ACOUSTIC STUDIO



# 49 Newcombe Street, Portarlington

# Noise Impact Assessment for Town Planning

**3 July 2026**

**Address** 83 William Street,
Melbourne VIC 3000 Australia

**Phone** +61 2 9557 6421

**Email** mail@acousticstudio.com.au

**Contact for this report**

[redacted]

# Document Information

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| 1.1 | 3/7/2026 | Updated architectural plans, no change to content or outcome | | |

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This report takes into account the particular instructions and requirements of our Client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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# Appendices

# Executive Summary

This report presents the environmental noise impact assessment for new plant and operations associated with 49 Newcombe Street, Portarlington, at Town Planning (TP) stage.

The noise assessment covers noise emission impacts from:

- Rooftop plant noise emissions.
- Noise from vehicles accessing the site for residents car parking and waste removal and deliveries activities.
- Noise from operations from the Café commercial tenancy on the ground floor.

This noise assessment report also provides advice with regard to external noise intrusion into the proposed development, mainly from existing transportation noise and general hum in the local surrounding area.

The noise assessment concludes that:

- The cumulative noise emission levels at affected noise sensitive receivers from preliminary fixed plant selections / assumptions plus general site operations, including basement carpark access and commercial tenancy operations, are predicted to comply with noise emissions criteria throughout the Day, Evening and Night if the general acoustic advice presented in this report is adopted.
  Note: Specific plant selections are locations are to be reviewed at Detailed Design stage once final selections are confirmed. The design allows for noise controls, if required (pending plant selections), such as rooftop plant screens.
- Noise from deliveries and waste vehicles will be managed in accordance with the relevant guidelines, such as VIC EPA and Greater Geelong Council.
- External noise intrusion in the proposed development is anticipated not to have an impact in the amenity of the apartment with the incorporation of standard DGUs in all façades.

In conclusion, compliance with applicable noise emissions and intrusion targets is predicted with the current design and operational / management noise included in this report.

# 1 Introduction

Acoustic Studio (ACS) has been engaged by Kerstin Thompson Architects (KTA) to provide a Noise Impact Assessment (NIA) to support the Town Planning (TP) application for a proposed residential apartment building at 49 Newcombe Street, Portarlington, which sits within Greater Geelong Council area in Victoria.

KTA is the Architect and Caleb (CAL) is the Services Engineer.

This report presents the findings of the assessment of noise emissions from the proposal to nearby residential properties as well as other nearby non-residential sensitive receivers – including the preschool adjacent to the site.

This assessment has been undertaken considering:

- For residential and educational receivers, environmental noise emissions criteria have been established in accordance with the Victorian Environment Protection Regulations.
- For non-residential sensitive receivers, noise targets at have been derived based on relevant Australian Standards and guidelines.
- The architectural drawings provided by KTA.
- Layouts and preliminary plant information provided by CAL for proposed plantrooms areas and indicative plant types and locations.

This report presents:

- Description of the project, its surrounds including identification of noise-sensitive receivers, and discussion of applicable noise emissions assessment requirements (refer Sections 2 and 3)
- Description of the noise surveys that have been carried out (refer Section 4)
- Project-specific noise emissions criteria (refer Section 5)
- For plant noise emissions (refer Section 6.2) the potential noise transmission paths associated with the operations of the proposal general plant (to be installed in rooftop plant area) and the acoustic design advice to ensure that the Project noise emissions criteria can be met with the proposed plant and operation regimes.
- Considerations for noise management of other site operational activities such as the use of the basement carpark, commercial tenancy (Café) and deliveries and waste collection (refer Section 6.5) and sleep disturbance.
- Cumulative impact and the General Environmental Duty assessments (refer Sections 6.4 and 6.5 respectively).
- Noise intrusion from external sources entering the new development (refer Section 7).

The conclusion to the report in Section 8 summarises the outcomes of the various noise emissions that have been assessed, as well as noise intrusion.

A glossary of acoustic terms used within this report is provided in Appendix A.

The proposed development plans by KTA are shown in Appendix B.

Appendix C presents attended survey noise results to support the derivation of the noise emissions criteria and noise intrusion assessment.

Appendix D presents the planning maps relevant to this noise assessment area in regard to zoning.

Appendix E presents a detailed description of how noise emissions criteria have been derived in accordance with applicable guidelines and standards.

# 2 Project Overview

## 2.1 Project Site and Surrounding Land Uses

The proposed site for a 3-storey residential apartment building is shown highlighted in red shaded area in Figure 1.

Figure 1 also highlights the types of noise sensitive receivers in the vicinity of the Project site, the closest being:

- Heritage Post Office building (currently used as a residence) on Harding Street to the west of the site, sharing a common boundary with it.
- Portarlington Preschool to the east of the site, on Newcombe Street, sharing a common boundary with it.
- Commercial receivers across Newcombe Street to the south of the site, including retail and hospitality venues.
- Residential receivers along Harding and Newcombe Streets to the south of the site across Newcombe Street.
- Recreational receivers, namely Portarlington Bowls Club, Portarlington Park and W.G.Little Reserve to the north.
- Portarlington Pier and associated carpark further to the north.

Further details of noise sensitive receivers around the project site are presented in Section 4.

It is also noted that the town of Portarlington, including the proposed development site, sit outside of the "major urban area" boundary of Greater Geelong Council, as per Data VIC maps (refer to Appendix D) and its population is below 7,000 as per census 2021. As such, Portarlington is understood to not be a "major urban area" for the purposes of VIC's EPA Noise Protocol and this noise assessment report (refer to Section 5.1.2 for further details).

**Figure 1 Proposed development in the context of the existing site and surrounds**


Source: Google Earth / ACS

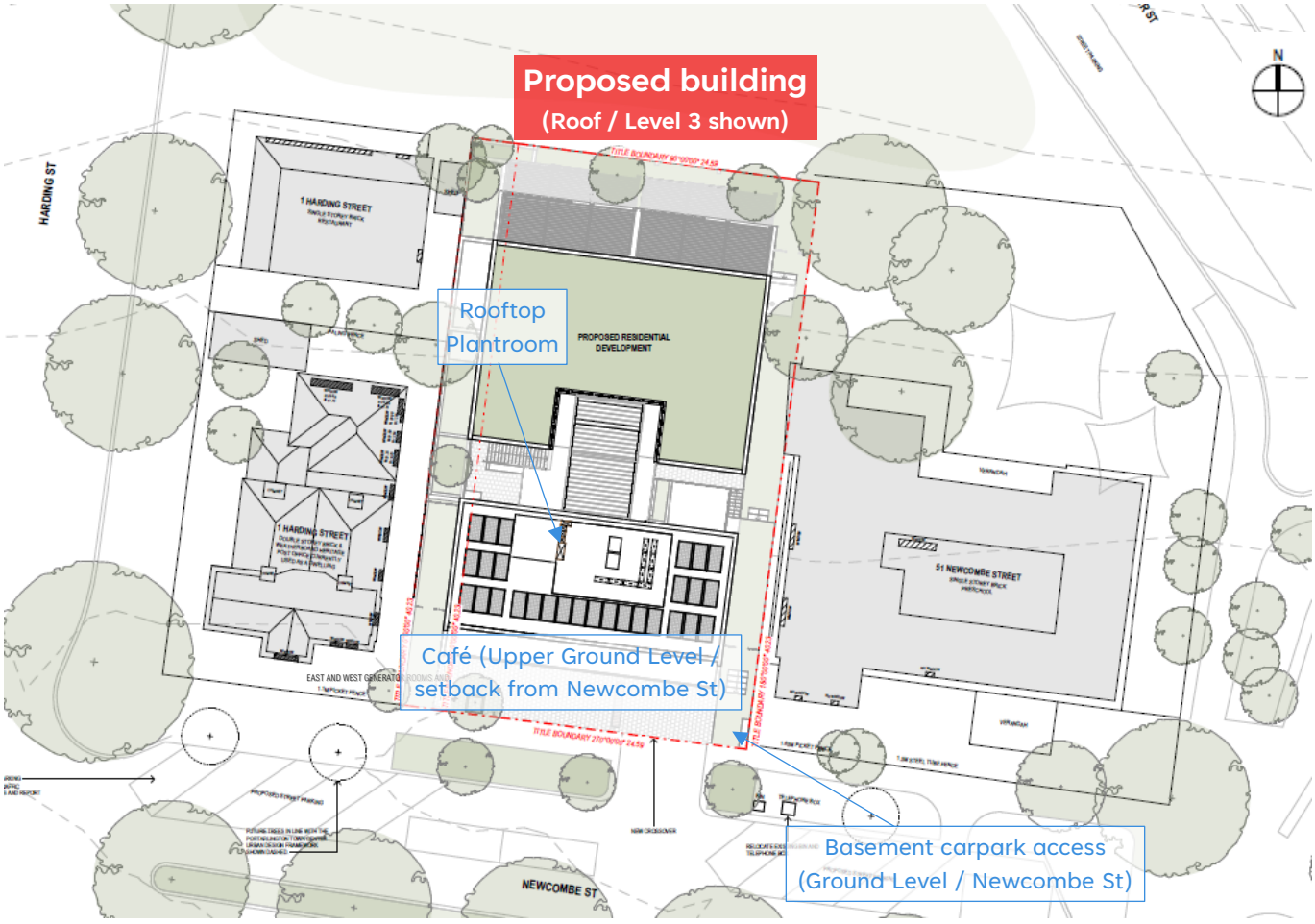
## 2.2 Project Description

As shown in KTA's TP architectural drawings in Appendix B, the proposed building is to include the following:

- Basement: carpark and bin rooms (residential and commercial).
- Lower Ground: storage, plantroom, courtyard / breezeway, 3 residential apartments.
- Upper Ground: commercial tenancy (Café use proposed), forecourt / breezeway, 2 residential apartments.
- Level 1: breezeway, 4 residential apartments.
- Level 2: 1 shared residential balcony, roof garden, residential apartment.
- Roof (Level 3): plantroom encompassing condenser units for all apartments plus general building exhaust fans.

Figure 2 shows an extract of the site plan indicating the location of the roof plantroom, commercial tenancy and carpark access, while also indicating the location of the closest sensitive receivers, namely, 1 Harding Street (2-storey heritage post office used as residence) and 51 Newcombe Street (1-storey preschool).

**Figure 2 Site plan showing the proposed apartment building with rooftop plant area and adjacent sensitive receivers**




Source: KTA [TP070-TP03] / ACS

## 2.3 Proposed Operations and Hours

For the purpose of this noise assessment, the proposed development is understood to operate as follows:

- **Residential – General plant**
  - 24/7, including residential-grade condenser units and basement plant areas / carpark exhaust fans installed in the rooftop plant area on Roof / Level 3.
- **Residential – Basement carpark**
  - 24/7 access to residents' carpark spaces (16) and garbage collection.
- **Commercial tenancy (Café) – General plant and operations**
  - General operations during typical business hours (Monday to Sunday 9am to 5pm), including kitchen exhaust operations and general noise from patrons, but no amplified or loud music (only background music inside the café enclosed areas at a level that allows conversation without vocal effort within the tenancy, no amplified music to be played in the outdoor areas of the café).
- **Deliveries, Waste removal**
  - Deliveries and waste removal to occur in accordance with the relevant plans for the development[1] and advice provided in this report as per Table 1.

## 2.4 Key Acoustic Considerations for Town Planning

Table 1 overleaf outlines the relevant acoustic considerations for Town Planning.



[1] Leigh Design's *49 Newcombe Street, Portarlington, Victoria – Waste Management Plan* (07-11-2025)

**Table 1 TP Acoustic Considerations**

| Key Acoustic Issue / Topic | | Requirement / Relevant Guideline | Report Relevant Section |
|---|---|---|---|
| Construction Noise Emissions | Construction plant and works | VIC EPA Publication 1834.1 Civil construction, building and demolition guide (2023) | Section 5.1.1 |
| Operational Noise Emissions | Building services – General plant (Residential + Commercial tenancy) | VIC EPA Publication 1826.4 Noise Protocol Part I (2021) | Sections 5.1.2, 6.2 |
| | Access to basement carpark – Residents only | | Sections 5.1.2, 6.3.1 |
| | Waste Collection | VIC EPA Publication 1254.2 Noise Control Guidelines (2021) | Sections 5.1.3, 6.3.1 |
| | Deliveries | | Sections 5.1.4, 6.3.4 |
| | Commercial tenancy – General operations | In the absence of specific guidelines for this type of noise emissions, a risk screening assessment is presented based in the Noise Protocol noise limits and the GED. | Sections 5.1.2, 6.3.2 |
| | Sleep disturbance | NSW EPA Road Noise Policy (RNP), 2011 | Sections 5.1.5, 6.3.5 |
| External Noise Intrusion | Road traffic, general ambient noise levels and same-site plant | AS/NZS 2107:2016 Australian/New Zealand Standard Acoustics – Recommended design sound levels and reverberation times for building interiors<br>VIC Department of Planning "Apartment Design Guidelines" Standard (D16 and B40) | Sections 5.2, 7 |

# 3 Regulatory Framework

## 3.1 Victorian Guidelines and Legislation

The Environment Protection Act 2017 ("The Act"; replaces the repealed Environment Protection Act 1970) provides the legislative framework for the protection of the environment in Victoria. The Act includes requirements relating to noise and defines prescribed standards for a range of situations where noise must be assessed, and introduces a duties-based framework, with the general environmental duty (GED) at the centre.

### General Environmental Duty

The general environmental duty (GED) is a centrepiece of the new laws and requires any person (including businesses) engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste to minimise those risks so far as reasonably practicable. Pollution may include the emission of noise. More information on how this project addresses the GED is covered in Section 6.7.

A summary of the key requirements and provisions of the Act and associated publications relevant to this project is provided in Table 2.

**Table 2 Key Victorian legislation and guidelines applicable to this project**

| Document | Overview |
|---|---|
| *Environmental Protection Act* (2017) ("The Act") | Establishes obligations for the control of environmental noise and applies to all types of noise sources except rail operations. The legislation does not specify noise limit values but sets out legal requirements to comply with State Environment Protection Policies and prescribed standards plus requirements for the GED. |
| VIC EPA publication 1856 *Reasonably practicable* (2020) | In Victoria, laws are into effect that are designed to prevent harm to human health and the environment from pollution, including noise, and waste. Under the Environment Protection Act 2017, the 'three duties' require any person to minimise or respond to risks so far as reasonably practicable. This guidance provides information about how to determine what is reasonably practicable. |
| *Environmental Protection Regulations* Part 5.3 – *Noise* (2021) ("The Regulations") Subordinate legislation to support the Act. | **Division 1 – Noise Protocol** Describes how the prediction, measurement, assessment, and analysis of noise must be in accordance with the Noise Protocol within a noise sensitive area[2]. |
| | **Division 2 – Unreasonable and aggravated noise from residential premises** Provides detail about residential noise limits and prohibited times. |
| | **Division 3 – Unreasonable and aggravated noise from commercial, industrial and trade premises** Provides detail about commercial, industrial and trade operating and prohibited time periods, base noise limits and cumulative impacts within a noise sensitive area[2]. |
| | **Division 4 – Unreasonable and aggravated noise from entertainment venues and outdoor entertainment events** Provides detail about entertainment venues and events noise limits and prohibited times. |

[2] As per the Regulations, a noise sensitive area means a residential building, a building with noise sensitive residential use (e.g. hotel guestrooms, hospital wards, corrective facilities) or any learning rooms during operational hours in a childcare centre, kindergarten, or primary or secondary school.

Table 2 (cont.) Victorian legislation and guidelines applicable to this project

| Document | Overview |
|---|---|
| VIC EPA publication 1826<br>*Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (2021)<br>("Noise Protocol")<br>Previously SEPP N-1 and SEPP N-2. | **Part I: Commercial industrial and trade premises**<br>Outlines the methodology for setting the noise limits for commercial, industrial and trade premises in both urban and rural areas of Victoria. It further outlines the steps that must be followed to undertake an assessment (measurement or prediction) of the effective noise level within a noise sensitive area or at an alternative assessment location. A comparison between the effective noise level and the relevant noise limit or the relevant alternative assessment criterion can determine whether the noise that is emitted from the commercial, industrial or trade premises is determined to be unreasonable under Division 3.<br>Refer to Appendix E Section E.1 for further detail on the Part I noise limits derivation for the Project for noise sensitive areas. |
| | **Part II: Entertainment venues and events**<br>Outlines the noise limits for music noise from indoor and outdoor entertainment venues. It further describes the steps that must be followed to undertake an assessment (measurement or prediction) of the effective noise level within a noise sensitive area or at an alternative assessment location. A comparison between the effective noise level and the relevant noise limit or the relevant alternative assessment criterion can determine whether the noise that is emitted from an indoor or outdoor entertainment venue or outdoor entertainment event is determined to be unreasonable under Division 4.<br>Note: Not applicable to the current development proposal. |
| VIC EPA Publication 1834<br>*Civil construction, building and demolition guide* (2023)<br>("EPA Construction Guideline") | Provides an overview of noise policy in Victoria for construction noise emissions and discusses controls relating to:<br>• Normal working hours for your activities, including scheduling works during normal hours, consultation with affected people and managing noise.<br>• Justified unavoidable works that need to be conducted outside of normal work hours.<br>• Managing noise and vibration that cannot be eliminated or minimised by source controls. |
| VIC EPA Publication 1254<br>*Noise Control Guidelines* (2021)<br>("EPA Guidelines") | Provides an overview of noise policies and legislation in Victoria for a range of different noise sources and provides supplementary guidance for situations where there is no policy or legislation. |
| VIC State Gov Department of Environment, Land, Water and Planning "Apartment Design Guidelines" (2021)<br>("ADGs") | Provides guidance to reduce internal and external noise impacts for new apartment developments in Victoria, in order to protect occupants' wellbeing and amenity, particularly for apartments located in urban environments near industrial areas, major roads and railway lines are subject to significant noise impacts requiring careful design responses. |
| City of Greater Geelong "Noise Schedule" | In accordance with Section 167 of the Environment Protection Act, defines noise as being unreasonable, if certain items of equipment are audible in a habitable room of a neighbour's house outside of prescribed hours. It provides a table which specifies different types/items of equipment and the prohibited hours under the Environment Protection (Residential Noise) Regulations 2021. |

## 3.2 Other Standards and Guidelines

Where no Victorian legislation or guideline exists (i.e. most non-residential receivers) the following guidelines are considered by ACS as 'best practice' and are considered as part of this noise assessment considering the General Environmental Duty assessment approach.

**Table 3 Other standards and guidelines**

| Document | Overview |
|---|---|
| NSW EPA *Noise Policy for Industry* (2017) ("NPI") | The NSW NPI balances the need for industrial activity with the community's desire to minimise intrusive sounds. It sets assessment noise levels, consistent methods, and best practice measures to manage industrial noise, and is based on the latest scientific research regarding noise's health effects.<br>The NPI can provide guidance on setting noise limits for sensitive receivers to the Project which are not considered within Victorian legislation, such as:<br>• Commercial receivers (e.g. hospitality, office space)<br>• Outdoor recreation areas (e.g. parks and reserves)<br>Refer to Appendix E Section E.1 *Non-residential Receivers - Recreational* for further detail.<br>The NPI also considers noise limits for minimising sleep disturbance. Refer to Section Appendix E Section E.2 for further detail. |
| Australian/New Zealand Standard *AS/NZS 2107:2016* ("AS2107") | AS2107[3] provides recommended design sound levels for building interiors which can provide guidance for setting external noise limits from environmental noise to meet recommended internal noise levels within sensitive spaces. |



[3] AS/NZS 2107:2016 *Australian/New Zealand Standard Acoustics—Recommended design sound levels and reverberation times for building interiors*

# 4 Existing Noise Environment

## 4.1 Sensitive Receivers

Table 4 identifies key noise sensitive receivers around the project site. Receiver types and areas are also shown in graphical format / aerial view map in Figure 3.

**Table 4 Surrounding noise sensitive receivers to development site**

| Receiver Type [ID] | Address and Description |
|---|---|
| Residential [R1] | 1 Harding St, Portarlington<br>Residential dwelling within the heritage post office, adjacent to project site to the west, with windows facing the shared boundary |
| Residential [R2] | 6 Harding St, Portarlington<br>Closest residential receiver not fronting Newcombe St (to the south) |
| Educational [R3] | 51 Newcombe St, Portarlington<br>Portarlington Preschool, adjacent to project site to east and with windows facing the shared boundary |
| Recreational Active [R4] | Portarlington Bowls Club and Portarlington Park playground, to the north of the site |

## 4.2 Noise Survey



### 4.2.1 General

As noted in Section 2.1, Portarlington and the proposed development sits outside the “major urban area” boundary and, as such, is to be assessed following the “rural area method” as per EPA VIC guidelines. In accordance with the Noise Protocol, a background level assessment / noise survey is only required within a background relevant area[4], including coastal areas. Hence, a noise survey has been conducted for this project as a conservative approach and to understand better the environment around the proposed site.

### 4.2.2 Short-term Noise Measurements

Operator attended short-term noise monitoring were undertaken from 13th to 14th November 2025 to understand the existing background and ambient noise environment around the proposed site. Measurements were conducted with a hand-held analyser (B&K Type 2250 S/N 3010119) with the microphone at 1.5m height from the ground and in the free field. Weather was calm and dry during the survey periods.

Measurements were conducted in general accordance with the requirements of AS1055:2018 *Acoustics – Description and Measurement of Environmental Noise*. The analyser used was checked for calibration with a B&K acoustic calibrator Type 4231 before and after measurement to confirm accuracy. Further to that, equipment used in the survey holds up-to-date NATA traceable calibrations. Certificates of calibration can be provided upon request.

Measurements were undertaken at the locations shown in Figure 1.

Detailed results of the attended noise survey and operator notes are presented in Appendix C.

[4] As per the Noise Protocol, a Background relevant area is a noise sensitive area within a rural area where background levels may be higher than usual. This includes areas where freeway or highway traffic is a significant audible background noise source. It also includes coastal areas, where representative background levels may be elevated by the sound of surf. At the time of the survey, surf noise was not audible or noticeable, therefore the measured background noise levels may be considered to be conservative (at the lower end of expected noise levels).

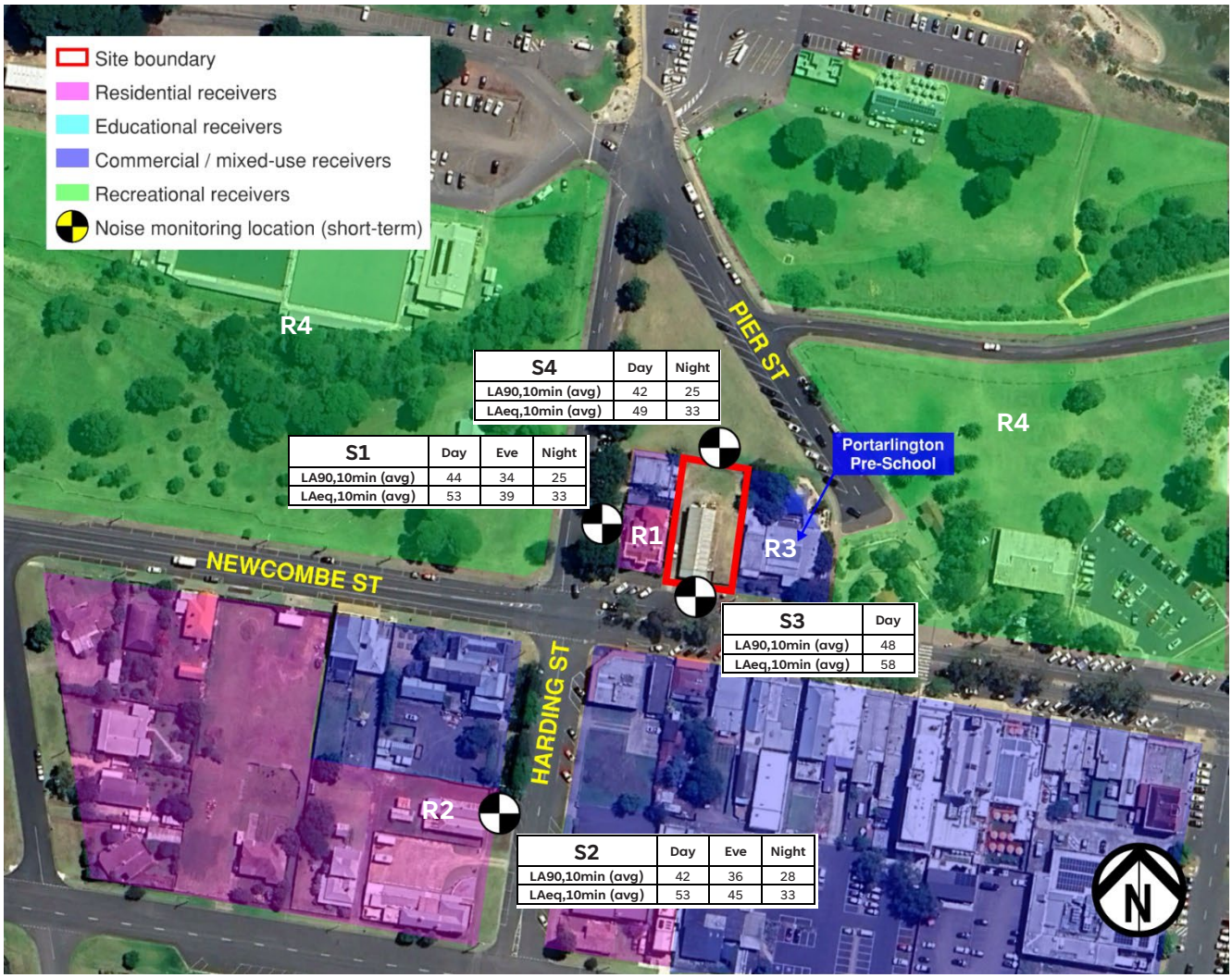
- **Location S1** – 1 Harding St (footpath) closest residential receiver sharing a common boundary with the Project site
- **Location S2** – 6 Harding St (footpath) closest residential receiver not sharing a boundary with the Project site
- **Location S3** – 49 Newcombe St (footpath) frontage of Project site
- **Location S2** – 49 Newcombe St (grassed area) back of Project site

A summary of overall existing environmental noise levels (ambient and background) at the observed most representative / closest residential receivers to the site, namely S1 and S2, is in Figure 3 and Table 5.

Figure 3 also shows the locations of key noise sensitive receivers (R1 to R4) as per Section 4.1.

A summary of overall existing external ambient / traffic noise levels at the front and rear of the proposed site, namely S3 and S4, is also in Figure 3 and Table 6.

**Figure 3 Noise monitoring locations and summary of results**




Source: Google Earth / ACS

**Table 5 Summary of short-term noise monitoring results at representative surrounding residential receivers**

| Location ID | Period | Ambient Noise[1] $dBL_{Aeq,10min\ ave}$ | Background Noise[1] $dBL_{A90,10min\ ave}$ |
|---|---|---|---|
| S1 | Day | 53 | **44** |
| | Evening | 39 | **34** |
| | Night | 33 | **25** |
| S2 | Day | 53 | **42** |
| | Evening | 45 | **36** |
| | Night | 33 | **28** |

Note: 1. In accordance with VIC EPA Noise Protocol, short-term ambient and background Noise is the arithmetic average of two 10 minute samples representative of the noise sensitive area at the critical period / times for the assessment.

**Table 6 Summary of short-term noise monitoring results at front and rear of the proposed development**

| Location ID | Period | Ambient / Traffic Noise[1] $dBL_{Aeq,10min\ ave}$ | Background Noise[1] $dBL_{A90,10min\ ave}$ |
|---|---|---|---|
| S3 | Day | **58** | 48 |
| | Night | **33** | 25 |
| S4 | Day | **49** | 42 |
| | Night | **33** | 25 |

### 4.2.3 Summary of Survey Results and Observations

Based on survey data analysis and site observations, it is concluded that the local environment is that of a quiet country town, with minor traffic and commercial activity.

Traffic noise is more prominent at those locations facing Newcombe Street and during the daytime, while intermittent traffic and faint general hum, natural noises – such as wind on leaves – is more characteristic of the environment at night.

**Background noise used in this assessment for the purpose of the Noise Protocol Part I (Commercial, industrial and trade premises) relevant to noise emissions**

For sensitive receivers, the background noise levels used for setting noise limits for the project have been highlighted in **bold** in Table 5.

**Ambient/traffic noise used in this assessment for the purpose of the external noise intrusion assessment**

For the proposed development, the ambient/traffic levels used for the noise intrusion assessment have been highlighted in **bold** in Table 6.

# 5 Project Specific Noise Criteria

## 5.1 Environmental Noise Emissions

### 5.1.1 Construction Noise

The GED and the obligation to not emit or permit to emit unreasonable noise apply to both the project and its contractors. It is important for the project to ensure that any future contractors implement the environmental management obligations during site preparation and the construction of the PAC. Reference is made in this report to VIC EPA Publication 1834.1 *Civil construction, building and demolition guide*, which provides guidance on working hours, recommended noise limits (where applicable), good environmental practice, and how it can support eliminating or reducing the risk of harm to human health and the environment from construction noise emissions associated with the proposal. Once a contractor is engaged and a construction program is available, the contractor should be responsible for following the relevant guidance and recommendations set out in Publication 1834.1 to ensure compliance with the GED and effective management of construction noise impacts. Because this responsibility falls with the contractor, construction noise is not considered in further detail in this report.

### 5.1.2 Environmental Noise Emissions

#### Noise Protocol Noise Limits – Rural Area

Following review of the KTA drawings and CAL mechanical spatial layouts, ACS understands that the proposed development includes a main centralised plantroom area in the roof where all the plant (i.e. plant catering for residential apartments, commercial tenancy and basement carpark) is to be installed.

In the absence of specific noise limits for plant noise emissions in Greater Geelong Council planning scheme for the subject area, ACS proposes to assess its environmental noise impacts referring to VIC's EPA Noise Protocol. The Noise Protocol is geared towards assessing noise from commercial premises but, as the building plant is centralised, it can be interpreted as a commercial-style plantroom, if the plant within is to be mostly residential-grade.

Table 7 summarises the relevant project specific noise targets based on the noise monitoring results and application of the EPA Noise Protocol and, for those receiver types not considered in the Noise Protocol (such as recreational), by other relevant standards and guidelines. Noise above the limits in Table 7 could be considered as unreasonable.

**Table 7 Summary of Project-Specific Environmental Noise Criteria for Plant Emissions**

| Receiver Type [ID] | Description | Period[1] | Noise Limits $dBL_{Aeq,30min}$ (external) |
|---|---|---|---|
| Residential [R1] & Educational [R3] | Facing Newcombe Street | Day | **52** |
| | | Evening | **45** |
| | | Night | **40** |
| Residential [R2] | Away from Newcombe Street | Day | **50** |
| | | Evening | **42** |
| | | Night | **37** |
| Recreational [R4] | Active (external) | When in use | **50** |

Note:
1. Periods are defined in accordance with relevant Regulations (also shown in Appendix E):
   - For plant emissions and operations associated with Commercial, Industrial and Trade Premises
     - Day – Monday to Saturday 7am to 6pm
     - Evening – Monday to Saturday 6pm to 10pm, and Sunday and Public Holidays 7am to 10pm
     - Night – Monday to Sunday 10pm to 7am

Details of the derivation of the noise limits in Table 7 above are presented in Appendix E section E.1, which have been obtained following the "rural area" method, as Portarlington is outside of the major urban areas of Greater Geelong Council (refer to Section 2.1 for details).

#### City of Greater Geelong – Noise Schedule

In accordance with the City of Greater Geelong Noise Schedule, the following items should not be audible in a habitable room of a neighbour's house outside of prescribed hours below:

- For home heat pumps and heaters:
  - Monday to Friday before 7 am or after 10 pm.
  - Weekends and public holidays before 9 am or after 10 pm.
- For air conditions used for cooling:
  - Monday to Friday before 7 am or after 11pm.
  - Weekends and public holidays before 9 am or after 11 pm.



### 5.1.3 Waste Collection

As noted in the EPA's Noise Control Guidelines, annoyance created by industrial / commercial waste collection tends to intensify in the early-morning period. To this end, early-morning collections should be restricted to minimise early morning disturbances in any residential areas. Where a residential area is impacted by noise from the collection of refuse, then collections should be ideally restricted to within the following times:

- One collection per week
  - 6:30am to 8pm Monday to Saturday
  - 9am to 8pm Sunday and public holidays
- Two or more collections per week
  - 7am to 8pm Monday to Saturday
  - 9am to 8pm Sunday and public holidays

### 5.1.4 Deliveries

Where a residential area will be impacted by noise from deliveries, the EPA's Noise Control Guidelines state that 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 noted below:

- 7am to 10pm Monday to Saturday
- 9am to 10pm Sundays and public holidays

Note: All ancillary motors or trucks should be turned off whilst making the delivery.

### 5.1.5 Sleep Disturbance

The relevant sleep disturbance screening criteria, external at residential boundary, is presented in Table 8.

#### Table 8 Sleep Disturbance Screening Criteria

| Receiver | ID | Period | Sleep Disturbance Screening Criteria (at Receiver boundary) | |
|---|---|---|---|---|
| | | | $dBL_{Aeq,30min}$ | $dBL_{Amax}$ |
| Residential | R1 | Night (10pm to 7am) | 40 | 52 |
| | R2 | | | |

## 5.2 External Noise Intrusion

As per ACS's observations during the noise survey, it is concluded that the main regular noise source affecting the proposed site, particularly during the day, is road traffic noise from local roads.

Furthermore, the site is located outside of the ANEF20 contour for Avalon airport and, as such, the proposed site is considered acceptable for residential development in accordance with with *Australian Standard 2021:2015 Acoustics – Aircraft noise intrusion – Building siting and construction* (AS 2021).

The noise intrusion criteria set for the residential apartments internal areas are presented in Table 9. It is noted that the criteria presented in the table below is consistent with the recommendations from AS2107 for "Houses and apartments in suburban areas or near minor roads" and with VIC's ADGs.

**Table 9 Noise Intrusion Criteria**

| Receiver | Room Type | Period | Noise Intrusion Criteria (internal) $dBL_{Aeq}$ |
|---|---|---|---|
| Residential Apartments | Living areas | Daytime | 40 |
| | Sleeping areas | Night-time | 35 |

# 6 Operational Noise Emissions Assessment

## 6.1 Closest Most-Affected Sensitive Receivers

Table 10 summarises the closest noise sensitive receivers to the proposed development. Compliance with project criteria at those locations will imply compliance at all other locations around the site.

**Table 10 Closest noise sensitive receivers to development site**

| Receiver Type [ID] | Address | Distance to Project Items (approx.) |
|---|---|---|
| Residential [R1] | 1 Harding St | 2m (from site boundary)<br>14m (from rooftop plant boundary) |
| Residential [R2] | 6 Harding St | 90m (from site boundary)<br>100m (from rooftop plant boundary) |
| Educational [R3] | 51 Newcomb St (Portarlington Preschool) | 2m (from site boundary)<br>12m (from rooftop plant boundary) |
| Recreational [R4] | Portarlington Park | 50m (from site boundary)<br>70m (from rooftop plant boundary) |

## 6.2 Assessment Results for General Plant Operations

### 6.2.1 Noise Emissions Targets Summary

In order from plant noise emissions from the development not to be cause of unreasonable noise, the noise limits listed below (calculated following the Noise Protocol method as shown in Section 5.1.2) are **not to be exceeded**.

- For **residential** and **educational** receivers:
  The most stringent criteria that apply to mechanical plant associated with the proposal – which could operate 24/7 – is during night time hours, i.e. **40dB(A)** at **R1 & R3** and **37dB(A)** at **R2** (as per Table 7).
- For **recreational** receivers:
  It is recommended targeting **50dB(A)** at the **nearest outdoor recreational areas around the proposal**, to preserve general environmental amenity in publicly accessible areas, including Portarlington Park (as per Table 7).

Taking into account the limits above and assuming all plant in the plantroom operating concurrently, the **sound pressure level at 1m from the roof plantroom perimeter should be no higher than 70dB(A) during the night-time** to comply with the limits at all residential/educational and recreational receivers noted above, considering the distance attenuation.

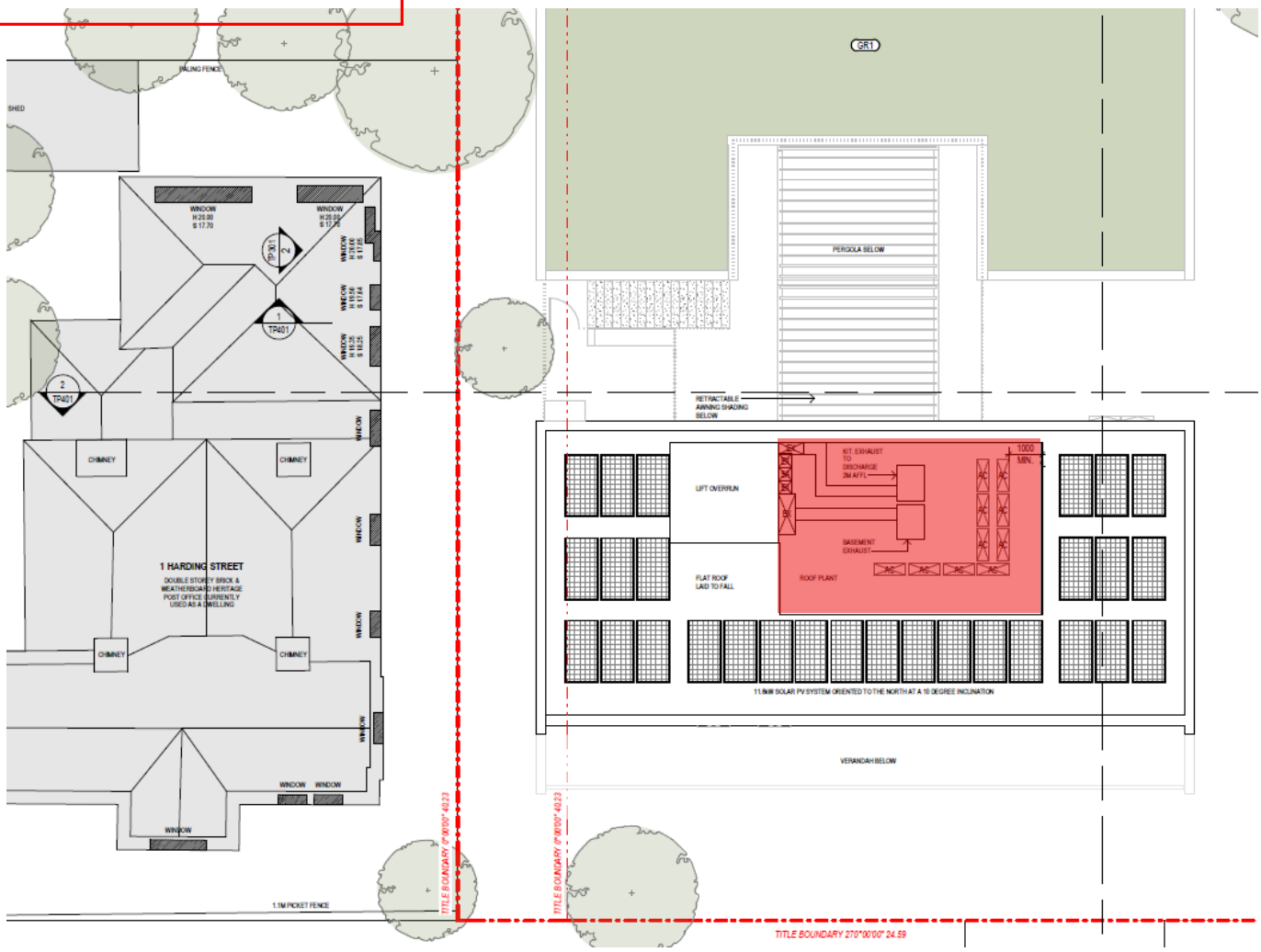
### 6.2.2 Noise Protocol Assessment

Plant and section location of the development roof plantroom is shown shaded in red in Figures 4 and 5 below. The plantroom perimeter area is surrounded by 1.4 metres height standard (i.e. not acoustic) louvres, for visual purposes only and open for ventilation.

KTA and CAL note that the following plant is anticipated to be installed in the plantroom:

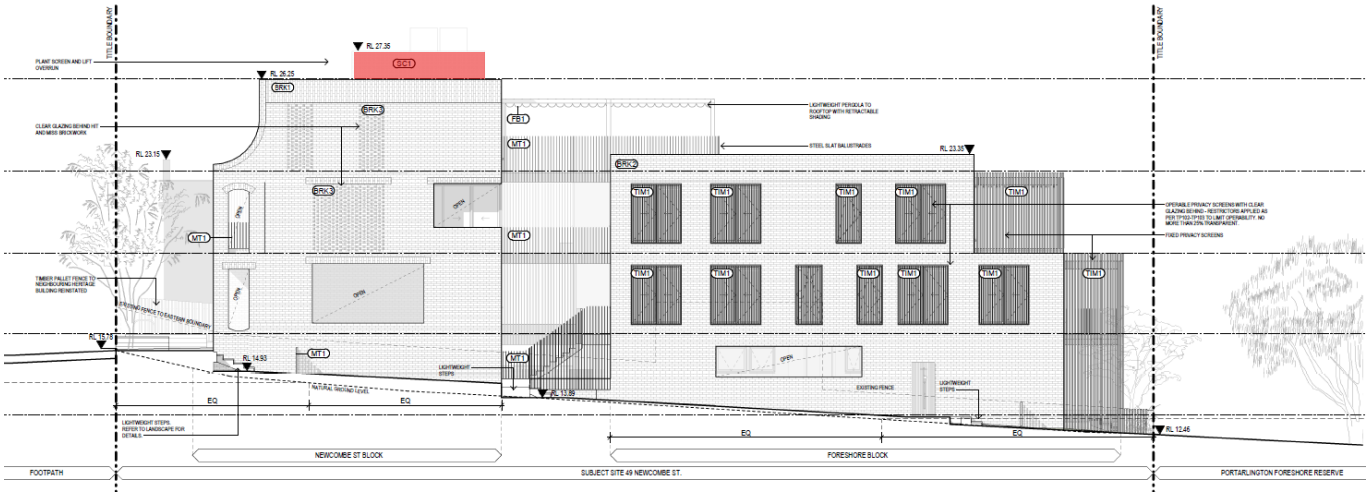
- 10 residential-grade condenser units (CUs) directly mounted in the plantroom floor (i.e. not staked)
- 2 general exhaust fans (carpark and kitchen from commercial tenancy) mounted elevated from plantroom floor with outlet ductwork opening sitting approximately 2 metres above the plantroom floor.

Figure 4 Rooftop plantroom (plan)




Source: KTA / ACS

Figure 5 Rooftop plantroom (section)




Source: KTA / ACS

Details of mechanical plant selections associated with the development – and its noise levels – are not available for review and assessment at this early stage. Based on ACS' experience with similar-sized residential developments:

- CUs radiated noise typically ranges from 55-70dB(A) at 1 metre depending on the size of the unit, and
- Exhaust fans can emit noise over a wider range – generally 50-80 dB(A) at 3 metres, depending on size and capacity. However, exhaust fans can accommodate attenuation in the ductwork outlet path, if required, in the form of internally lined acoustic duct and/or attenuators.

ACS concludes that, for the proposed rooftop plantroom to comply with the targets in Section 6.2.1:

- **CUs** are to be selected to **emit no more than 61dB(A) at 1 metre**, when measured in the free field.
- **Exhaust fans** are to be selected to **emit no more than 51dB(A) at 3 metres**, when measured in the free field, or to incorporate attenuators in the discharge/outlet so as the noise levels at 3 metres from the outlet is not above 51dB(A).

The allowances above for CUs and fans have been included based on the current architectural and services proposals at TP stage. Actual treatments may change (and still achieve the relevant noise emissions targets) depending on final locations, orientation and equipment selections.

Hence, plant selections and locations should be reviewed by an Acoustic Consultant during Detailed Design (DD) to ensure that noise emissions still meet the applicable environmental noise criteria in this report at the nearest receiver boundaries, including the recommendations in City of Greater Geelong – Noise Schedule in regard to prescribed hours and audibility.

Should these source noise limits be exceeded, general design considerations and controls that may need to be implemented at DD stage typically include, but are not limited to:

- Strategic selection and location of plant to ensure the cumulative noise contribution at the receiver boundary is achieved, and/or
- Noise control measures to be put in place to minimise noise impacts such as:
  - Noise enclosures or barriers/screening as required.
  - Acoustic louvres as required.
  - In-duct attenuation.
  - Sound absorptive panels.

The architectural design has allowances to incorporate one or a combination of the above measures. The actual measures will be determined once plant selections are made during design development.

## 6.3 Assessment for other noise sources

### 6.3.1 Residential Basement Carpark Access

Environmental noise emissions associated with movements of vehicles within the site (i.e. when residents access the basement carpark via the carpark ramp) have been considered as part of the operations of the development and, as such, are assessed against the VIC EPA Noise Protocol limits presented in Section 5.1.2.

Residents' basement carpark access – from Newcombe Street, at upper ground level – is shown highlighted in red in Figure 6 below. The carpark ramp is open to the east towards and sits approximately 3.5 metres from the Preschool boundary, and 4.5 metres from the closest window of the Preschool building, which is the most-affected receiver for this noise source.

As per the traffic report for the development [5], the following vehicle movements associated with resident's carpark access are expected:

- AM Peak: up to 8 vehicles per hour

[5] Amber's Residential & Retail Development – 49 Newcombe Street, Portarlington – Traffic Impact Assessment (October 2025) Ref: 1049 rep 251024 final

- PM Peak: up to 8 vehicles per hour

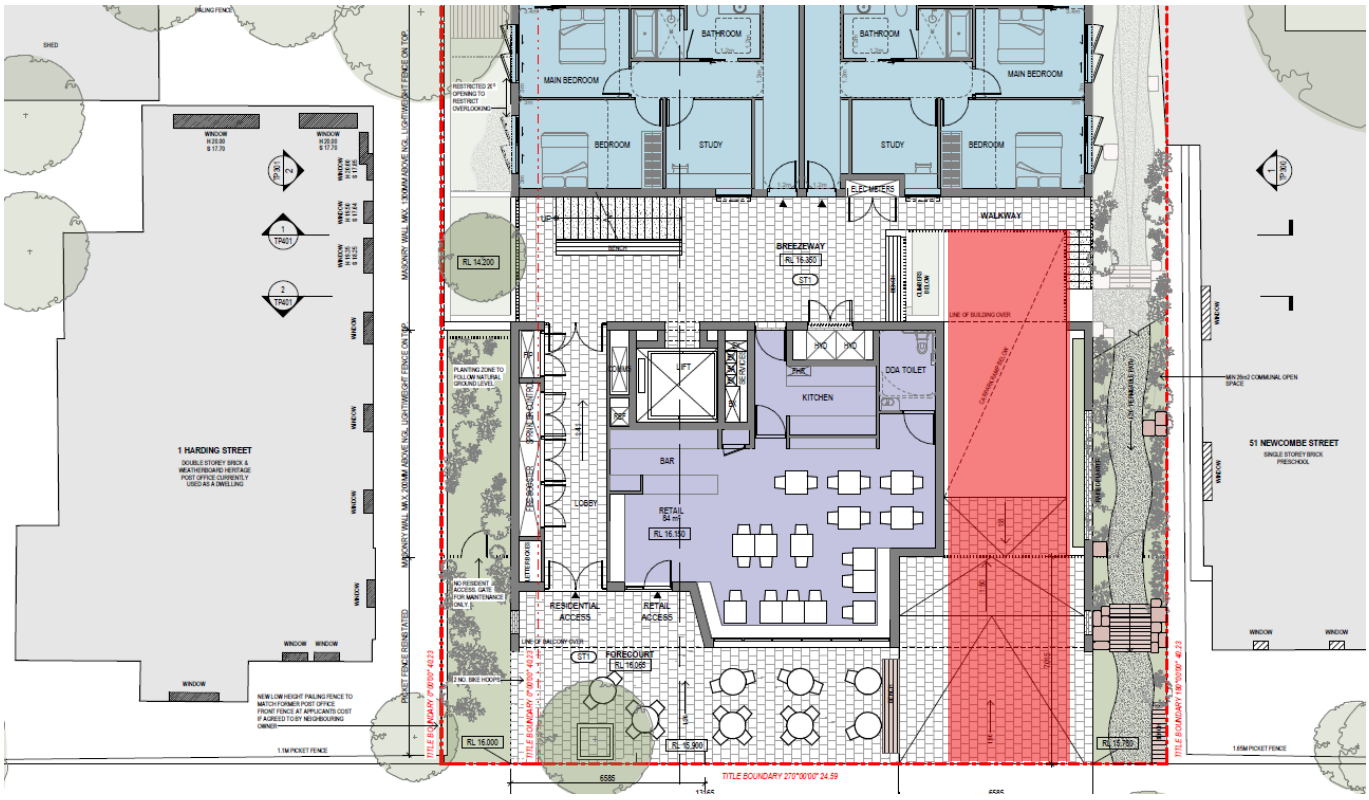
The conservatively predicted noise emissions associated with the "peak" vehicle movements, and assuming vehicles typically moving along the carpark ramp at slow uniform speed are:

- 50 dB(A) (LAeq,30min) at the Preschool boundary
- 48 dB(A) (LAeq,30min) at the Preschool closest window to the ramp

The noise limit during the AM/PM vehicle movement peaks (Daytime) at the most affected receivers (Preschool to the east sharing a common boundary with the carpark ramp) is 52dB(A)(LAeq,30min). Hence, the proposal complies with the Noise Protocol limits.

Vehicle movements are not assessed during the evening and night-time periods as the Preschool is not in operation outside daytime hours.

**Figure 6 Carpark entry ramp (plan)**




Source: KTA / ACS

In order to further minimise any impacts associated with the carpark ramp access (in line with the GED requirements for the development) it is recommended that the design of the carpark entrance and ramp – once it progressed at DD stage –includes the following considerations to avoid adverse noise impacts at adjacent preschool:

- Incorporate a low-noise door mechanism / motor and ensure a regular maintenance schedule to reduce the potential for unwanted noise.
- Any threshold plates / drain covers etc. should be well secured and not cause intermittent noise peaks as vehicles pass over them.

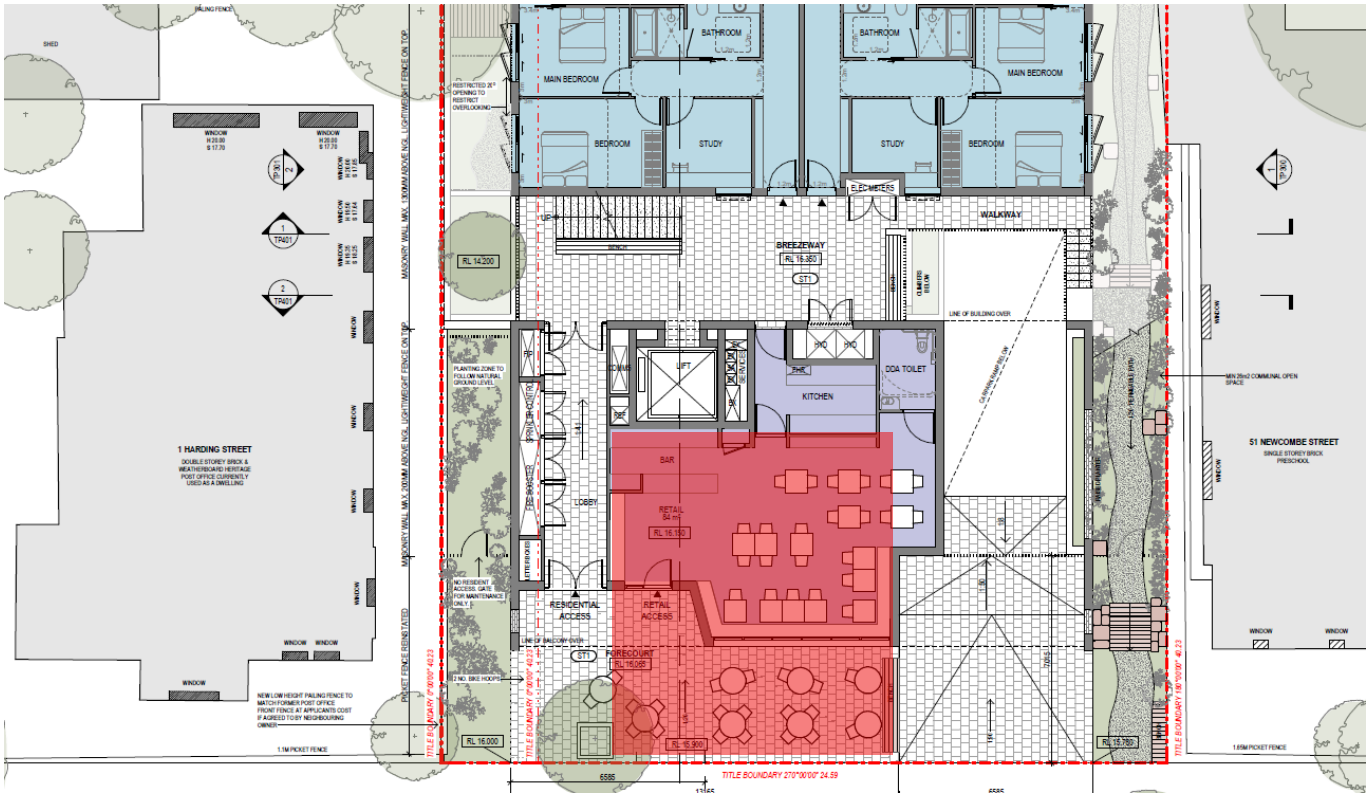
### 6.3.2 Commercial Tenancy – Café Operations

Environmental noise emissions associated with commercial tenancy / café operations on the site have been considered as part of the operations of the development and mechanical plant associated with the café has been included in the general plant assessment in Section 6.2.

Impacts of other operations associated with the café (e.g. patrons talking in the outdoor areas tables, background music) is not to be assessed against the VIC EPA Noise Protocol, as the Noise Protocol Part I specifically excludes patron noise and music. However, the noise limits in limits presented in Section 5.1.2 are used as screening criteria in this section to ascertain if the anticipated noise impact of café operations can have an adverse effect in the surrounding area and, if so, to provide acoustic advice and noise controls.

The proposed commercial tenancy / Café sits within the Upper Ground Level – facing Newcombe Street – is shown highlighted in red in Figure 7. The café tenancy is enclosed but includes an outdoor area which sits approximately 7 metres from the residential boundary of 1 Harding Street to the west (and 10 metres from the closest residential window), and 9 metres from the Preschool boundary to the east. Hence, the residential boundary is expected to be the most-affected and it the only receiver assessed in this report.

**Figure 7 Commercial tenancy – Café (plan)**




Source: KTA / ACS

As per the KTA drawings (also refer to Figure 7), up to 8 tables can be set in the café outdoor areas with a maximum of 20 patrons at a time. ACS understands that no background music will be played in the outdoors area with no PA system installed outside.

The predicted noise emissions associated with the "peak" café outdoor area operations, assuming at full capacity and 1-in-3 patrons talking at conversational level are:

- 52 dB(A) (LAeq,30min) at the 1 Harding Street residential boundary
- 50 dB(A) (LAeq,30min) at the 1 Harding Street residential closest window to the café outdoors area

The levels above are below the 52dB(A)(LAeq,30min) daytime Noise Protocol limit. As such, those are anticipated not to be overly disruptive for the area.

Café operations are not assessed during the evening and night-time periods as the Café is expected to operate 9AM to 5PM, as per Section 2.3.

In order to further minimise any impacts associated with the café operations (in line with the GED requirements for the development) the following additional recommendations are made:

- If background music is to be played inside the café, the noise level is to be limited to that that allows normal conversation (i.e. approximately 60-65dB(A)).
- Maintain the door and windows of the café closed at all times, particularly if any background music is to be played inside the café tenancy.
- Background music is not to be played in the outdoor area of the café.
- Limit the number of tables and seats outdoors so as not to exceed a capacity of 20 patrons as currently shown in KTA TP drawings.

### 6.3.3 Waste Collection

Further to the limits on collection times notes in Section 5.1.3, the following noise management recommendations apply in lieu of the application of noise limits for the activity:

- Refuse bins should be located at sites that provide minimal annoyance to residential premises.
- Compaction, if any, should be carried out while the vehicle is moving.
- Bottles should not be broken up at the 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.

### 6.3.4 Deliveries

Further to the limits on collection times notes in Section 5.1.3, the following noise management recommendations apply in lieu of the application of noise limits for the activity:

- Refuse bins should be located at sites that provide minimal annoyance to residential premises.
- Compaction, if any, should be carried out while the vehicle is moving.
- Bottles should not be broken up at the 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.

### 6.3.5 Sleep Disturbance Assessment

In regard to the sleep disturbance assessment for the proposed development, ACS states the following:

- Night-time operations (i.e. after 10pm) are not proposed for the commercial tenancy / cafe.
- Any plant in the rooftop plantroom that remains operational during night-time hours (10pm to 7am), such as outdoor CUs and fans, will have a constant noise characteristic without intermittent high noise events that could be associated with sleep disturbance and, as such, it is not assessed herein.

Therefore, the only item to be assessed against the sleep disturbance screening criteria in Section 5.1.5 are the impacts of a resident's car accessing the basement carpark at night.

The closest residential window to the proposed development carpark ramp is 20 metres away, at 1 Harding Street residence eastern façade.

The impact of a car stopping at the basement carpark ramp, waiting for the gate to open and accelerating as it enters the carpark in is anticipated to be 25dB(A)(LAeq,30min) and 50dB(A)(LAmax) at the assessment location (1 Harding St outside of its closest window to the ramp) and, as such, is below the screening criteria (refer Section 5.1.5) that would warrant further assessment.

## 6.4 Cumulative Noise Assessment

In order to assess the worst-case cumulative noise impact assessment of the proposed development on the surrounding local area, ACS has considered the following noise sources:

- Daytime
  - Plant noise (all rooftop plantroom operating concurrently)
  - Patron noise outdoor areas in the Upper Ground Level café
  - 8 vehicle movements accessing or existing the basement carpark (as per AM/PM peak estimations)
- Night-time
  - Plant noise (all rooftop plantroom operating concurrently)
  - Occasional, intermittent noise from residents' cars accessing the basement carpark

The noise sources listed above are located in different parts of the proposed building and, as such, affect sensitive receivers in different ways. For instance, the plant noise emissions from the roof plantroom impact the most the upper levels at the far rear of the residence in 1 Harding Street, while the carpark ramp movements and the café operations affect the front areas of both 1 Harding Street and the Preschool, facing Newcombe Street, where background and ambient noise levels are already higher.

Taking the above into account, ACS have assessed the cumulative noise impacts of all noise sources listed above in a 3D noise propagation model.

It is concluded that cumulative noise impacts from the development are predicted to meet applicable guidelines at all time periods assessed. Furthermore, cumulative noise impacts from the proposed development are not expected to be above the current ambient noise levels measured at sensitive receivers, as presented in this report.

## 6.5 General Environmental Duty

The GED mandates that any individual or business undertaking activities that may give rise to risks of harm to human health or the environment from pollution or waste, including noise emissions must minimise those risks, so far as reasonably practicable. In the context of the Project, Table 11 presents a review of GED considerations with regards to noise emissions. While assessing the GED, reference has been made to VIC EPA Publication 1856 "Reasonably practicable" and how to determine what is reasonably practicable based in consideration of the following items:

1. Eliminate first / What if I can't eliminate my risk?
2. Likelihood
3. Degree (or consequence)
4. Knowledge about the risks
5. Availability and suitability
6. Cost

Table 11 General Environmental Duty Review

| Type of Pollution | Potential Impact | How Has the Risk Been Minimised? | Residual Risk of Harm |
|---|---|---|---|
| General Plant Noise Emissions | Decreased amenity of surrounding residential and educational receivers | • Noise limits for the equipment to be installed in the rooftop plantroom of the proposed development have been set. Those are to be further reviewed and coordinated during detailed design for compliance with Noise Protocol limits.<br>• The quietest plant available is to be selected, where possible, within the relevant available range. When an item of plant exceeds the maximum noise emissions recommended din this report, additional noise control, as also noted in this report, are to be incorporated into the Detailed Design for mechanical services in order to control noise to the desired levels. | **Low** |
| Basement Carpark Operations | Decreased amenity of surrounding residential and educational receivers | • Movements of resident's cars accessing and existing the basement carpark via the carpark ramp have been assessed against the Noise Protocol limits and found to be below those, hence minimising the risk of unreasonable noise.<br>• No sleep disturbance risks are associated with car movements in and out of the site<br>• Additional advice is provided in this report in regard to typical noise issues associated with carpark ramps (such as control of door motor noise emissions and proper installation of threshold plates and drain covers so those will not create noise peaks during cars pass-by) | **Low** |
| Commercial Tenancy / Café Operations | Decreased amenity of surrounding residential and educational receivers | • An inspection of the site and surrounds showed that the café is to operate from the main street from Portarlington where similar tenancies are already operating with no adverse impacts.<br>• The café is only operating during the daytime, when surrounding residential receivers are less sensitive.<br>• Additional noise management advice has been provided in this report so any adverse noise impacts of the café operations, particularly those emanating from the outdoors patron areas, are managed (e.g. limiting the number of patrons outside at any one time, not playing background music outside). | **Low** |
| Other operations (e.g. waste collection, deliveries) | Decreased amenity of surrounding residential and educational receivers | • The proposed development sits in the main street of Portarlington, so deliveries and waste collection is not an uncharacteristic activity for the area.<br>• Garbage collection is understood to occur from the basement carpark (as noted in the Town Planning Waste Management Report) further reducing the noise impacts associated with bins movements.<br>• Deliveries and waste collection are to be managed in accordance with the relevant plans for the site and with all EPA VIC and Greater Geelong Council relevant guidelines. | **Low** |

The review of GED noise impacts determines that the project has minimal potential of harming the environment or human health through pollution or waste relating to noise.

# 7 External Noise Intrusion Assessment

The main noise sources with potential to impact on the site are:

- Pre-existing transportation road around the site (i.e. traffic noise, noise from the ferry terminal/pier)
- Mechanical plant noise from plant to be installed in rooftop plantroom as part of this project.

Noise from the outdoor play area in the Preschool is not considered to be a significant contributor to noise affecting the proposed development, as the outdoor play area is located on the far side of the preschool (not adjacent to the proposed development).

Measured traffic noise levels around are summarised in Table 6 in Section 4.2.

## 7.1 Building Envelope Construction Recommendations

Based on the measured levels around site and consideration of proposed rooftop plant, minimum façade acoustic treatment recommendations to meet the requirements of Section 5.2 are provided below:

- External Walls and Roof constructions other than below main roof plantroom in Level 3
  - Minimum $R_w$ 40
  - Can be met with hollow blockwork, brick or similar wall types
  - Can be met with typical tiled or metal roof system with insulation, air gap and plasterboard ceiling – detail to be determined during design development stage
- Roof construction directly below the main roof plantroom in Level 3
  - Minimum $R_w$ 50
  - Can be met with 150mm solid concrete
- Glazing systems (including frame and seals)
  - Minimum $R_w$ 30 – All areas / orientationCan be met with typical single (10mm) or double (6/12/6) glazed systems.

# 8 Conclusion and Summary of Mitigation Measures at TP Stage

## 8.1 Environmental Noise Emissions

### 8.1.1 Construction

Once the project reaches the construction planning stage and a Contractor is on board, it is recommended that a Construction Noise and Vibration Management Plan (CNVMP) is prepared in accordance with the recommendations in EPA's *Civil construction, building and demolition guide, Chapter 4 - Noise and Vibration*. The plan should outline all proposed works and include noise and vibration mitigation measures targeted to the specific construction plan for the project.

### 8.1.2 General Plant

During the finalisation of the DD phase of the project, acoustic detailed design advice should be provided to the architect and services engineers to ensure that noise emissions from plant and site operations are effectively controlled to meet the relevant criteria presented in this TP report at the nearest sensitive receiver boundaries.

General design considerations and controls which are allowed for in the design, which may need to be implemented, typically include but are not limited to:

- Strategic selection and location of plant to ensure the cumulative noise contribution at the receiver boundary is achieved, and/or
- Noise control measures to be put in place to minimise any remaining noise impacts such as:
  - Noise enclosures or barriers/screening as required.
  - Acoustic louvres as required.
  - In-duct attenuation.
  - Sound absorptive panels.

### 8.1.3 Residential Basement Carpark Access

No noise impacts associated with the operations of the basement carpark are anticipated considering the peak vehicle movements in the traffic report.

In order to further minimise any impacts associated with the carpark ramp access it is recommended that the design of the carpark ramp – once it progressed at DD stage –includes the following noise controls to avoid adverse noise impacts at adjacent sensitive receivers.

- Incorporate a low-noise door mechanism / motor and keep it well maintained.
- Any threshold plates / drain covers etc. should be well secured and not cause intermittent noise peaks as vehicles pass over them.

### 8.1.4 Commercial Tenancy – Café Operations

In order to minimise any noise impacts associated with the café operations the following additional recommendations are made:

- If background music is to be played inside the café, the noise level is to be limited to that that allows normal conversation (i.e. approximately 60-65dB(A)).
- Close the door and windows of the café, particularly if any background music is to be played inside the café tenancy.
- Background music is not to be played in the outdoor area of the café.
- Limit the number of tables and seats outdoors so as not to exceed a capacity of 20 patrons, as currently shown in KTA TP drawings.

### 8.1.5 Waste Collection and Deliveries

Follow all recommendations in EPA Noise Guidelines for waste collection and deliveries as listed in this report.

## 8.2 External Noise Intrusion

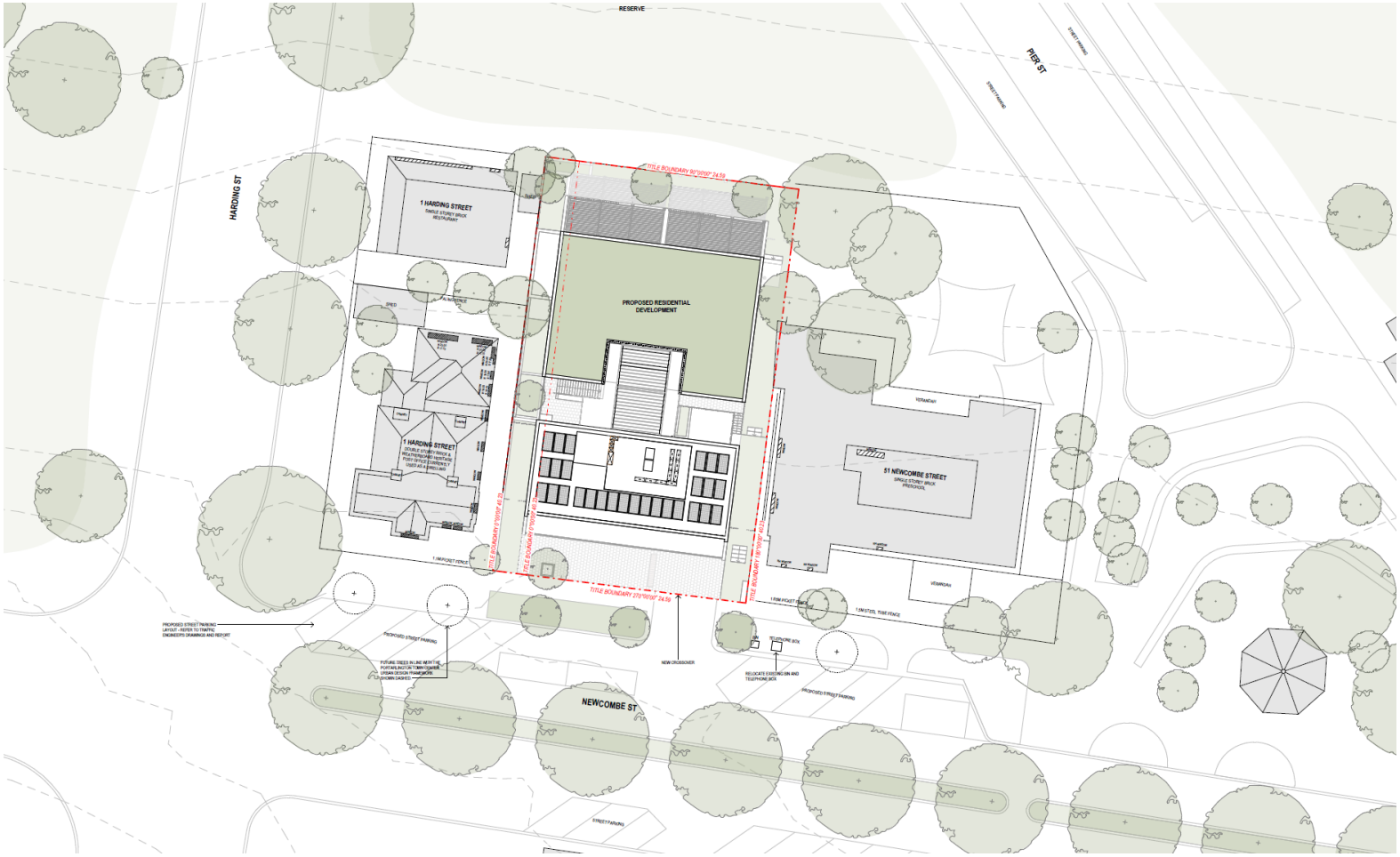
Due to the relatively low existing ambient noise levels around the site (primarily from transportation sources), no upgrades to the standard residential roof or façade constructions are required to meet the recommended building envelope performance.

# Appendix A Glossary of Terms

| Term | Definition |
|---|---|
| A-Weighted Sound Level (dB(A)) | Decibel can be expressed as an 'A – weighted' sound pressure level, based on the frequency response of the human ear and has been found to correlate well with human subjective reactions to various sounds. It is noted that an increase or decrease of approximately 10 dB corresponds to a subjective doubling or halving of the loudness of a noise, and a change of 2 to 3 dB is subjectively barely perceptible. |
| Ambient Noise Level | The ambient noise level is commonly referred to as the equivalent continuous sound level (Leq) over a period of time. |
| Background Noise Level | The average noise level in a noise-sensitive area, measured in the absence of other sounds. The measurement is usually taken as the noise level that is exceeded 90% of the time. |
| C-Weighted Sound Level (dB(C)) | As the sound level increases, the ear is better able to hear low frequency sounds. The C frequency weighting gives more emphasis to low frequency sounds than the A-frequency weighting. |
| Decibel (dB) | The human ear responds to a very large range of pressures, and hence a logarithmic unit, the decibel, is used. A change of 10dB in sound pressure level corresponds to an approximately doubling (or halving) of loudness. |
| Extraneous Noise | Any noise that is not part of the typical noise emissions in the area of study and is also not relevant to the typical background noise. Extraneous noise includes noise from aircraft, local traffic, construction works, insects, bird chirping, people talking, rustling leaves, and the effect of wind on the microphone diaphragm. |
| Frequency | The rate of repetition of a sound wave. Frequency is measured Hertz (Hz), or cycles per second. Human hearing ranges approximately from 20 Hz to 20 kHz (2000 Hz). |
| Ground-borne noise | The transmission of noise energy as vibration of the ground. The energy may then be re-radiated as airborne noise. |
| Hertz (Hz) | Hertz is the unit of frequency. One Hertz (or 1Hz) is one cycle per second. (1kHz = one thousand Hertz). |
| L1(period) | The sound pressure level that is exceeded for 1% of a measurement period (e.g. the loudest 30s in a 50 minute symphony). |
| L10(period) | The sound pressure level that is exceeded for 10% of a measurement period. |
| L90(period) | The sound pressure level that is exceeded for 90% of a measurement period. This is commonly accepted as the background noise level. |
| LAeq(period) | The equivalent continuous sound pressure level. The level of noise equivalent to the energy average of noise levels occurring over a measurement period and it is a measure of a time-varying sound (e.g. traffic noise) |
| LAmax | The highest sound pressure level recorded over a measurement period. |
| Linear weighting | The sound level when no frequency weighting is applied. |
| Noise | Noise is generally defined as unwanted sound and vibration that are heard of felt. What is noise to one person may not be experienced the same way by another person. |

| Term | Definition |
|---|---|
| Noise Rating (NR) curves | Set of standard reference curves against which a noise spectrum, measured at different frequencies, can be assessed. The octave band noise spectrum is plotted on the set of curves. The highest value curve which is reached by the spectrum is the NR value. |
| Noise Reduction Coefficient (NRC) | A single number rating that indicates the extent to which the material absorbs sound. It is the average of the sound absorption coefficients in the 250-2000Hz octave bands. |
| Reverberation Time (RT) | The reverberation time of a room is the time (in seconds) taken for the sound pressure level to decay by 60dB after the sound source has stopped. It remains a basic design parameter in auditorium acoustics design. |
| Octave Band Centre Frequency | The most commonly used frequency bands are octave bands, in which the centre frequency of each band is twice that of the band below it. |
| Sound | Sound is an instantaneous fluctuation in air pressure over the static ambient pressure and is transmitted as a wave through air or solid structures. |
| Sound Absorption | The process by which sound waves are absorbed by a material or surface, rather than being reflected or transmitted. This process reduces the amplitude of sound waves, which can lower noise levels and improve sound quality. |
| Sound Absorption Coefficient | Sound absorption coefficient indicates the extent to which a material absorbs sound at a specific frequency and is expressed on a scale of 0 to 1, with a value of 1 representing the maximum possible absorption. |
| Sound Insulation | The ability of a material to block or reduce the transmission of sound. The concept can be applied to construction elements such as walls, ceilings, doors and windows. |
| Sound Pressure Level (SPL) | Expressed in dB, it is the level of noise measured by a standard sound level meter and requires a description of where the noise was measured relative to the source. |
| Sound Power Level (SPL) | Expressed in dB, it is the total acoustic energy radiated by a plant or equipment to the environment. |
| Vibration | Vibration is a rapid back-and-forth motion of particles in a substance or body. It may be expressed in terms of displacement, velocity and acceleration. Velocity and acceleration are most commonly used when assessing structure-borne noise or human comfort issues respectively. |
| Weighted Sound Transmission Class (Rw) | The Rw of a building element (such as a wall or floor) is a single number rating used to compare the sound insulation ratings of walls, floors, ceilings, windows or doors. |

# Appendix B Proposed Development Plans

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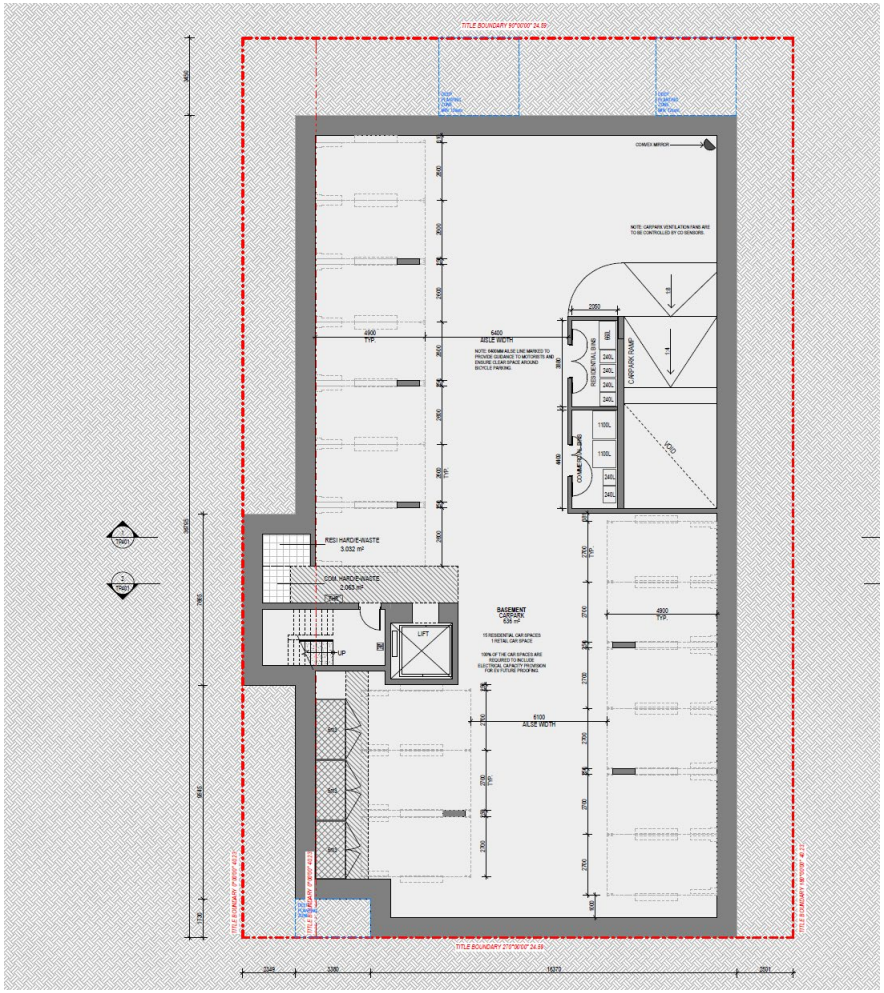


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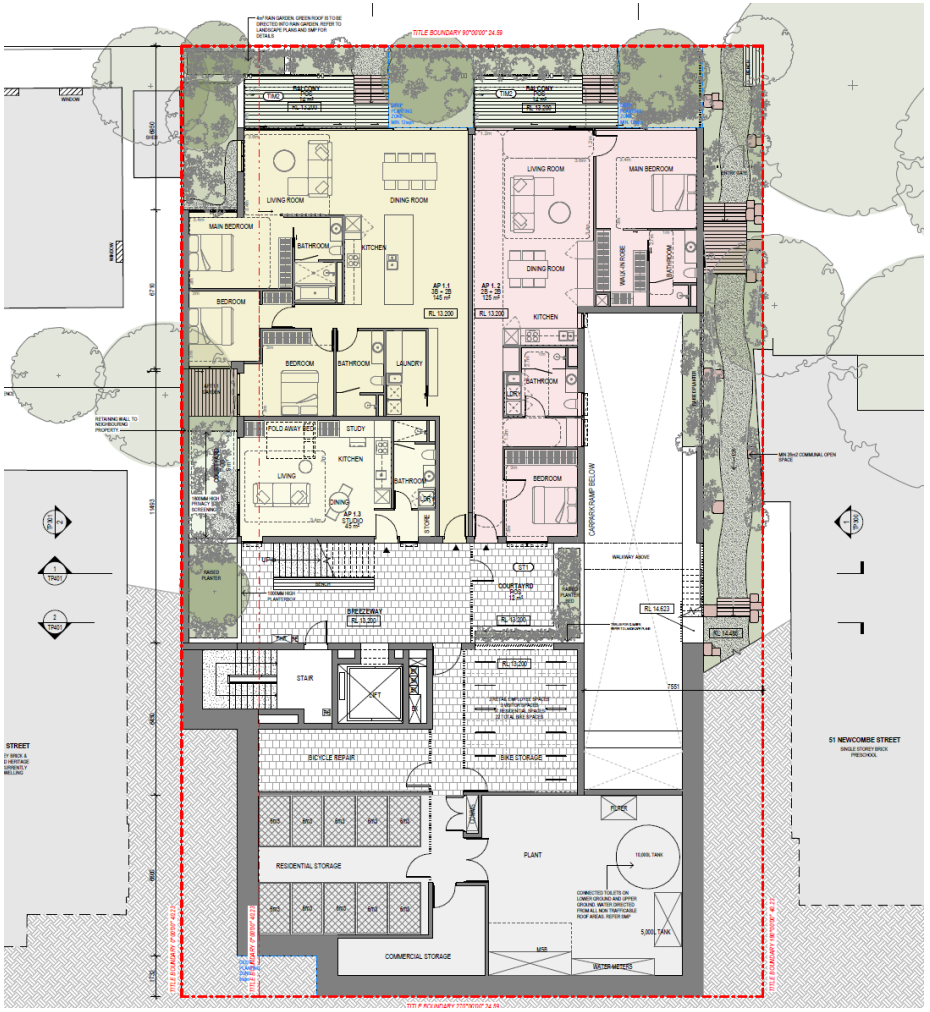


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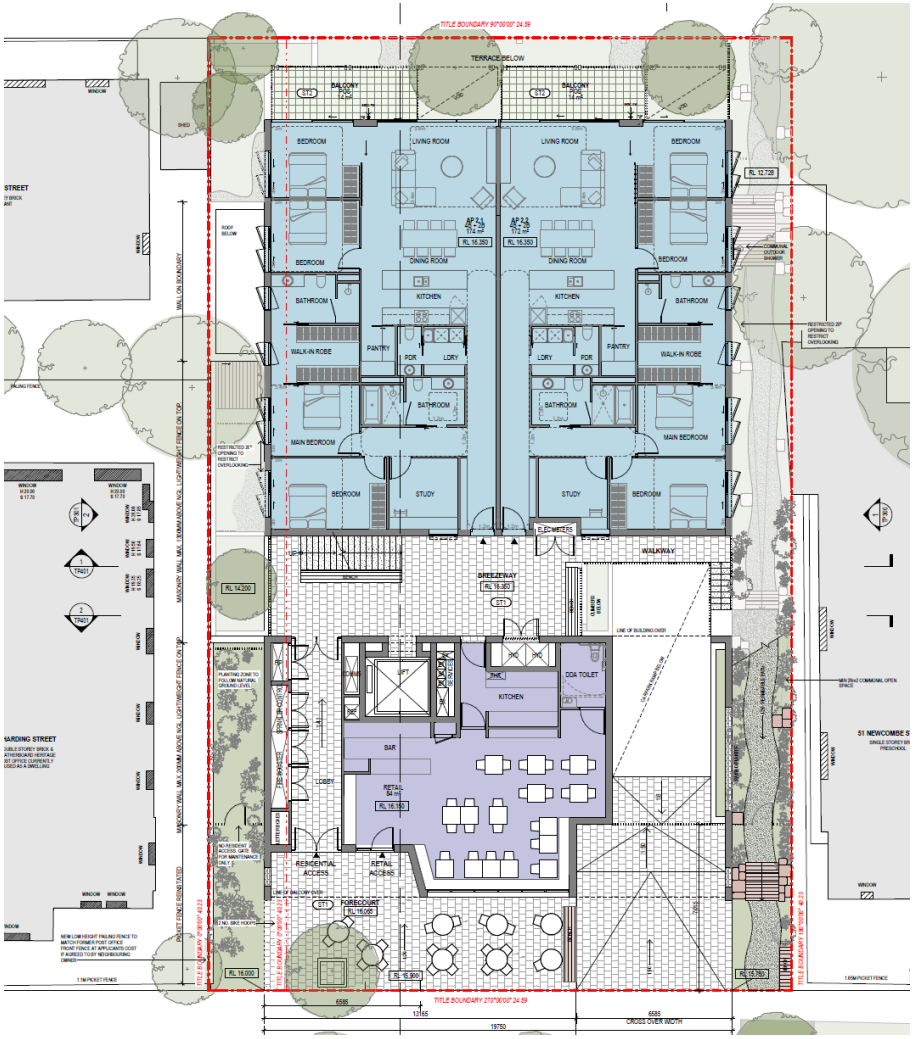


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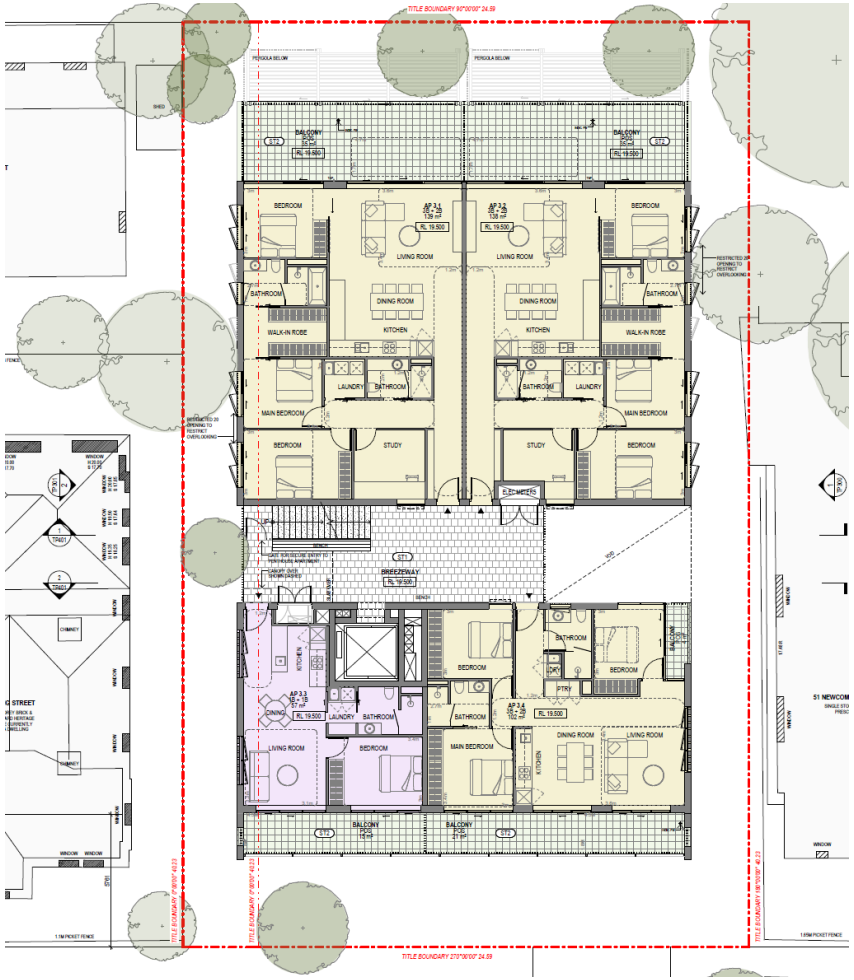

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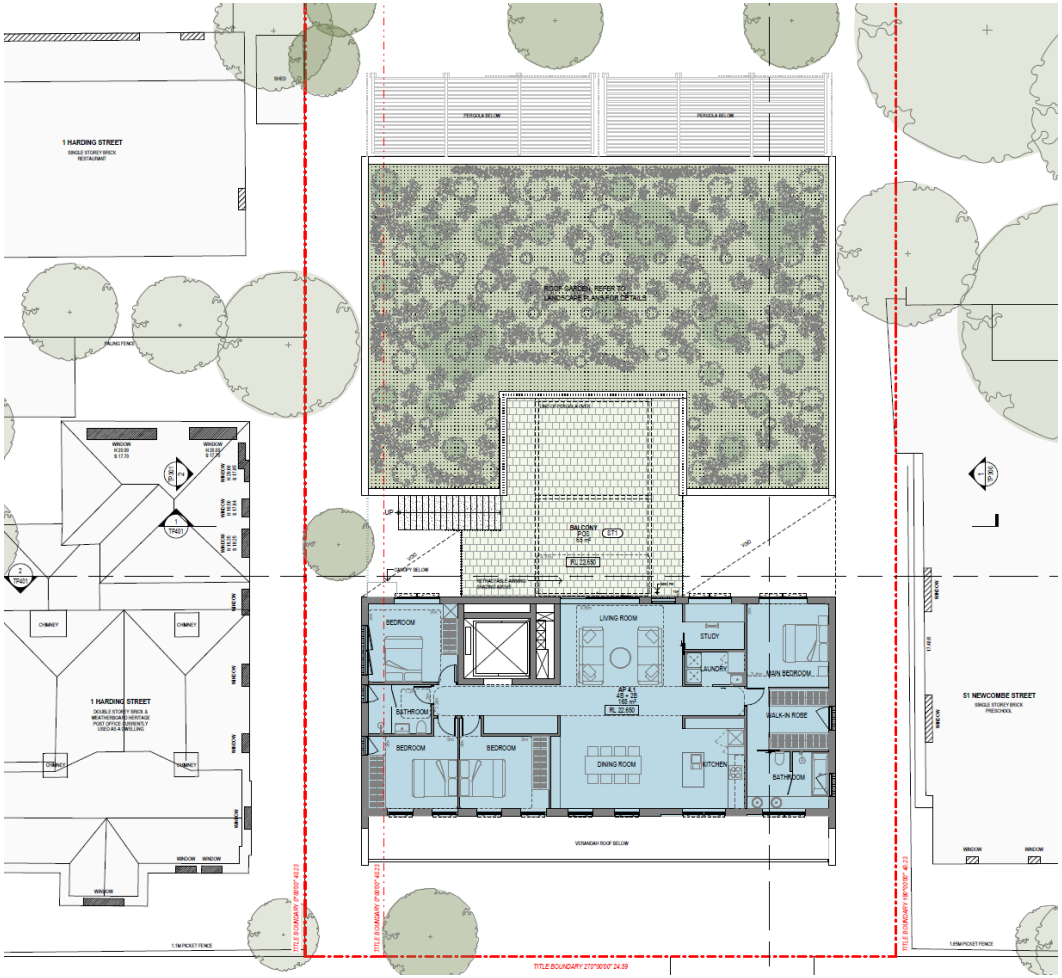


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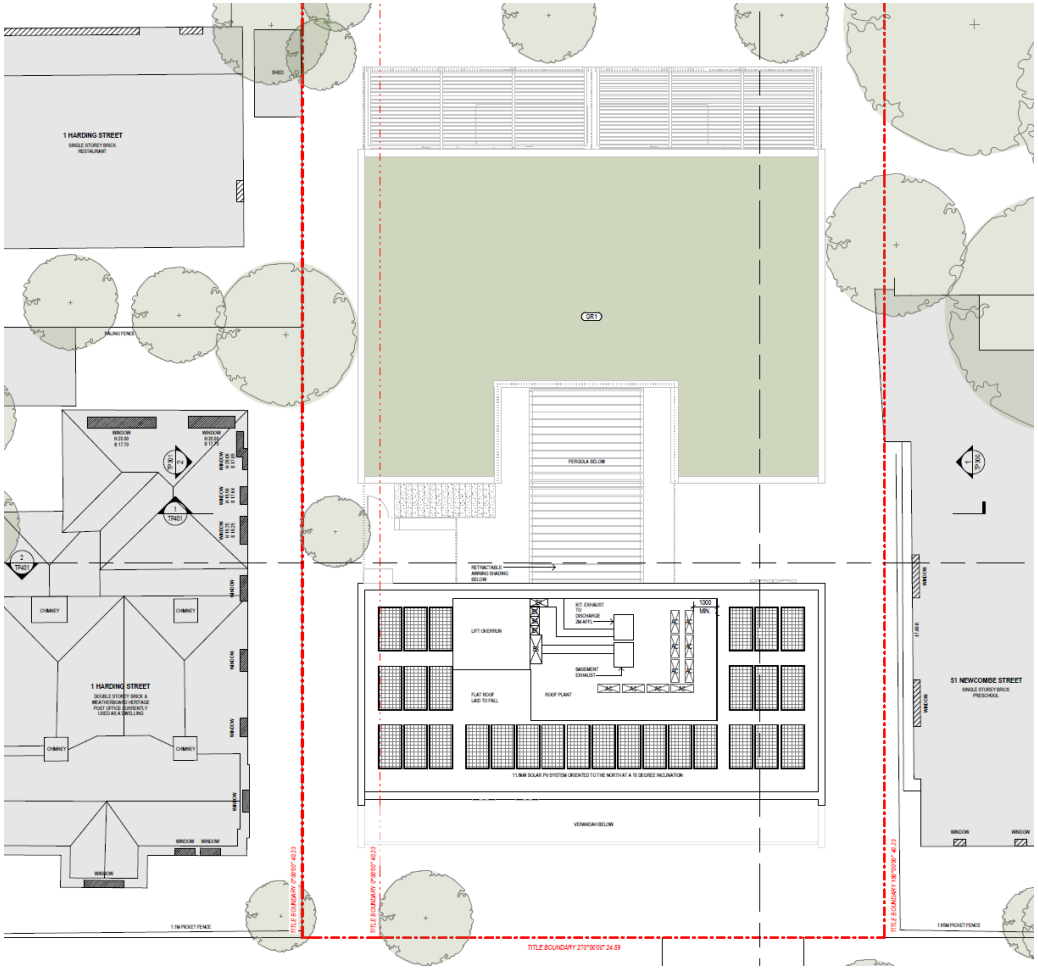


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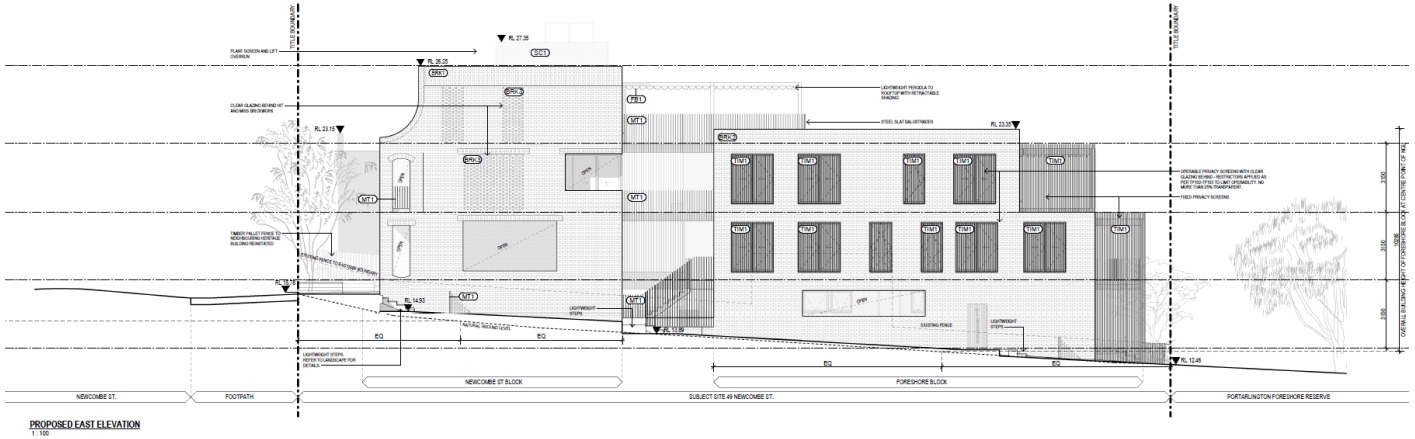


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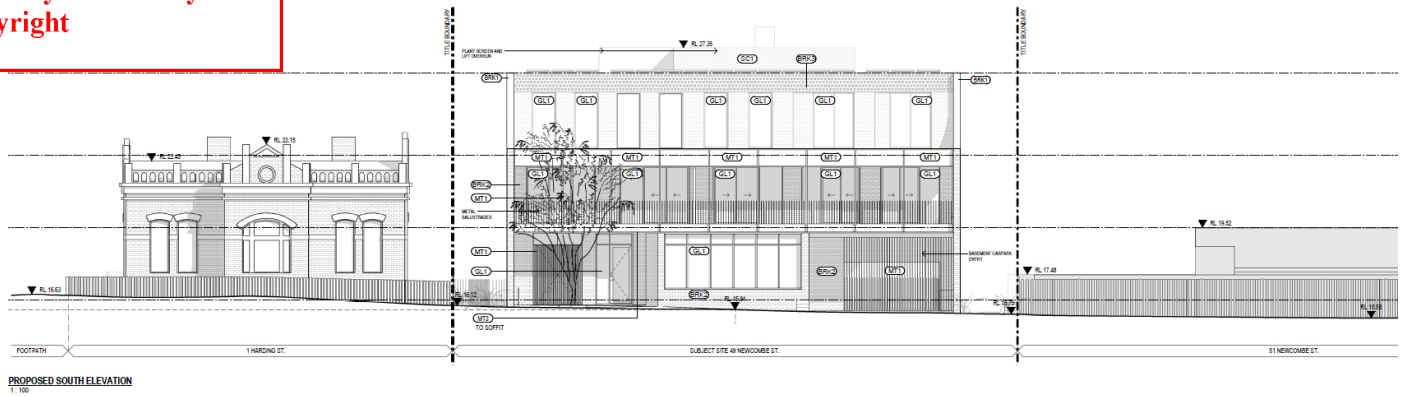
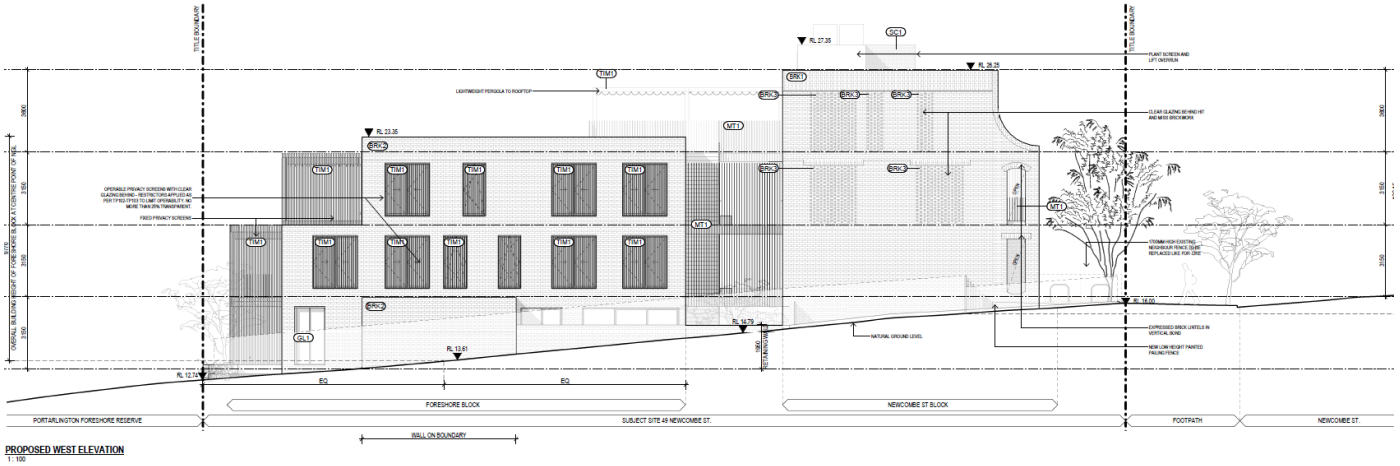
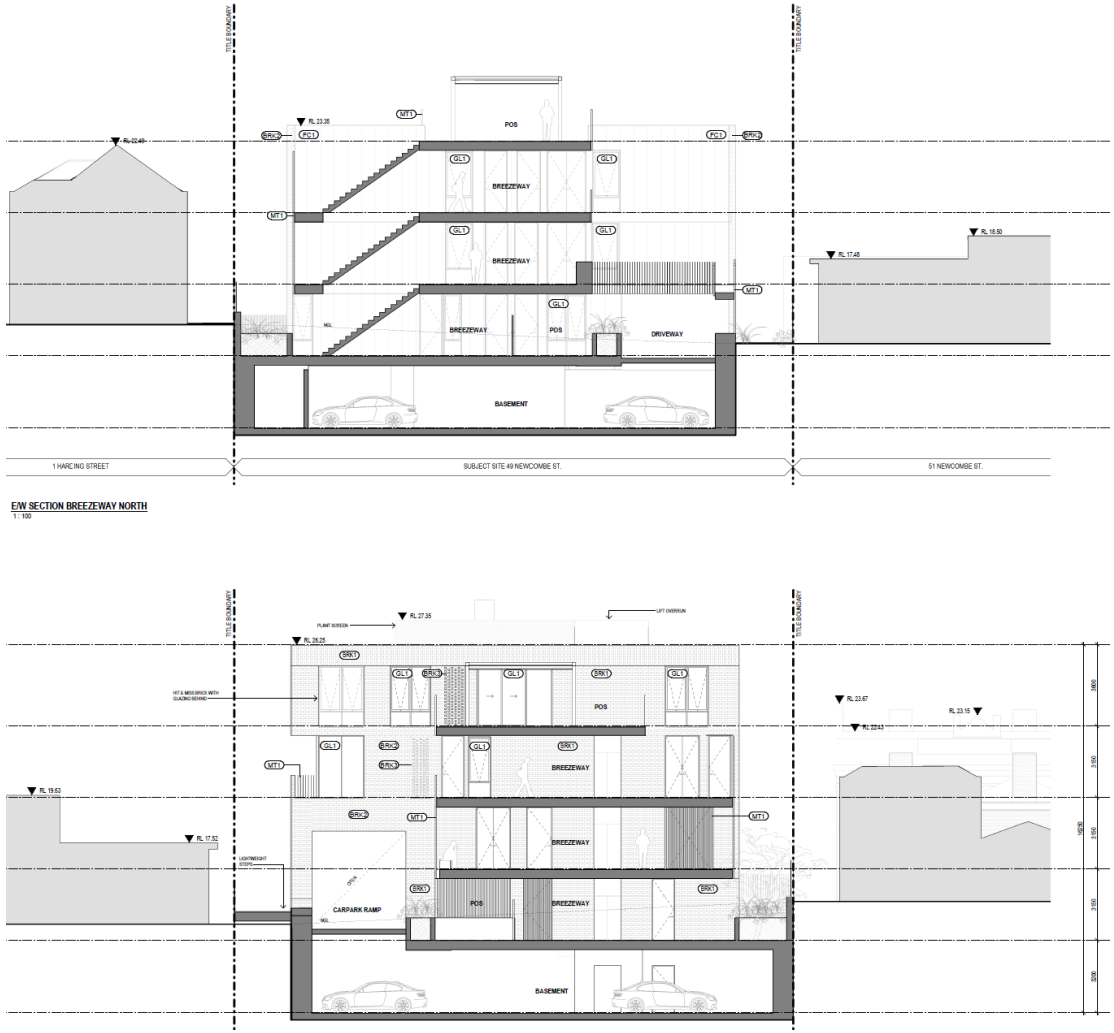
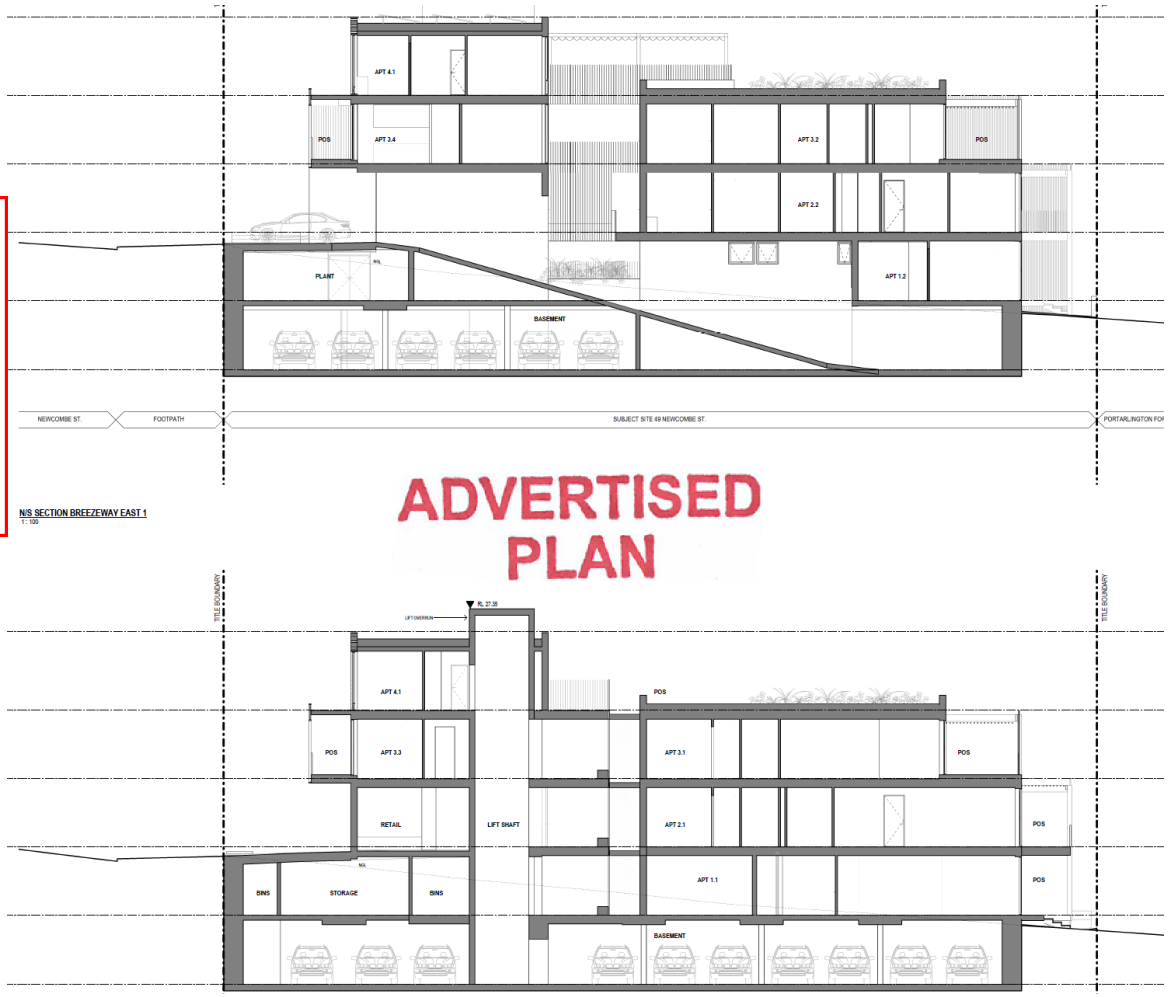



Source: KTA




Source: KTA




Source: KTA

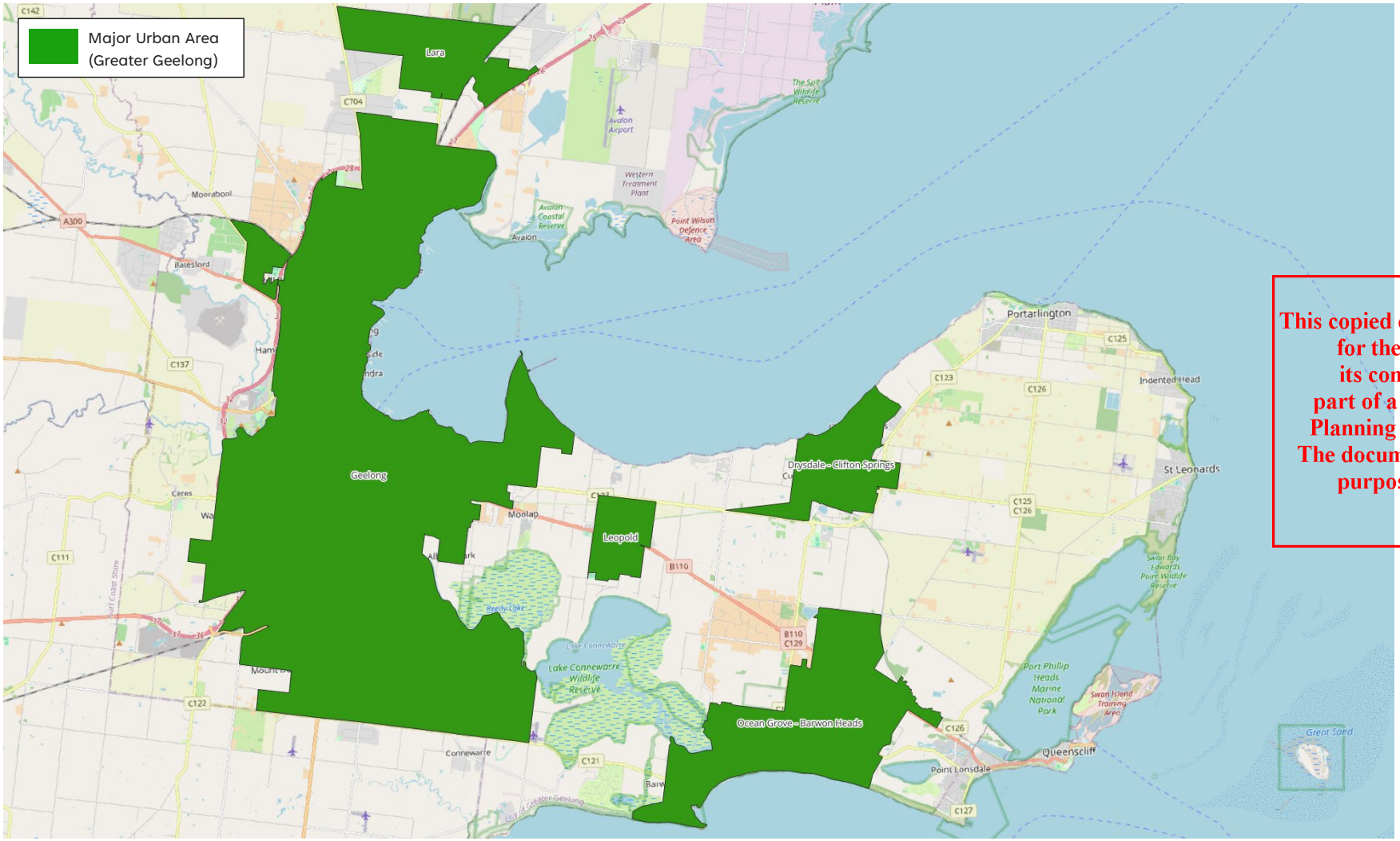
# Appendix C Attended Noise Survey Results

Table 12 Attended Noise Survey Results Summary

| Location ID | Date and Time | Ambient Noise $dBL_{Aeq,10min}$ | Background Noise $dBL_{A90,10min}$ | Site Notes and Observations |
|---|---|---|---|---|
| S2 | 13/11/2025 21:12 | 48 | **38** | Minor wind and tree rustle. Flag pole rope clanging. Very minor sporadic traffic |
| S4 | 13/11/2025 21:24 | 40 | **37** | Quiet, minor traffic and some intermittent activity noise from dock. Some birds. |
| S2 | 13/11/2025 21:36 | 39 | **34** | Very quiet. Some faint voices and minor plant noise from commercial areas. Minimal traffic. Flag pole rope clanging. |
| S4 | 13/11/2025 21:49 | 38 | **31** | No obvious dominant noise sources. Minimal traffic. Some intermittent seagull and vehicle noise. Plant noise from rear of wine bar. |
| S2 | 14/11/2025 1:00 | 32 | **28** | Very quiet. Faint plant noise and voices from back of bakehouse. Some distant bird chirps. Distant cars. |
| S4 | 14/11/2025 1:12 | 29 | **25** | Very quiet. Some people at docks. Distant insect noise. Distant cars. |
| S2 | 14/11/2025 1:25 | 33 | **29** | Very quiet. Faint plant noise from back of bakehouse. Distant cars. |
| S4 | 14/11/2025 1:37 | 34 | **26** | Very quiet. Faint plant noise from commercial areas. Cars idling at pier. |
| S3 | 14/11/2025 10:02 | 57 | **48** | Constant slow traffic (30-40km/h). Regular cars every 5-10 seconds. Lots of bird chirps all around. Some child noise from preschool. |
| S2 | 14/11/2025 10:14 | 53 | **41** | Regular slow local traffic on Harding St, but most from Newcombe St. Bird noise. Car idling nearby to start. General activity hum from town centre. |
| S1 | 14/11/2025 10:27 | 53 | **45** | Local traffic to and from pier. Traffic from Newcombe St. Minor activity noise from general town centre hum. |
| S4 | 14/11/2025 10:42 | 50 | **43** | Traffic to and from pier car park fairly constant. Crying and noise from preschool. Birds. Ferry arrival (very quiet). Reversing alarm from maintenance vehicle at pier. |
| S3 | 14/11/2025 10:57 | 59 | **47** | Traffic on Newcombe. A little busier from cars with people arriving on ferry and departing from carpark. |
| S2 | 14/11/2025 11:12 | 55 | **41** | Regular slow local traffic on Harding, but most from Newcombe. Bird noise. General activity hum from town centre. |
| S1 | 14/11/2025 11:31 | 53 | **45** | Local traffic to and from pier. Traffic from Newcombe. Minor activity noise from general town centre hum. |
| S4 | 14/11/2025 12:40 | 49 | **42** | Intermittent traffic noise. Seems quieter than morning. |
| S2 | 14/11/2025 12:52 | 53 | **44** | Intermittent local traffic and distant from Newcombe. Minor activity noise from general town centre hum. |
| S2 | 14/11/2025 13:53 | 49 | **42** | As above |
| S4 | 14/11/2025 14:06 | 56 | **46** | Some plant noise and low level music from restaurant. Similar traffic as earlier samples. |

Source: ACS

# Appendix D Planning Maps






Source: VICDATA (https://discover.data.vic.gov.au/dataset/major-urban-area-location-polygons-and-table) / ACS


Source: VICPLAN (https://mapshare.vic.gov.au/) / ACS

# Appendix E Noise Limits Derivation

## E.1 Noise Protocol Part I – Commercial, Industrial and Trade Premises – Rural Area Method

The objective The Regulations Division 3 is to protect sensitive areas from noise emitted as a result of the business operations conducted from commercial premises (such as mechanical plant and any other fixed infrastructure in the proposal), but explicitly excludes contributions made from music, voices, noise from crowds and sporting events.

As noted in Section 2.1, the site is understood to be outside of a "major urban area" for the purpose of the Noise Protocol and, as such, the noise limits for the development are to be set using the "rural method".

The project area planning maps showing zoning for the area is presented in Appendix D. The project site is bound by the following land uses and designated types in the Noise Protocol:

- C1Z: Commercial.
- RGZ: Residential growth.
- PPRZ: Public park and recreation.
- TRZ2: Principal road network

Under the requirements of the Noise Protocol Part I, the noise limit at noise sensitive receiver positions as per the "Rural Area" method is determined by:

- The zone levels for each of the day, evening and night periods using Annex B of the Noise Protocol and the land uses listed above.
- Adjusting those zone levels, as required, by accounting for the distance between the zones as per Clause 20 of the Noise Protocol.
- Where a background and ambient noise levels survey has been conducted, calculate the noise limits following the instructions of Sections 2.4 and 2.5 of the Noise Protocol.

Furthermore, different criteria apply according to three time periods, namely, day, evening and night, which are defined as follows in relation to noise emitted from commercial, industrial and trade premises.

**Table 13 Time periods as defined in The Regulations (Regulation 116)**

| Period | Day of week | Time Period |
|---|---|---|
| Day | Monday to Saturday | 7am to 6pm |
| Evening | Monday to Saturday | 6pm to 10pm |
| | Sunday and Public Holidays | 7am to 10pm |
| Night | Monday to Sunday | 10pm to 7am |

Derivation of the noise limits is presented in Table 14 in the next section.

### Residential/Educational Receivers – General Noise Limits

Table 14 below shows the applicable noise limits for general plant, calculated in accordance with the relevant method specified by the Noise Protocol, at the closest affected sensitive receivers around the site as follows:

- Residential receivers
- Educational receivers surrounding the site with learning rooms within, namely, Portarlington Preschool

Due to the zoning levels and noise survey data obtained on site, it is concluded that noise limits are to be set for:

- Residential/educational receivers facing Newcombe St (namely R1 and R3 in this report)

- Residential receivers away from Newcombe St (namely R2 in this report)

As per Regulation 118 (2)b, noise limits cannot be set:

- Below the base noise limits for rural areas of 45dB(A) at daytime, 37dB(A) evening and 32 dB(A) night-time
- Above 55dB(A) at night-time.

Compliance with the limits in Table 14 at the closest residential/educational receivers to the site would imply compliance at all other sensitive receivers around the site.

**Table 14 Calculation of noise limits at most-affected residential/educational receivers – General plant**

| Period | Calculation | R1 & R3 | R2 |
|---|---|---|---|
| Day | Measured background, $L_{A90}$ | 44 | 42 |
| | Zoning Level | 50 | 47 |
| | **General Plant Noise Limit, $dBL_{Aeq,30min}$** | **52** | **50** |
| Evening | Measured background, $L_{A90}$ | 34 | 36 |
| | Zoning Level | 45 | 42 |
| | **General Plant Noise Limit, $dBL_{Aeq,30min}$** | **45** | **42** |
| Night | Measured background, $L_{A90}$ | 25 | 28 |
| | Zoning Level | 40 | 37 |
| | **General Plant Noise Limit, $dBL_{Aeq,30min}$** | **40** | **37** |

### Non-residential Receivers - Recreational

The Noise Protocol does not classify public open spaces as “noise sensitive areas.” In the absence of EPA Victoria recommendations, the NPI provides amenity noise targets for recreational areas, depending on their typical usage:

- Passive Recreation (e.g. national park) - 50 $dBL_{Aeq}$ (external)
- Active recreation (e.g. playground, golf course) - 55 $dBL_{Aeq}$ (external)

From site observations, ACS understands that the use of the recreational areas around the proposed development aligns more closely with “active recreation” as defined in the NPI (e.g. bowls club, playground). However, it is proposed that project-related noise emissions be managed to remain within the aspirational target outlined in the NPI for passive recreation areas (i.e. ~ 50$dB_{LAeq}$) as that level is consistent with current ambient noise levels measured in the vicinity of recreational areas to the north of the proposal (refer to Ambient Noise Levels presented in Table 12 in Appendix C for location S4 during the daytime.

## E.2 Sleep Disturbance

As part of a screening-level risk assessment within the GED framework, the NSW NPI has been considered in regard to sleep disturbance. Based on current research, the NPI provides guidance on the assessment of sleep disturbance based on the predicted event $L_{Aeq,15min}$ and/or $L_{AFmax}$ noise levels at the receiver that are considered applicable to the Project. It suggests the sleep disturbance screening criteria listed below, which applies at receiver boundary closest to bedroom windows and during the night-time period.

- Event $L_{Aeq,15min}$ 40dBA or Night-time RBL[6]+ 5dB, whichever is the greater, and/or
- Event $L_{AFmax}$ 52dBA or Night-time RBL[3] + 15dB, whichever is the greater.

If the sleep disturbance screening criteria is exceeded, then further assessment of sleep disturbance effects is warranted with a detailed analysis to cover the extent to which the noise level exceeds the background level and the number of times this happens during the night-time period.

Some guidance on possible impact is contained in the review of research results in the NSW EPA Road Noise Policy (RNP) 2011. Other factors that may be important in assessing the extent of impacts on sleep include:

- How often will high noise events occur.
- Time of day (normally between 10pm and 7am).
- Whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods).

A further consideration for sleep awakening is whether the environmental noise has changed. Section 5.3 "Response to a Change in Noise Level" of the RNP states:

*"While people may express a certain tolerance for their existing noise environment, they may feel strongly about increases in noise. [...] The difference in reported awakenings from sleep was equivalent to a difference of 7dBA in maximum noise levels."*

Section 5.4 of the RNP, "Sleep Disturbance", states that *"From the research on sleep disturbance to date it can be concluded that:*

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

So, the internal noise levels provided in the RNP are related to potential sleep awakening.

Typically noise impact assessments consider the worst-case scenario, including when residential receivers have windows open sufficiently to provide natural ventilation. This would result in approximately 10dB attenuation from outside to inside through the open window. This situation is considered likely during warmer seasons. When windows are closed, the likely sound attenuation through standard windows with poor seals (common in older houses) is approximately 20dB.

Based on a minimum attenuation of 10dB with windows open, conclusions from the RNP (as per extract from RNP Section 5.4 above) are:

- Short term external noises of 60 to 65dBA are unlikely to cause awakening reactions.

External levels of 75 to 80dBA are unlikely to affect health and wellbeing significantly, provided that these events occur no more than twice in one night.

[6] Rating Background Level as per NSW NPI. For the purpose of this assessment it is assumed to be approximately equivalent to Background Noise used in this assessment for the purpose of the Noise Protocol Part I

ACOUSTIC STUDIO



**Address** Level 1, 83 William Street,
Melbourne VIC 3000 Australia

**Phone** +61 2 9557 6421

**Email** mail@acousticstudio.com.au