24 March 2017

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Samantha Wilson

Columbia Lane Developments Pty Ltd
c/- Urbis
Tower 2, Level 23 Darling Park
201 Sussex Street
Sydney NSW 2000

Re: Columbia Lane, Homebush - Planning proposal acoustic assessment

Dear Sam,

1 Introduction

EMM Consulting Pty Limited (EMM) has been commissioned by Columbia Lane Developments Pty Ltd to prepare an assessment of potential noise impacts on the proposed residential development at 11-17 Columbia Lane, Homebush.

This report has been prepared with reference to the plans as provided in Appendix A dated February 2017.

The proposed development is surrounded by existing residential areas and commercial facilities and is also located in close proximity to an electrical substation, Homebush railway station and major transport routes; Parramatta Road and the M4 Western Motorway. The subject site and surrounding features are shown in Figure 1. Features of the surrounding environment are summarised as follows:

- The M4 Western Motorway and Parramatta Road are located approximately 160 m and 100 m, respectively, from the northern boundary of the subject site. Commercial and residential apartment buildings are located between the subject site and the roads and will provide considerable acoustic shielding.

- An electrical substation is located south of the water canal which is immediately south of the subject site. The nearest transformer is located approximately 15 m from the boundary of the subject site. We understand that Audgrid has confirmed to JQZ that the substation is to be partly decommissioned. As such, noise from the substation will be virtually eliminated and therefore not affect the development;

- Homebush railway station is located approximately 150 m west south west of the subject site with several residential apartment buildings located in between the subject site and the station.

- The nearest railway line is located approximately 160 m south of the subject site. It is understood this line carries both freight and passenger trains.

Source: Google Earth

Figure 1 Proposed development site and surrounding area

2 Noise goals

2.1 Overview

This assessment has been conducted with reference to the following in relation to the various noise sources that have potential to impact on the proposed development:

- development near rail corridors and busy roads – Interim guideline (the Guideline) (Department of Planning, 2008);
- State Environmental Planning Policy (Infrastructure) 2007 (the 'Infrastructure SEPP'); and
- NSW Industrial Noise Policy (INP) (Environment Protection Authority, 2000).

2.2 Residential noise goals (internal)

The Guideline refers to the State Environmental Planning Policy (Infrastructure) 2007 (the 'Infrastructure SEPP') with regard to internal noise criteria for residential buildings, as follows:

> "...the consent authority must be satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:
>
> - In any bedroom in the building: 35 dB(A) at any time 10pm – 7am
> - Anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40 dB(A) at any time."

The Guideline also provides examples of standard construction techniques to achieve certain levels of noise intrusion. Categories 1 and 2 have been reproduced in Appendix B of this report.

2.3 Rail noise and vibration

The Infrastructure SEPP provides a guide as to the level of acoustic assessment required for proposed noise-sensitive developments in the vicinity of existing rail infrastructure. Figure 3.1 from the Infrastructure SEPP is provided here as Figure 2, and indicates the zones of assessment based on distances in metres from the nearest operational rail track.

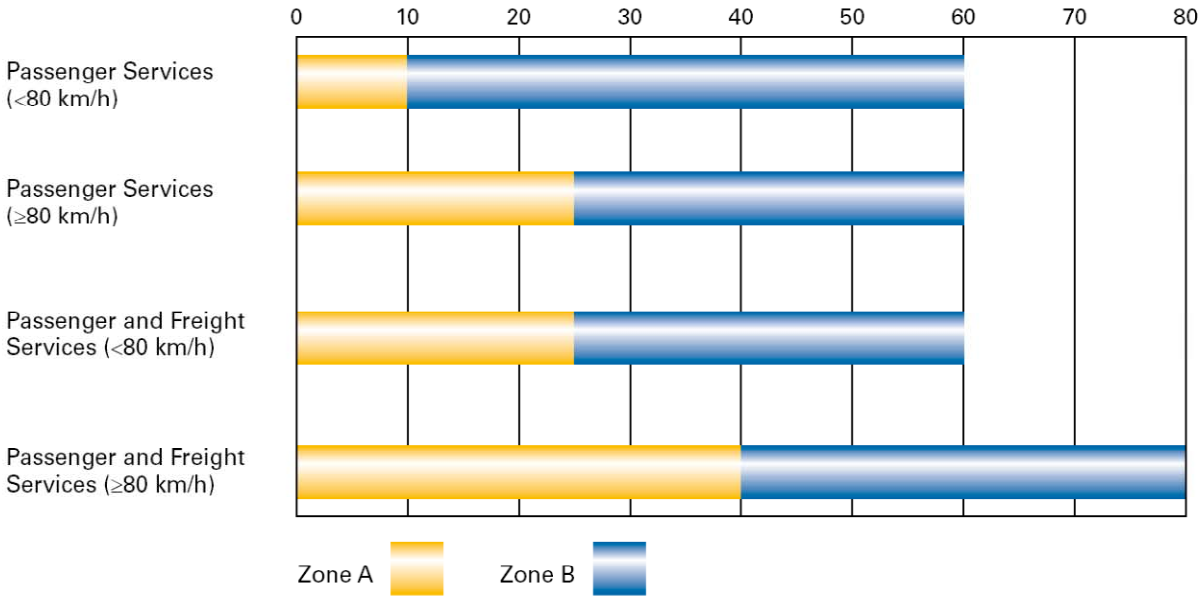


Figure 2 **Acoustic Assessment Zones based on distance (m) of noise-sensitive development from operational track (not corridor)**

If the proposed development falls within Zone A then a detailed noise assessment should be undertaken. If it falls within Zone B, then Category 2 construction (refer Appendix B) would normally be adequate to achieve the relevant internal noise levels. It is inferred that if a proposed development falls outside of Zone B then standard construction would be adequate to meet internal noise goals and an acoustic assessment would not be required.

Given the curvature of the track and proximity to the station it is unlikely that trains on the nearest rail line to the proposed development would be travelling at speeds greater than 80 km/h. The nearest rail line is located approximately 160 m from the subject site and hence, falls outside of Zone B.

The vibration assessment zone for residential buildings is 25 m from the tracks, in accordance with the Guideline. The proposed development falls outside of this zone and therefore an assessment of potential rail vibration impacts is not required. Notwithstanding, an assessment of vibration levels at the subject site has been conducted (refer Section 6).

2.4 Road noise

Based on guidance provided in the Guideline (refer Section 3.5.2 of the Guideline regarding screening tests) given the proximity of the proposed development to the nearest roads and the volume of traffic on these roads, an acoustic assessment is required with regard to road traffic noise for apartments with line of sight to the road. The latter infers that road traffic noise will only likely require consideration for apartments on the east and west elevations of the development given the shielding offered by the buildings to the north.

2.5 External noise goals – industrial noise

The NSW INP provides the following with regard to intrusive noise impacts relevant to residential dwellings: "*The intrusiveness of an industrial noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source...measured over a 15-minute period, does not exceed the background noise level measured in the absence of the source by more than 5 dB.*"

This is discussed further in Section 4 in relation to potential noise impacts from the existing substation.

3 Existing acoustic environment

An unattended ambient noise survey was conducted over a period of approximately five days by Acouras Consultancy in 2014 (refer report attached to the planning application); approximate locations of the two noise monitoring locations are shown in Figure 1. Noise logger 1 was located on the roof (15th storey) of the residential building at 12-14 Station Street, facing the rail line. Noise logger 2 was located on the ground with direct line of site to Parramatta Road and the M4 motorway. A summary of the ambient noise monitoring results is provided in Table 1. Importantly, this data has been collected from locations closer and more exposed to the ambient noise sources (eg road traffic from Parramatta Road and the motorway) than the development.

Table 1 Ambient noise monitoring summary

Noise monitoring location / date	Time period	Existing noise levels		
		$L_{Aeq(period)}$, dB	Rating background Level (RBL), dB	Highest $L_{Aeq(1hour)}$, dB
1	Day	59	54	64
11-15 December, 2014	Evening	60	54	
	Night	58	53	62
2	Day	59	52	63
24-27 February, 2014	Evening	58	50	
	Night	54	42	59

Notes: 1.Day: 7am-6pm, Evening: 6pm-10pm, Night: 10pm-7am.

It is noted that construction activity on the block immediately north of the subject site was occurring during the unattended noise survey. Hence, it is likely that the daytime period (and possibly other periods) could be affected by noise from the construction site. This is particularly relevant to noise monitoring location 2. Noise monitoring location 2 is approximately 40 metres north of the proposed northern facade of the development. This would result in elevated levels of road traffic noise from the M4 motorway and Parramatta Road. Similarly, the roof top location of noise monitoring location 1 is likely influenced by roof top mechanical plant nearby the microphone. As such, the presented noise monitoring results and subsequent assessment of noise intrusion can be considered conservative.

The long-term unattended noise monitoring results were supplemented by operator-attended noise surveys by EMM on 19 August 2015. The operator-attended noise surveys were conducted with the aim of determining the existing level of noise from the substation at the boundary of the subject site.

Results of the operator-attended noise survey confirmed the tonal nature of the substation (primarily at 100 Hz) and determined a contribution at the site boundary of $L_{Aeq,15\ minute}$ 42 dB. Due to the low-frequency and tonal nature of the source, which is typical of substations, a 5 dB modifying factor would apply to the measured noise level, in accordance with the INP to account for potentially greater annoyance from such sources. With the inclusion of the modifying factor the substation noise emission level at the boundary is estimated at $L_{Aeq,15\ minute}$ 47 dB which is to be compared to the relevant INP intrusive criteria.

As noted earlier, Ausgrid have confirmed that the substation will be partly decommissioned. As such, noise from the substation is no longer expected to affect the development.

4 INP noise assessment (external)

Based on the lowest measured night-time RBL of the two monitoring locations the INP intrusive noise goal would be $L_{Aeq,15\ minute}$ 47 dB. With the inclusion of the modifying factor the estimated substation contribution at ground level is $L_{Aeq,15\ minute}$ 47 dB as shown above and therefore complies with the INP criteria.

Based our site observations, no other significant industrial noise sources exist such that would warrant consideration of changes to the acoustic design of the development. With the substation noise removed as per Ausgrid's advice, it is expected that industrial noise is not a feature of the area.

5 Internal noise assessment

The unattended noise monitoring results include contribution from all external noise sources including, but not limited to, the substation, rail and road traffic. The highest $L_{Aeq(1hour)}$ levels measured during the day (64 dB) and night (62 dB) have been utilised to determine the required building construction to achieve the relevant internal noise goals. Assuming that a noise-sensitive area (ie bedroom or living area) would be located on the building facade then construction category 2 would be required to achieve 35 dB in bedrooms at night and 40 dB in living areas during the day time (refer to Appendix B for a description of typical category construction options).

Given the changes in the ambient noise environment in the area around the development site, a reassessment of noise will be required for subsequent stages of the project.

Based on the current conservative data available, some windows and doors on external facades to living and sleeping areas may need to be closed to achieve acceptable internal levels. In such instances, alternative means of achieving the requirement for 'comfort ventilation' would need to be considered. Design input should be sought from an appropriately qualified mechanical consultant to ensure compliance with relevant ventilation requirements. Section 3.6.1 of the Guideline states that, 'If internal noise levels with windows or doors open exceed the criteria by more than 10 dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia'.

In the time since noise monitoring was conducted, a number of residential apartment buildings have been constructed to the north of the site, providing considerable acoustic shielding to the development from road traffic noise from the M4 motorway and Parramatta Road. Ausgrid has also confirmed that the electricity substation to the south of the development will be partly decommissioned. As such, noise from the substation is no longer expected to affect the development.

A review of internal/external noise levels and construction element requirements would be conducted during the detailed design stage and following updated noise monitoring, to account for the recent developments outlined above. This will provide the opportunity to refine the recommended construction requirements.

EMM are confident that there will not be any noise issues that cannot be readily addressed to satisfy all requirements using conventional means.

6 Rail vibration

Vibration measurements were conducted by Acouras Consultancy (refer report as attached to the planning application) on Monday 15 December 2014. Ground vibration levels associated with train movements were

not distinguishable from the background vibration levels. Based on these results, vibration from train pass-bys would not likely be noticed within the proposed residential development.

7 Conclusion

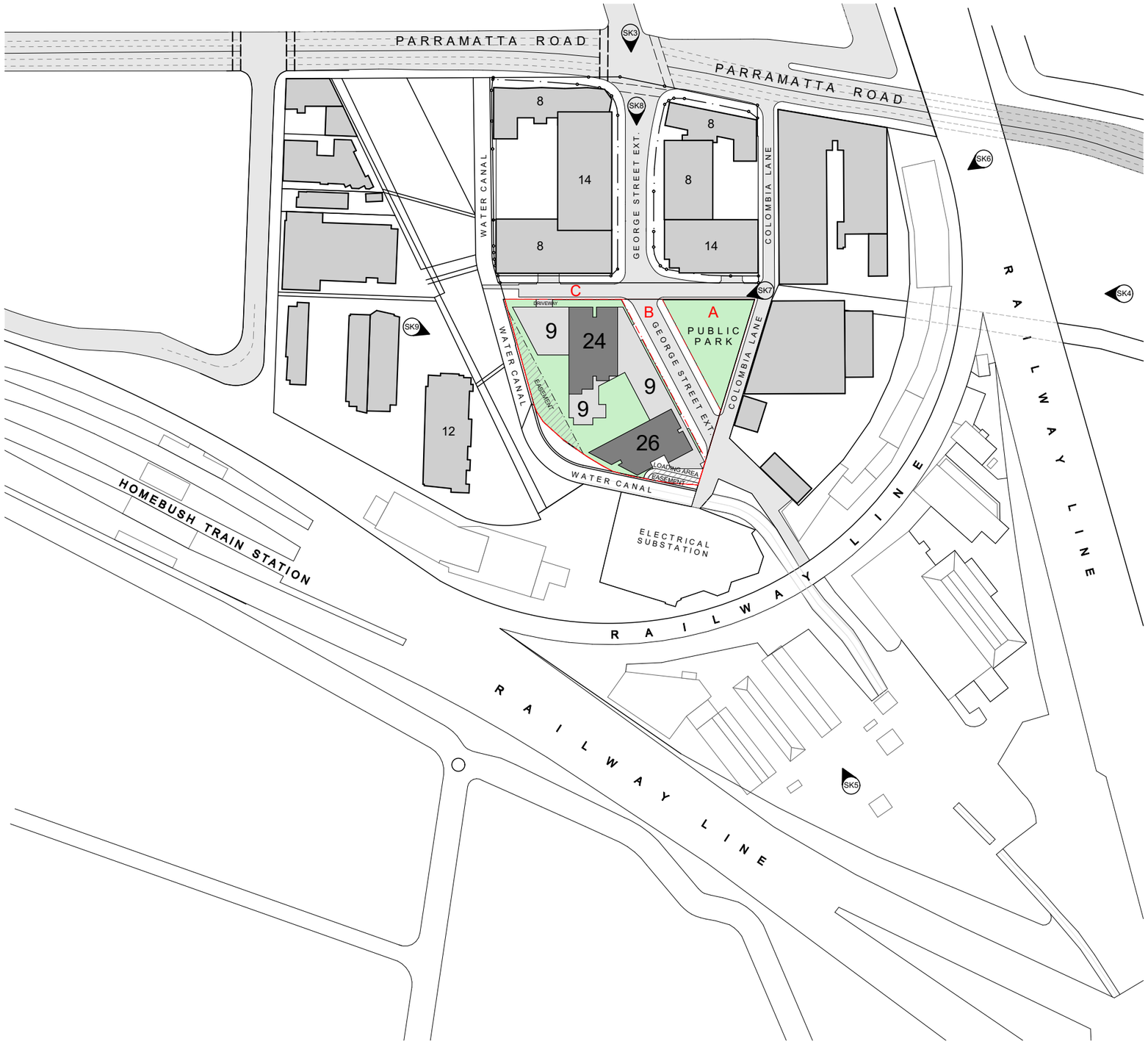
EMM has prepared an assessment of potential noise and vibration impacts on the proposed Columbia Lane residential development. It was found that conventional acoustic design can be readily used to overcome residual noise and vibration issues were identified such that relevant guidelines can be achieved.

Yours sincerely

Najah Ishac
Director – Acoustics technical leader
nishac@emmconsulting.com.au

Appendix A

Architectural plans



Site Plan

1:2000

PROPOSED FSR 5:1
CONCEPT

SK1

concept design

N

project **PLANNING PROPOSAL**
RESIDENTIAL DEVELOPMENT

location **Stage 2, 11-17 Columbia Lane HOMEBUSH**

date **FEBRUARY 2017**

• **job no.** 14028 • **drawing no.** SK1 • **issue** • **project architect** GK • **drawn** GH/ CT • **scale** 1:2000@A3

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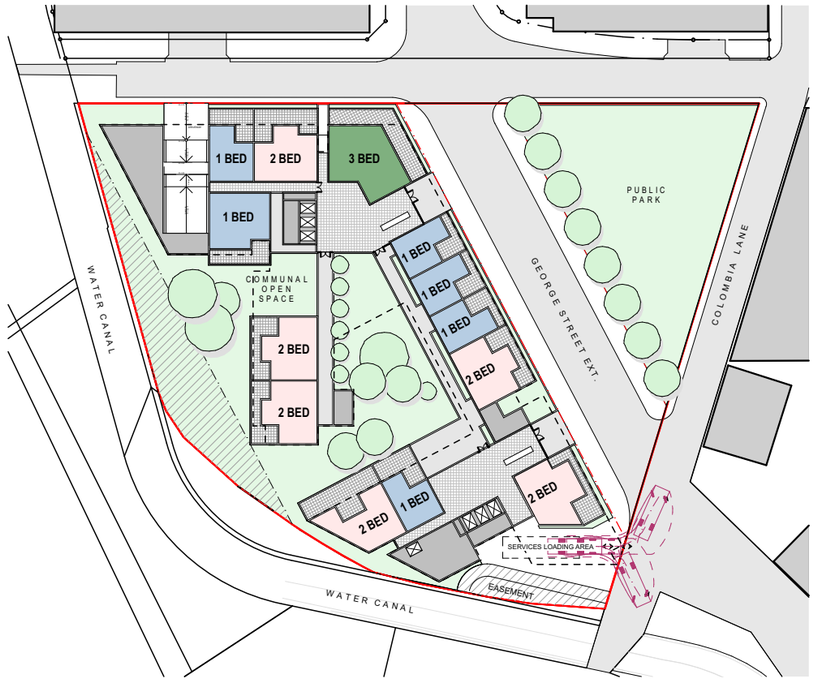
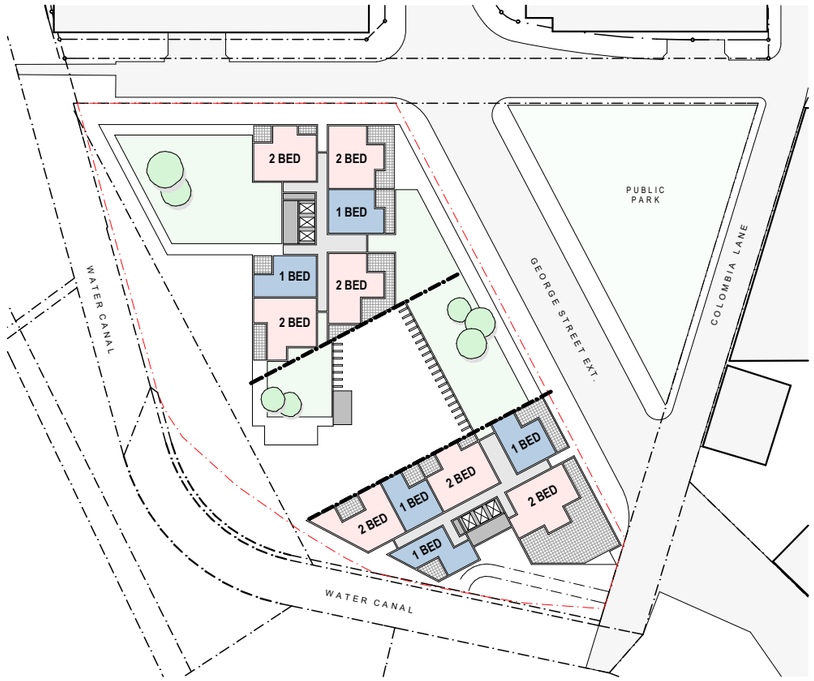
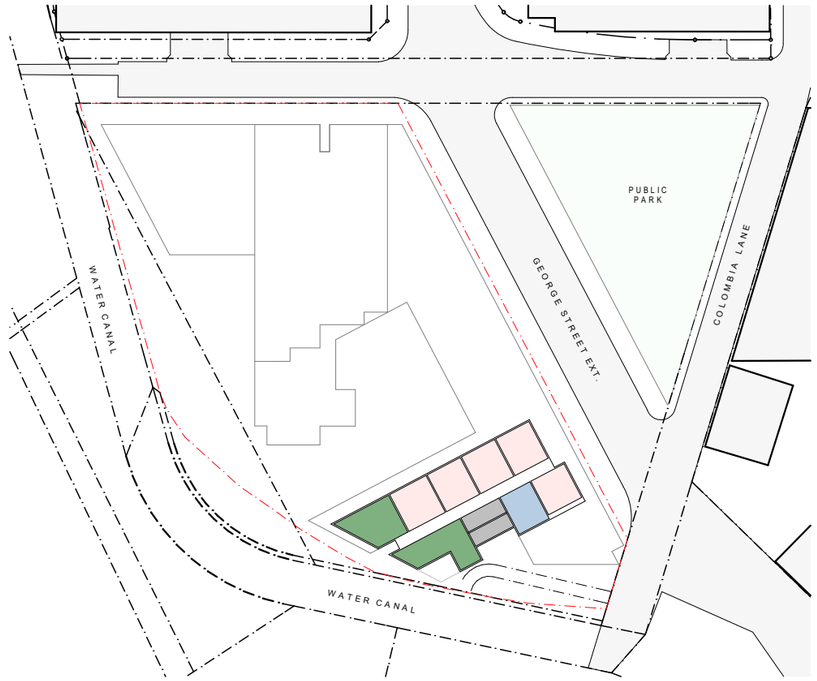


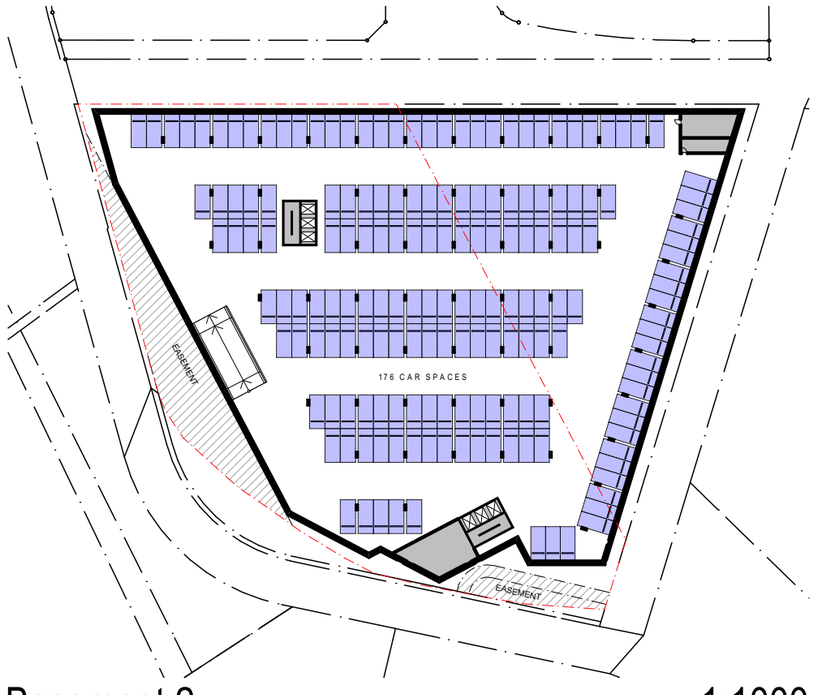
Ground floor 1:1000



Level 9 1:1000



Levels 24-25 1:1000



Basement 2 1:1000

Levels 1-8 1:1000

Levels 10-23 1:1000

PROPOSED FSR 5:1
CONCEPT

SK2

plan layouts

N

project PLANNING PROPOSAL
RESIDENTIAL DEVELOPMENT

location Stage 2, 11-17 Columbia Lane HOMEBUSH

date FEBRUARY 2017

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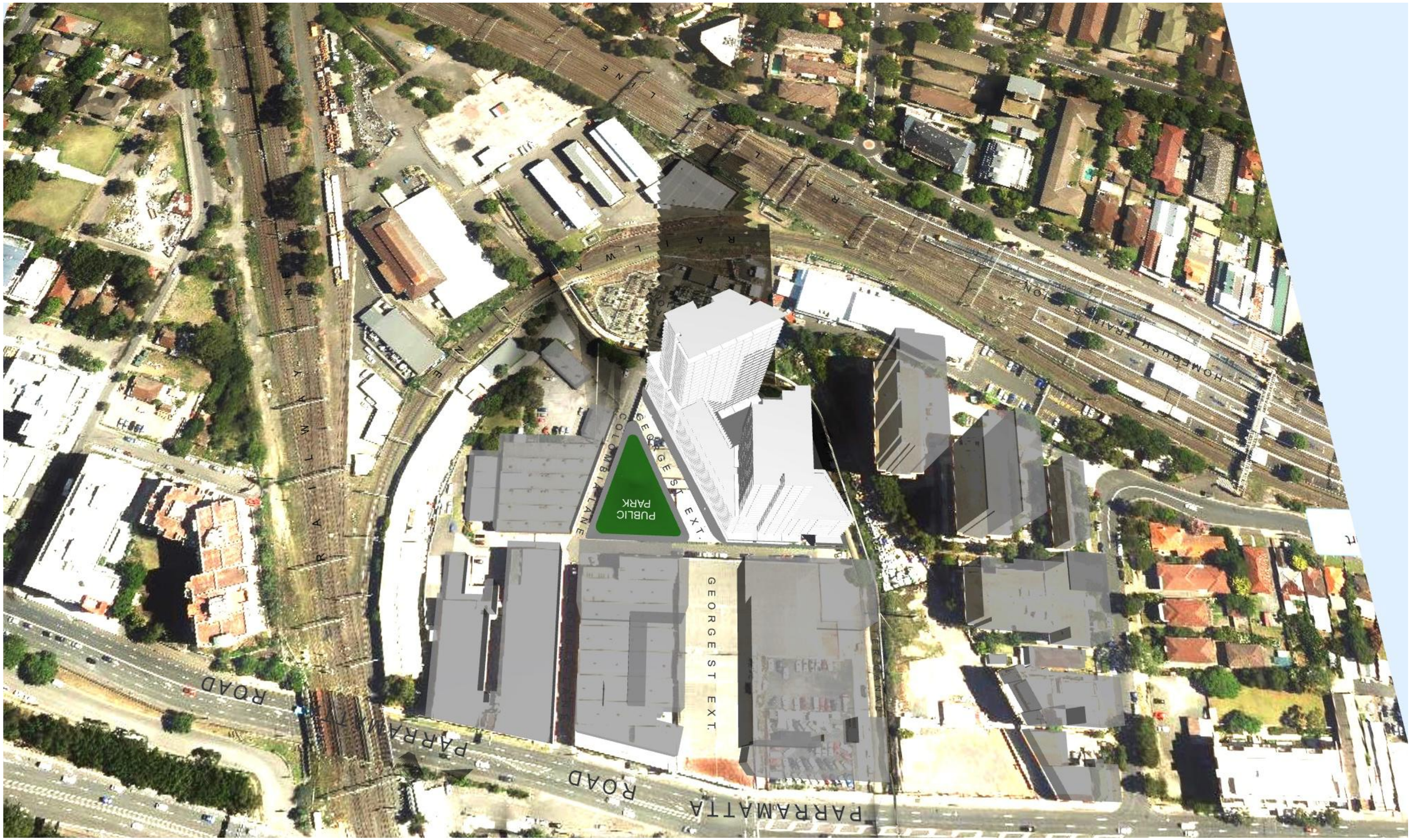
• job no. 14028 • drawing no. SK2 • issue • project architect GK • drawn GH/ CT • scale 1:1000@A3



PROPOSED FSR 5:1 CONCEPT

SK3

aerial view from north

N

project **PLANNING PROPOSAL**
RESIDENTIAL DEVELOPMENT

location **Stage 2, 11-17 Columbia Lane HOMEBUSH**

date **FEBRUARY 2017**

• **job no.** 14028 • **drawing no.** SK3 • **issue** • **project architect** GK • **drawn** GH/ CT • **scale** not to scale

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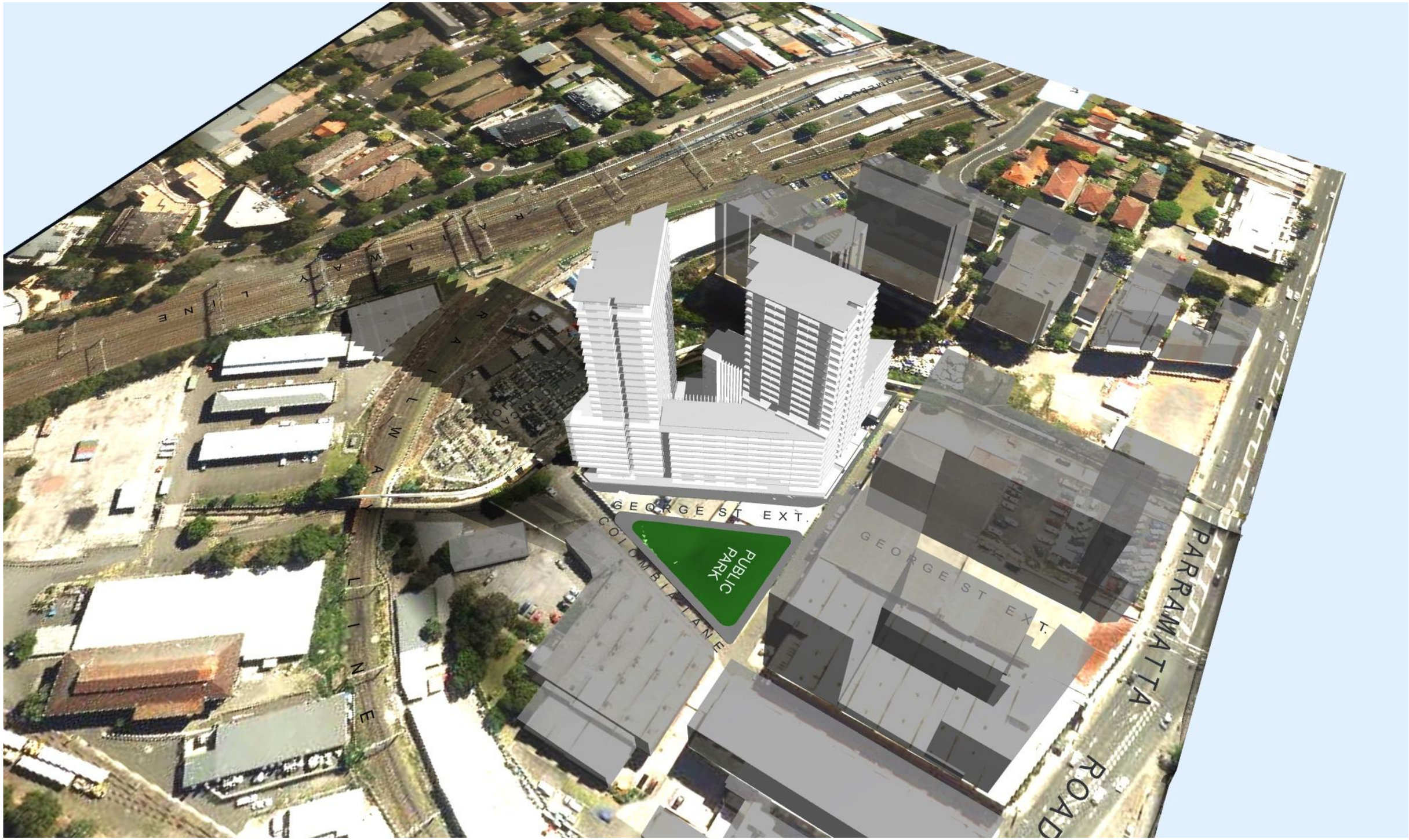

PROPOSED FSR 5:1 CONCEPT

SK6 aerial view from northeast

N

mpa

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RESIDENTIAL DEVELOPMENT

location Stage 2, 11-17 Columbia Lane HOMEBUSH

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• job no. 14028 • drawing no. SK6 • issue • project architect GK • drawn GH/ CT • scale not to scale

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PROPOSED FSR 5:1
CONCEPT

SK7 perspective view from columbia lane

N

mpa

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location **Stage 2, 11-17 Columbia Lane HOMEBUSH**

date **FEBRUARY 2017**

• **job no.** 14028 • **drawing no.** SK7 • **issue** • **project architect** GK • **drawn** GH/ CT • **scale** not to scale

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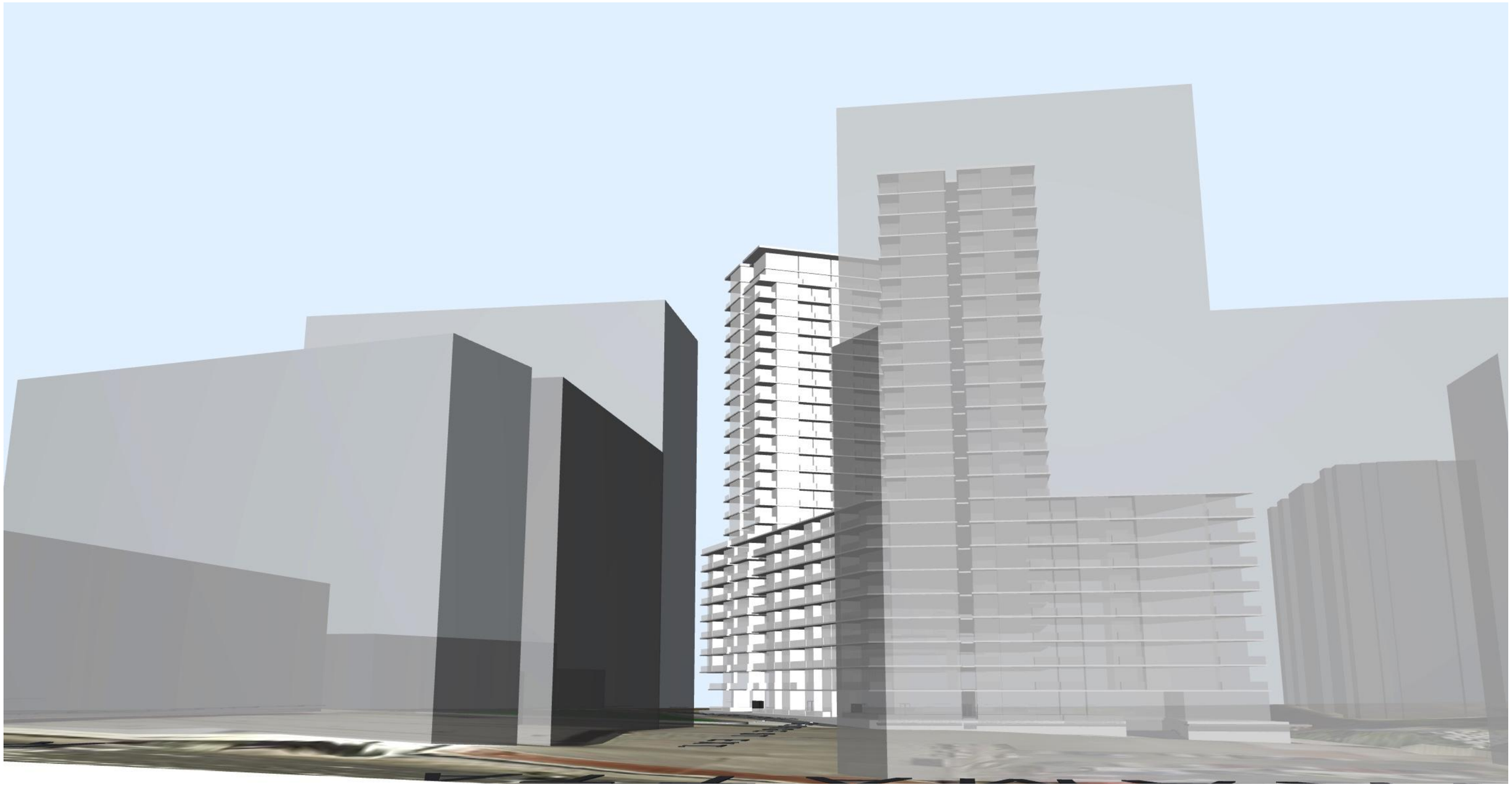

PROPOSED FSR 5:1
CONCEPT

SK8 perspective view from george street

N

mpa

project
PLANNING PROPOSAL
RESIDENTIAL DEVELOPMENT

location
Stage 2, 11-17 Columbia Lane HOMEBUSH

date
FEBRUARY 2017

• job no. 14028 • drawing no. SK8 • issue • project architect GK • drawn GH/ CT • scale not to scale

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June 21 - 9am

PROPOSED FSR 5:1 CONCEPT

SK10

shadow diagram

N

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RESIDENTIAL DEVELOPMENT

location **Stage 2, 11-17 Columbia Lane HOMEBUSH**

date **FEBRUARY 2017**

• **job no.** 14028 • **drawing no.** SK10 • **issue** • **project architect** GK • **drawn** GH/ CT • **scale** not to scale

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June 21 - 12noon

PROPOSED FSR 5:1
CONCEPT

SK11 **shadow diagram**

N

project **PLANNING PROPOSAL**
RESIDENTIAL DEVELOPMENT

location **Stage 2, 11-17 Columbia Lane HOMEBUSH**

date **FEBRUARY 2017**

• **job no.** 14028 • **drawing no.** SK11 • **issue** • **project architect** GK • **drawn** GH/ CT • **scale** not to scale

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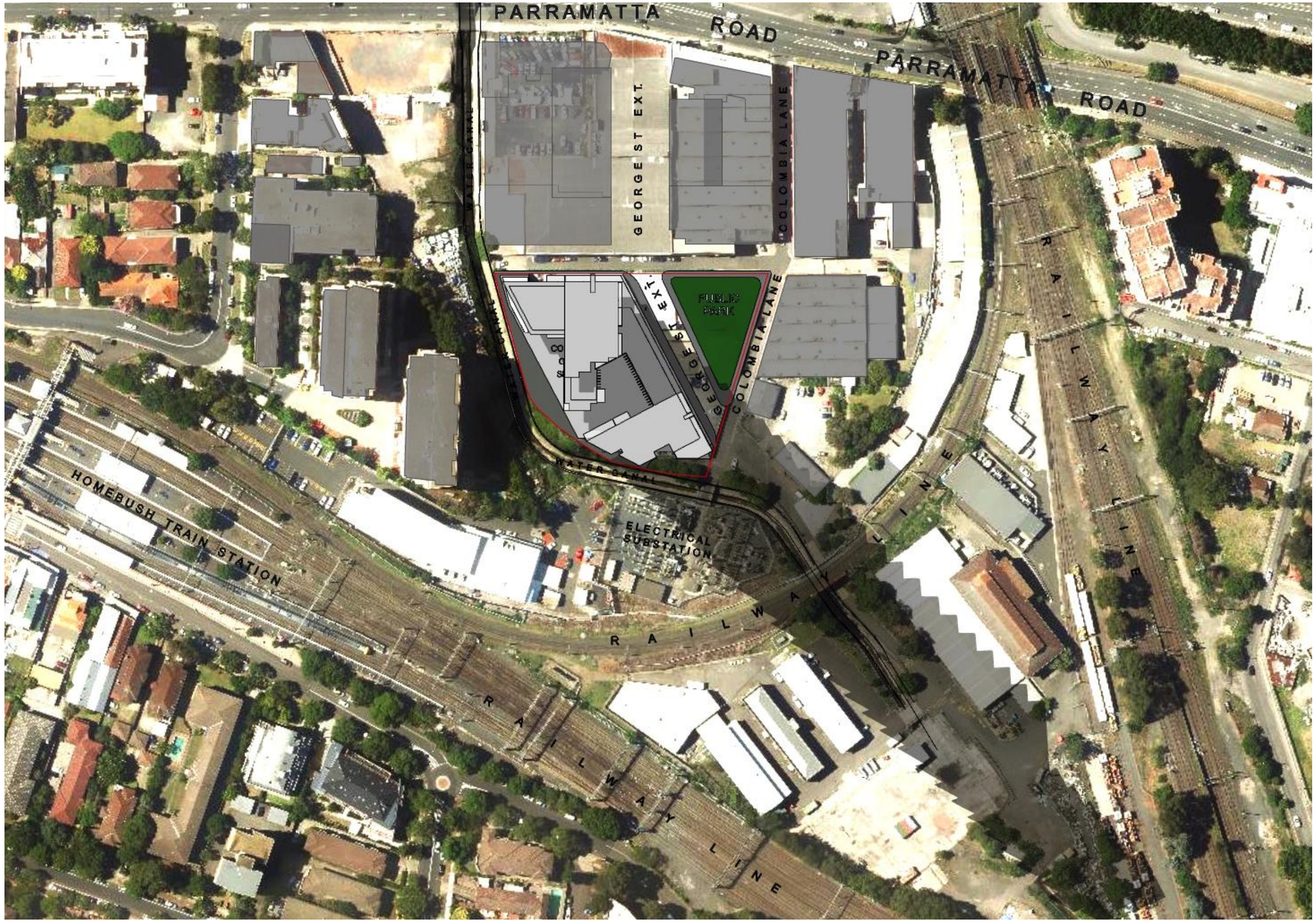

June 21 - 3 pm

PROPOSED FSR 5:1
CONCEPT

SK12 **shadow diagram**

N

project **PLANNING PROPOSAL**
RESIDENTIAL DEVELOPMENT

location **Stage 2, 11-17 Columbia Lane HOMEBUSH**

date **FEBRUARY 2017**

• **job no.** 14028 • **drawing no.** SK12 • **issue** • **project architect** GK • **drawn** GH/ CT • **scale** not to scale

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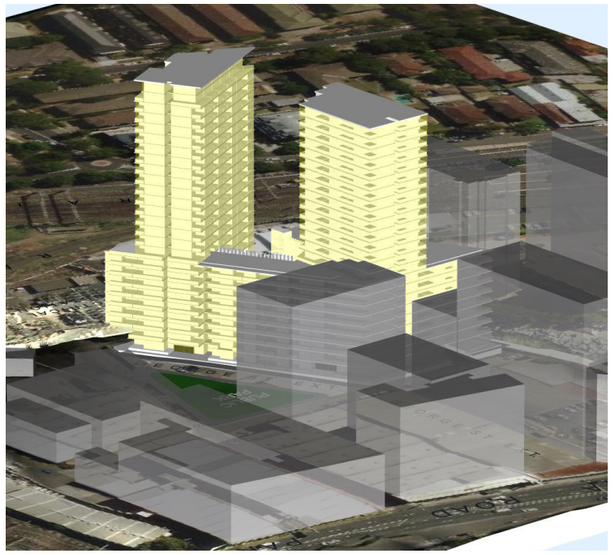
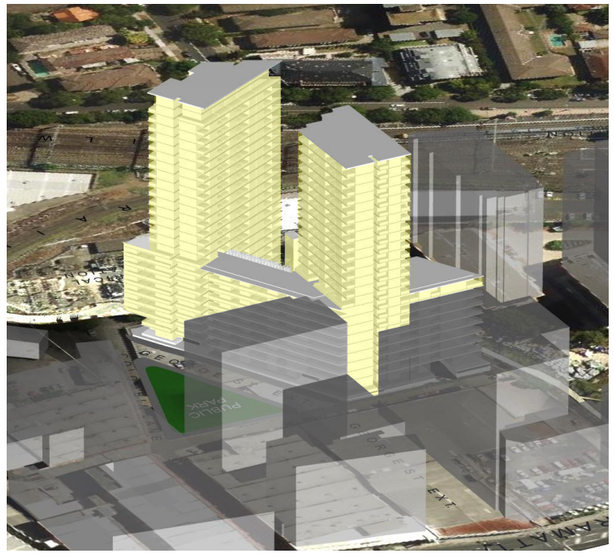
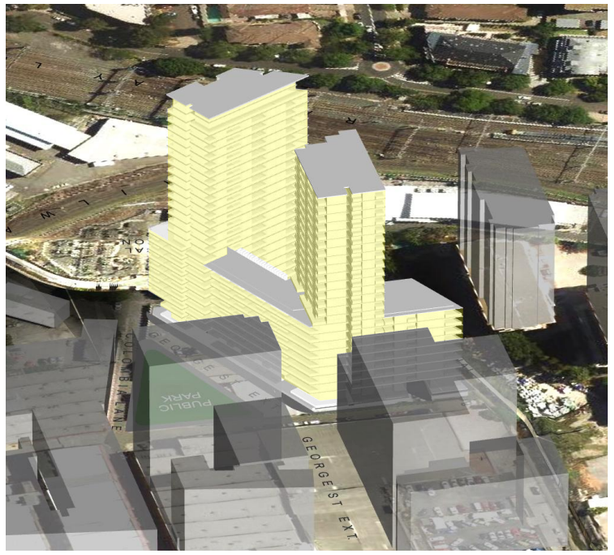


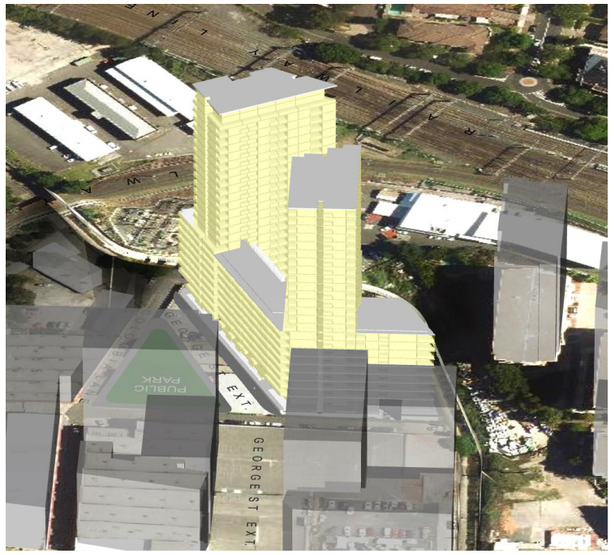
June 21 - 9am



June 21 - 10am

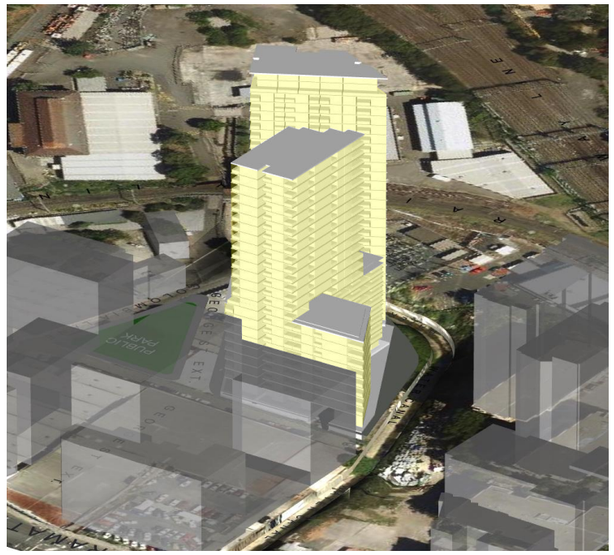


June 21 - 11am



June 21 - 12noon

June 21 - 1pm



June 21 - 2pm

June 21 - 3pm

INDICATES BUILDING FACADES RECEIVING SUN AT THE RESPECTIVE TIMES

PROPOSED FSR 5:1 CONCEPT

SK13

sun study

N

mpa

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RESIDENTIAL DEVELOPMENT

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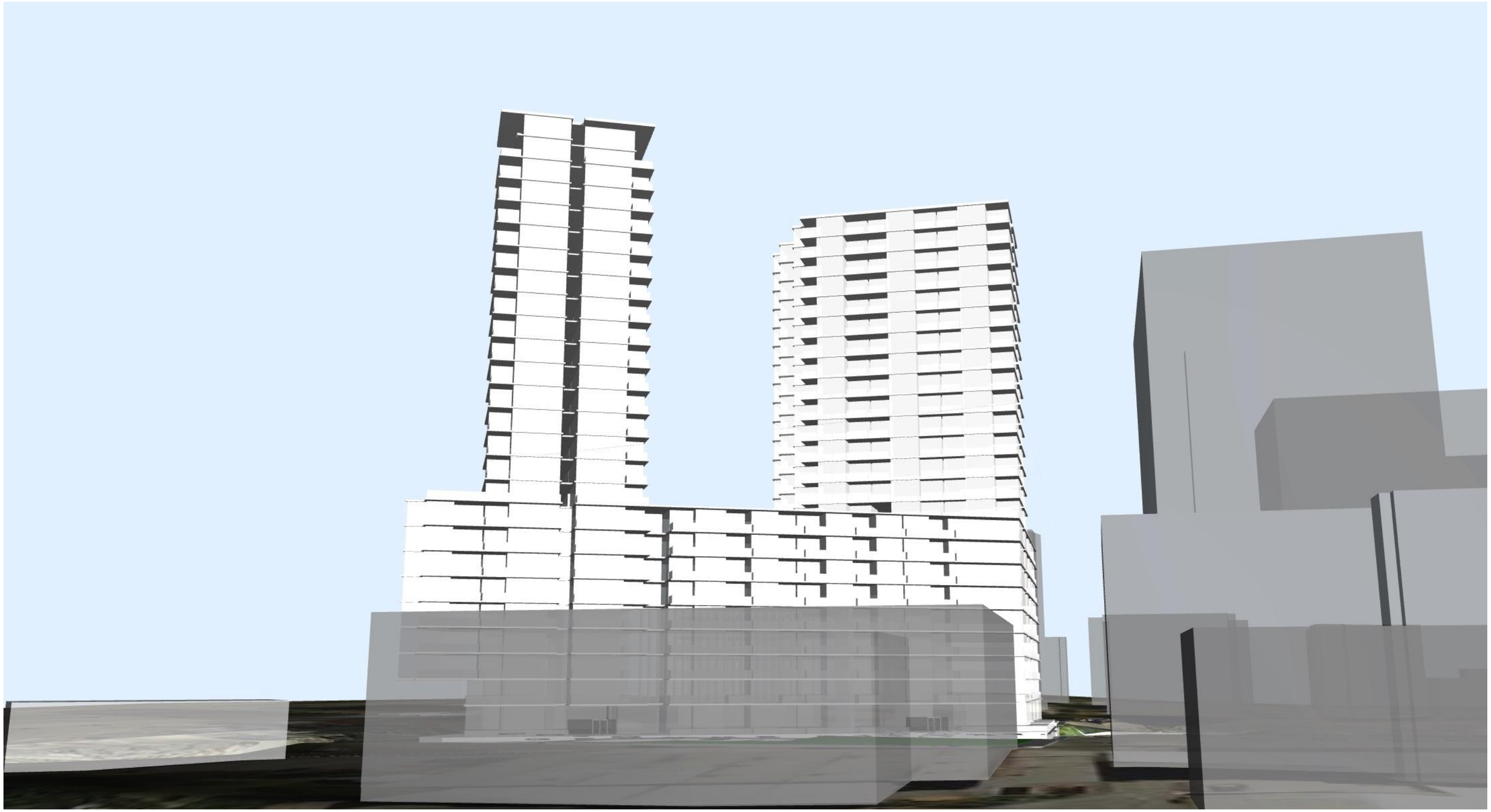

PROPOSED FSR 5:1
CONCEPT

SK14

perspectives

N

mpa

project **PLANNING PROPOSAL**
RESIDENTIAL DEVELOPMENT

location **Stage 2, 11-17 Columbia Lane HOMEBUSH**

date **FEBRUARY 2017**

• **job no.** 14028 • **drawing no.** SK14 • **issue** • **project architect** GK • **drawn** GH/ CT • **scale** not to scale

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PROPOSED FSR 5:1
CONCEPT

SK15

perspectives

N

project
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RESIDENTIAL DEVELOPMENT

location
Stage 2, 11-17 Columbia Lane HOMEBUSH

date
FEBRUARY 2017

• **job no.** 14028 • **drawing no.** SK15 • **issue** • **project architect** GK • **drawn** GH/ CT • **scale** not to scale

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PROPOSED FSR 5:1
CONCEPT

SK16

perspectives

N

mpa

project **PLANNING PROPOSAL**
RESIDENTIAL DEVELOPMENT

location **Stage 2, 11-17 Columbia Lane HOMEBUSH**

date **FEBRUARY 2017**

• **job no.** 14028 • **drawing no.** SK16 • **issue** • **project architect** GK • **drawn** GH/ CT • **scale** not to scale

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PROPOSED FSR 5:1
CONCEPT

SK18

perspectives

N

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project **PLANNING PROPOSAL**
RESIDENTIAL DEVELOPMENT

location **Stage 2, 11-17 Columbia Lane HOMEBUSH**

date **FEBRUARY 2017**

• **job no.** 14028 • **drawing no.** SK18 • **issue** • **project architect** GK • **drawn** GH/ CT • **scale** not to scale

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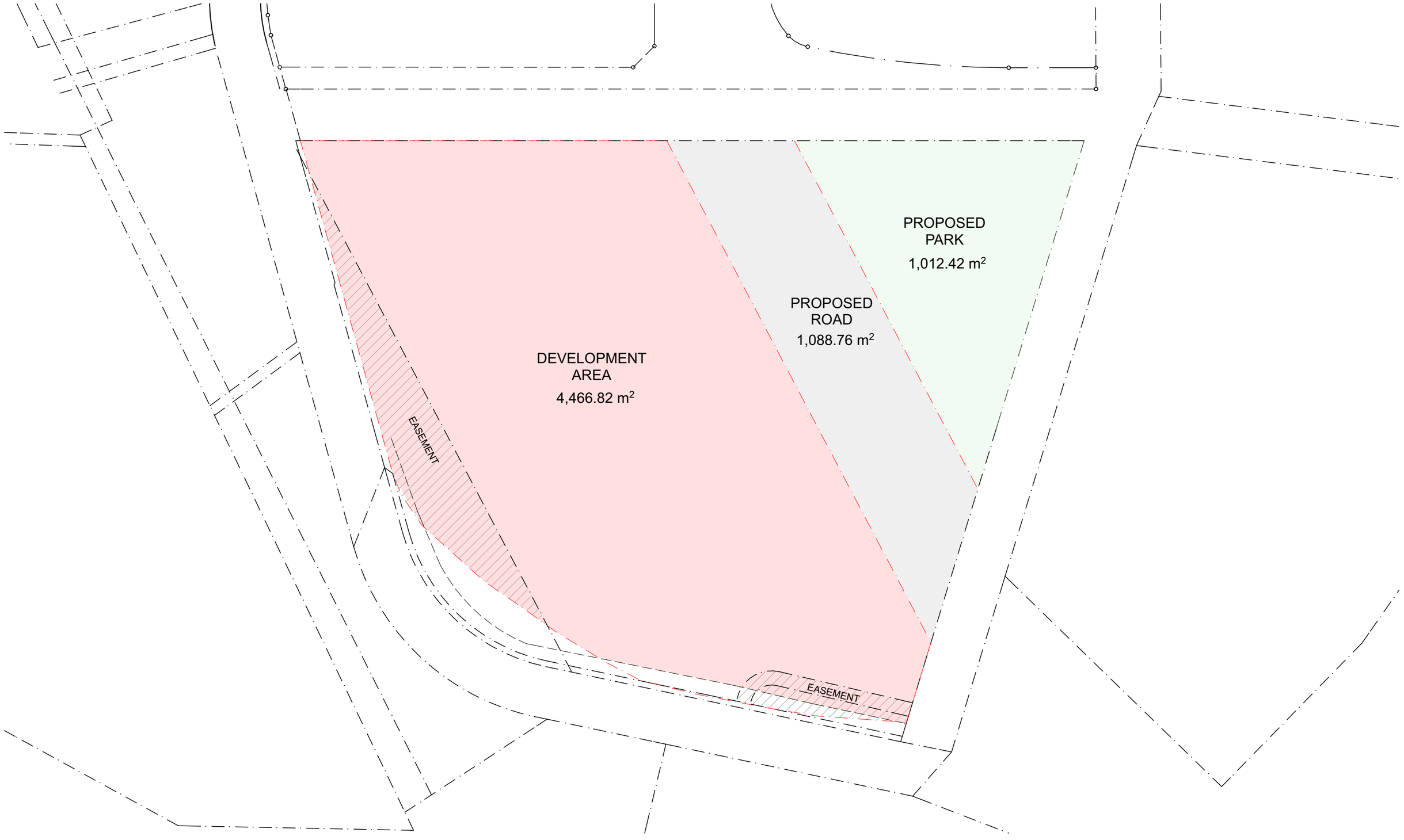

PROPOSED FSR 5:1 CONCEPT

SK19

land dedication

N

project **PLANNING PROPOSAL**
RESIDENTIAL DEVELOPMENT

location **Stage 2, 11-17 Columbia Lane HOMEBUSH**

date **FEBRUARY 2017**

• **job no.** 14028 • **drawing no.** SK19 • **issue** • **project architect** GK • **drawn** GH/ CT • **scale** 1:500@A3

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Appendix B

Construction categories as per the Guideline

Appendix C – Acoustic Treatment of Residences

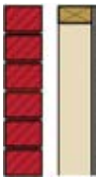
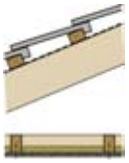
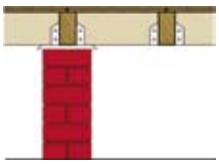
The following table sets out standard (or deemed-to-satisfy) constructions for each category of noise control treatment for the sleeping areas and other habitable areas of single / dual occupancy residential developments only. The assumptions made in the noise modelling are as follows:

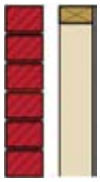
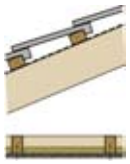
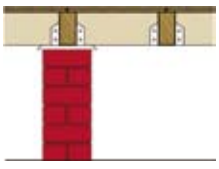
- Typical layout of a modern dwelling taken from a recent large residential development in an outer Sydney suburb
- Bedrooms and other habitable rooms are exposed to road noise

ACOUSTIC PERFORMANCE OF BUILDING ELEMENTS

The acoustic performances assumed of each building element in deriving the Standard Constructions for each category of noise control treatment presented in the preceding Table, are presented below in terms of Weighted Sound Reduction Index (Rw) values, which can be used to find alternatives to the standard constructions presented in this Appendix:

Category of Noise Control Treatment	R_w of Building Elements (minimum assumed)				
	Windows/Sliding Doors	Frontage Facade	Roof	Entry Door	Floor
Category 1	24	38	40	28	29
Category 2	27	45	43	30	29
Category 3	32	52	48	33	50
Category 4	35	55	52	33	50
Category 5	43	55	55	40	50

Category No.	Building Element	Standard Constructions	sample
1	**Windows/Sliding Doors**	Openable with minimum 4mm monolithic glass and standard weather seals	
	Frontage Facade	**Timber Frame or Cladding:** 6mm fibre cement sheeting or weatherboards or plank cladding externally, 90mm deep timber stud or 92mm metal stud, 13mm standard plasterboard internally	
		Brick Veneer: 110mm brick, 90mm timber stud or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally	
		Double Brick Cavity: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or metal sheet roof with sarking, 10mm plasterboard ceiling fixed to ceiling joists, R1.5 insulation batts in roof cavity.	
	Entry Door	35mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	1 layer of 19mm structural floor boards, timber joist on piers	
		Concrete slab floor on ground	

Category No.	Building Element	Standard Constructions	sample
2	**Windows/Sliding Doors**	Openable with minimum 6mm monolithic glass and full perimeter acoustic seals	
	Frontage Facade	**Timber Frame or Cladding Construction:** 6mm fibre cement sheeting or weatherboards or plank cladding externally, 90mm deep timber stud or 92mm metal stud, 13mm standard plasterboard internally with R2 insulation in wall cavity.	
		Brick Veneer Construction: 110mm brick, 90mm timber stud frame or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally.	
		Double Brick Cavity Construction: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or metal sheet roof with sarking, 10mm plasterboard ceiling fixed to ceiling joists, R2 insulation batts in roof cavity.	
	Entry Door	40mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	1 layer of 19mm structural floor boards, timber joist on piers	
		Concrete slab floor on ground