

O'Callaghan Consulting Engineers

Noise Impact Assessment Mixed-Use Development

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7 – 15 Horne Street, Elsternwick

For Auyin Property Development Pty Ltd

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Revision Record

No.	Author	Reviewed/Approved	Description	Date
D	E O'Callaghan		Client Draft	25/02/2026
1	E O'Callaghan		Client Issue	04/03/2026
2	E O'Callaghan		Minor Internal amendment	10/03/2026
3	E O'Callaghan		Minor layout change	05/06/2026

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Executive Summary

O'Callaghan Consulting Engineers was engaged by Auyin Property Development Pty Ltd to conduct a noise assessment for the proposed mixed-use development located at 7 – 15 Horne Street, Elseternwick.

The report is prepared as part of a planning application for consideration by the Department of Transport and Planning. A revision was completed due to a minor layout change.

Measurements of the existing noise environment was conducted and observed that road traffic noise was the dominant noise source. During site visits, it was observed that trains were typically inaudible with horns barely audible. Trams on Glen Huntly Road were audible while no cars were passing nearby but were barely audible during vehicle passby. It was therefore considered that if road traffic noise was designed to comply, then all other transportation noises would also comply.

The following is a summary of the assessment results and recommendations:

- Noise predictions from the dominant road traffic noise were undertaken. It was predicted that the site is affected by the road network.
- In-principle building envelope treatments were recommended and predicted to comply with the internal acoustic amenity, as detailed in Section 7.
 - Further detailed design is required prior to building permit stage. Should the layout or building envelope elements change, further detailed design is required.
- Further detailed design of mechanical services is required once preliminary selections are made. Certification of compliance required once installed.

Note this does not mean that transportation noise will be inaudible within the apartments nor that on-site activities will be inaudible at nearby sensitive receivers.

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1 Introduction

O'Callaghan Consulting Engineers was engaged by Auyin Property Development Pty Ltd to conduct a revised noise assessment for the proposed mixed-use development located at 7 – 15 Horne Street, Elsternwick. The update was required due to a minor layout change. This report was prepared as part of the planning application for consideration by Department of Transport and Planning.

The purpose of this report is to review the potential for transportation noise impacts onto the development, including noise from the ground floor commercial use, perform analysis, discuss the results in relation to the relevant noise criteria and provide recommendations for noise attenuation.

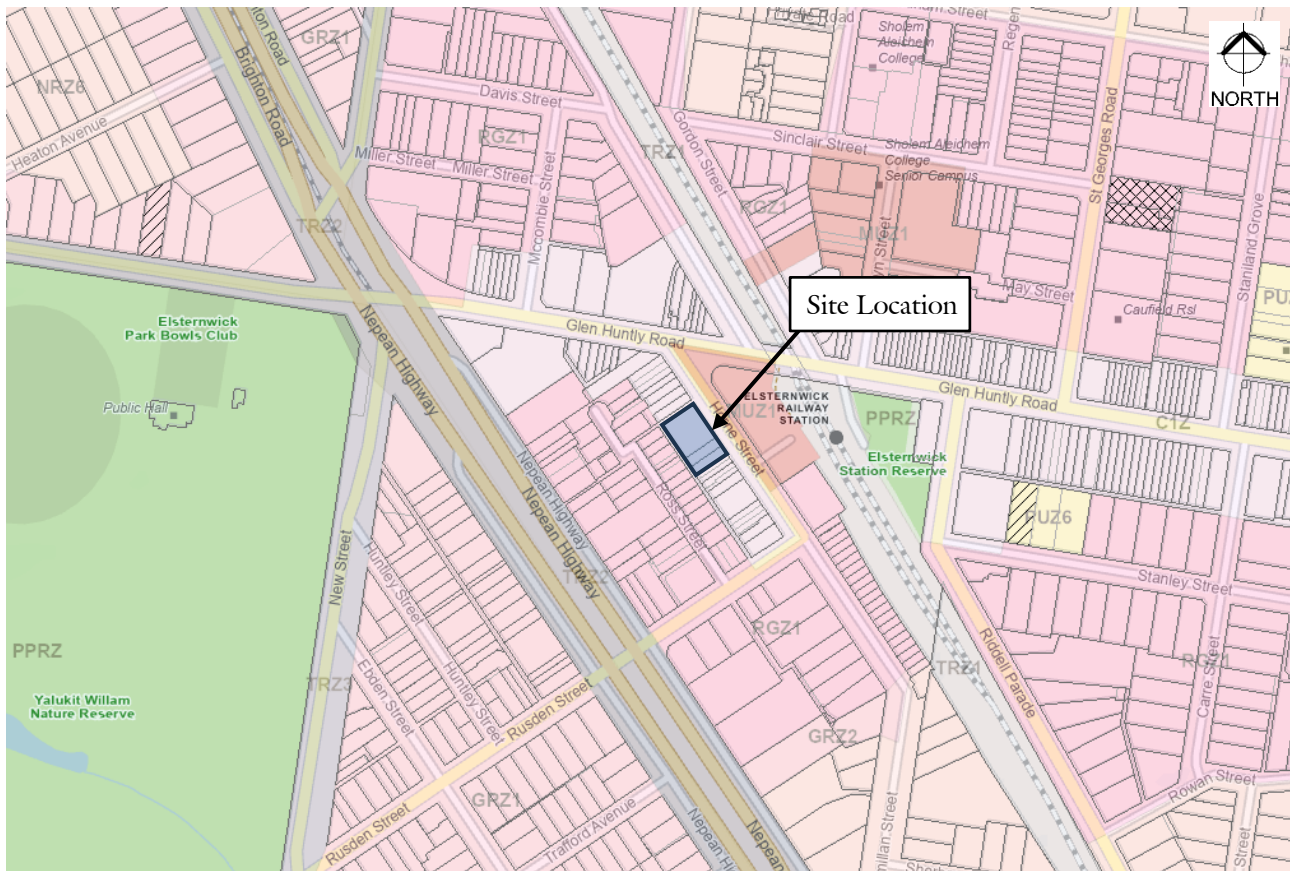
2 Site Description

The site is located in the Glen Eira Council local government area and is described by the following:

- 7 – 15 Horne Street, Elsternwick
CP163463, Lots 5~1, 6~1 on LP1423

Refer to Figure 1 for the approximate site location.

Figure 1: Site Locality



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3 Development Description

The development proposes the construction of a 12 storey mixed use building as described in Table 1.

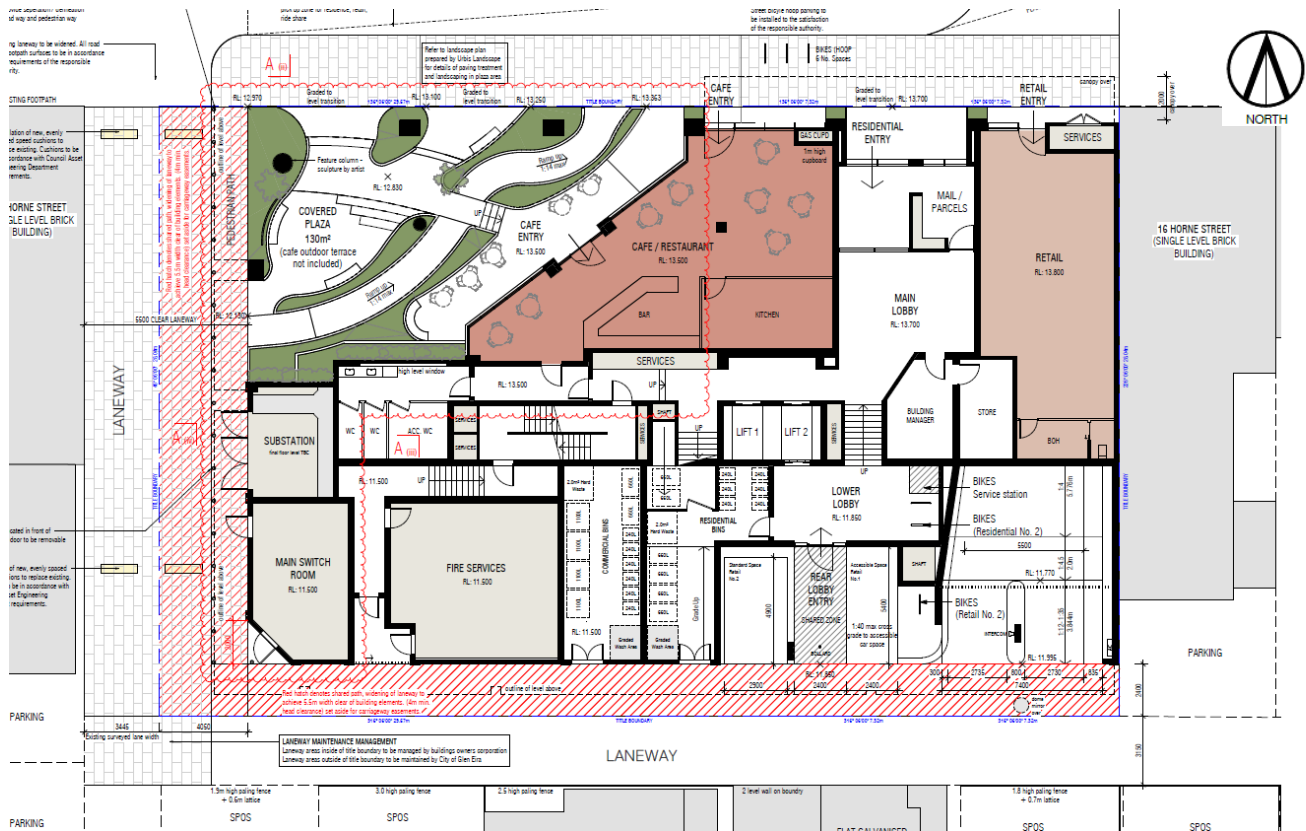
Table 1: Proposed Land Uses

Floor Level	Land Use Description	Proposed Operating Hours
Basement	2 basement levels 58 total parking spaces - storage and amenities - Private apartment storage and bicycle racks - Mechanical services equipment	N/A
Ground & Upper Ground	82.5m² retail space 117m² café/retail space with bar with 15 seat outdoor dining area 130m² covered plaza - Entry lobby and car park entrance - Communal Health Facilities / Studio - Bicycle storage and bathroom amenities - Vehicle access via rear laneway - Services and waste bin storage in laneway	7:00am to 10:00pm, 7 Days EPA Pub1254.2
Level 1 & 2	14 residential apartments as a mixture of 2 and 3 bedrooms.	N/A
Level 3	3 residential apartments with 2 bedrooms. - Communal lounge, dining room with outdoor terrace and multi-purpose room.	7am to 10pm (body corporate management)
Levels 4 to 11	A total of 22 residential apartments as a mixture of 2 and 3 bedrooms.	N/A
Level 12	1 residential apartment with 3 bedrooms and individual ensuite with panoramic balcony.	N/A
Rooftop	- Residential Mechanical services equipment - Commercial mechanical services equipment	24 hours, 7 days 7am to midnight

The ground floor plan of the development is shown in Figure 2. Further development plans are shown in Appendix A.

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Figure 2: Ground Floor Plan



3.1 Description of Acoustic Environment

A site inspection was conducted on the 28th of January 2026 and observed the following:

- The site is located in a mixed-use area with commercial retail, restaurants and take away establishments and residential apartment and detached dwellings.
- South-west across single and two storey residential dwellings is the Nepean Highway an 8-lane divided arterial road, with service roads bounding each side.
- North on Glen Huntly Road is the #67 tram line.
- South is predominantly residential dwellings and apartments.
- North-east of the site in a significant cutting is the Elsternwick train station (Sandringham Line). It was also observed on Horne Street at the bus station, that buses were observed to be stationary for several minutes

The current acoustic environment is dominated by road traffic noise. When trams pass the site and traffic is moving, trams are barely detectable above road noise. Trains were not audible on the existing roof top of the site with exception of a barely audible train horn. It is considered by assessing to comply with road traffic noise, other transportation noise will also comply.

No other significant noise sources were observed at the site.

4 Noise Measurements

4.1 Equipment

The following equipment was used to measure existing noise levels:

- Norsonic Nor139 Environmental Noise Monitor (SN#1393052)
- Norsonic Nor140 Environmental Noise Monitor (SN#1407615)
- SVAN sound level calibrator type SV36 (SN# 155525)

All equipment was calibrated by a National Association of Testing Authorities (NATA) accredited laboratory. The equipment was checked for calibration before and after the measurement session. No significant drift from the reference signal was recorded.

4.2 Road Traffic Noise Measurements

Unattended noise monitoring was conducted to establish the existing road traffic noise levels from the 28th January to the 6th February 2026. Two unattended road traffic noise monitors was installed. One at the site on the roof top of 7 Horne Street and the other at 205 Glen Huntly Road approximately 18 metres from the nearest trafficable lane of Nepean Highway as shown in Figure 3. The monitoring locations was chosen to obtain representative noise parameters of the road network. The microphone was in a free field position, 1.5m above ground (at 205 Glen Huntly) and 1.5m above roof level (at the site) both with had unobstructed line of sight to the road network.

Figure 3: Noise Monitoring Locations



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Road traffic noise measurements were conducted in accordance with AS2072¹. The environmental noise monitor was set to measure statistical noise parameters in 'A'-weighting, 'Fast' response, over 15-minute intervals. The noise parameters were chosen to allow analysis of predicted road traffic noise impacts against relevant criteria and the application of AS2107² and *Better Apartments – Design Standards*³ (BADS).

4.3 Weather Observation

Minor rainfall (<1.5mm) was recorded on the 28th January 2026 and was omitted from the analysis. No rainfall was observed during remaining unattended noise monitoring period. Weather was generally fine with light to moderate winds and temperature range between 6-26°C (source: Bureau of Meteorology, Melbourne Olympic Park).

4.4 Measured Road Traffic Noise Levels

Table 3 presents the measured road traffic noise levels from both monitoring locations described in Figure 3. Noise levels are presented as an arithmetic average of all non-weather affected days to one decimal place to show rounding errors for calculations when correcting the $L_{A10,18\text{Hour}}$ to different noise descriptors.

Table 2: Measured (Unattended) Road Traffic Noise Levels

Road Traffic Noise Descriptor	Time Period	Measured Noise Level dB(A)	
		RTN	AMB
$L_{A10,18\text{Hour}}$	6am to midnight	70.1	63.9
Noisiest daytime $L_{Aeq,1\text{Hour}}$	Varies	68.3	63.8
Noisiest nighttime $L_{Aeq,1\text{Hour}}$	Varies	66.4	60.6
$L_{Aeq, 15\text{Hour}}$	7am to 10pm	66.8	62.1
$L_{Aeq, 9\text{Hour}}$	10pm to 7am	63.6	57.0
$L_{Aeq, 16\text{Hour}}$	6am to 10pm	65.7	61.1
$L_{Aeq, 8\text{Hour}}$	10pm to 6am	62.7	55.8
$L_{Aeq,24\text{ hr}}$	Midnight to midnight	65.9	60.8

Graphical presentation of the revised unattended noise monitoring are presented in Appendix B.

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¹ Australian Standard AS2702:1984 Acoustics - Methods for the Measurement of Road Traffic Noise.

² AS 2107-2016 Acoustics - Recommended design sound levels and reverberation times for building interiors.

³ Department of Environment, Land, Water and Planning, Victoria (December 2016), *Better Apartments – Design Standards*.

4.5 Unattended Ambient Noise Levels

Table 3 presents the measured ambient noise levels at the on-site unattended noise monitoring location described in Figure 3. The measurements are based on the unattended noise monitoring data shown graphically in Appendix B and are a 10th percentile average of all non-weather affected periods.

Table 3: Measured Ambient Noise Levels

Time Period	Measured Noise Levels, dB(A)		
	L ₉₀ (BL)	L _{eq}	L ₁₀
Day (7am to 6pm)	55	61	63
Evening (6pm to 10pm)	52	59	61
Night (10pm to 7am)	45	50	52
Night (10pm to 12am)	49	56	58

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5 Noise Criteria

The development is creating a noise sensitive receiver in proximity to noise sources including generating on-site noise and requires further assessment to achieve predicted compliance with relevant criteria. A noise assessment was completed considering the following which are relevant to the development:

- Glen Eira Planning Scheme 13.05-1S Noise and Air Abatement.
- Environmental Protection Regulations 2021 (EPR2021) Part 5.3 Noise, 25 May 2021.
- Publication 1826.4 - *Noise Limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues*, 5 September 2025 (EPAPub1826.5).
- Clause 58.04-3 Apartment developments – Noise Impacts Objectives Standard D16.

The following additional documents are also referred in establishing a development criteria:

- *VicRoads Traffic Noise Reduction Policy – Requirements for Developers* 2005.
- NSW Road Noise Policy, March 2011.

The relevant noise criterion for the site is described in the sections below.

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5.1 Road Traffic Noise

Road traffic noise considers two criteria, external and indoor noise and are summarised below.

5.1.1 External Amenity

The site is located adjacent to a road carrying significant vehicles and was considered for assessment. The road network contains Transport Zone 1 and 2 roads. The *VicRoads Traffic Noise Reduction Policy – Requirements for Developers* 2005 specifies an external noise level objective of 63dB(A) $L_{10,18\text{Hour}}$ (façade corrected) for residential dwellings.

5.1.2 Internal Amenity

Noise impacts on the façade of the dwellings predicted to exceed the VicRoads external criteria will require further design to the building envelope for predicted indoor compliance. Glen Eira Council has indoor criteria in Clause 58.04-3 noise impact objectives and is summarised in Table 4. For reference Clause 58.04-3 is reproduced:

Standard D16

Noise sources, such as mechanical plants should not be located near bedrooms of immediately adjacent existing dwellings or small second dwellings.

The layout of new dwellings and buildings should minimise noise transmission within the site.

Noise sensitive rooms (such as living areas and bedrooms) should be located to avoid noise impacts from mechanical plants, lifts, building services, non-residential uses, car parking, communal areas and other dwellings.

New dwellings should be designed and constructed to include acoustic attenuation measures to reduce noise levels from off-site noise sources.

Buildings within a noise influence area specified in Table D5 should be designed and constructed to achieve the following noise levels:

- *Not greater than 35dB(A) for bedrooms, assessed as an $L_{Aeq,8h}$ from 10pm to 6am.*
- *Not greater than 40dB(A) for living areas, assessed $L_{Aeq,16h}$ from 6am to 10pm.*

Buildings, or part of a building screened from a noise source by an existing solid structure, or the natural topography of the land, do not need to meet the specified noise level requirements.

Noise levels should be assessed in unfurnished rooms with a finished floor and the windows closed.

In addition, internal noise levels specified in Table 1 of AS2107 are expressed as equivalent continuous (L_{Aeq}) levels and are reproduced in Table 4 for ease of reference. Which includes the medical centre which may be impacted by transport noise internally.

Table 4: Recommended Design Levels for Building Interiors

Description	Recommended Design Sound Level, $L_{Aeq,T}$ (dB)
Clause 58.04-3 Standard D16 Living Areas (Family/meals rooms, etc.) Work Areas (Laundry, Bathrooms, etc.)	<40 $L_{eq,16Hour}$ <b35 $L_{eq,8Hour}$
AS2107:2016 – 7 – Residential Buildings Houses and Apartments in inner city areas or near major roads: Sleeping Areas (Bedrooms) Living Areas (Family/meals rooms, etc.) Work Areas (Laundry, Bathrooms, etc.)	35 – 40 35 – 45 35 – 45

The assessment has adopted Council's Planning Scheme indoor criteria for design. Compliance will still be considered achieved if AS2107 is met during certification measurements.

The minimum building envelope sound transmission loss performance requirements predicted to achieve the internal noise limits will be determined using the calculation method described in AS2021:2015⁴ which can be adapted for road traffic noise.

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⁴ AS 2021-2015 Acoustics - Aircraft noise intrusion - Building siting and Construction.

5.1.3 Sleep Disturbance

In the absence of guidance from Glen Eira Planning Scheme we have used the following criteria provided by the NSW Road Noise Policy.

As the existing dominant noise source in the local environment is traffic noise from the road network it is considered reasonable to use the sleep disturbance criteria suggested by the NSW Road Noise Policy. To help protect against people waking or being disturbed from their sleep, the DECCW⁵ (now EPA) recommends:

- Maximum internal noise levels below 50-55 dB(A) are unlikely to awaken people from sleep.
- One or two noise events per night, with maximum internal noise levels of 65-70 dB(A), are not likely to affect health and wellbeing significantly.

5.2 EPR2021: Part 1 Commercial, Industrial and Trade

The purpose of *Part 1* is to protect noise sensitive areas from noise generating activities in the Melbourne metropolitan region from commercial, industrial and trade (CIT) premises.

Noise emissions from typical onsite activities including mechanical plant from these types of premises are assessed against *Part 1*. Details of the criteria and established noise limits are discussed below.

The time periods for assessment as stated in EPR2021 are presented in Table 5.

Table 5: EPR2021 Part 5.3 Clause 116 – CIT Time Periods

Period	Day of the week	Time Period
Day	Monday – Saturday (Except Public Holidays)	7am to 6pm 7am to 1pm
Evening	Monday – Saturday Sunday and Public Holidays	7am to 10pm
Night	Monday – Sunday	10pm to 7am

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The zoning levels and resulting noise criteria for onsite commercial activities are presented in Table 6. The criteria sets the noise limit for noise emissions from the site, to the nearest sensitive receivers. The criteria calculated using EPAPub1826.5. the criteria is developed from the on-site noise monitor.

Table 6: EPAPub1826.4 Part 1 – Noise Criteria

Time Period	Measured Level L ₉₀ (dB(A))	Zoning Level L _{eq} (dB(A))	Noise Limit L _{eq} (dB(A))
Day	55	55	61
Evening	52	49	55
Night (10pm – 12am)	49	44	52
Night	45	44	48

⁵ Department of Environment, Climate Change and Water NSW (2011). NSW Road Noise Policy.

5.3 Commercial Mechanical Plant Noise

Compliance of noise emission levels from commercial mechanical plant is assessed under EPA2021Part 1. Refer to Table 6 for noise limits.

5.4 Domestic Mechanical Plant Noise

Noise from domestic mechanical plant is also assessed under the *Environment Protection Regulation 2021 Part 5.3*. The regulation prescribes certain items with prohibited times of use, where noise levels must be inaudible within a sleeping area of sensitive receiver. A summary of relevant items to the development is presented summarised in Table 7: Prohibited Times for Residential Equipment.

Table 7: Prohibited Times for Residential Equipment

Group Number	Group Items*	Day of the Week	Time of day
3	Heating equipment (including central heating a hot water system or heat pump, air conditioning, or split system used for heating), vacuum cleaner, swimming pool pump, spa pump or water pump (other than a pump being used to fill a header tank).	Monday to Friday	10pm to 7am
		Saturday, Sunday and Public Holidays	10pm to 9am
4	An air conditioner, evaporative cooler or split system used for cooling	Monday to Friday	11pm to 7am
		Saturday, Sunday and Public Holidays	11pm to 9am

The *EPA Publication 1973* (EPA1973) describes unreasonable noise from residential equipment as follows:

“Day/evening operation (non-prohibited hours)

the assessed noise level exceeds the background noise level $[L_{A90 D/E,T}]$ by more than 5 dB at the measurement point in the relevant area.”

“Night operation

At night during the prohibited times, noise from residential equipment is unreasonable if it can be heard in a habitable room within any other residence, regardless of whether any door or window giving access to the room is open.”

By applying the noise limits specified Table 8, plant can be more easily determined as unreasonable or not.

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Table 8: Domestic Mechanical Plant Noise Criteria

Time Period	Noise Levels, dB(A)	
	Measured L_{90}	Criteria $L_{eq,T}$
Day (7am to 6pm)	55	60
Evening (6pm to 10pm)	52	54
Night (10pm to 7am)	45	<45

* estimated using Australian Standards/Council indoor sleeping area level ($L_{Acq,T}$ 30dB), adjusting for an open window or door (+)10dB.

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Due to built up environments, inaudibility is commonly not achievable during the night time period. The criteria recommended in Table 8 is not expected to cause noise annoyance within neighbouring dwellings.

5.5 ERP2021: Part 2 Music Noise

The site is proposing a bar at the ground floor level and requires consideration of potential acoustic amenity impacts. It is not currently proposed to include amplified music at the ground level restaurant and is discussed further in Section 6. Criteria is included however as under compliance situations music and patron noise are not able to be separated.

EPAPub1826.4 Part 2 is the protocol used for establishing the criteria relevant for indoor and outdoor music noise venues and was triggered by Clauses 13.05-1S and 53.06 of the Glen Eira Planning Scheme. The Policy provides guidance on compliance from noise generated by onsite music.

It is noted that Clause 53.06-1 requires only those noise sensitive receivers located within 50 metres to be assessed. The assessment time periods are described in Table 9.

Table 9: EPR2021 Part 5.3 Clause 123 – Music Noise Time Periods

Period	Day of the week	Time Period
Day & Evening	Monday – Saturday (Except Public Holidays)	7am to 11pm
	Sunday & Public Holidays	9am to 10pm
	Sunday or a public holiday (<i>other than if either is preceding a public holiday</i>)	9am to 11pm
Night	Monday to Friday (<i>other than a public holiday or a day preceding a public holiday</i>)	11pm to 7am
	Sunday or a public holiday (<i>if neither is preceding a public holiday</i>)	10pm to 7am
	Saturday or any day preceding a public holiday	11pm to 9am

Table 10 present the acoustic criteria for the site relevant to the respective time periods. The criteria calculated using EPAPub1826.4.

Table 10: EPAPub1826.4 Part 2 Day/Evening Noise Criteria

Time Period	Noise Levels dB(A)	
	Measured L_{90}	Criterion $L_{Acq,DE}$
Day/Evening	53	58

5.6 Patron/Conversation Noise

The EPR2021 contains an exclusion Clause 117 for the application of the criteria to patron or conversation/voice noise. The following criteria are used as standard practice in the industry:

- *Industry-Accepted criteria for voice/conversation noise [represented as an L_{10}], based on measured background noise levels. The relevant targets are:*
 - *Background + 10 dB for the evening period (6 pm to 10 pm all nights, Saturday afternoon and all day Sunday)*
 - *Background + 5 dB for the night period (after 10 pm)*

Table 11 presents a comparison of the two criteria methods for the specific time periods, which are accepted practice by Council's to assess compliance at the nearest noise sensitive receiver.

Table 11: Patron Noise Criteria

Time Period	Measured Level L_{90} dB(A)	Industry Accepted Method
Day (7am to 6pm)	55	65
Evening (6pm to 10pm)	52	62
Day/Evening	53	63
Night (10pm to 7am)	45	50
Night (10pm to 12am)	49	54

Compliance with this criterion is considered achieved external to the sensitive place in a private yard or incident on a residential bedroom window.

5.7 Background Music Noise

The Association of Australasian Acoustical Consultants Licensed Premises Noise Assessment Technical Guideline v2.0 (AAAC Guideline) specifies typical background music noise. Table 12 provides a summary of typical internal reverberant noise levels from amplified music.

Table 12: Comparison of Patron Noise Criteria

Music Noise Type	Internal Sound Pressure Level ($L_{Aeq,T}$ dB)	Comment
Background Music	67 – 74	Allows for conversation at <i>normal</i> vocal effort at 600 mm separation
	70 – 77	Allows for conversation at <i>raised</i> vocal effort at 600 mm separation

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6 Noise Assessment

The following sections summarise the analysis of transportation noise with the potential to impact the development.

6.1 Road Traffic Noise Assessment

The following sections describe the methodology and results of the road traffic noise analysis in the 10-year planning horizon (2036).

6.1.1 Traffic Volumes

Presented in Table 13 are the existing traffic volumes and percentage of heavy vehicles for road network, obtained from VicRoads Google Earth data and the Elsternwick Structure Plan Transport study 2022. Forecast traffic volumes were based upon growth rates shown below and are taken from VicRoads Open Data. Some growth rates were slightly negative and was conservatively assessed higher.

Table 13: Traffic volumes – Road Network

Location	Traffic Volumes (AADT)				Heavy Vehicles (%)	Adopted Growth Rate (% p.a.)
	2019	2020	2026	2036		
Glen Huntly Road	13,000	-	13,429	14,116	6.0	0.5
Tennyson Street	-	7,800	8,037	8,448	6.3	0.5
Hotham Street	-	14,000	14,426	15,163	5.9	0.5
Horne Street	6,550	-	6,783	7,130	6.0	0.5
Rusden Street	5,280	-	5,468	5,748	6.0	0.5
Brighton Road (N Glen Huntly)	-	68,000	70,066	73,649	5.0	0.5
Nepean Highway (Btn Glen Huntly & Rusden St)	-	69,000	71,097	74,732	5.0	0.5
Nepean Highway (Sth Rusden St)	-	70,000	72,127	75,815	5.1	0.5

The 18 hour traffic volumes used in the noise calculations were calculated using the SCAT data and were approximately 95% of the AADT.

6.1.2 Noise Calculation Parameters

Road traffic noise predictions were conducted using the CoRTN based modelling algorithms in SoundPLAN v9.1. The basis of the noise model is provided in Table 14.

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Table 14: Noise Calculations Parameters

Description	Value/Description
Noise modelling algorithm	CoRTN
Modelling software	SoundPLAN v9.1
Road surface type	Asphalt with 3-5mm surface porosity
Speed limit	The posted speed limit is 60km/h
Source height above grade	0.5m all vehicles
Ground Levels	1m interval Contours obtained from VicData
Receiver heights	1.5m above finished floor level
Floor Heights (slab to slab)	Varies between 3.1, typically 3.2m and 3.65m
Façade correction	+2.5 dB(A)
Screening	Existing buildings located adjacent the site, where applicable.

6.1.3 Noise Model Verification

To verify the road traffic noise model, the $L_{A10,18\text{Hour}}$ noise levels were modelled and compared to the measured levels as presented in Table 15.

Table 15: Road Traffic Noise Verification

Location	Measured $L_{A10,18\text{Hour}}$ (dB)	Predicted $L_{A10,18\text{Hour}}$ (dB)	Prediction Difference (dB)	Required Correction
205 Glen Huntly Rd	70.1	70.6	+0.5	0
7 Horne St	63.9	65.8	+1.9	0

As the modelled levels are within the allowable tolerance of $\pm 2\text{dB(A)}$ of the measured level, no correction was required to the model.

6.1.4 Predicted Road Traffic Noise Levels

Modelling was conducted to determine the road traffic noise impact levels at the development in the 10-year planning horizon (Year 2036). Using the modelling input parameters specified above, the predicted $L_{A10,18\text{hour}}$ noise levels for the worst affected façades at the development are summarised in Figure 4 to Figure 7.

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Figure 4: Prediction Noise Impact – Ground Level

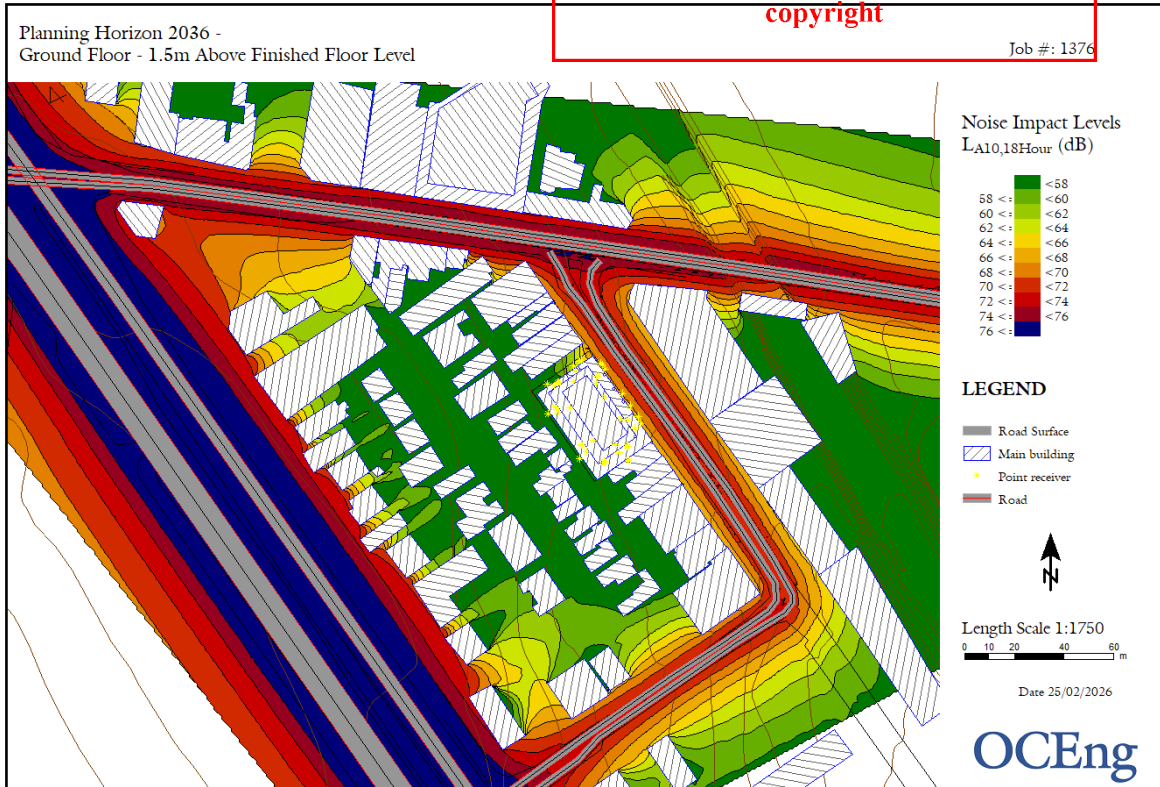


Figure 5: Prediction Noise Impact –Level 4

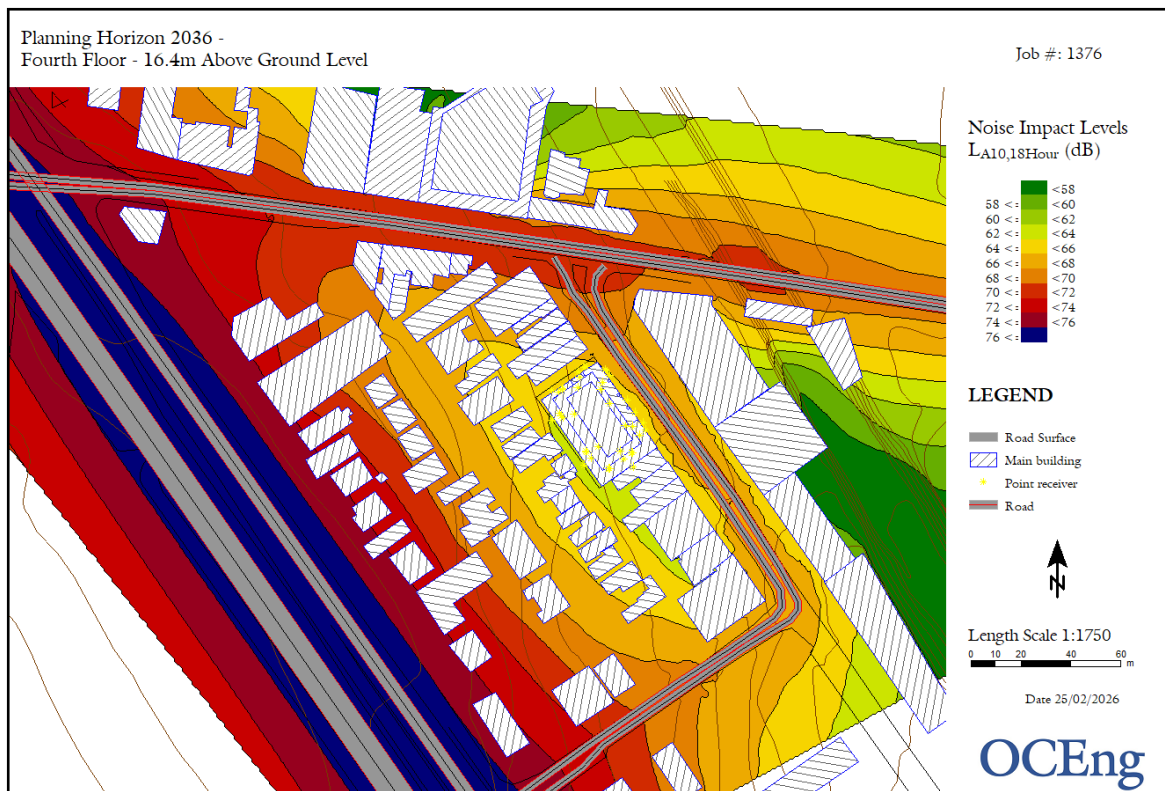


Figure 6: Prediction Noise Impact –Level 8

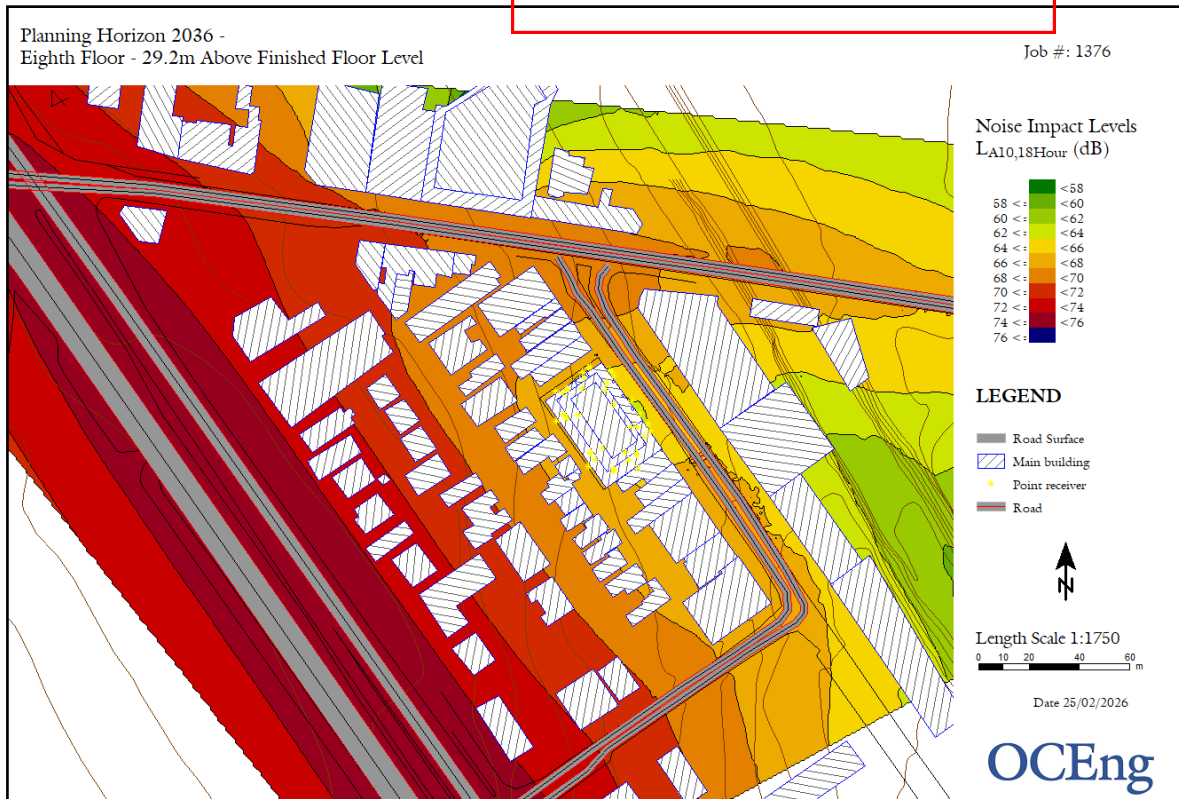
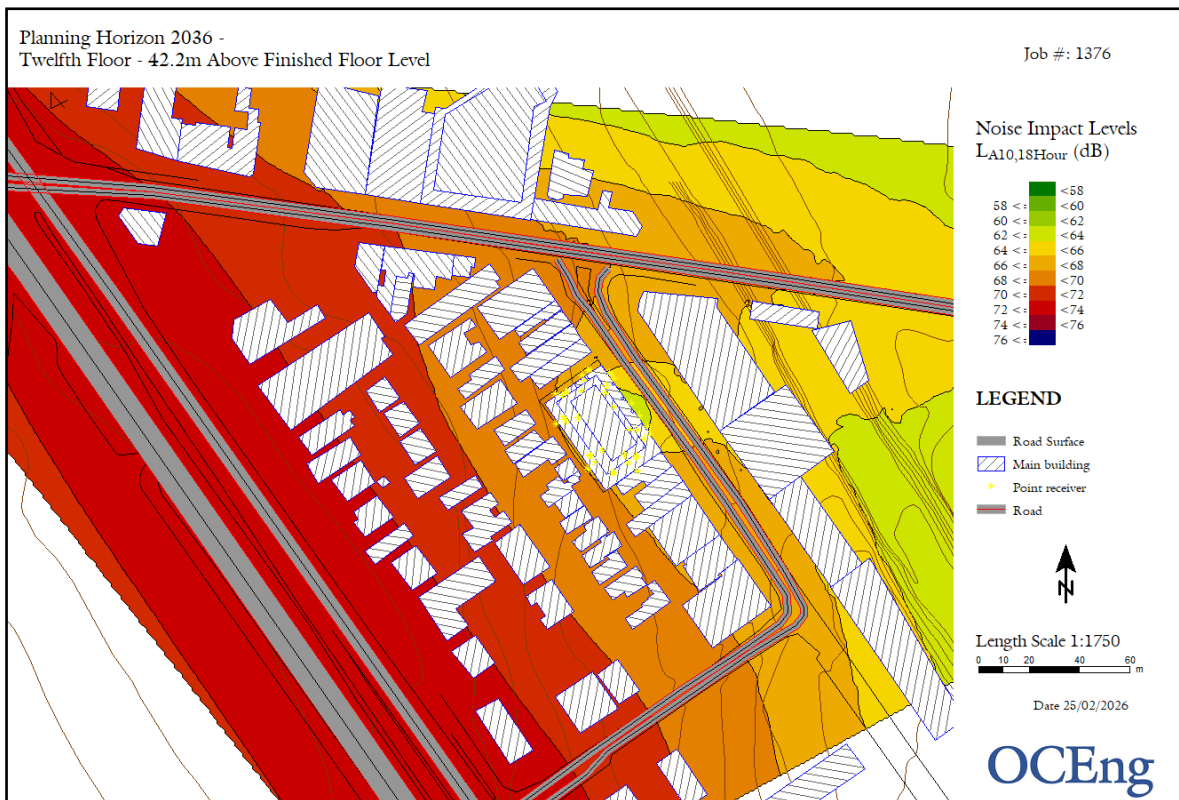


Figure 7: Prediction Noise Impact – Level 12



The results of the calculations show that the development is predicted to exceed the VicRoads Criteria from transportation network. Further detailed design of the building façade noise controls for predicted compliance were presented in Section 7.

6.2 On-Site Activity Noise

The following sections summarise the analysis of noise sources with the potential to impact the development.

The assessment of on-site activities associated with the proposed development was conducted with typical activities measured by OCEng in previous projects. Predicted impacts at the nearest sensitive receivers were calculated based on the receivers identified in 6.2.1.

The following noise sources were investigated:

- Café/Restaurant Noise
- Background music
- Car park traffic generation
- Waste collection services.
- Rooftop mechanical services deck.

The assessment methodology, parameters and results of analysis including receivers assessed are discussed in the following sections.

6.2.1 Nearest Noise Sensitive Receivers

This assessment will focus on the nearest sensitive receivers as outlined in Table 16 and shown in Figure 8.

Table 16: Receiver Locations

Receiver	Address	Property Type
1	12 – 26 Ross Street	Single, two and multi-storey residential dwellings
2	242 Glen Huntly Road	multi-storey residential apartment building

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Figure 8: Noise Sensitive Receivers



If compliance can be achieved at the identified receiver locations, then all remaining noise sensitive locations are expected to comply.

6.2.2 Car Park, Delivery & Waste Collection Noise

The vehicle entrance to the site is proposed from the rear laneway which is predominantly residential use with 58 residential parking spaces. There are 2 commercial retail spaces at ground level in the laneway.

In accordance with Clause 114 of EPR2021, noise from a motor vehicle is exempt from assessment provided it is entering or exiting the site. Therefore, residential passenger vehicles from the site were excluded from the assessment.

An assessment of commercial generated vehicles was not conducted as two spaces are not likely to cause noise annoyance due to low number of parking spaces and infrequent activity.

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Table 17 presents the noise sources with the potential to impact the nearest sensitive receivers. The noise source levels were calculated to one metre and include corrections for tonality and impulsiveness as per AS1055 (where relevant).

Table 17: Typical Transient Noise Source Levels

Noise Source Description	Noise Level at 1m, dB(A) $L_{Aeq,T}$	Assessed number of events in 1 hour	Measured Duration, T (sec)
Refrigeration/Delivery vehicle	78	2	900
Waste Collection (Rear Loader)	82	3	123

*Includes 2dB(A) adjustment to account for impulsiveness characteristics in accordance with AS1055.

The calculations were based on the following:

- The retail premises proposes to operate during the day time and evening period. We have investigated noise to midnight on a shoulder night time period comparable to Part 2 criteria.
- Distance attenuation, with direct line of sight.
- No physical screening was considered.
- Activities from waste collection and deliveries will be limited to the hours described by EPAPub1254.2.

The predicted noise impact levels were calculated based on the above assumptions and are presented in Table 18.

Table 18: On-Site waste collection and delivery Noise Predictions

Receiver	Noise Source	Predicted External Noise Level, L_{eq} 1 hour dB(A)	Complies with Criteria	
			Day Time (61 dB(A))	Evening (55 dB(A))
1	Deliveries (laneway)	58	✓	✗
	Waste Collection (laneway)	58	✓	✗
2	Deliveries (laneway)	14	✓	✓
	Waste Collection (laneway)	14	✓	✓

With no noise controls, waste collection and delivery activities are predicted to comply with the daytime criteria.

Waste collection and delivery activities must not be conducted outside the EPA Publication 1254.2⁶ recommended hours.

Recommendations for current best practises to further minimise noise from waste collection, delivery and car park are discussed in Section 7.6.

⁶ Environmental Protection Agency Noise Control Guidelines, Publication 1254.2, May 2021.

6.2.3 Café / Restaurant Noise

There is potential for patron noise from the premises to impact the acoustic amenity of the nearest noise sensitive receivers. A maximum capacity of the ground level terrace space is estimated at 15 customers outside and 24 customers inside which could be expected during the day, evening or night shoulder time periods.

The predicted noise impact at the most exposed Receiver 2 assuming the assessment methodology was **46dB L_{Aeq,T}**. The result of the calculations show compliance is predicted to be achieved with the day, evening and shoulder night time period to midnight without physical noise controls.

It is noted that the plaza where outdoor patrons will dine, will be landscaped and will assist in improving acoustic amenity through some diffusion and absorption of sound.

6.2.4 Retail Shops / Office

Noise from retail is not generally expected to cause noise impacts as most activities are conducted indoors with one-on-one conversation. Shops are likely to include background ambience music.

Background ambience music within the retail spaces are expected to be inaudible outside the building and will not cause noise annoyance to nearby receivers.

6.2.5 Background Music Noise

The ground and upper ground floor retail spaces are expected to play background or ambient music (as described in Section 5.7). The music is proposed to be played at comfortable levels to provide atmosphere within the premises, which would not inhibit normal conversation between customers and staff.

Background music noise levels are expected to be inaudible at Receivers 1 and 2 without noise controls during the proposed operating hours.

6.2.6 Communal Dining and Lounge

The communal dining and lounge area is located on level 3 Southern aspect with a terrace facing south. A landscaped planter box forms part of the 1.5metre high balustrading and will have a mix of shrub and taller trees providing visual and acoustic screening to nearby neighbours. The floor level is elevated higher than the nearest current receivers and building edge/1.5m high balustrade screening will reduce potential noise impacts.

OCEng were advised by the Client the space will be provided to residents with the intent for casual use by residents rather large scale events. On this basis the communal lounge could be considered an extension of the on-site resident's apartment and be a breakout space for family and friend-oriented activities typical of residential premises.

6.3 Mechanical Plant Noise

Mechanical services plant has the potential to impact the amenity of noise sensitive receivers. A detailed mechanical plant noise assessment of proposed building was not possible as plant has not been selected. The following environment side services are expected at the site:

- Car park supply and exhaust fans

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- restaurant kitchen exhaust
- residential air-conditioning condenser units
- Fire services

Detailed design is typically conducted during building design where fan and duct calculations are completed to determine additional noise controls for compliance at the nearest sensitive receivers.

Recommended to guide design and minimise noise impacts are discussed in Section 7.

7 Recommendations

The following recommendations must be implemented for predicted compliance with the noise criteria detailed in Section 5.

On-site noise generating activities were predicted to comply with the criteria

By complying with the minimum transportation noise control requirements, noise from other sources including the area also predicted to comply.

7.1 Transportation Noise

An assessment to predict the noise impacts from road traffic noise was performed. Based on the analysis, road traffic noise is the dominant noise source. By controlling noise from road noise, all other external sources of noise are expected to be attenuated. The following sections summarise the predicted noise controls required to achieve compliance internally.

Based on the guidance in Section 5.1.3 and treatment recommendations in Section 7.1 sleep disturbance is less likely to occur.

7.2 Building Envelope Treatment

The recommended minimum in-principle building envelope treatments for the attenuation of road traffic noise are summarised in the sections below.

Further detailed design is recommended prior to construction (during the endorsed plans or stage), once the floor plans, glazing and wall dimensions are finalised to optimise noise control materials.

7.2.1 External Glazing

A review of worst affected rooms was completed. It is predicted that the minimum glazing requirements for the site will be:

- Bedrooms – $R_w + C_{tr}$ 30 to $R_w + C_{tr}$ 35
- Living spaces (kitchen, meals, dining, living) – $R_w + C_{tr}$ 30 to $R_w + C_{tr}$ 33

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Glazing requirements will change floor to floor and depend on noise impact incident at the window, size of the room and window and room use. Further detailed design is required during endorsed plans stage to optimise the design.

7.2.2 External Walls

The building is proposed to be constructed of a minimum 150mm thick concrete panel and will achieve an R_w50 as a base build element. The minimum external wall performance must not be less than R_w50 .

Selected external wall systems must be verified by the acoustic consultant prior to final approval.

7.2.3 Roof/Balcony Construction

It is recommended external roof systems, including balconies over habitable/non-habitable spaces of apartments achieve a minimum R_w50 .

Selected ceiling systems should be verified by the acoustic consultant prior to final approval.

7.3 Onsite Activity Noise

An assessment of the typical activities with the potential to impact the nearest sensitive receivers was performed. The site is expected to comply with the criteria without additional noise controls.

While commercial operating hours are proposed typically between 7am and 8pm, the noise report has predicted compliance can be achieved for hours including 7am to 10pm, 7 days.

To further minimise the potential for noise annoyance O'Callaghan Consulting Engineers recommend the following:

- All trafficable concrete carpark areas should be low squeal surfaces and not be painted or resin finished.
- Speed bumps shall either be built into the slab or are preferably not used.
- Ramps shall not use texturing that results in a "rumble strip" such as parallel grooving of concrete surfaces.
- All car park and delivery/waste collection bay roller doors must always remain closed other than when operationally necessary for vehicles to enter/exit the site.
 - Roller doors are recommended to be electric drive, variable speed motors.

7.3.1 Communal Dining and Lounge Area

To minimise noise annoyance from this space OCEng recommend the following:

- Provide an In-house system for residents to use with either a wifi or aux connection.
- limit the room to "background music levels" by installing an in-house system,
- upgrading the external façade so that the residents can have a *good time* with less worries of noise impacts with doors closed.

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- Consideration to limiting hours of use, or the number of days used. Should residents wish to continue later, the rooftop may allow for extended use. These management controls will be managed by the Body Corporate By-Laws.

7.4 Residential Mechanical Plant Noise

Residential air-conditioning condenser units are not expected to be a significant source of noise from the development. The nearest affected sensitive place will be located on-site. By controlling noise to on-site all other receivers are predicted to comply.

An assessment was conducted and predicts that mechanical plant noise levels from the development are predicted to comply without noise controls provided the sound power level of an outdoor condenser unit does not exceed **64dB(A)**.

Typically, selected plant for residential units are unlikely to exceed this sound power level due to on-site noise amenity constraints and compliance is expected to be achieved.

Noise impacts from air-conditioning condenser units will be further reduced by:

- Locating plant at private balconies and on the services roof top. Do not change location without prior approval.
- Installing high performing vibration isolation pads if units are wall mounted. Isolation pads/mounts such as MasonMercer super waffle pads/NR mounts or Embleton shearflex/supershearflex/NR/NRD mounts to reduce the risk of structureborne generated noise.

A suitably qualified acoustic consultant is recommended to conduct a detailed mechanical plant noise assessment once preliminary plant selection is made to provide advice on achieving compliance.

Compliance with this noise limit is required as a cumulative noise source level from all plant and must be checked prior to finalisation of plant selections.

Plant noise compliance measurements are recommended to confirm the equipment is compliant with the criteria.

7.5 Services Equipment Noise

Detailed plant selections for the proposed development are not available at this stage and it is not possible to carry out a detailed examination of the ameliorative measures that may be required to achieve the noise targets.

Plant must be acoustically treated to achieve the criteria detailed in Section 5 to prevent noise emissions from adversely impacting the surrounding properties. This may include:

- Investigate locating commercial plant in the basement to reduce noise levels onto residential receivers.
- Mechanical plant located with no line-of-sight and as far away as possible from noise sensitive receivers.
- Plant locations should also consider positioning equipment in areas where existing ambient noise levels are higher than anywhere else on site.
- Selecting the quietest plant possible.

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- Treatments the plant equipment with vibration isolation, enclosures, barriers, duct lining and silencers, etc.
- Installing high performing vibration isolation pads on all equipment. Vibration Isolation pads/mounts are typically required to reduce the risk of structureborne generated noise.
- Car park and supply and exhaust air fans to be able to accommodate minimum 2x Diameter length silencers on the environment side of the fan. Also to internal to building side if possible.

While compliance is expected to be achieved for off-site sensitive receivers, noise impacts may occur to on-site receivers if plant is not appropriately noise controlled and vibration isolated.

A suitably qualified acoustic consultant is recommended to conduct a detailed mechanical plant noise assessment once preliminary plant selection is made to provide advice on achieving compliance.

Compliance with this noise limit is required as a cumulative noise source level from all plant and must be checked prior to finalisation of plant selections.

Plant noise compliance measurements are recommended to confirm the equipment is compliant with the criteria.

7.6 Noise Control Guidelines

The Environmental Protection Agency Noise Control Guidelines Publication 1254.2 May 2021 (EPA1254) provides additional recommendations to minimise noise annoyance for commonly occurring activities. Activities considered relevant to the proposed development are discussed in the following sections and should conform to the recommended collection times to minimise noise annoyance.

7.6.1 Noise from Shops

The EPA1254 provides the following noise minimisation recommendations from retail shops:

Where amplified speech or music from shops (spruiking) is to be controlled, the following conditions may be specified.

Each loudspeaker or loudspeaker system to be placed in such a position that, while it is in use, it remains:

- *Located entirely inside the shop*
- *Situated not less than three metres from any public entrance to the shop*
- *Directed in such a manner that the device does not point towards any wall which contains an external window or entrance to the shop unless the wall is more than 15 metres from the device itself*
- *Operating at a level that does not exceed 65 dB(L_{Aeq}) two metres from the facade.*

Should background music be played at any outdoor areas, the noise levels shall not exceed L_{Aeq} 65dB measured 2 metres from the façade.

7.6.2 Industrial Waste Collection

The EPA Publication 1254 provides guidance for minimising noise from industrial waste collection activities. These recommendations can be applied to commercial operations and are summarised as follows:

- *Refuse bins should be located at sites that provide minimal annoyance to residential premises.*
- *Compaction should be carried out while the vehicle is moving.*

- *Bottles should not be broken up at collection site.*
- *Routes which service predominantly residential areas should be altered regularly to reduce early morning disturbances.*
- *Noisy verbal communication between operators should be avoided where possible.*

In addition to the above, the schedule for waste collection summarised in Table 19 is provided.

Table 19: EPA1254 Waste Collection Schedule

Day of the Week	Recommended Collections Times	
	1 Collection/Day	2 or More Collections/Day
Monday to Saturday	6:30am to 8pm	7am to 8pm
Sunday and Public Holidays	9am to 8pm	9am to 8pm

Waste Collections are recommended to occur during any of the recommended times above and are not expected to impede the operation of the site.

7.6.3 Deliveries and Truck-Mounted Refrigeration Units

The EPA1254 states the following noise minimisation recommendations for deliveries to shops, supermarkets and service stations:

Where a residential area will be impacted by noise from deliveries, then deliveries should be inaudible in a habitable room of any residential premises (regardless of whether any door or window giving access to the room is open) outside the hours contained in the schedule.

Table 20: EPA1254 Deliveries Schedule

Day of the Week	Recommended Delivery Times
Monday to Saturday	7am to 10pm
Sunday and Public Holidays	9am to 10pm

Deliveries are recommended to occur during any of the recommended times above and are not expected to impede the operation of the site.

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8 Conclusion

An environmental noise assessment was undertaken for the proposed mixed-use development located at 7 – 15 Horne Street, Elsternwick. The report was prepared as part of the planning application for consideration by Department of Transport and Planning.

Provided the recommendations presented in Section 7 are implemented, the development is predicted to comply with the noise criteria outlined in Section 5.

Note, these recommendations do not mean that transportation noise will be inaudible at the site.

We trust the information provided in this report is sufficient. If you have any further questions, please do not hesitate to contact us.

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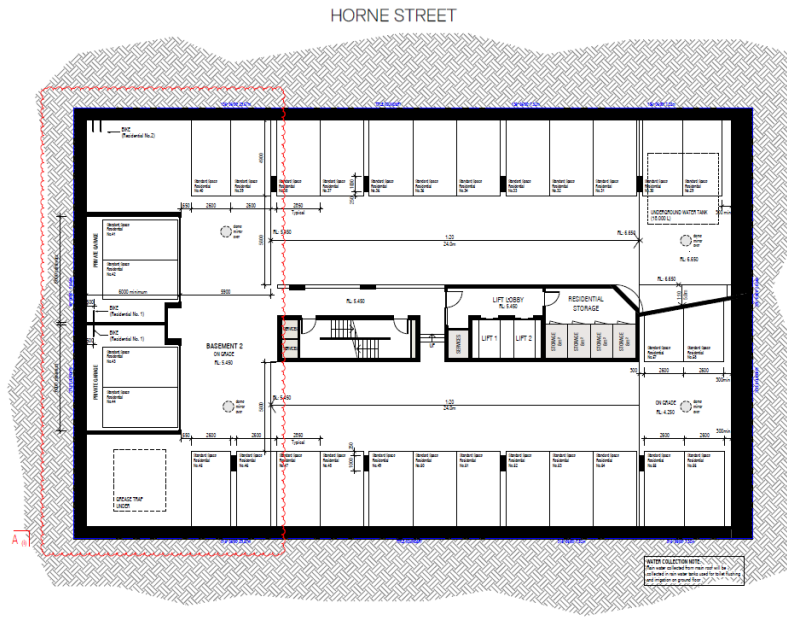
Appendix A Relevant Development Plans

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COLOUR LEGEND

- Apartment - 2 BED
- Apartment - 3 BED
- Communal Facilities
- Retail / Commercial
- Cafe / Restaurant
- Services
- Planting / Landscaped Area
- Balcony / Terrace Area

GENERAL NOTES

- All apartments to have a minimum energy rating of 5 stars
- Overall development to have an average energy rating of 5 stars
- All apartments to have hot water supplied through an electric instantaneous hot water system
- Water saving to be achieved through the use of efficient fixtures & fittings and rainwater harvesting system
- Windows to have high performance glazing as required to meet energy requirements
- High quality indoor environment to be achieved through the use of better materials, more natural light and the provision of fresh air to occupants
- Adequate daylight for occupant health and energy efficiency provided in accordance with design guidelines

PARKING NOTES

The basement design, including all levels, ramp grades, transitions, headroom clearances, and dimensions of carpark to be in accordance to AS/NZS 2983.1:2004, and to the satisfaction of the responsible authority. Refer to traffic report prepared by Urbis.

- All mechanical venting of basement required to occur internally within site
- Car spaces to be typically 2850 x 4900 unless otherwise specified
- Columns to be located within a distance of 250 to 500mm from aisle end of parking space unless specified otherwise
- Need Kelly staggered height wall mounted bike storage (or similar) @ 500mm centres
- CO2 sensors will be installed throughout the two basement carparking areas and connected to mechanical exhaust equipment to lower operational time while maintaining good air quality

PARKING ALLOCATION

On-site parking allocation to include

- Not less than one car space for each two bedroom apartment
- Not less than two car spaces for each three or more bedroom apartment
- Not less than one car space per 100sqm of leasable floor area for Retail / Commercial tenancies

NOT FOR CONSTRUCTION

ISSUE	DATE FOR OFF SUBMISSION
1	10/06/2019
2	10/06/2019
3	10/06/2019
4	10/06/2019
5	10/06/2019
6	10/06/2019
7	10/06/2019
8	10/06/2019
9	10/06/2019
10	10/06/2019

MIXED-USE PROPOSAL TOWN PLANNING

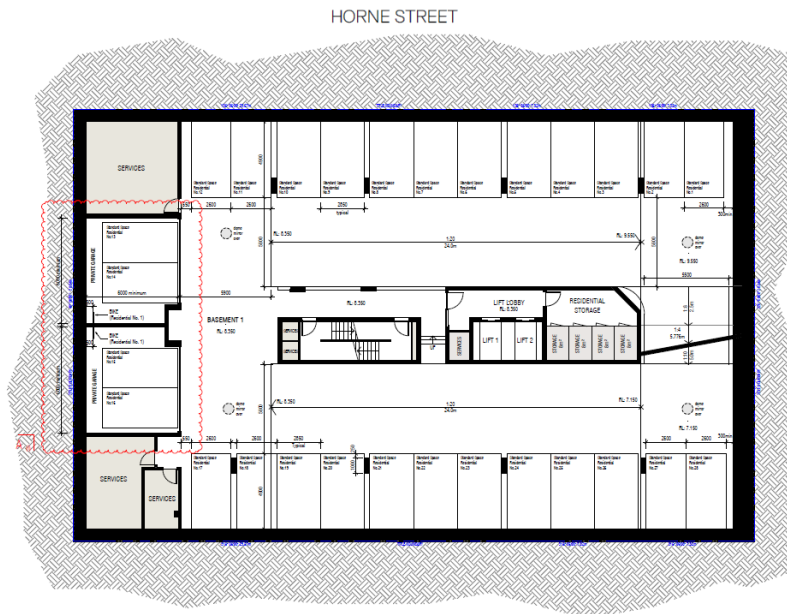
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ISSUE FOR SUBMISSION	TP098 - A
BASEMENT 2	

CBG



COLOUR LEGEND

- Apartment - 2 BED
- Apartment - 3 BED
- Communal Facilities
- Retail / Commercial
- Cafe / Restaurant
- Services
- Planting / Landscaped Area
- Balcony / Terrace Area

GENERAL NOTES

- All apartments to have a minimum energy rating of 5 stars
- Overall development to have an average energy rating of 5 stars
- All apartments to have hot water supplied through an electric instantaneous hot water system
- Water saving to be achieved through the use of efficient fixtures & fittings and rainwater harvesting system
- Windows to have high performance glazing as required to meet energy requirements
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- Adequate daylight for occupant health and energy efficiency provided in accordance with design guidelines

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NOT FOR CONSTRUCTION

ISSUE	DATE FOR OFF SUBMISSION
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4	10/06/2019
5	10/06/2019
6	10/06/2019
7	10/06/2019
8	10/06/2019
9	10/06/2019
10	10/06/2019

MIXED-USE PROPOSAL TOWN PLANNING

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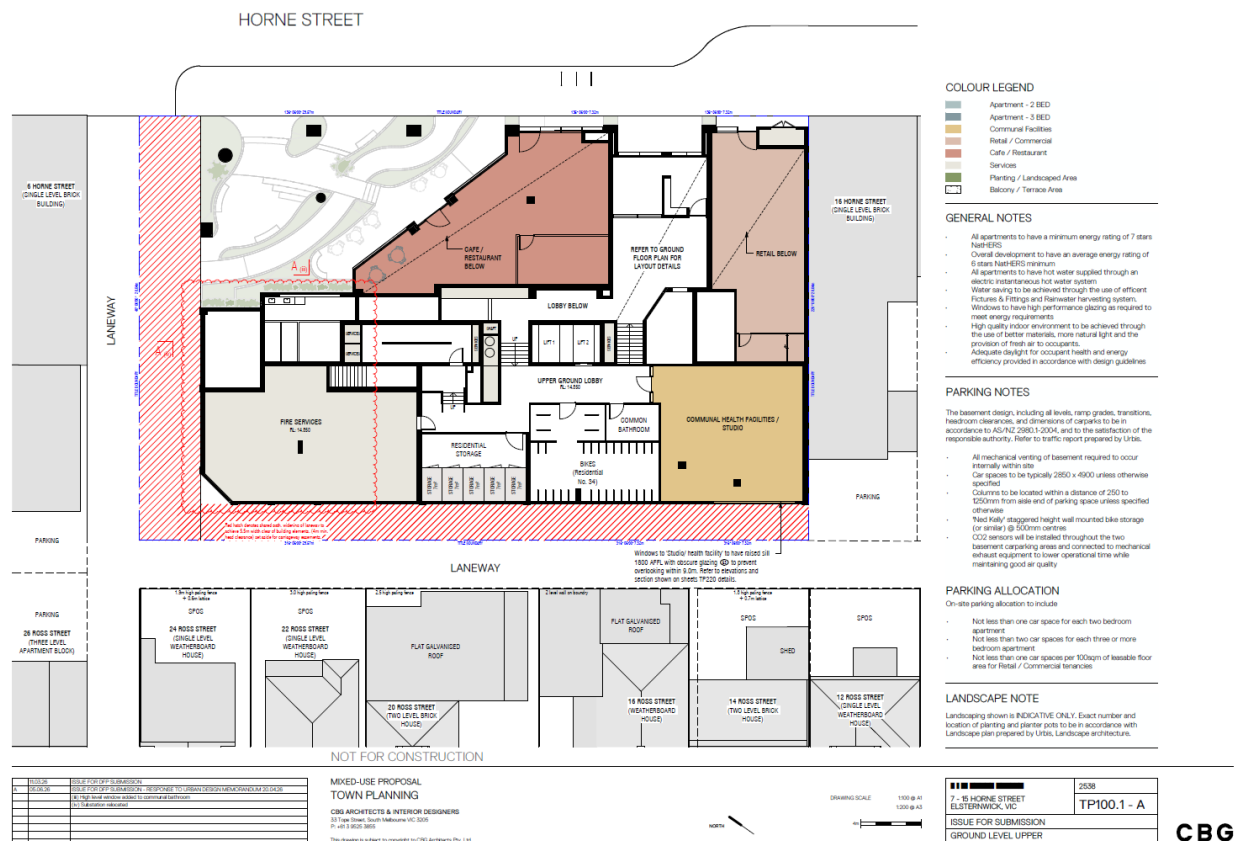
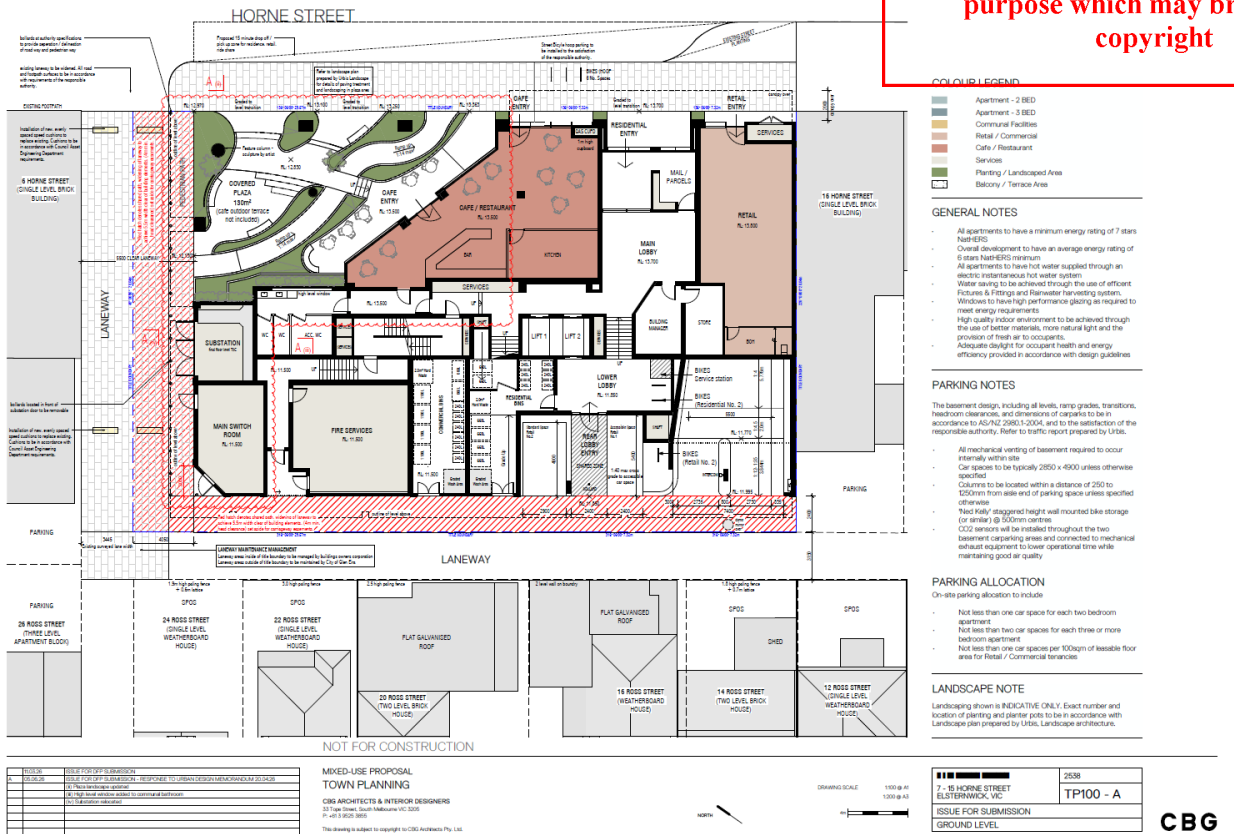
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BASEMENT 1	

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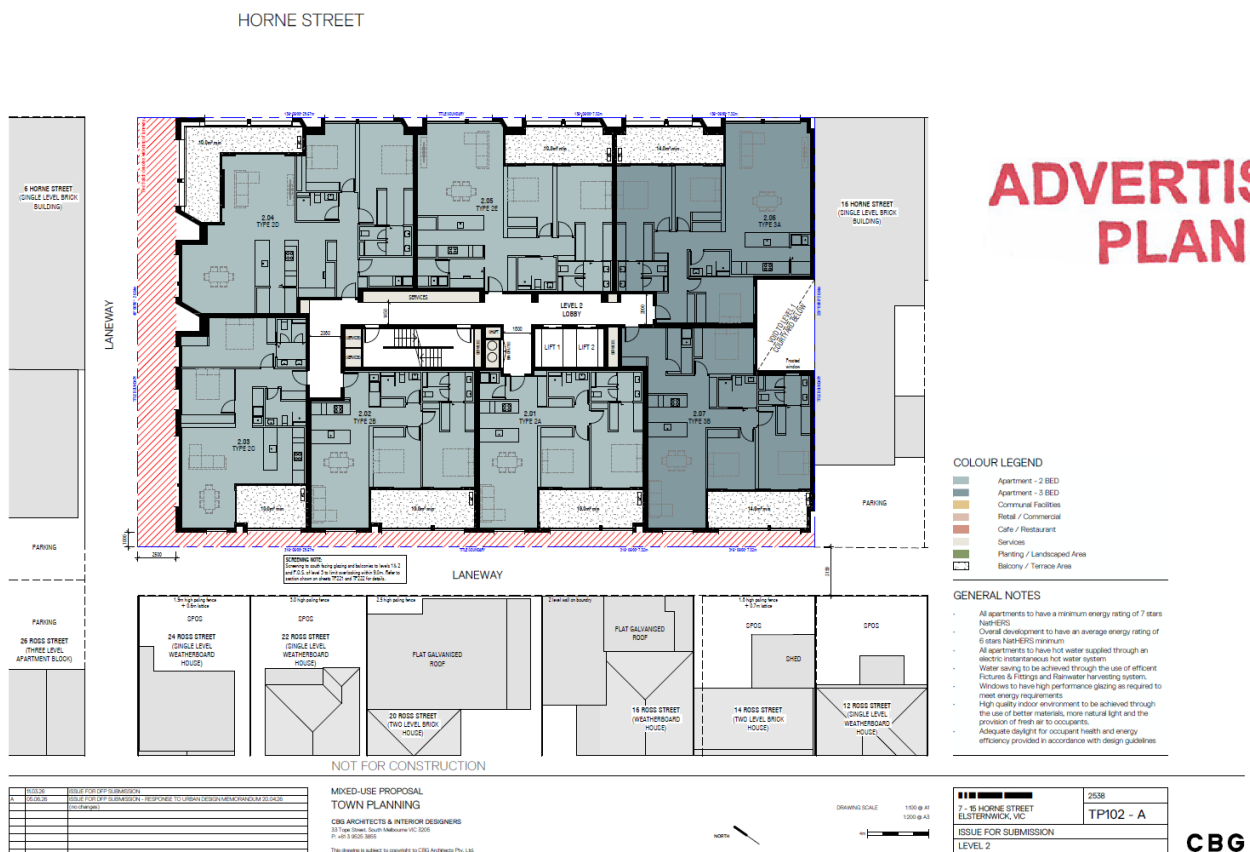
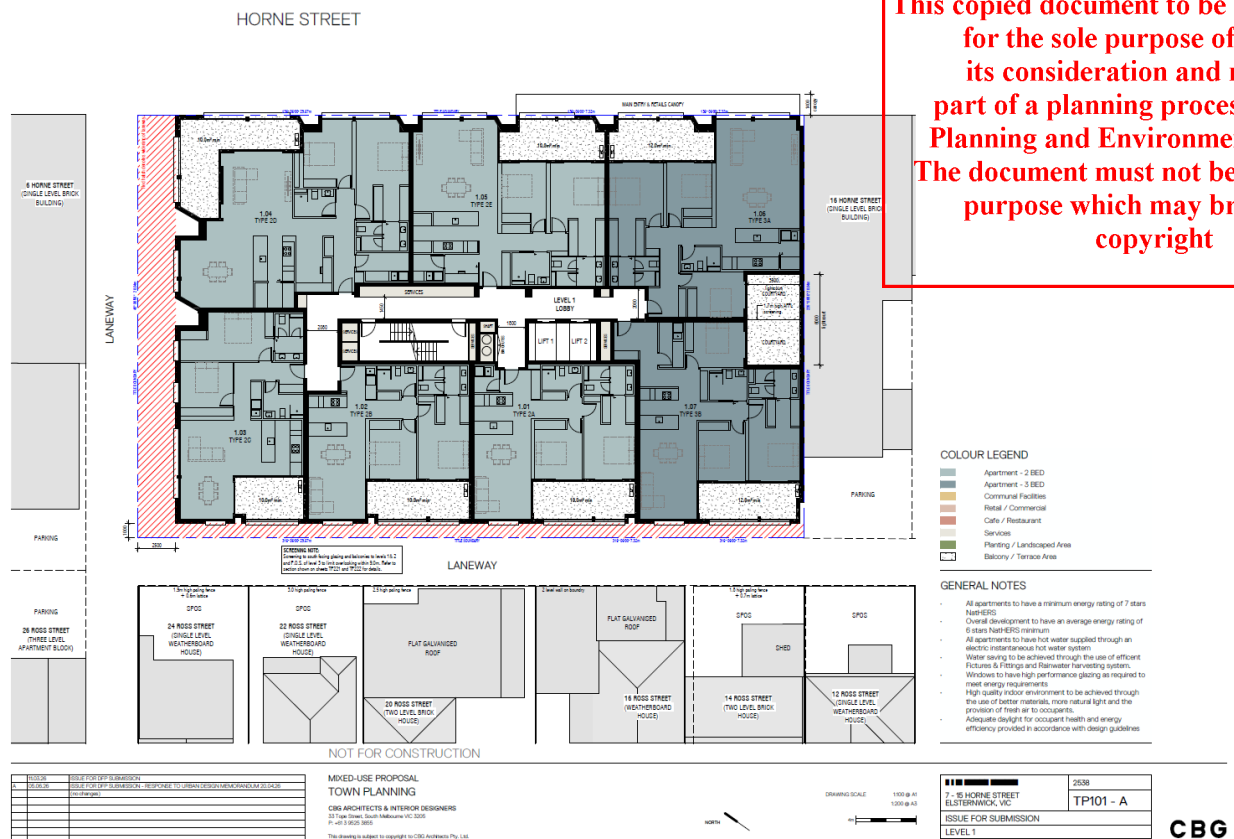
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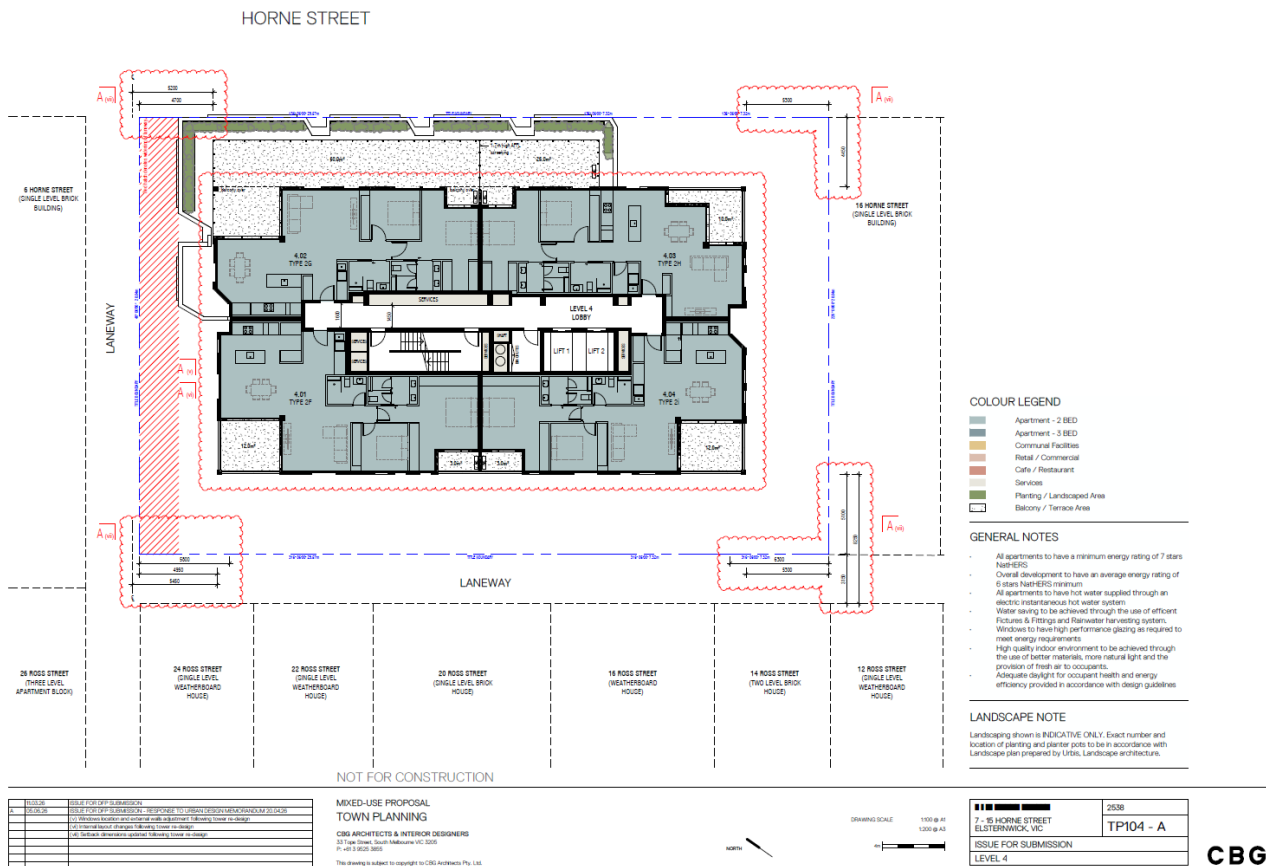
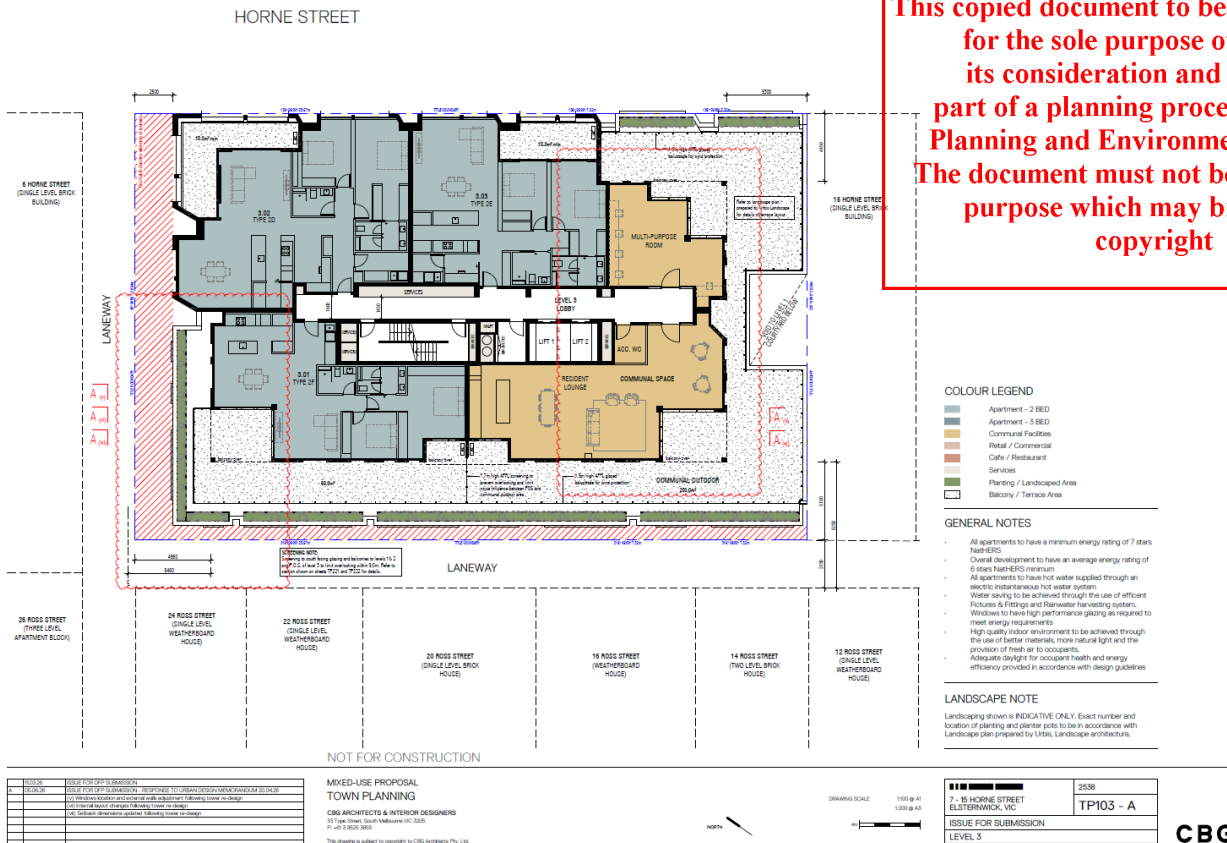
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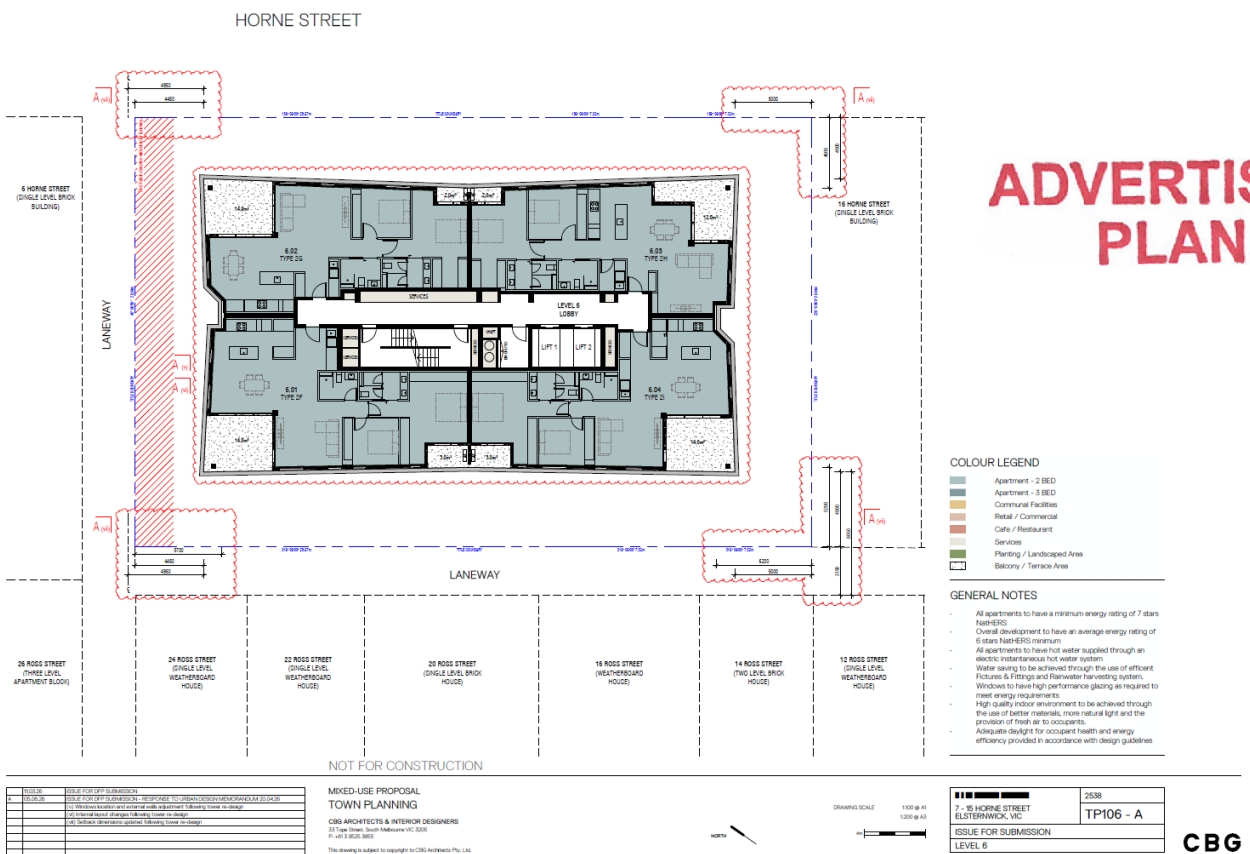
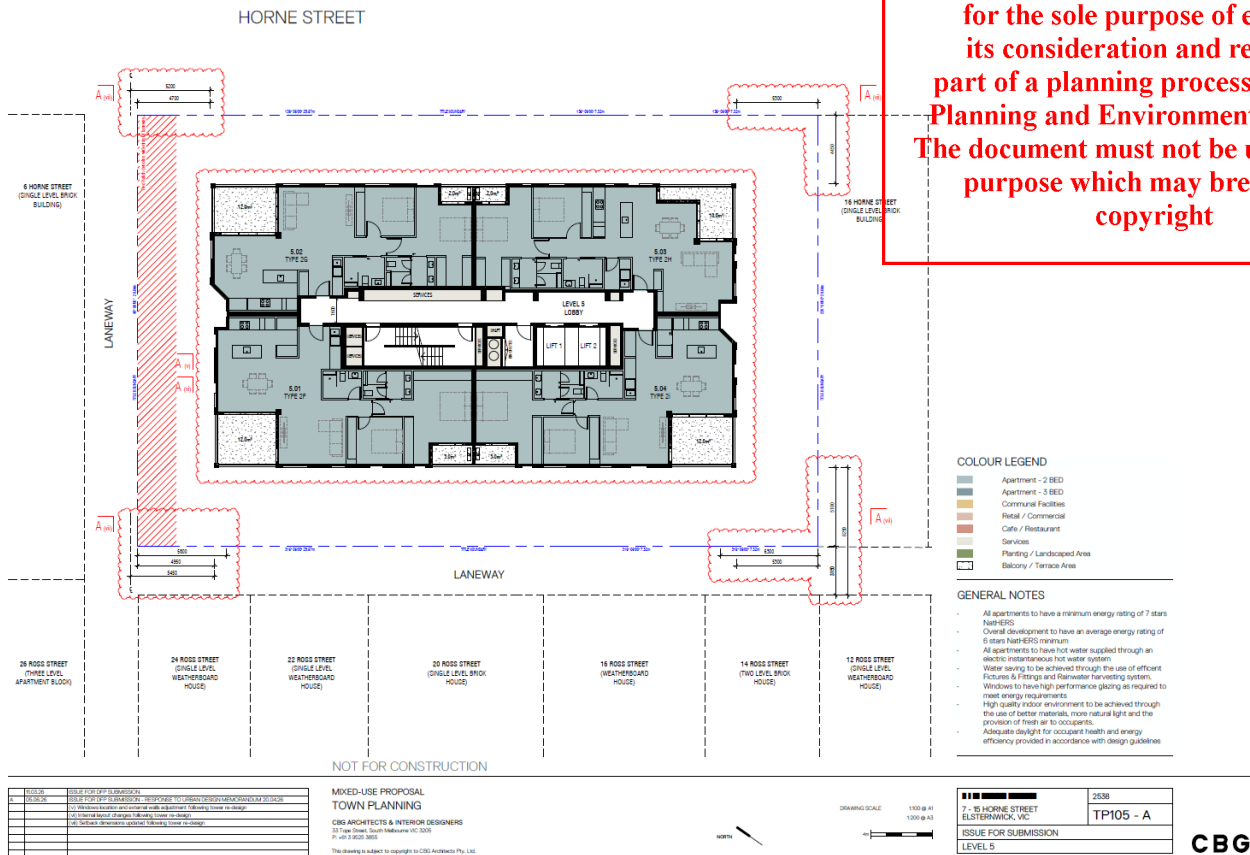
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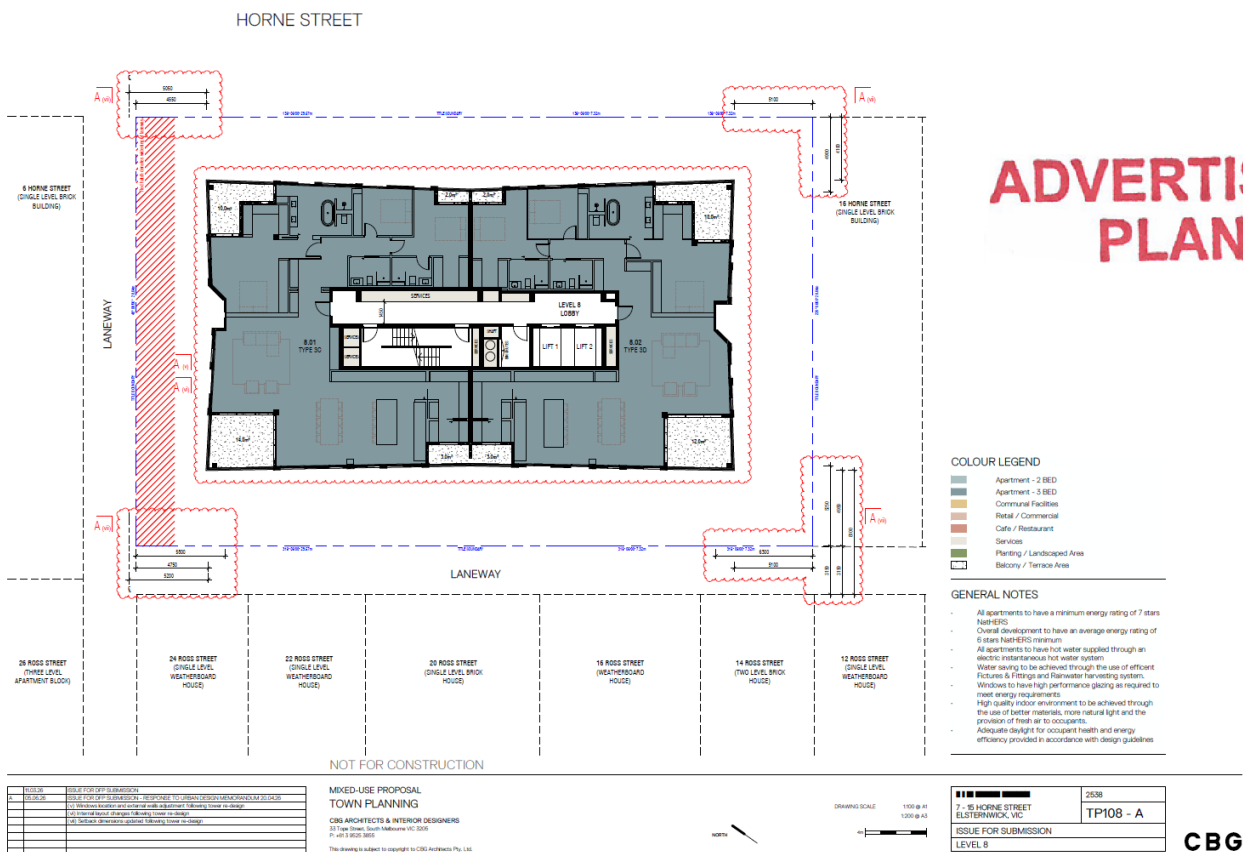
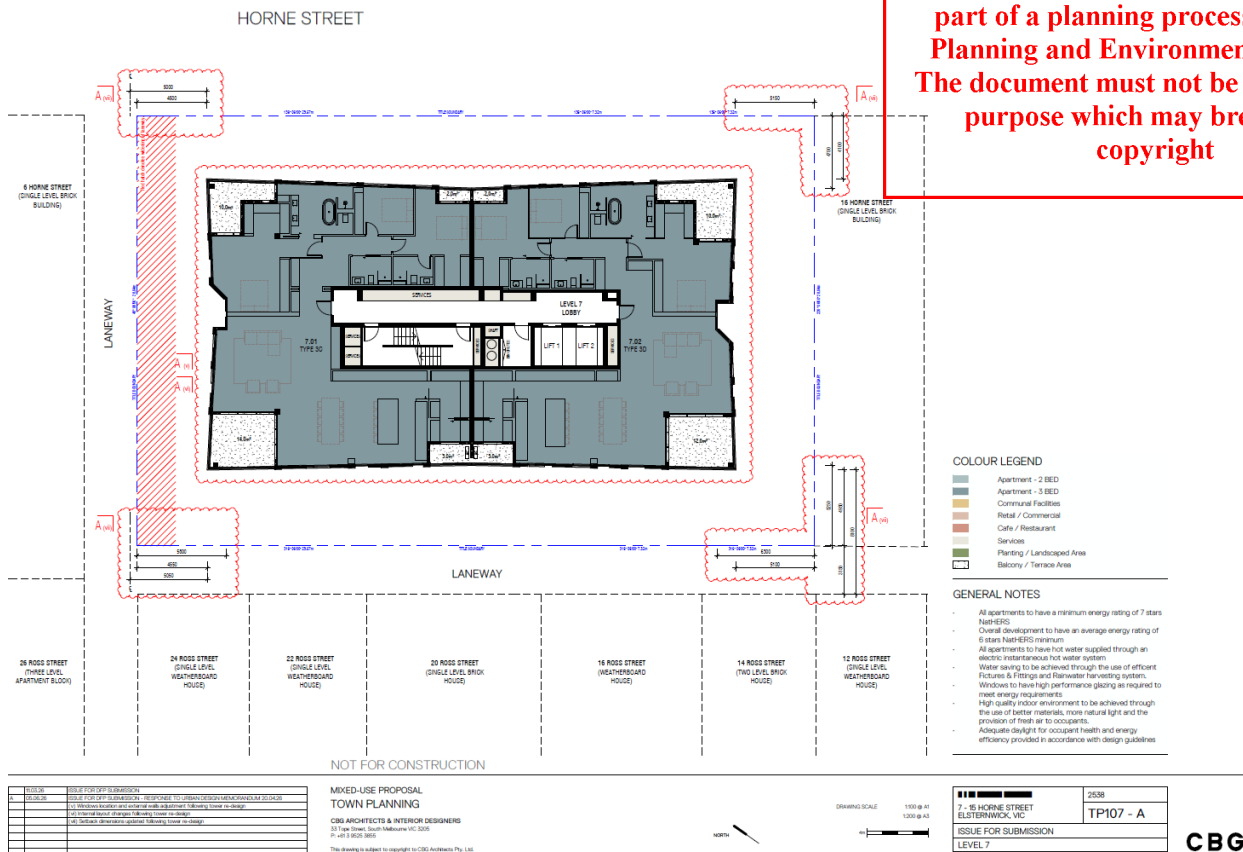
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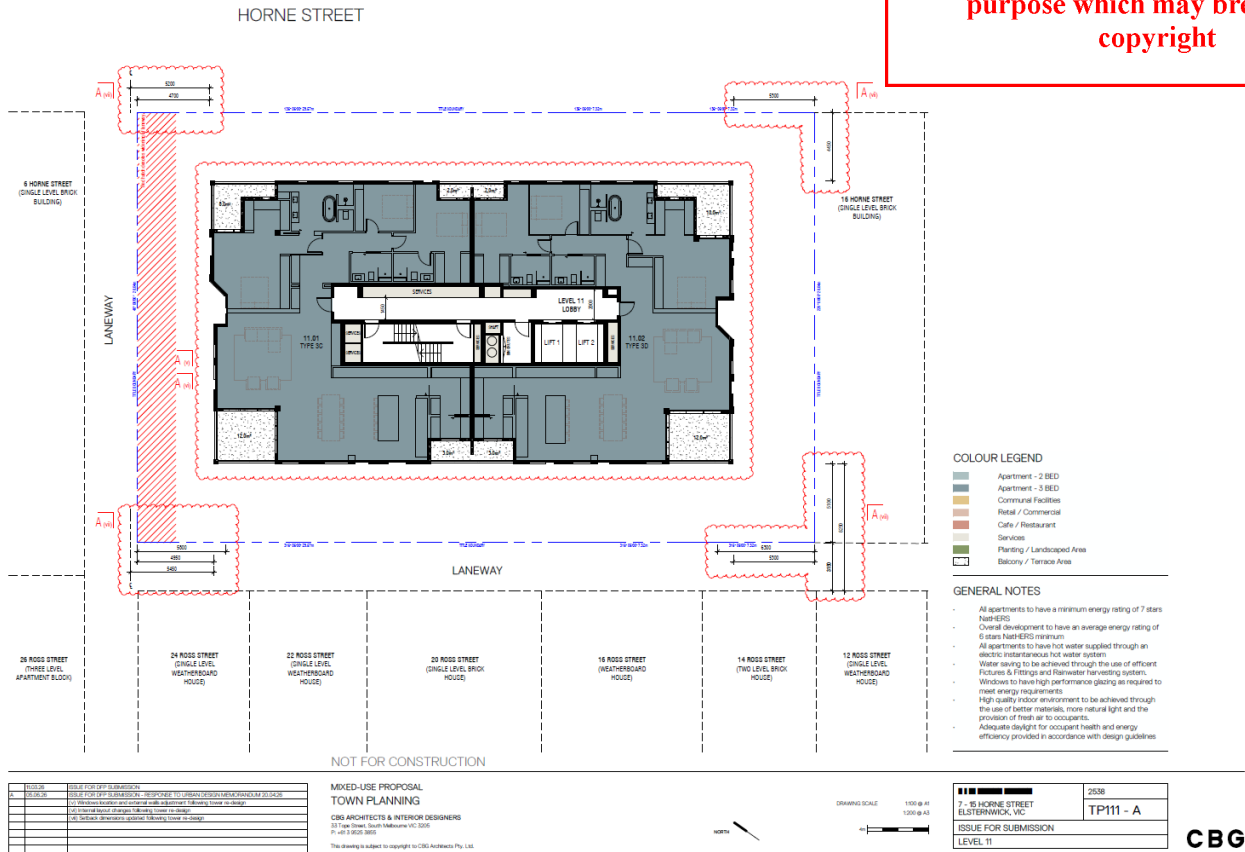


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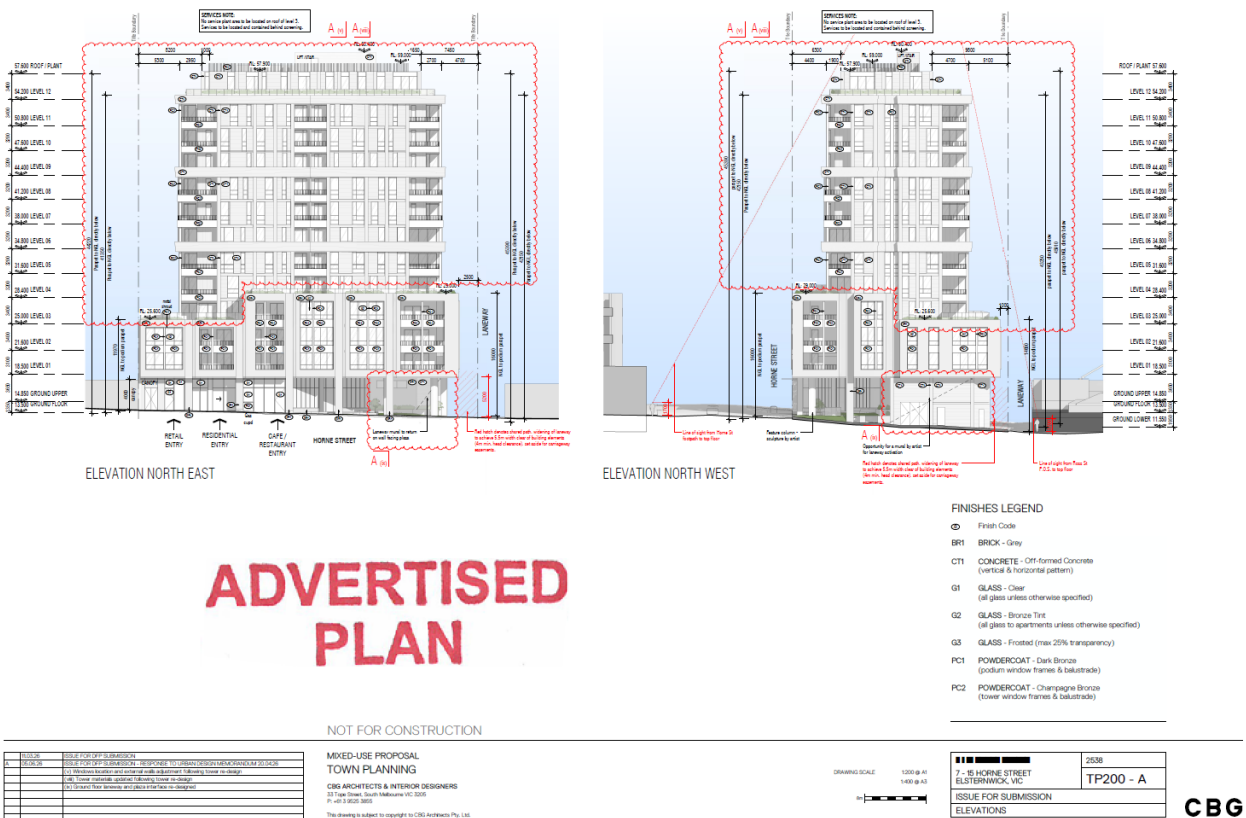
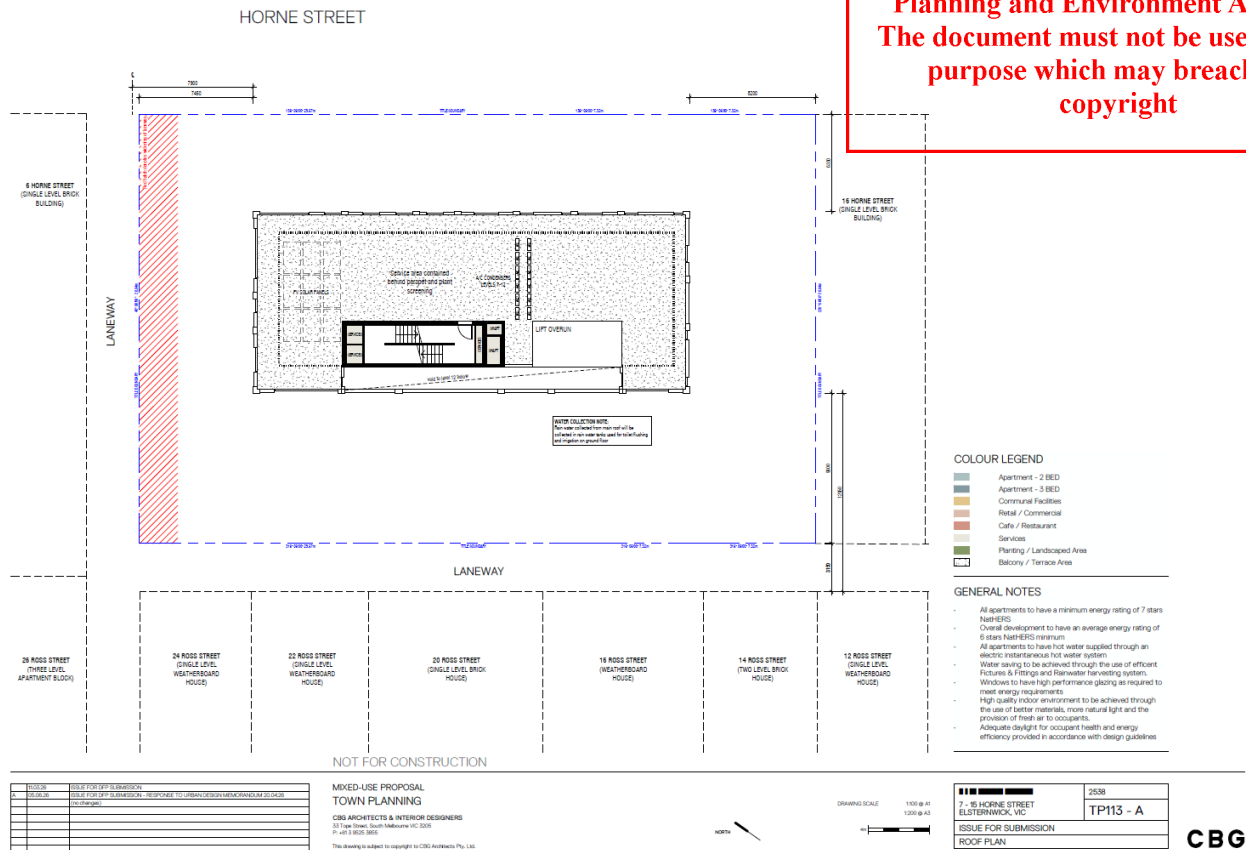
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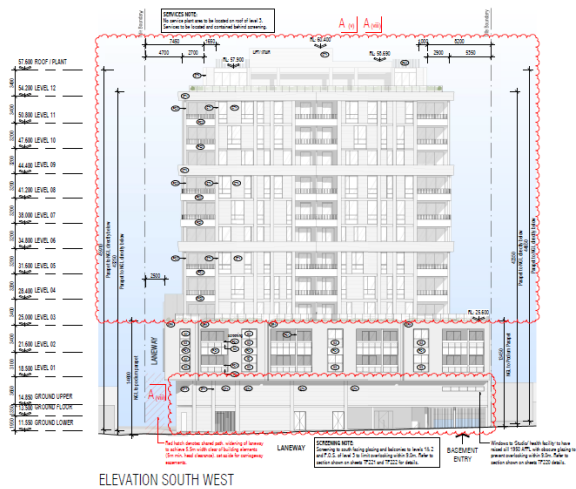
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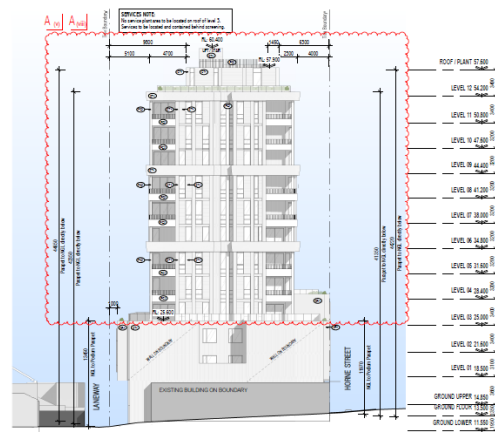


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ELEVATION SOUTH WEST



ELEVATION SOUTH EAST

FINISHES LEGEND

- | | |
|-------------|---|
| Finish Code | |
| BR1 | BRICK - Grey |
| CT1 | CONCRETE - Off-formed Concrete
(vertical & horizontal pattern) |
| G1 | GLASS - Clear
(all glass unless otherwise specified) |
| G2 | GLASS - Bronze Tint
(all glass to apartments unless otherwise specified) |
| G3 | GLASS - Frosted (max 25% transparency) |
| PC1 | POWDERCOAT - Dark Bronze
(podium window frames & balustrade) |
| PC2 | POWDERCOAT - Champagne Bronze
(tower window frames & balustrade) |

NOT FOR CONSTRUCTION

[illegible]MIXED-USE PROPOSAL
TOWN PLANNING

CBG ARCHITECTS & INTERIOR DESIGNERS
33 Tingo Street, South Melbourne VIC 3205
P: +61 3 9525 3655

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DRAWING SCALE 1200 @ A



 7 - 15 HORNE STREET ELSTERNWICK, VIC	2538 TP201 - A
ISSUE FOR SUBMISSION	
ELEVATIONS	

CBG

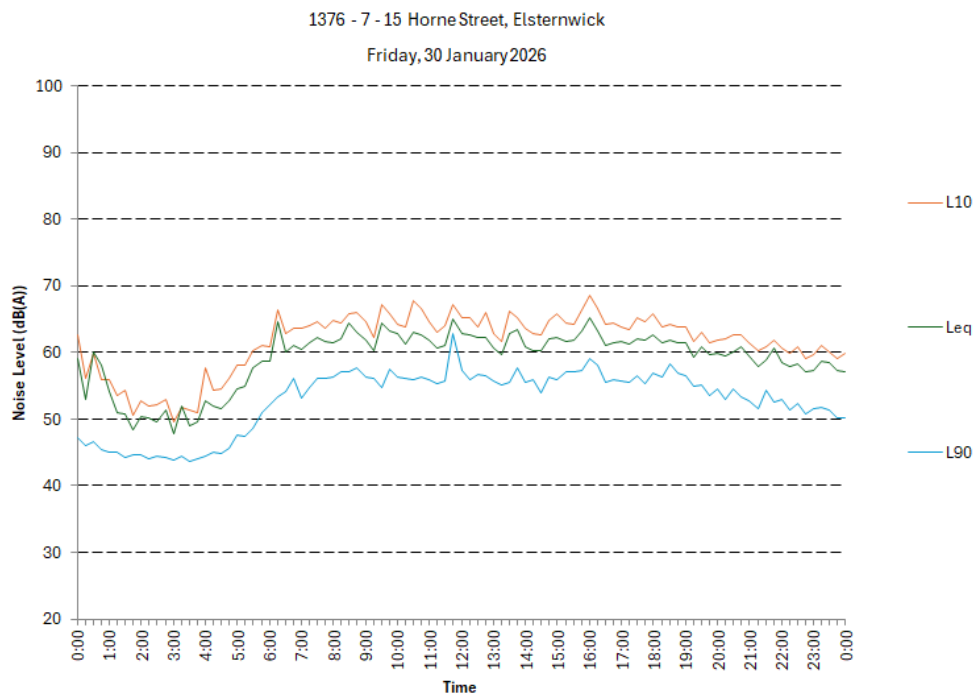
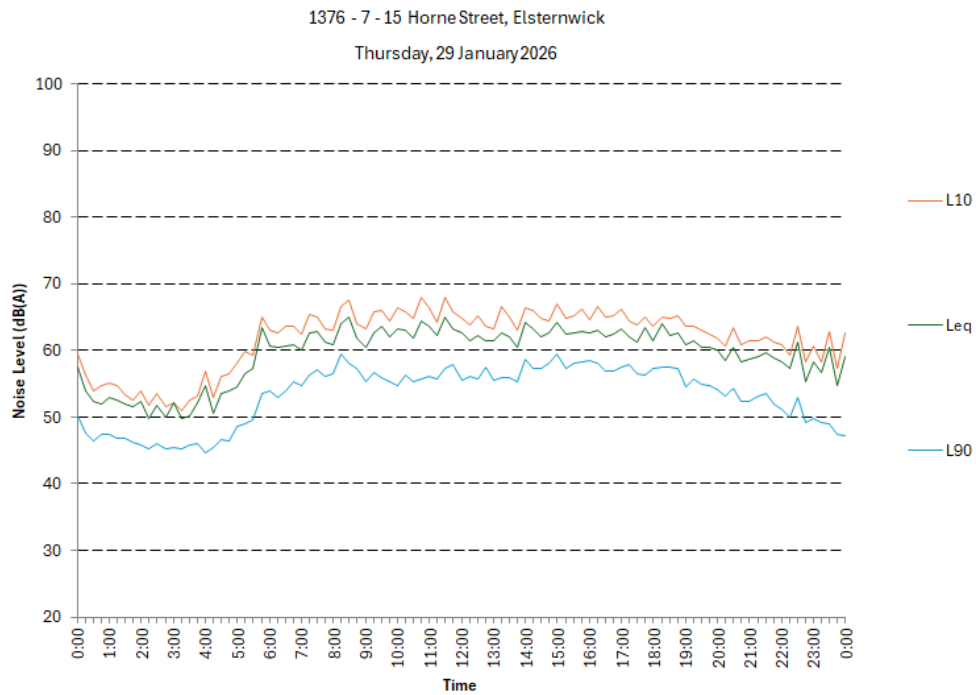
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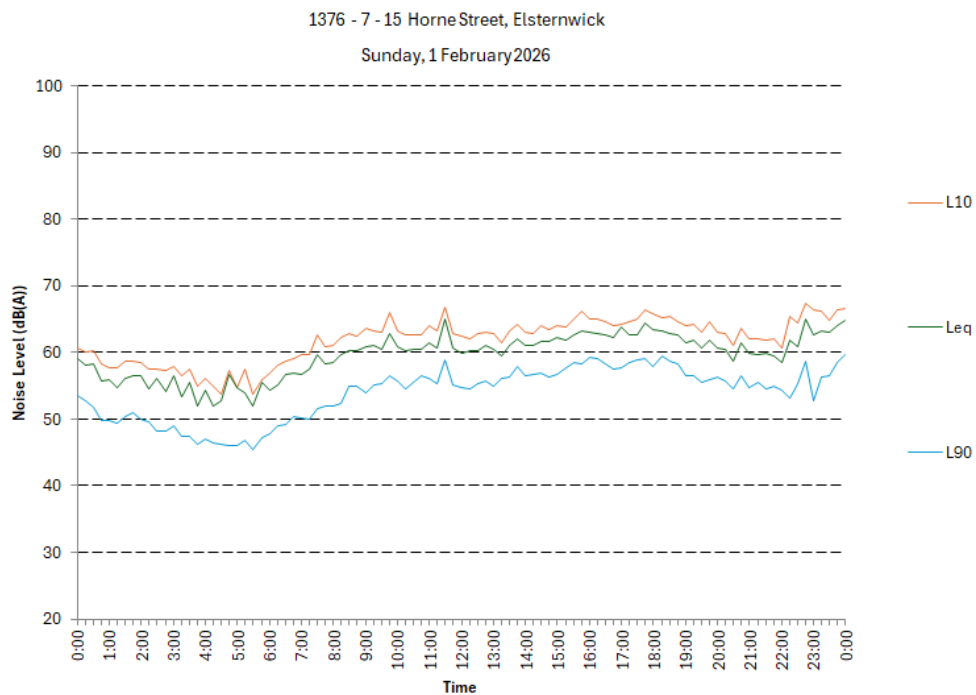
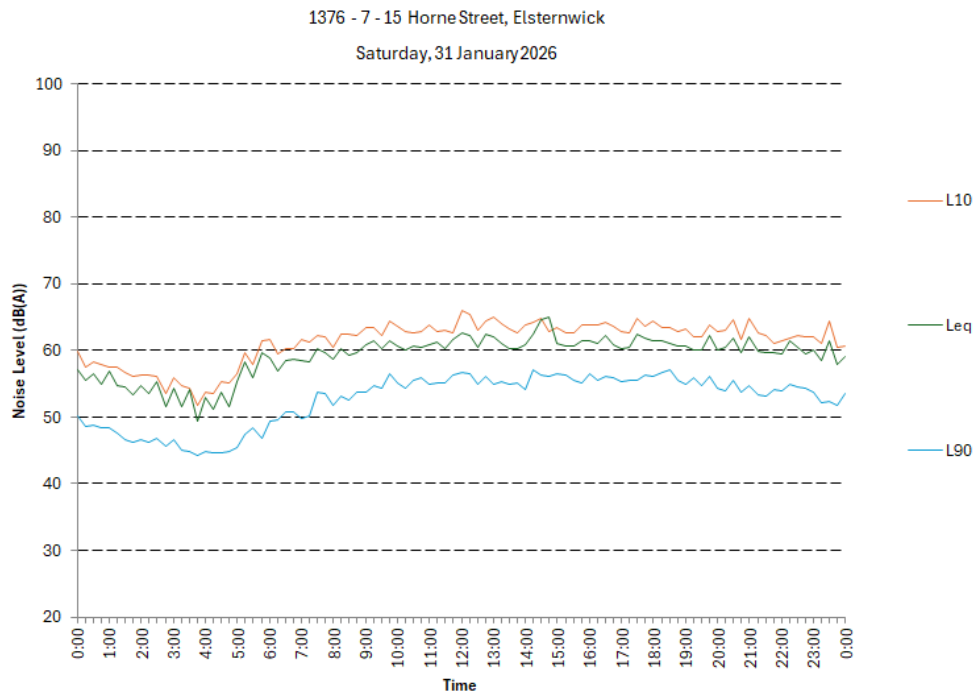
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Appendix B Unattended Noise Monitoring Graphs

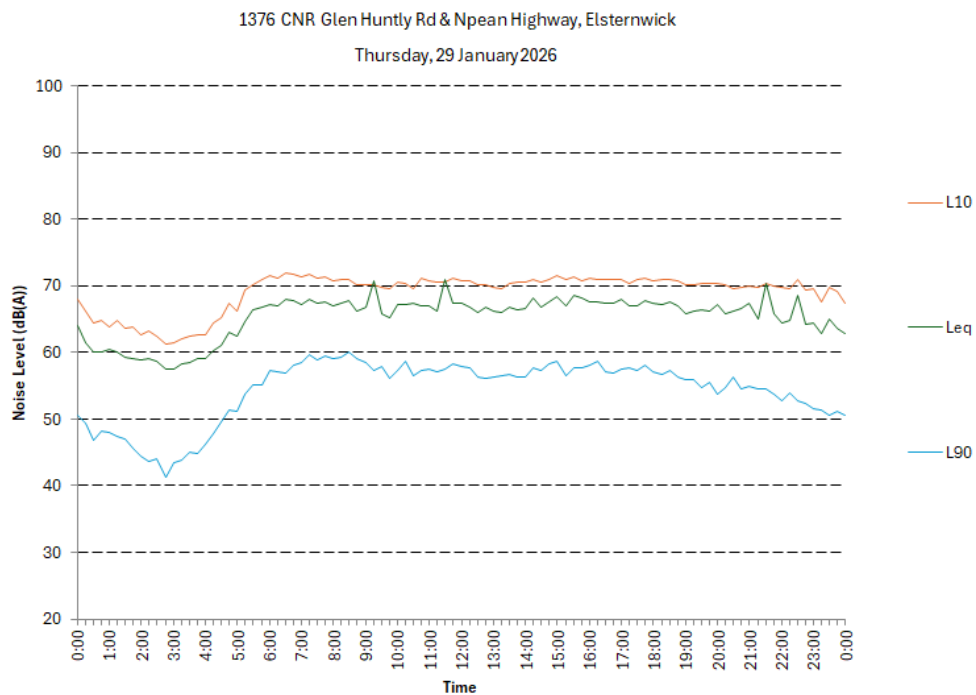
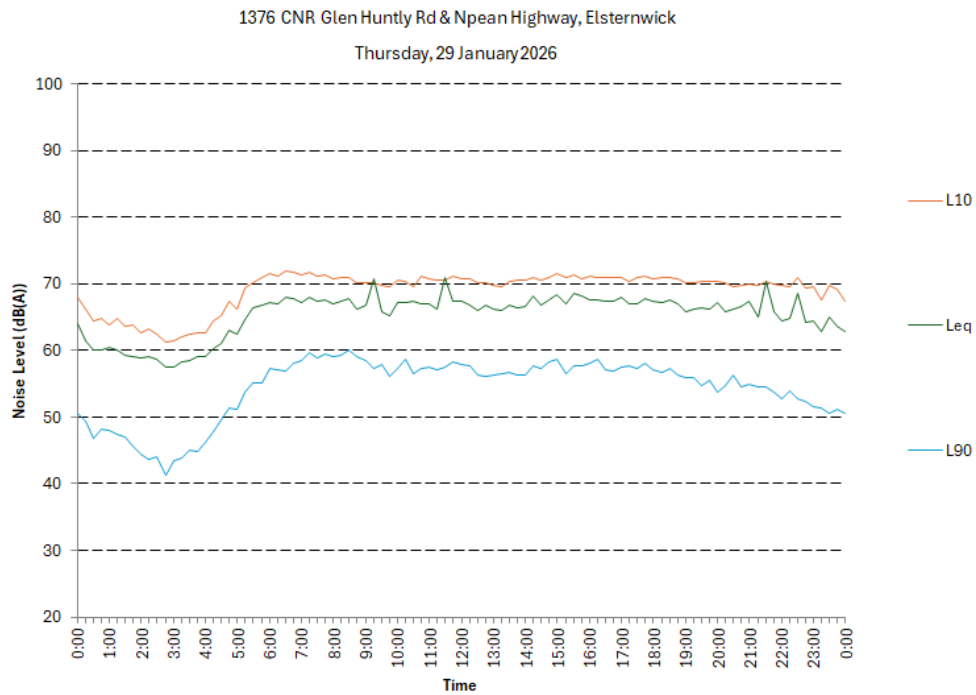
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Appendix C SoundPLAN Results

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Proposed Mixed-Use Development
7 - 15 Horne Street, Elsternwick
Verification 2026

Receiver	RL Microphone Height m	L10, 18Hour dB(A)
Glen Huntly RTN	11.23	70.6
Horne Street (Site)	20.80	65.8

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SoundPLAN 9.1

Proposed Mixed-Use Development
7 - 15 Horne Street, Elsternwick
Planning Horizon 2036

Receiver	Floor Level (Refer Receiver Level Left)	Facade	L10, 18 Hour (Facade Corrected) dB(A)
LG-UG	F 1	NE	69.3
L1-L2	GF	NE	69.5
L1-L2	F 1	NE	68.8
L1-L2	GF	NE	69.2
L1-L2	F 1	NE	68.4
L1-L2	GF	SW	60.0
L1-L2	F 1	SW	63.1
L1-L2	GF	SW	60.8
L1-L2	F 1	SW	63.3
L1-L2	GF	NW	61.1
L1-L2	F 1	NW	63.6
L1-L2	GF	NW	63.6
L1-L2	F 1	NW	65.3
L3	GF	NE	68.3
L3	GF	NE	67.9
L3	GF	SE	57.3
L3	GF	SW	61.2
L3	GF	SW	64.8
L3	GF	NW	64.2
L3	GF	NW	66.9
L4	GF	NE	67.7
L4	GF	NE	67.1
L4	GF	NE	62.2
L4	GF	SE	62.4
L4	GF	SE	63.3
L4	GF	SW	66.0
L4	GF	SW	66.2
L4	GF	NW	66.3
L4	GF	NW	67.2
L5-L11	GF	NE	57.2
L5-L11	F 1	NE	63.9
L5-L11	F 2	NE	65.4
L5-L11	F 3	NE	65.6
L5-L11	F 4	NE	65.5
L5-L11	F 5	NE	65.3
L5-L11	F 6	NE	65.1
L5-L11	GF	NE	63.1
L5-L11	F 1	NE	64.2
L5-L11	F 2	NE	64.8
L5-L11	F 3	NE	64.8
L5-L11	F 4	NE	64.7
L5-L11	F 5	NE	64.5
L5-L11	F 6	NE	64.4

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Reference: 1376 R3 7-15 HorneStElsternwickPlan

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Proposed Mixed-Use Development
7 - 15 Horne Street, Elsternwick
Planning Horizon 2036

Receiver	Floor Level (Refer Receiver Level Left)	Facade	L10, 18 Hour (Facade Corrected) dB(A)
L5-L11	GF	SE	63.9
L5-L11	F 1	SE	64.8
L5-L11	F 2	SE	65.4
L5-L11	F 3	SE	65.8
L5-L11	F 4	SE	66.3
L5-L11	F 5	SE	66.6
L5-L11	F 6	SE	66.9
L5-L11	GF	SE	64.5
L5-L11	F 1	SE	65.5
L5-L11	F 2	SE	66.3
L5-L11	F 3	SE	66.9
L5-L11	F 4	SE	67.4
L5-L11	F 5	SE	67.8
L5-L11	F 6	SE	68.1
L5-L11	GF	SW	67.0
L5-L11	F 1	SW	67.8
L5-L11	F 2	SW	68.4
L5-L11	F 3	SW	69.0
L5-L11	F 4	SW	69.4
L5-L11	F 5	SW	69.7
L5-L11	F 6	SW	70.0
L5-L11	GF	SW	67.2
L5-L11	F 1	SW	67.9
L5-L11	F 2	SW	68.5
L5-L11	F 3	SW	69.0
L5-L11	F 4	SW	69.5
L5-L11	F 5	SW	69.8
L5-L11	F 6	SW	70.0
L5-L11	GF	NW	67.2
L5-L11	F 1	NW	67.6
L5-L11	F 2	NW	68.0
L5-L11	F 3	NW	68.2
L5-L11	F 4	NW	68.5
L5-L11	F 5	NW	68.7
L5-L11	F 6	NW	68.8
L5-L11	GF	NW	66.4
L5-L11	F 1	NW	67.2
L5-L11	F 2	NW	67.5
L5-L11	F 3	NW	67.7
L5-L11	F 4	NW	67.8
L5-L11	F 5	NW	67.9
L5-L11	F 6	NW	68.1
L12	GF	NE	56.8

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Proposed Mixed-Use Development
7 - 15 Horne Street, Elsternwick
Planning Horizon 2036

Receiver	Floor Level (Refer Receiver Level Left)	Facade	L10, 18 Hour (Facade Corrected) dB(A)
L12	GF	NE	56.5
L12	GF	SE	59.4
L12	GF	SW	60.8
L12	GF	SW	60.9
L12	GF	NW	60.9

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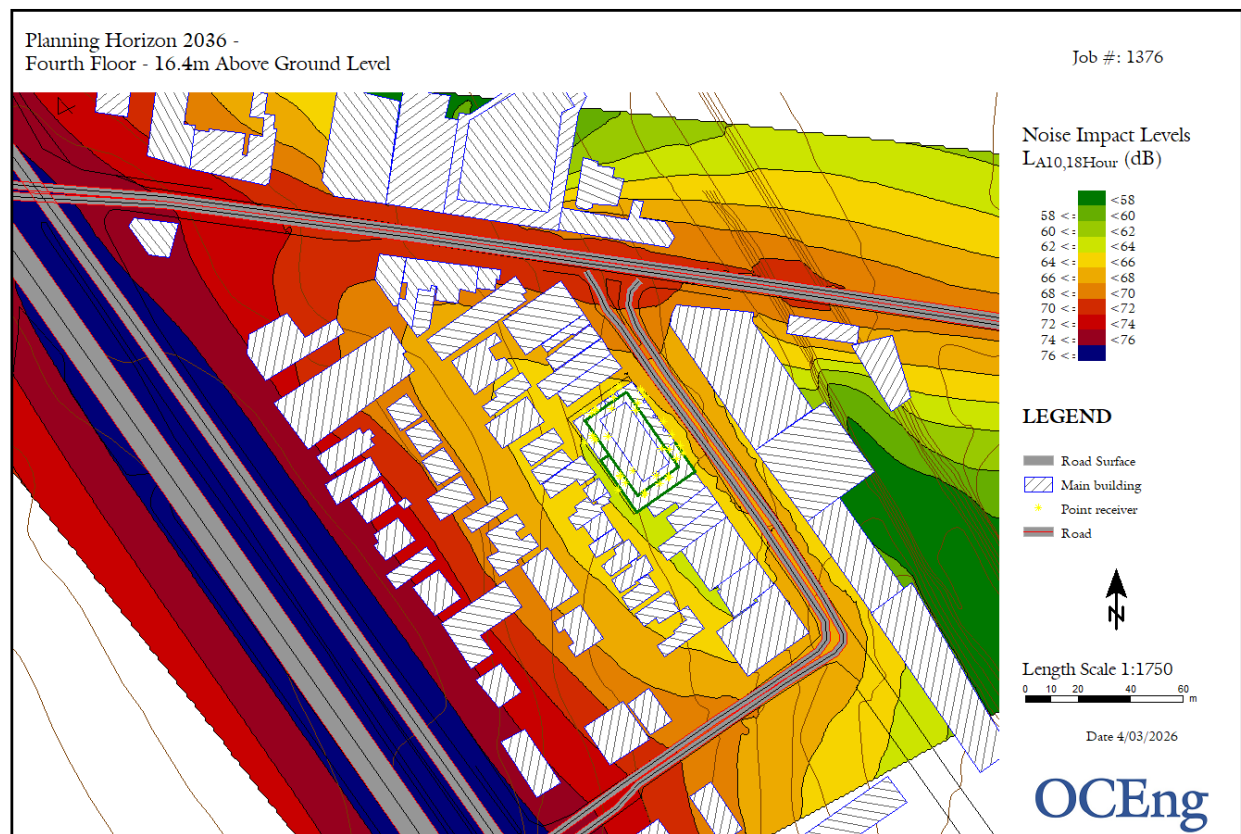
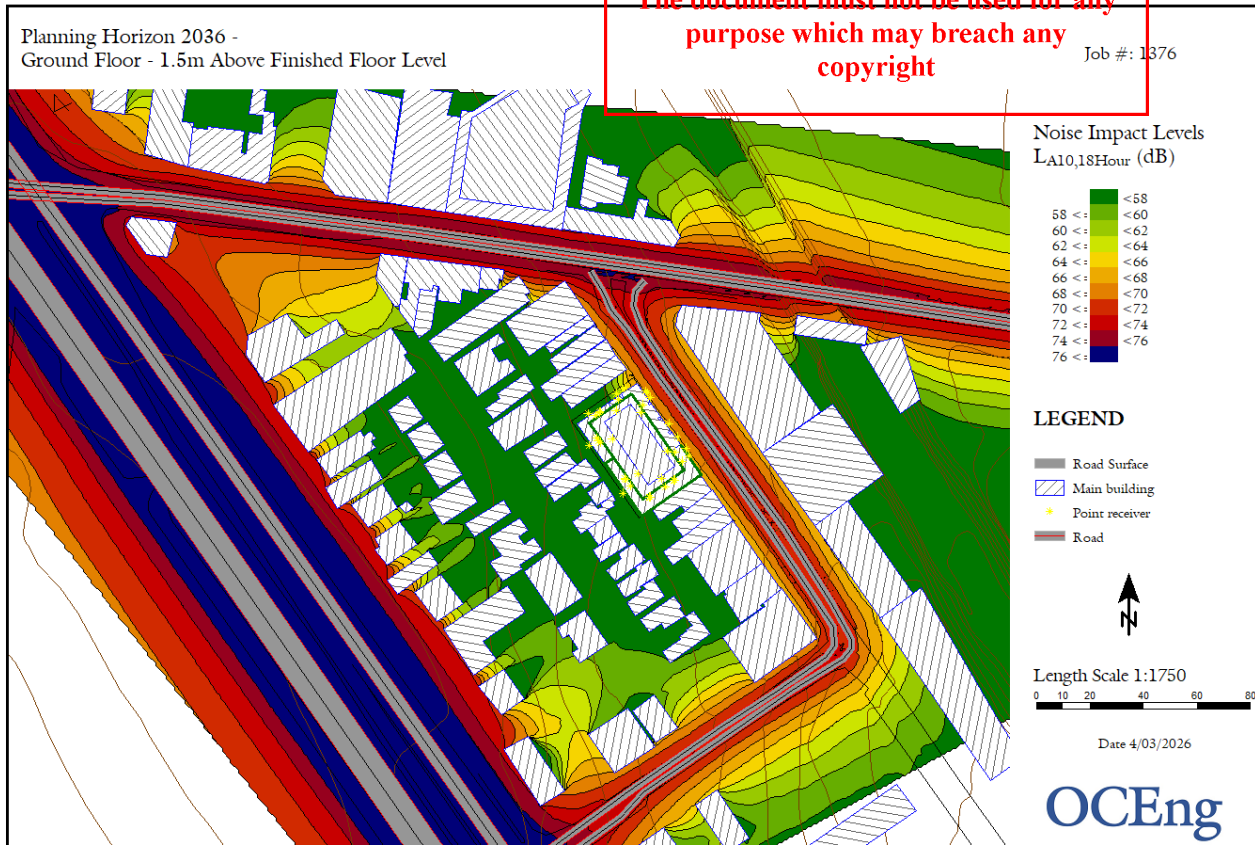
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