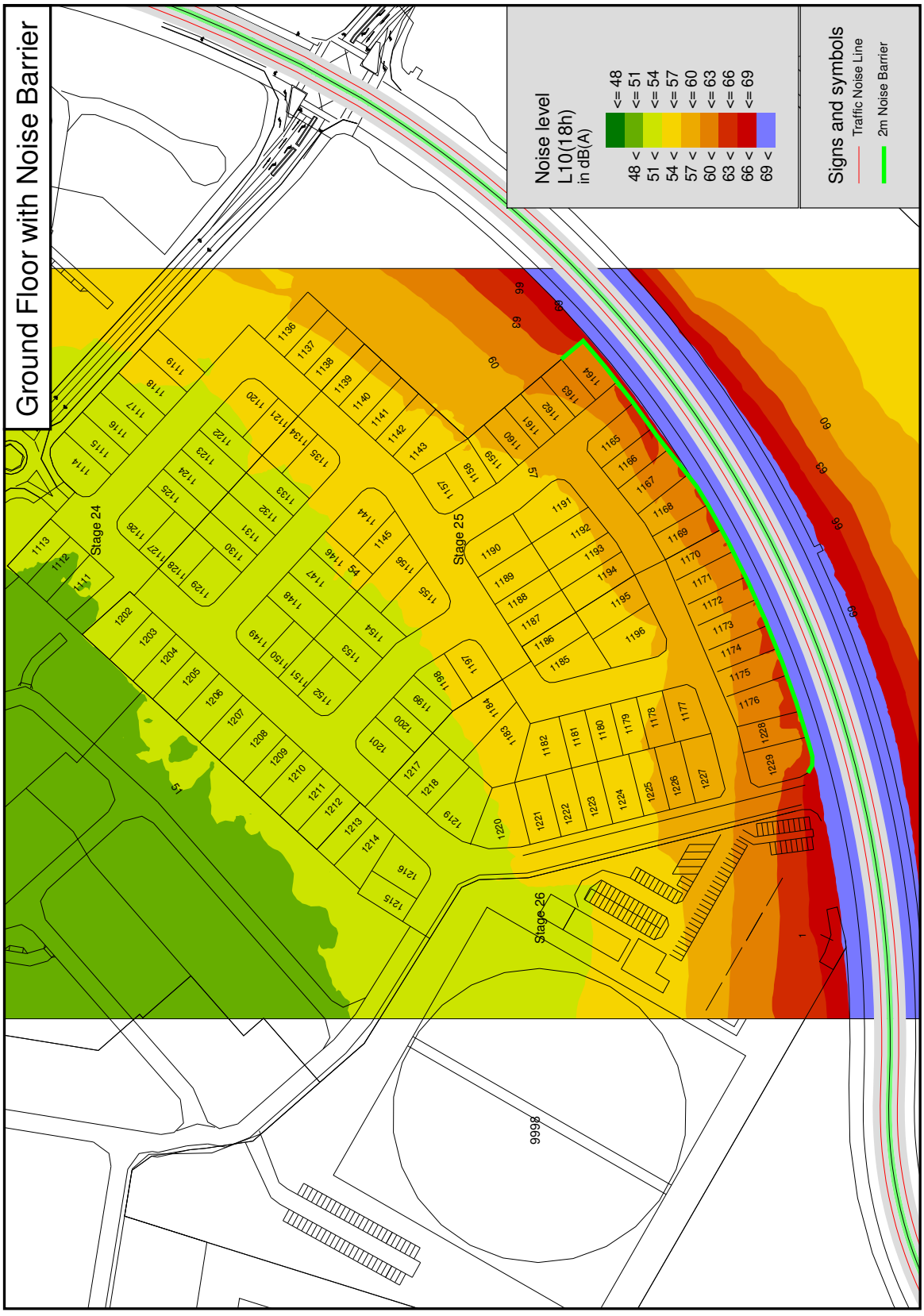

Figure A-4 Predicted Noise Levels for Ground Floor with Noise Barrier (Façade Corrected)

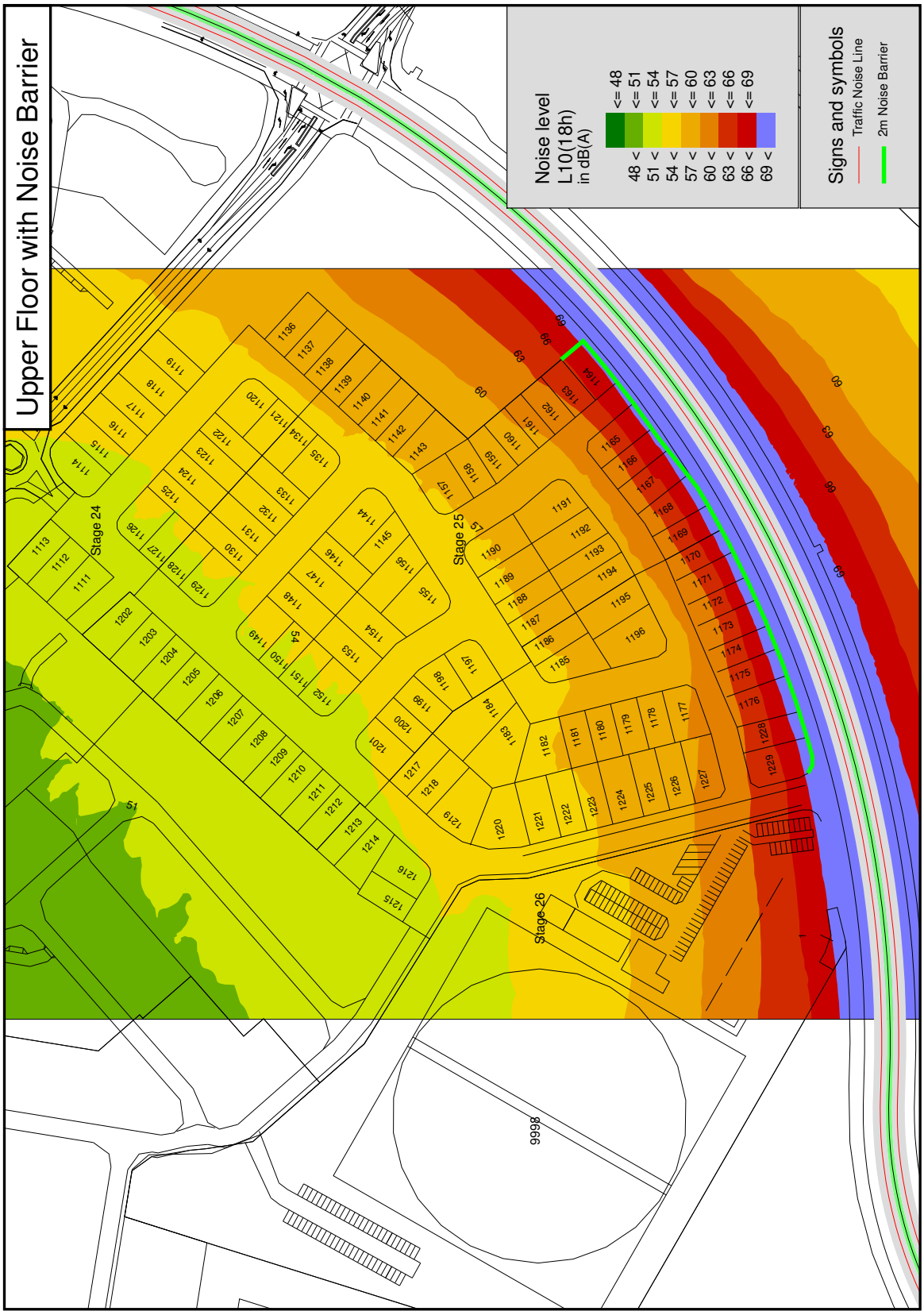

Figure A-5 Predicted Noise Levels for Upper Floor with Noise Barrier (Façade Corrected)

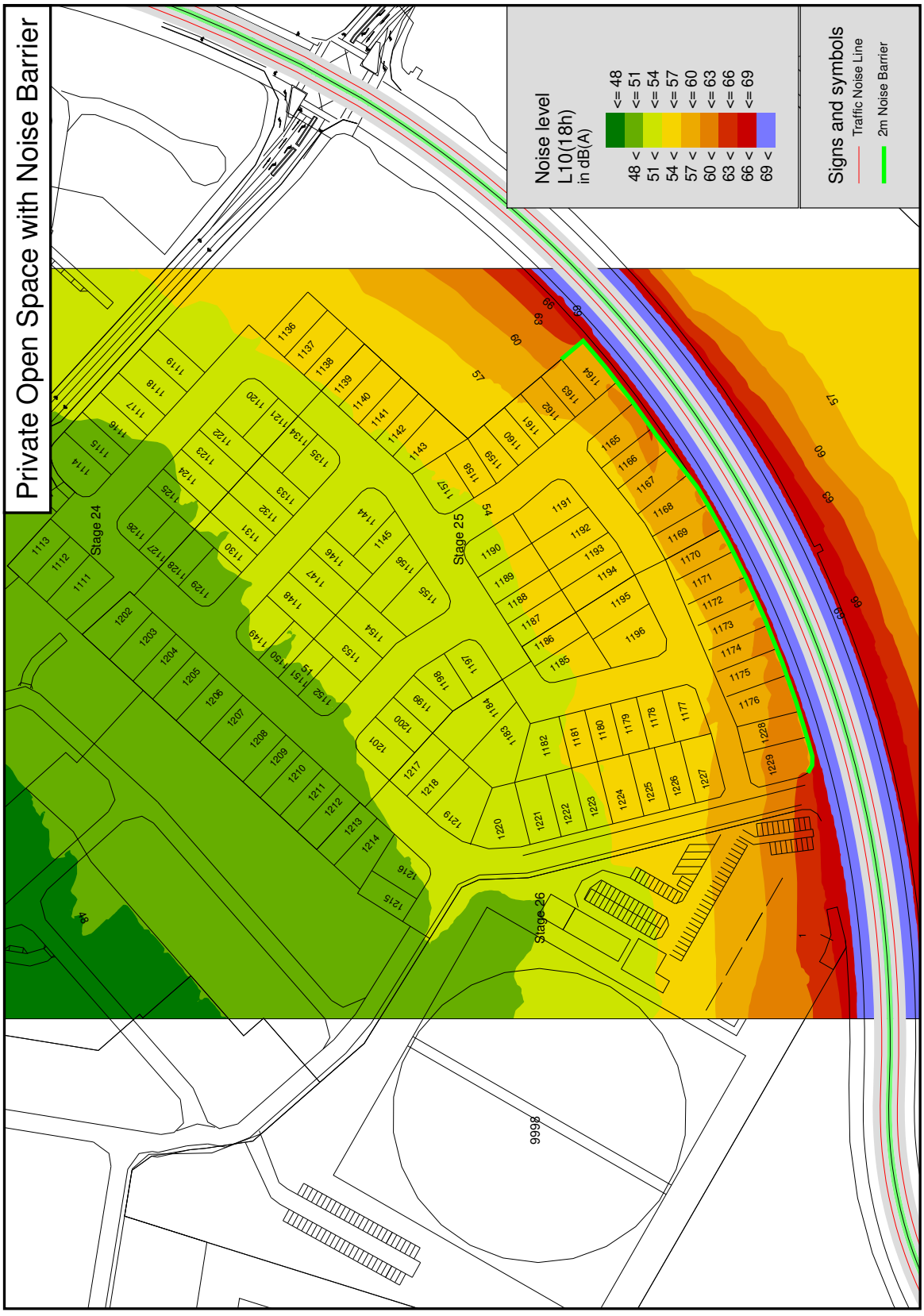

Figure A-6 Predicted Noise Levels for Private Open Space with Noise Barrier (Free Field)

Appendix B NOISE CONTOUR MAPS FOR MP4.4 IDENTIFICATION

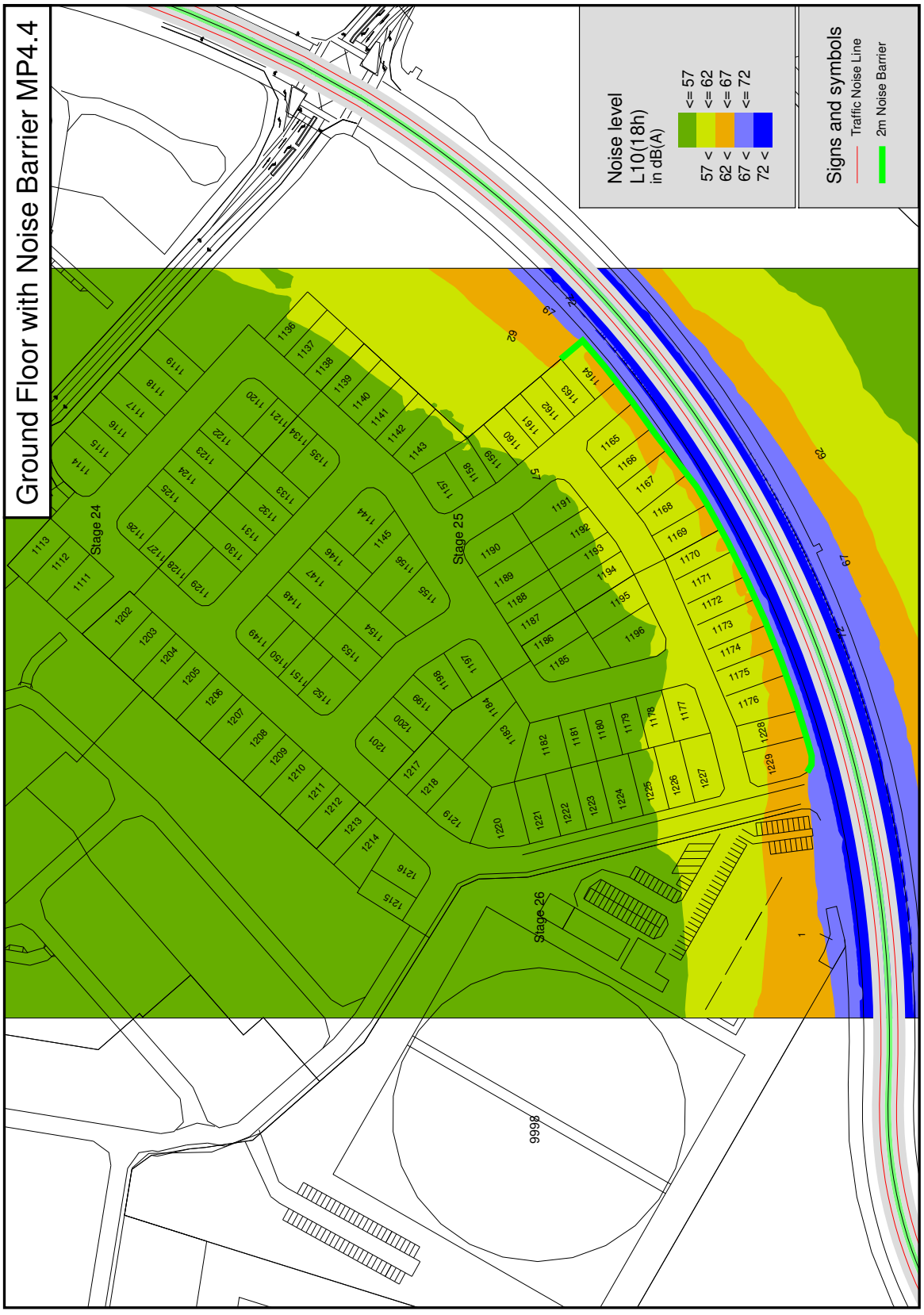

Figure B-1 Predicted Noise Levels for Ground Floor (Façade Corrected)

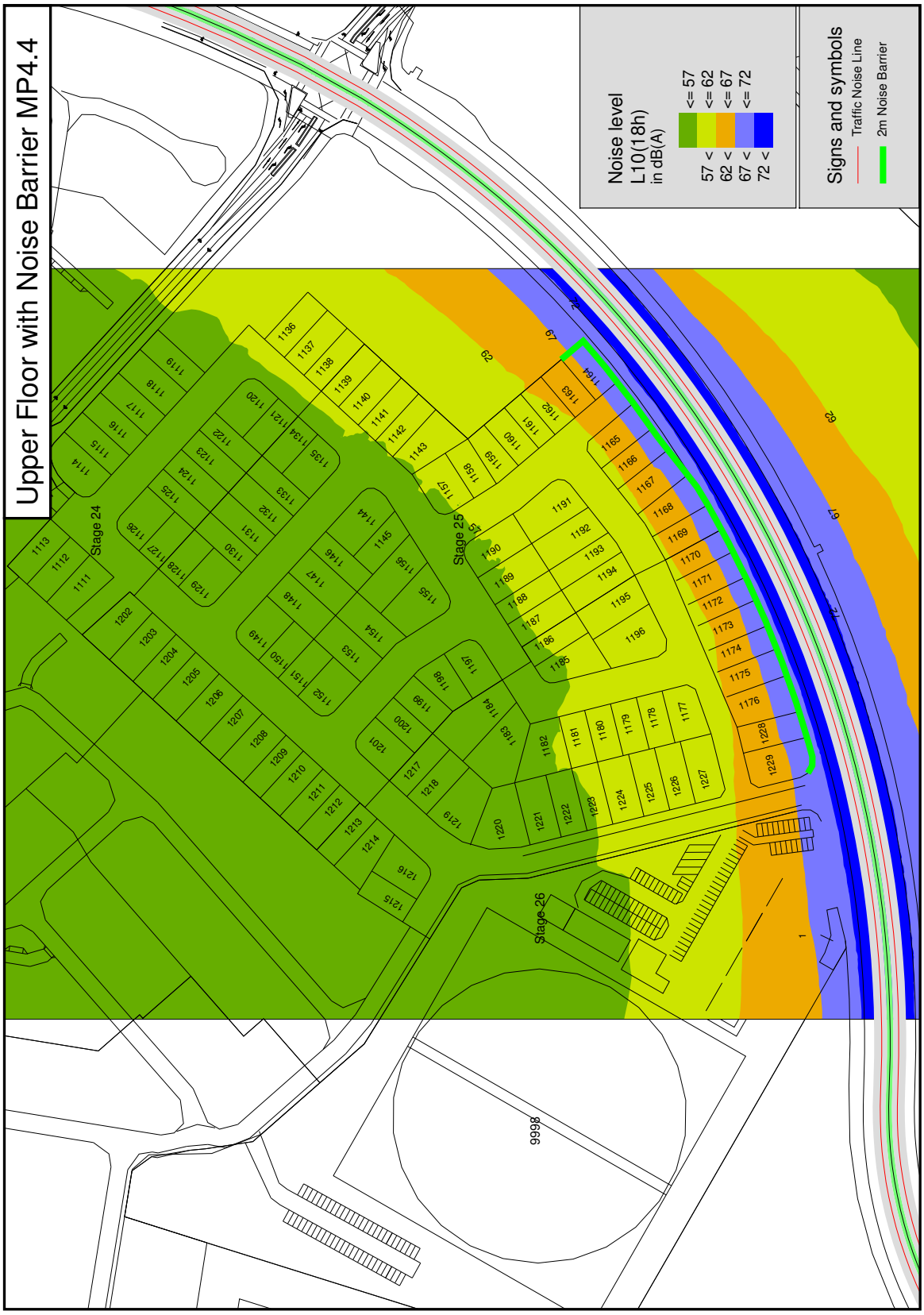

Figure B-2 Predicted Noise Levels for Upper Floor (Façade Corrected)