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Attention: Costas Alexandrou

Dear Costas

Flagstone City Development
Stage 1A to 1D Road Traffic Noise Assessment

1 Introduction

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 1A to 1D of the proposed Flagstone City Development. SLR has previously carried out an acoustic assessment (SLR Report 620.10512-R1 dated 14 August 2012) for the Flagstone City Development Project (the Project), however refinement of the lot configurations as well as finalising of the pad heights for Stages 1A to 1D has taken place warranting revision of the road traffic noise assessment.

This report summarises the results of the road traffic noise assessment with regard to the *Queensland Development Code – Buildings in a Transport Noise Corridor* (QDC MP4.4).

Based on the revised lot configuration design and the findings of the original acoustic assessment (620.10512-R1), assessment of railway and Flagstone Sewage Treatment Plant (STP) noise emissions was not considered to be necessary for Stages 1A to 1D.

2 Development Description

The subject site is acknowledged as being the centre of the city of Greater Flagstone. It will incorporate the main city centre for the region located next to the existing railway track (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 most recent lot configuration of Stages 1A to 1D of the Project is shown on **Figure 1**.

Figure 1 Plan of Development Stage 1A to 1D

3 Road Traffic Noise Criteria

As noted in SLR Report 620.10512-R1, some of the roads within the Flagstone City Development are state controlled roads, and in the absence of criteria for local roads all roads are to be assessed against the Department of Transport and Main Roads (TMR) Policy Position Statement (PPS). The Report also states that noise barriers have not been designed to mitigate road traffic noise within the study area 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.

In Queensland, residential buildings located within a Transport Noise Corridor as defined by the *Building Act 1975*, must be designed and constructed in accordance with the *Queensland Development Code – Buildings in a Transport Noise Corridor* (QDC MP4.4) document.

QDC MP4.4 provides noise categories based on road traffic noise levels expected 1 m from the facade of a building on the subject site. The higher the noise category, the more substantial the acoustic design and construction requirements will be. The noise categories and their corresponding criterion levels applicable to road noise are described in **Table 1**.

Table 1 QDC MP4.4 Noise Category Levels

Noise Category	Level of transport noise* ($L_{A10,18hr}$) for State-controlled roads and designated local government roads
Category 4	≥73 dB(A)
Category 3	68 – 72 dB(A)
Category 2	63 – 67 dB(A)
Category 1	58 – 62 dB(A)
Category 0	≤ 57 dB(A)

* measured at 1m from the facade of the proposed or existing building

For existing residential lots, the location of the QDC MP4.4 noise categories with respect to a development site can be obtained from the State Planning Policy interactive mapping system (SPP IMS) online portal administered by the Department of State Development, Infrastructure and Planning (DSDIP). For future residential lots such as this Project, an assessment of QDC MP4.4 noise category is to be carried out in accordance with Schedule 3 of QDC MP4.4.

It should be noted that an assessment of QDC MP4.4 noise category that does not include modelling/consideration of the acoustic shielding provided by any existing or future building structures, such is the case with the SPP IMS will generally result in a conservative assessment of noise category.

4 Assessment of Road Traffic Noise

4.1 Methodology

The methodology applied to the assessment of road traffic noise for Stages 1A to 1D of the Project is identical to that detailed in the original acoustic assessment (SLR Report 620.10512-R1). The current assessment incorporates the final lot configuration shown in **Figure 1** 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 1A to 1D 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 1A to 1D is summarised in **Table 2**.

The noise categories in the form of colour contours are shown in **Appendix A Map 1** for low-set dwellings (ie calculated at 1.8 m above pad level) and **Appendix A Map 2** for high-set dwellings (ie calculated at 4.6 m above pad level).

As noted in **Section 3**, the Flagstone City Development 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.

Table 2 QDC MP4.4 Noise Level Category for Stages 1A to 1D Lots

Stage	Lot	QDC MP4.4 Noise Category	
		Low-set Dwelling	High-set Dwelling
1A	1	2	3
	2	2	2
	3	1	2
	4	1	2
	5	1	1
	6	1	1
	7	1	1
	8	1	1
	9	1	1
	10	1	1
	11	1	1
	12	1	2
	13	1	2
	14	2	2
	15	2	3
	16	3	3
	17	2	2
	18	2	2
	19	1	2
	20	1	2
	21	1	1
	22	1	1
	23	1	1
	24	1	1
	25	1	1
	26	1	2
	27	1	2
	28	1	2
	29	1	2
	30	2	2
	31	2	2
	32	2	3
	40	1	1
	41	1	1
	42	1	1
	43	1	1
	44	1	1
	51	2	2
	52	2	2
	53	2	2
	54	2	2
	55	1	2
	56	1	2
	57	1	2

	58	1	1
	119	1	1
1B	59	1	1
	60	1	1
	61	1	1
	62	1	1
	63	1	1
	64	1	1
	65	1	1
	66	1	1
	67	1	2
	68	2	2
	69	1	1
	70	1	1
	71	1	1
	72	1	1
	73	1	1
	74	0	1
	75	1	1
	76	1	1
	77	1	1
	78	1	1
	79	0	0
	80	0	1
	81	0	1
	82	0	1
	83	0	1
	84	1	1
	85	1	1
	86	0	1
	87	0	1
	88	0	1
	89	0	1
	90	0	0
	93	0	1
	94	0	1
	95	0	0
	96	0	0
	97	0	0
	98	0	0
	113	0	0
	114	0	0
	115	0	1
	116	0	1
	117	0	1
	118	0	1
1C	37	1	1

	38	1	1
	39	1	1
	91	0	0
	92	0	0
	99	0	0
	100	0	0
	101	0	0
	102	0	0
	103	0	0
	104	0	0
	105	0	0
	106	0	0
	107	0	0
	108	0	0
	109	0	0
	110	0	0
	111	0	0
	112	0	0
	120	1	1
	121	1	1
	122	1	1
	123	1	1
	134	0	0
	135	0	0
	136	0	0
	137	0	0
	138	0	0
	139	0	0
	140	0	0
	141	0	1
	142	0	1
	143	0	1
	144	0	1
	145	0	0
	146	0	0
	147	0	0
	170	0	0
1D	33	1	1
	34	0	1
	35	0	1
	36	0	1
	45	1	1
	46	1	1
	47	1	1
	48	1	1
	49	1	1
	50	1	1

5 QDC MP4.4 Requirements

The noise reduction performance to be achieved through the various components of a proposed residential dwelling is measured in terms of the Rw value. The minimum Rw values to be achieved for each component of the buildings external envelope, for each of the predicted noise categories, are shown in **Table 3**.

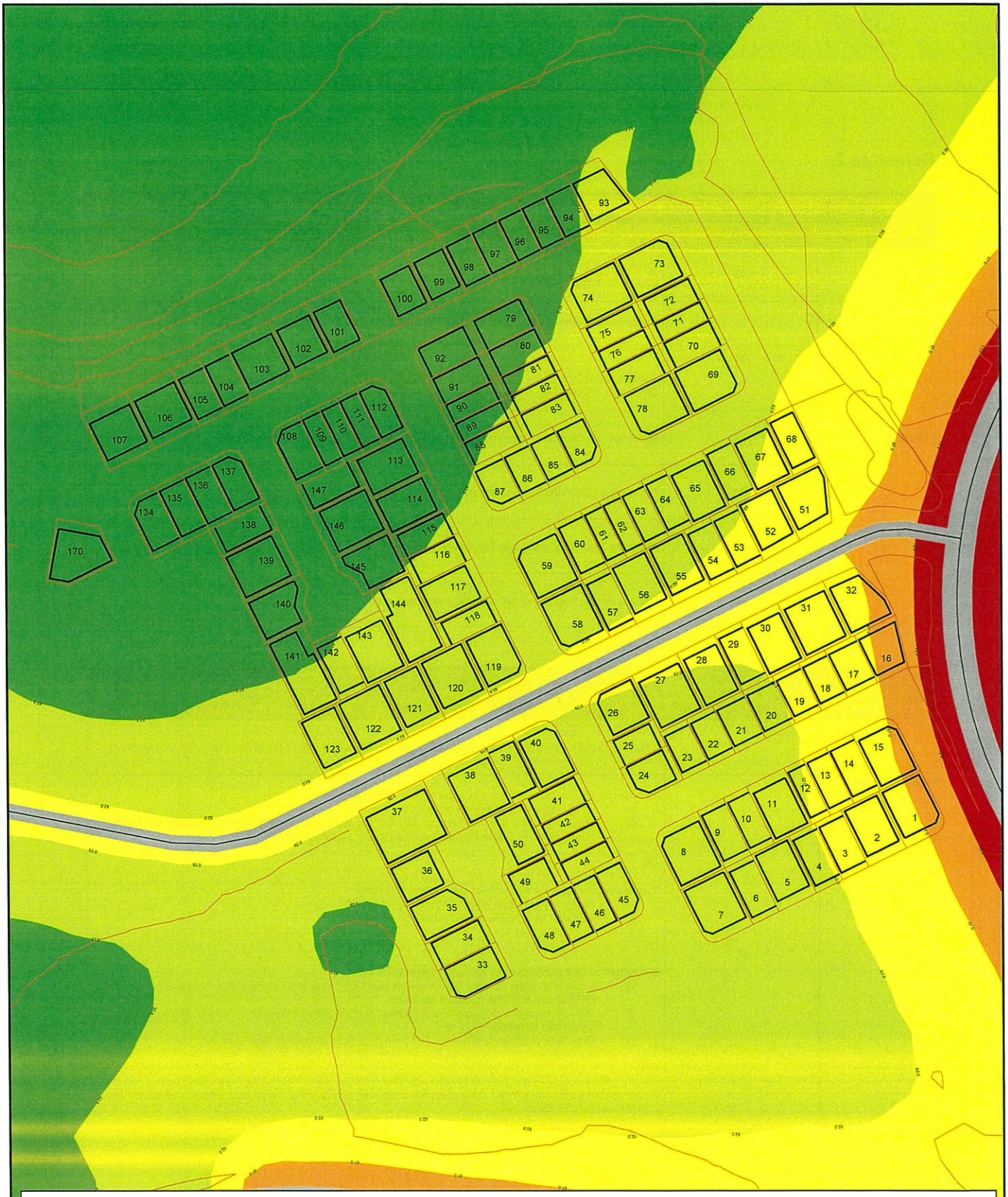
Table 3 Minimum noise reduction performance for building components

Noise category	Minimum transport noise reduction (dB (A)) required for habitable rooms	Component of building's external envelope	Minimum Rw 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 than 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 than 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 than 1.8m^2)
		External walls	35
		Roof	35
		Entry doors	28
Category 0	No additional acoustic treatment required – standard building assessment provisions apply.		

There are no lots within Noise Category 4.

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

It is noted that for constructability purposes, that 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 Rw performance should be used.


Legend
Max Building Envelope
Road Surface
Elevation line
Noise level
LA10(18hr) dB(A)
<= 57 - Catetgory 0
57 < <= 62 - Category 1
62 < <= 67 - Category 2
67 < <= 72 - Category 3
72 < - Category 4
620.10512 - Appendix A Map 2
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 1:2500
0 12.5 25 50 75 100 m

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*.