25 August 2016

620.10512 Stage 1E-1F RTN 20160825.docx

Peet Flagstone City Pty Ltd
Level 2, 167 Eagle Street
Brisbane QLD 4000

Attention: Nick Karimi

Dear Nick

Flagstone City Development
Stage 1E and 1F Road Traffic Noise Assessment

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Peet Flagstone City Pty Ltd (Peet) to conduct an assessment of road traffic noise for Stages 1E and 1F of the proposed Flagstone City Development.

The road traffic noise assessment has been undertaken with regard to the *Queensland Development Code – Buildings in a Transport Noise Corridor* (QDC MP4.4). In summary the assessment has concluded:

- At least 31 lots in Stage 1E and 17 lots in Stage 1F will require no additional acoustic treatments if a low-set dwelling is constructed; and at least 17 lots in Stage 1E and 5 lots in Stage 1F will require no additional acoustic treatments if a high-set dwelling is constructed.
- In Stage 1F, Lots 148, 151, 183 and 200, could require Category 2 property treatments (see **Table 2**) for a low-set or high-set dwelling and up to 8 other lots for high-set dwellings. The remaining lots (Stage 1E and 1F) would require no more than Category 1 property treatments (low-set and high-set dwellings).
- The shape and form of individual buildings is not known at this time and as such buildings are not included in the noise model. It is recommended dwellings proposed to be built on lots behind developed lots more exposed to the road network undergo further assessment once the building design is known to confirm QDC MP4.4 construction requirements.

The enclosed report details the road traffic assessment methodology, predicted MP4.4 noise categories and recommended building components for the relevant building component and applicable noise category.

Should you have any questions, or require additional assistance, please contact the undersigned at 07 3858 4800 (rcuskelly@slrconsulting.com).

Yours sincerely

RACHEL CUSKELLY

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1 Introduction

SLR has previously carried out an acoustic assessment[1] for the Flagstone City Development Project (the Project); however refinement of the lot configurations as well as finalising of the pad heights for Stages 1E and 1F has taken place warranting revision of the road traffic noise assessment.

The findings of the original acoustic assessment determined that noise from the Sydney to Brisbane Line, to the east of the Flagstone City Development Project, would be within rail noise assessment criteria at Stage 1E and 1F. The Flagstone Sewage Treatment Plant (STP) is located at least 900 m from Stage 1E and 1F and noise emissions would achieve the assessment criteria.

In this regard, further consideration of noise from the rail Line and the STP has not been required for this assessment.

2 Development Description

The subject site is the centre of the city of Greater Flagstone and will incorporate the main city centre for the region located next to the existing Sydney to Brisbane Line (future integrated transport site for passenger bus and rail).

Surrounding this will be the transitional city frame which will include more residential and support uses, and then the traditional neighbourhood design of sub neighbourhoods within walking distance of neighbourhood centres. The design of Flagstone City Development aims to provide a built environment with an emphasis on green space.

The general lot configuration of Stages 1E and 1F within the Flagstone City Development are shown on **Figure 1**.

3 Road Traffic Noise Criteria

For the purpose of the noise assessments undertaken to date it has been assumed that all roads within the Flagstone City Development would be designated as either State-controlled roads or designated local government roads.

Residential buildings within a Transport Noise Corridor for State-controlled roads or designated local government roads are to be designed and constructed in accordance with the *Queensland Development Code – Buildings in a Transport Noise Corridor* (QDC MP4.4). It is noteworthy that QDC MP4.4 applies only at the building approval and construction phase.

QDC MP4.4 provides noise categories based on road traffic noise levels expected 1 m from the facade of a building. The higher the noise category, the more substantial the acoustic design and construction requirements will be in order to achieve an acceptable amenity within the residence.

The noise categories and their corresponding criterion levels applicable to road noise from State-controlled roads within the Flagstone City Development are described in **Table 1**.

Table 1 QDC MP4.4 Noise Category Levels

Noise Category	Level of Transport Noise for State-Controlled Roads, dBA ($L_{A10(18hour)}$)
Category 4	≥73
Category 3	68 – 72
Category 2	63 – 67
Category 1	58 – 62
Category 0	≤ 57

Note Transport noise is assessed at 1 m from the façade of the proposed or existing building.

[1] SLR Consulting Australia , 2012. Flagstone Development Noise Assessment, document 620.10512-R1, dated 13 August 2012.

Figure 1 Stage 1E and Stage 1F Lot Configuration

FIRE ANT NOTE:

UNDER QUEENSLAND LEGISLATION, FIRE ANTS ARE A NOTIFIABLE PEST AND SUSPECTED SIGHTING MUST BE REPORTED TO BIOSECURITY QUEENSLAND. MOVEMENT OF FIRE ANTS IS PROHIBITED UNLESS APPROVED OTHERWISE BY THE DEPARTMENT OF PRIMARY INDUSTRIES. THE CONTRACTOR SHALL ACQUIRE THE NECESSARY PERMITS TO COMPLETE THE WORKS.

LOCAL AUTHORITY:	ECONOMIC DEVELOPMENT QUEENSLAND
EDQ FILE REF NO:	DEV2012/402
RP DESCRIPTION:	LOT 908 RP819216
PARISH/COUNTY:	MACLEAN/UNDULLAH
ORIGIN:	PM107142 (RL39.078)
HORIZONTAL DATUM:	MGA

REV	DESCRIPTION	BY	APP	DATE
A	ORIGINAL ISSUE	AC	JH	02.12.15

5 0 5 10 15 20 25m
1 : 500 (FULL SIZE A1)

SURVEYOR
THG
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RPEQ 5023

Approved by, for and on behalf of Bradlees

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QUALITY ASSURED COMPANY AS/NZS ISO 9001:2008 REGN. NO. 233

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Bradlees Part of the Meinhardt Group

CLIENT: PEET FLAGSTONE CITY PTY. LTD.

PROJECT: FLAGSTONE CITY - STAGE 1E
ECONOMIC DEVELOPMENT QUEENSLAND

TITLE: INDICATIVE PAD LEVELS PLAN

STATUS: PRE CONSTRUCTION CERTIFICATION

DESIGNED	DRAWN	APPROVED	DATE	SCALE @ A1	SHEET
NM	AC	JH	02.12.15	1:500	1 OF 1

PROJECT No	DRAWING No	REV
15-839	C1-S1E-CIL-103	A

LEGEND

PL 45.84	FINISHED PAD LEVEL
	NOMINAL KERB LINE
⇨	ZERO LOT BOUNDARY
	PROPOSED BUILDING ENVELOPE

FIRE ANT NOTE:

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A	ORIGINAL ISSUE	AC	JH	02.12.15

5 0 5 10 15 20 25m
1 : 500 (FULL SIZE A1)

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CLIENT: PEET FLAGSTONE CITY PTY. LTD.

PROJECT: FLAGSTONE CITY - STAGE 1F

ECONOMIC DEVELOPMENT QUEENSLAND

TITLE: INDICATIVE PAD LEVELS PLAN

STATUS: PRE CONSTRUCTION CERTIFICATION

DESIGNED	DRAWN	APPROVED	DATE	SCALE @ A1	SHEET
NM	AC	JH	02.12.15	1:500	1 OF 1

PROJECT No: 15-840
DRAWING No: C1-S1F-CIL-103
REV: A

4 Assessment of Road Traffic Noise

4.1 Methodology

The road traffic noise assessment methodology for Stages 1E and 1F of the Project is identical to that detailed in the original acoustic assessment (SLR 2012). The current assessment incorporates the most recent lot configuration as well as 3-D topography of the final pad heights.

4.2 QDC MP4.4 Assessment

Year 2051 road traffic noise levels for Stages 1E and 1F of the Project have been predicted with regards to the QDC MP4.4 noise categories. The QDC MP4.4 noise category for each residential lot in Stage 1E and 1F are detailed in the following figures:

- **Figure 2** presents the noise categories calculated at 1.8 m above pad level for low-set dwellings,
- **Figure 3** presents the noise categories calculated at 4.6 m above pad level for high-set dwellings.

Tables of the predicted road traffic noise categories at each Lot within Stage 1E and Stage 1F are detailed in **Appendix B**.

The building design and construction of the dwellings was not known at the time of the assessment, as such the noise model did not take into account potential road traffic noise shielding from future residential buildings within the development.

It is recommended that dwellings proposed to be built on lots located behind developed lots more exposed to the road network undergo further assessment to confirm if a lower noise category is applicable and therefore a reduction in QDC MP4.4 construction requirements.

Figure 2 Noise Categories Calculated at 1.8 m above Pad Level for Low-Set Dwellings

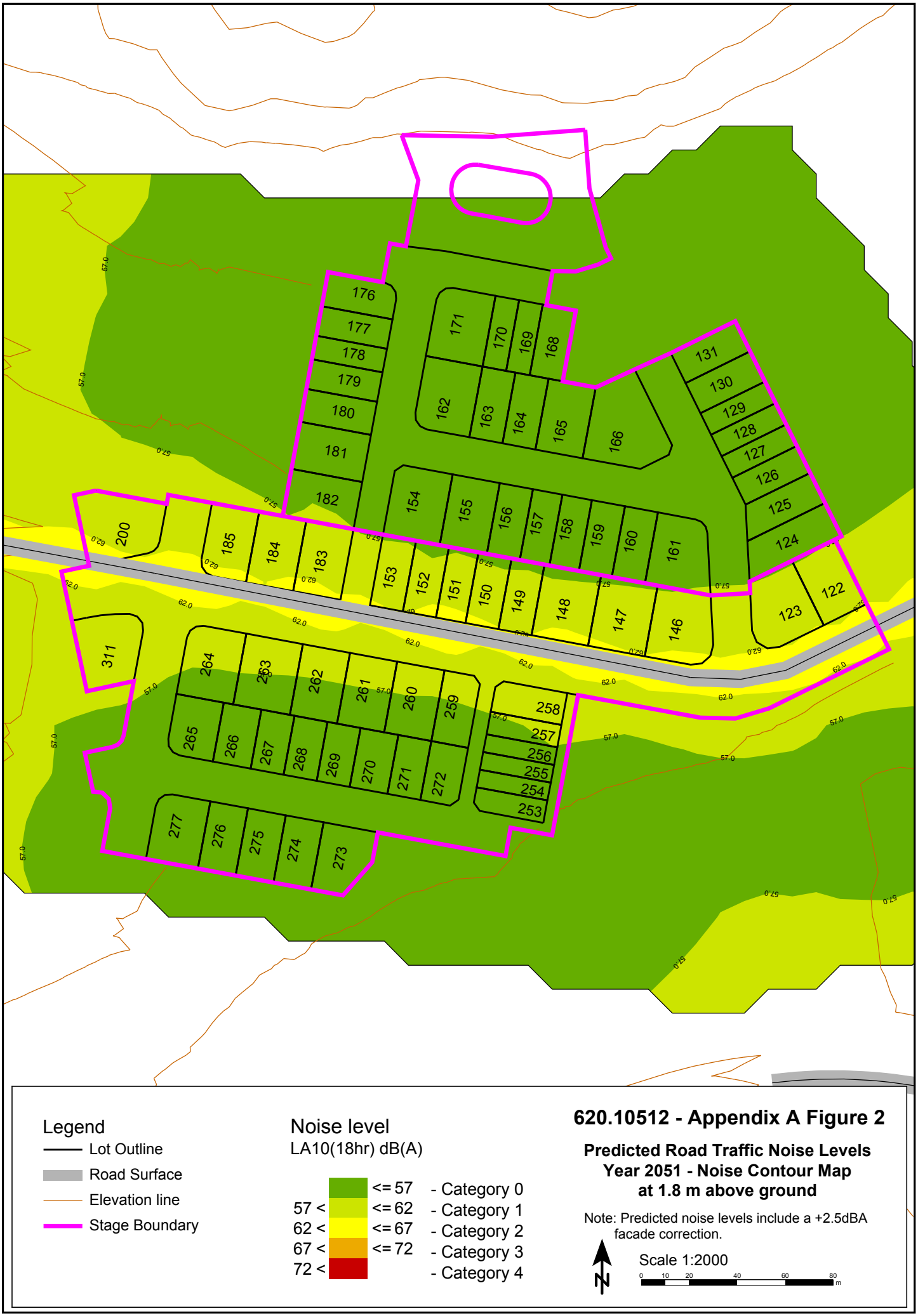
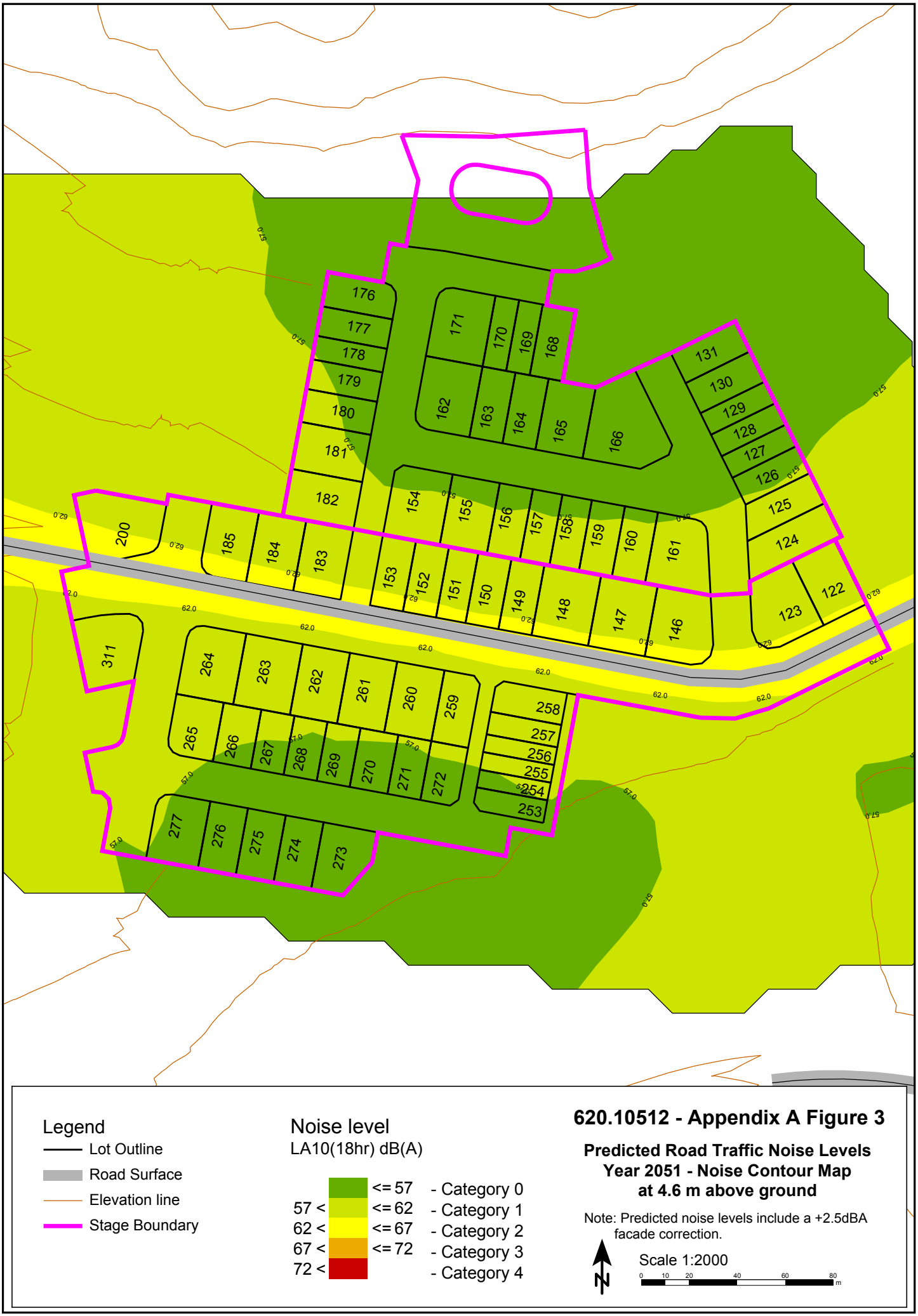

Legend
Lot Outline
Road Surface
Elevation line
Stage Boundary
Noise level
LA10(18hr) dB(A)
<= 57 - Category 0
57 < <= 62 - Category 1
62 < <= 67 - Category 2
67 < <= 72 - Category 3
72 < - Category 4
620.10512 - Appendix A Figure 2
Predicted Road Traffic Noise Levels
Year 2051 - Noise Contour Map
at 1.8 m above ground
Note: Predicted noise levels include a +2.5dBA facade correction.
Scale 1:2000
0 10 20 40 60 80 m

Figure 3 Noise Categories Calculated at 4.6 m above Pad Level for High-Set Dwellings


Legend
Lot Outline
Road Surface
Elevation line
Stage Boundary
Noise level
LA10(18hr) dB(A)
<= 57 - Category 0
57 < <= 62 - Category 1
62 < <= 67 - Category 2
67 < <= 72 - Category 3
72 < - Category 4
620.10512 - Appendix A Figure 3
Predicted Road Traffic Noise Levels
Year 2051 - Noise Contour Map
at 4.6 m above ground
Note: Predicted noise levels include a +2.5dBA facade correction.
Scale 1:2000
0 10 20 40 60 80 m

5 QDC MP4.4 Requirements

Consistent with the original assessment, noise barriers have not been included in the designed to mitigate road traffic noise as they are not considered to be in-line with the Flagstone City Development design requirements. Alternative mitigation methods such as building treatments are to be investigated as the preferred option.

The noise reduction performance to be achieved through the various components of a proposed residential dwelling is measured in terms of the R_w value. The minimum R_w values to be achieved for each component of the buildings external envelope, for each of the MP4.4 noise categories, are shown in **Table 2**. Note there are no lots predicted to be Noise Category 4.

Table 2 Minimum Noise Reduction Performance for Building Components

Noise category	Minimum Transport Noise Reduction For Habitable Rooms	Building External Envelope Component	Minimum Rw required for each component
Category 3	35 dBA	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 than 1.8m^2)
		External walls	47
		Roof	41
		Floors	45
		Entry doors	33
Category 2	30 dBA	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 than 1.8m^2)
		External walls	41
		Roof	38
		Floors	45
		Entry doors	33
Category 1	25 dBA	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 than 1.8m^2)
		External walls	35
		Roof	35
		Entry doors	28
Category 0	No additional acoustic treatment required – standard building assessment provisions apply.		

QDC MP4.4 provides acceptable forms of construction to achieve the minimum R_w performance for each component of the building's external envelope. Those constructions have been reproduced in **Appendix C**.

It is noted that for construction purposes, where more than one noise category for a common facade is triggered, a consistent construction detail for a building component based upon the higher required R_w performance should be used.

It is acceptable to use materials other than those presented in QDC MP4.4 with manufacturer's specifications that, in combination, achieve the minimum R_w value for the relevant building component and applicable noise category.

It may also be possible to further refine the QDC MP4.4 accepted forms of constructions based on the actual building dimensions, preferred construction materials, and the predicted noise levels based on the methodology contained within Australian Standard 3671:1989 *Acoustics – Road traffic noise intrusion – Building siting and construction* (AS 3671).

It is highly likely that an alternative solution (to adopting the QDC MP4.4 noise category/constructions) will result in a reduced R_w requirement and subsequently a reduced construction cost to the applicant/developer.

6 Conclusions

This report describes the results of a road traffic noise assessment undertaken for Stages 1E and 1F of the proposed Flagstone City Development in accordance with the QDC MP4.4.

The Flagstone City Development 3D SoundPLAN noise model was updated, with the final lot configurations for Stages 1E and 1F, to predict the road traffic noise levels at the site for the planning horizon (year 2051) traffic volumes.

Based on the noise modelling, the predicted noise levels and the subsequent corresponding noise categories at the future development lots have been identified. The minimum noise reduction performance of each building component for the noise categories have been presented in **Table 2**. Examples of acceptable forms of construction for the building components as described in QDC MP4.4 are shown in **Appendix C**. It is acknowledged that other acceptable forms of construction, which may result in reduced construction costs, could be determined using AS 3671.

At this stage of the development, the shape and form of residential dwellings is unknown and therefore building structures are not included in the noise model. Consequently, it is recommended that dwellings proposed to be built on lots located behind developed lots more exposed to the road network undergo further assessment to confirm if a lower noise category is applicable and therefore a reduction in QDC MP4.4 construction requirements.

Checked/
Authorised by: SW/RC

PREDICTED NOISE CATEGORIES AT LOTS IN STAGE 1E AND 1F

Stage	Lot	QDC MP4.4 Noise Category	
		Low-set Dwelling	High-set Dwelling
1E	124	0	1
	125	0	1
	126	0	1[1]
	127	0	0
	128	0	0
	129	0	0
	130	0	0
	131	0	0
	154	0	1
	155	0	1
	156	0	1
	157	0	1
	158	0	1
	159	0	1
	160	0	1[2]
	161	0	1[2]
	162	0	0
	163	0	0
	164	0	0
	165	0	0
	166	0	0
	168	0	0
	169	0	0
	170	0	0
	171	0	0
	176	0	0
	177	0	0
	178	0	0
	179	0	1
	180	0	1
	181	0	1
	182	1	1

1. Category 1 only applies up to approximately 6m from lot boundary and therefore Category 0 criteria (rather than Category 1) are likely to apply to the actual dwelling built on the lot.
2. Category 2 only applies up to approximately 6m from lot boundary and therefore Category 1 criteria (rather than Category 2) are likely to apply to the actual dwelling built on the lot.

Stage	Lot	QDC MP4.4 Noise Category	
		Low-set Dwelling	High-set Dwelling
1F	122	1	1
	123	1	1
	146	1	2[1]
	147	1	2[1]
	148	2[1]	2[1]
	149	1	2[1]
	150	1	2[1]
	151	2[1]	2[1]
	152	1	2[1]
	153	1	2[1]
	183	2[1]	2
	184	1	2
	185	1	2
	200	2	2
	253	0	0
	254	0	1
	255	0	1
	256	0	1
	257	1	1
	258	1	1
	259	1	1
	260	1	1
	261	1	1
	262	1	1
	263	1	1
	264	1	1
	265	0	1
	266	0	1
	267	0	1
	268	0	1
	269	0	1
	270	0	1[2]
	271	0	1[2]
	272	0	1
	273	0	0
	274	0	0
	275	0	0
	276	0	0
	277	0	1[2]
	311	1	1

3. Category 2 only applies up to approximately 6m from lot boundary and therefore Category 1 criteria (rather than Category 2) are likely to apply to the actual dwelling built on the lot.
4. Category 1 only applies up to approximately 6m from lot boundary and therefore Category 0 criteria (rather than Category 1) are likely to apply to the actual dwelling built on the lot.

Schedule 2

Component of building's *external envelope*	Minimum R_w	Acceptable forms of construction
Glazing	43	Double glazing consisting of two panes of minimum 5mm thick glass with at least 100mm air gap and full perimeter *acoustically rated seals*.
	38	Minimum 14.38mm thick laminated glass, with full perimeter *acoustically rated seals*; OR Double glazing consisting of one pane of minimum 5mm thick glass and one pane of minimum 6mm thick glass with at least 44mm air gap, and full perimeter *acoustically rated seals*
	35	Minimum 10.38mm thick laminated glass, with full perimeter *acoustically rated seals*.
	32	Minimum 6.38mm thick laminated glass with full perimeter *acoustically rated seals*.
	27	Minimum 4mm thick glass with full perimeter *acoustically rated seals*
	24	Minimum 4mm thick glass with standard weather seals

Component of building's *external envelope*	Minimum R_w	Acceptable forms of construction
External walls	52	Two leaves of clay brick masonry, at least 270mm in total, with subfloor vents fitted with noise attenuators.
	47	Two leaves of clay brick masonry at least 110mm thick with: (i) cavity not less than 50mm between leaves; and (ii) 50mm thick mineral insulation or 50mm thick glass wool insulation with a density of 11kg/m^3 or 50mm thick polyester insulation with a density of 20kg/m^3 in the cavity. OR Two leaves of clay brick masonry at last 110mm thick with: (i) cavity not less than 50mm between leaves; and (ii) at least 13mm thick cement render on each face OR Single leaf of clay brick masonry at least 110mm thick with: (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) Mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m^3 positioned between studs; and (iii) One layer of plasterboard at least 13mm thick fixed to outside face of studs. OR Single leaf of minimum 150mm thick masonry of hollow, dense concrete blocks, with mortar joints laid to prevent moisture bridging.

Component of building's *external envelope*	Minimum R_w	Acceptable forms of construction
	41	Two leaves of clay brick masonry at least 110mm thick with cavity not less than 50mm between leaves OR Single leaf of clay brick masonry at last 110mm thick with: (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m^3 positioned between studs; and (iii) One layer of plasterboard at least 10mm thick fixed to outside face of studs OR Single leaf of brick masonry at least 110mm thick with at least 13mm thick render on each face OR Concrete brickwork at least 110mm thick OR In-situ concrete at least 100mm thick OR Precast concrete at least 100mm thick and without joints.

Component of building's *external envelope*	Minimum R_w	Acceptable forms of construction
	35	Single leaf of clay brick masonry at least 110mm thick with: (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) One layer of plasterboard at least 10mm thick fixed to outside face of studs OR Minimum 6mm thick fibre cement sheeting or weatherboards or plank cladding externally, minimum 90mm deep timber stud or 92mm metal stud, standard plasterboard at least 13mm thick internally.
Roof	45	Concrete or terracotta tile or sheet metal roof with sarking, *acoustically rated plasterboard* ceiling at least 13mm thick fixed to ceiling joists, cellulose fibre insulation at least 100mm thick with a density of at least 45kg/m^3 in the cavity. OR Concrete or terracotta tile or sheet metal roof with sarking, 2 layers of *acoustically rated plasterboard* at least 16mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m^3 or polyester insulation at least 50mm thick with a density of at least 20kg/m^3 in the cavity.
	41	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m^3 or polyester insulation at least 50mm thick with a density of at least 20kg/m^3 in the cavity. OR Concrete suspended slab at least 100mm thick.
	38	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity, mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m^3.

Component of building's *external envelope*	Minimum R_w	Acceptable forms of construction
	35	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity.
Floors	51	Concrete slab at least 150mm thick.
	45	Concrete slab at least 100mm thick OR Tongued and grooved boards at least 19mm thick with: (i) timber joists not less than 175mm x 50mm; and (ii) mineral insulation or glass wool insulation at least 75mm thick with a density of at least 11kg/m^3 positioned between joists and laid on plasterboard at least 10mm thick fixed to underside of joists; and (iii) mineral insulation or glass wool insulation at least 25mm thick with a density of at least 11kg/m^3 laid over entire floor, including tops of joists before flooring is laid; and (iv) secured to battens at least 75mm x 50mm; and (v) the assembled flooring laid over the joists, but not fixed to them, with battens lying between the joists.
Entry Doors	35	Solid core timber not less than 45mm thick, fixed so as to overlap the frame or rebate of the frame by not less than 10mm, with full perimeter *acoustically rated seals*.
	33	Fixed so as to overlap the frame or rebate of the frame by not less than 10mm, fitted with full perimeter *acoustically rated seals* and constructed of - (i) solid core, wood, particleboard or blockboard not less than 45mm thick; and/or (ii) acoustically laminated glass not less than 10.38mm thick.

Component of building's *external envelope*	Minimum R_w	Acceptable forms of construction
	28	Fixed so as to overlap the frame or rebate of the frame, constructed of - (i) Wood, particleboard or blockboard not less than 33mm thick; or (ii) Compressed fibre reinforced sheeting not less than 9mm thick; or (iii) Other suitable material with a mass per unit area not less than 24.4kg/m^2; or (iv) Solid core timber door not less than 35mm thick fitted with full perimeter *acoustically rated seals*.