Cogent Acoustics

313-317 Kings Way, South Melbourne

Acoustic Engineering Report

313-317 Kings Way, South Melbourne

Acoustic Engineering Report

Prepared for:

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Revision History

Rev.	Date	Purpose	Prepared by:	Reviewed by:
0	16/08/2021	Not for construction	Alex Horng	Irena Peoples
1	19/08/2021	Updated Architectural Drawings	Alex Horng	Irena Peoples
2	20/08/2021	Updated Basement Plans	Alex Horng	Irena Peoples
3	19/07/2022	Added External Noise Intrusion	Alex Horng	Irena Peoples

Executive Summary

Neoscape has appointed Cogent Acoustics Pty Ltd to provide acoustic engineering consulting services associated with the proposed commercial development at 313-317 Kings Way, South Melbourne.

Advice in relation to the following acoustic engineering elements has been requested, and is presented in this report:

Table 1 Acoustic Engineering Elements and Reference Criteria

Acoustic Engineering Element	Reference Criteria
External noise ingress via building facade and roof	▪ AS/NZS 2107:2016
Environmental noise emissions due to mechanical plant serving common areas and commercial parts of the building.	▪ Environment Protection Regulations 2021 ▪ EPA Publication 1826

A review of the above elements has been undertaken and it is considered that the building design will satisfy the reference criteria with inclusion of the following acoustic engineering measures:

Table 2 Recommended Acoustic Engineering Measures

System	Acoustic Engineering Measure
External Facade / Glazing	▪ Based on the adopted external noise levels and the baseline building construction, it is considered that acoustic mitigation measures will be required for certain areas of the external glazing. ▪ Recommended external glazing requirements in order to satisfy the internal noise level criteria are presented in Section 7.4, along with indicative glazing configurations that would be expected to meet the acoustic performance recommendations. ▪ Framing must be specified to match the required acoustic rating of the glazing. ▪ Openable windows and doors must include rubber or dense foam acoustic seals e.g. Schlegel Q-Lon or equivalent.
Roof	▪ The roof is understood to be comprised of a concrete slab with a minimum thickness of 200 mm. ▪ This construction is considered to be acoustically sufficient to achieve the target internal noise levels.
Car Park Entrance Door	The car park entrance door should incorporate: ▪ A soft start motor with a Sound Power Level no greater than 74 dB(A) ▪ Rubber sealing strip / bump stop at base of gate / door (or at the end of the gate's travel in the case of a sliding gate) to prevent noise due to hard contact on closure of the door / gate;

System	Acoustic Engineering Measure
	▪ A guiderail system designed for smooth operation; ▪ The door should be installed and adjusted so as not to impact rigid surfaces at the ends of its travel. ▪ The gate / door frame, guiderails, and motor should be isolated from the building using rubber vibration isolation mounts or pads. ▪ Refer to Section 8 for further details.
Car Stacker System	▪ Noise emissions due to operation of the proposed car stacker system are calculated to comply with the EPA Noise Protocol noise limits, and the WHO Sleep Disturbance Guidelines, subject to the system having a Sound Power Level of no greater than 74 dB(A) L_{Aeq} and 85 dB(A) L_{AFmax}. ▪ Refer to Section 9 for further details.
Air-Conditioning Condenser Units	▪ Noise due to the air-conditioning condenser units is expected to comply with EPA Noise Protocol noise limits, provided that the units in each floor's condenser room have a combined Sound Power Level no greater than 70 dB(A) each. ▪ It is recommended that further acoustic review to confirm compliance with EPA Noise Protocol noise limits should be undertaken at the design stage if any of the following occurs: – If the selected air-conditioning condenser units in each floor's condenser room have a combined Sound Power Level greater than 70 dB(A) each. – If the air-conditioning condenser units are to be installed at any location other than the proposed location shown in Figure 7. ▪ Refer to Section 10 for further details.
Noise from Commercial Tenancy Mechanical Equipment	▪ If any mechanical plant is to be installed to serve commercial tenancies (e.g. the ground floor coffee point), it will be the responsibility of the commercial tenant to ensure that the plant achieves compliance with the EPA Noise Protocol noise limits. ▪ Refer to Section 11 for further details.

System	Acoustic Engineering Measure
Background Music Noise	▪ Based on the background noise levels measured at the site, it is considered that general background music played within the ground floor coffee point and lift lobby will not impact nearby noise sensitive areas. ▪ It is recommended that a detailed acoustic assessment be undertaken in accordance with the EPA Noise Protocol if it is proposed to: – Play music at higher levels than would be considered general background / ambience music for a cafe; or – Host live music entertainment; or – Include outdoor / footpath dining; or – Broadcast music to outdoor areas. ▪ Refer to Section 12 for further details.

Contents

1 Introduction

1.1 Purpose

Neoscape has appointed Cogent Acoustics Pty Ltd to provide acoustic engineering consulting services in relation to the proposed commercial development at 313-317 Kings Way, South Melbourne.

This report has been prepared for the purpose of informing a Planning Permit Application to Council.

The scope of this report comprises:

- Review of existing environmental noise levels at the site and provision of advice on noise attenuation measures to protect future occupants from external noise.
- Assessment of noise due to proposed mechanical plant and relevant operational activities in relation to the statutory requirements of *EPA Publication 1826 – Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues* (EPA Noise Protocol) (EPA Victoria, 2021)
- Consideration of the potential for sleep disturbance due to operational noise.

A glossary of the acoustic nomenclature used in this report is presented in Appendix A.

1.2 Reference Documentation

This report is based on information contained in the following documents and drawings:

Table 3 Reference Documentation

Document	Prepared by	Issue
Town Planning Architectural Drawings; Project No. 21035, Drawing Nos. A0096(C) to A0100(C), A0100M(C), A0101(C), A0105(A), A0106(A), A0111(A) to A0113(A), A0118(C), A0119(C)	Elenberg Fraser	13/07/2022

1.3 Report Limitations

The following limitations are applicable with respect to the acoustic advice presented in this report:

- Cogent Acoustics has prepared this document for the sole use of the Client and for the specific purpose expressly stated in the document. No other party should rely on this document without the prior written consent of Cogent Acoustics. Cogent Acoustics undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document.

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- Subject to the above conditions, this document may be transmitted, reproduced or disseminated only in its entirety.

2 Project Characteristics

2.1 Site Location

The project site is located at 313-317 Kings Way, South Melbourne, as shown in Figure 1.

Figure 1 Aerial Image of Site (Aerial Photo Source: Google Maps)

2.2 Proposed Project

The project is understood to comprise a 19-storey office tower with a ground floor lobby and meeting room plus four basement levels with a car lift and car stacker. Figure 2 shows the proposed site plan. The proposed floor plans are presented in Appendix B.

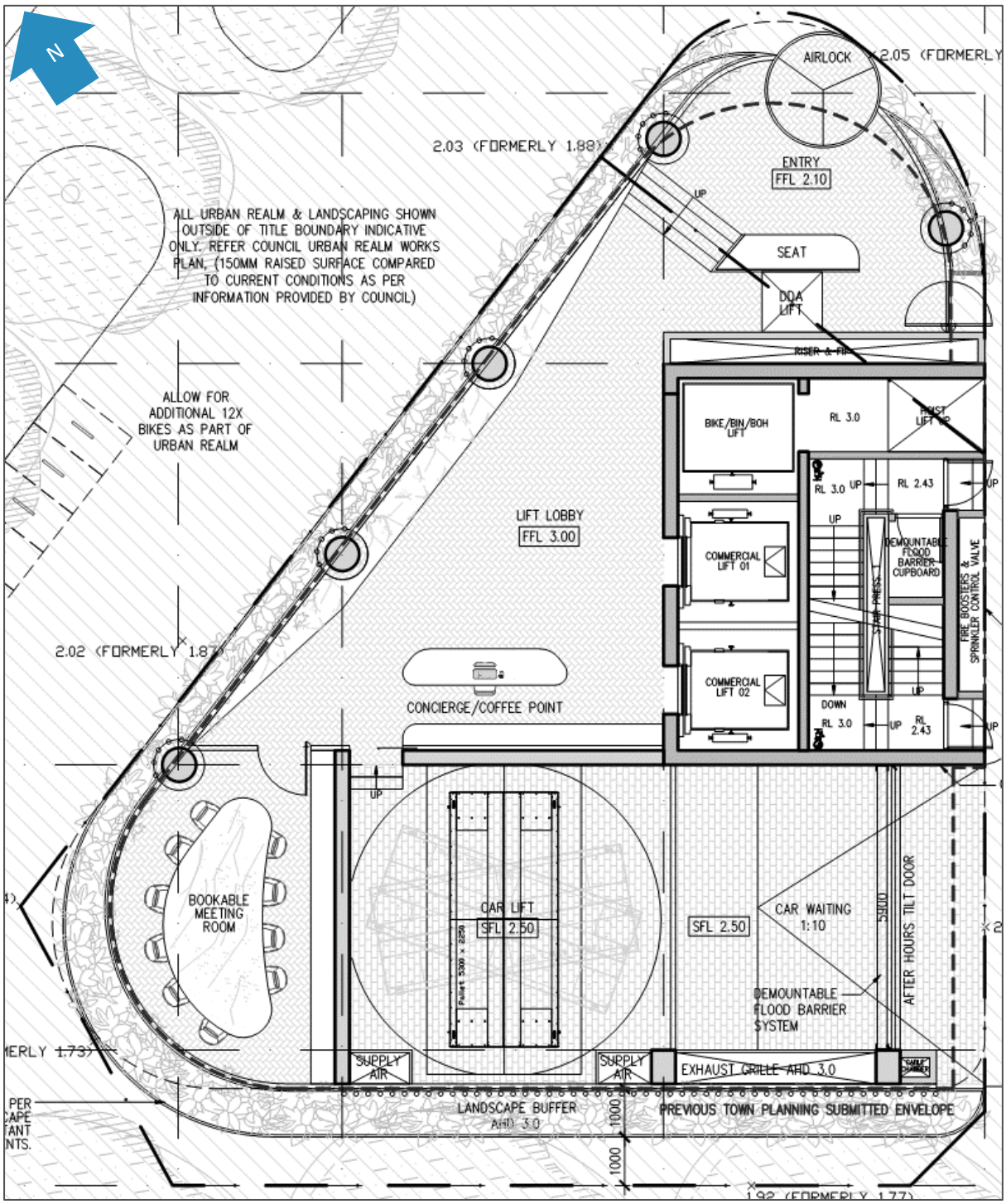


Figure 2 Proposed Site Plan (Image Source: Elenberg Fraser)

3 Legislation and Guidelines

3.1 Summary of Relevant Documents

Table 4 presents a summary of the relevant legislation and guidelines applicable to the proposed development. Further details in relation each document are presented in the subsequent subsections.

Table 4 Summary of Relevant Statutory Requirements and Guidelines

Document	Status	Relevance to this Project
Environment Protection Regulations 2021 (EPRs) (State of Victoria, 2021)	Legislation	Defines unreasonable or aggravated noise from commercial, industrial and trade premises, as well as from entertainment venues and outdoor entertainment events.
EPA Publication 1826 – Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues (EPA Noise Protocol) (EPA Victoria, 2021)	Legislation	Prescribes the methods for determining the statutory environmental noise limits that apply to noise emissions from industrial, commercial, and trade premises within Victoria, and the methods to be used for assessment. Mechanical plant noise emissions due to the development will be subject to the requirements of the EPA Noise Protocol.
AS/NZS 2107:2016 Acoustics – Design Sound Levels and Reverberation Times for Building Interiors (Standards Australia, 2016)	Guideline	The guidance provided is relevant to the development in respect of noise intrusion from external sources.
World Health Organization Guidelines for Community Noise (WHO Guidelines) (World Health Organization, 1999)	Guideline	Provides guidance on noise levels for different types of spaces. The guidance provided is relevant with respect to potential sleep disturbance due operation of the car stackers.

3.2 Environment Protection Regulations 2021

Noise emissions from residential premises, and from commercial, industrial and trade premises, and from entertainment venues, must comply with the *Environment Protection Regulations 2021* (EPRs) (State of Victoria, 2021).

The EPRs prescribe the time periods, relevant noise sources, base noise limits, and specify the noise levels above which noise emitted is defined as 'Aggravated Noise'.

For the purpose of assessing noise emissions in relation to the requirements of the EPRs, prediction, measurement, and assessment of noise from commercial, industrial and trade premises, and from entertainment venues, must be conducted in accordance with *EPA Publication 1826 – Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues* (EPA Noise Protocol) (EPA Victoria, 2021).

3.3 EPA Publication 1826 – Noise Protocol Part I

Part I of *EPA Publication 1826 – Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues* (EPA Noise Protocol) (EPA Victoria, 2021) prescribes the procedures used to determine limits for, and assess, environmental noise emissions from sources such as mechanical equipment and activities associated with commercial, industrial or trade operations.

The limits prescribed by the EPA Noise Protocol apply at or within Noise Sensitive Areas, such as residential dwellings, as defined in Appendix A.

The limits are dependent on a number of factors including:

- The time of day at which the noise emissions occur;
- The planning zone types in the area of the Noise Sensitive Area; and
- The background noise levels at the Noise Sensitive Area.

In accordance with the EPA Noise Protocol, noise emissions from the source under consideration are measured so as to obtain an L_{Aeq} Sound Pressure Level that is representative of the audible noise at the Noise Sensitive Area over a continuous 30-minute period. Adjustments to the measured level are applied where necessary to account for characteristics such as duration, intermittency, reflections, impulsiveness, tonality, and measurement location. The adjusted noise level is termed the Effective Noise Level, and it is the Effective Noise Level that is assessed in relation to the noise limits.

4 Noise Sensitive Areas

Table 5 and Figure 3 identify the nearest and potentially most-affected Noise Sensitive Areas (NSAs) in the vicinity of the project site, as defined by the relevant environmental noise legislation.

Assessment of environmental noise emissions due to the project will be undertaken at these locations. It is expected that compliance with the environmental noise criteria at these locations will also result in compliance at all other nearby NSAs.

Table 5 Details of Potentially Most-Affected Noise Sensitive Areas (NSAs)

NSA Ref.	Address	No. Storeys	NSA Type	Notes
1	1-13 Cobden Street, South Melbourne	19	Residential	Future Building
2	14 Kings Place, South Melbourne	3	Residential	Existing Dwelling

Figure 3 Locations of Potentially Most-Affected Noise Sensitive Areas (NSAs) (Aerial Photo Source: Google Maps)

5 Existing Acoustic Conditions

5.1 Exterior Soundscape

The existing soundscape in the vicinity of the site and potentially most-affected Noise Sensitive Areas is dominated by noise due to road traffic travelling along Kings Way.

5.2 Background Noise Levels

Environmental noise logging was performed at the site to establish the background noise levels. The measurements were performed at a location near the southern corner of the site between 31 July and 5 August 2021. Details of the measurement location and measurement methodology are presented in Appendix C.

The background noise levels at the selected noise logging location are considered to be representative of the background noise levels at NSA 1. Attended noise measurements have determined that background noise levels were approximately 5 dB lower at NSA 2.

Table 6 presents a summary of the measured background noise levels, as determined in accordance with the procedures given by the EPA Noise Protocol. Graphs showing the variation of background noise level over the full measurement period are presented in Appendix D.

Table 6 Background Noise Levels

Period	Applicable Times	L_{A90} Background Noise Level, dB(A)
Day	▪ 7am to 6pm Monday to Friday ▪ 7am to 1pm Saturday	62
Evening	▪ 6pm to 10pm Monday to Friday ▪ 1pm to 10pm Saturdays ▪ 7am to 10pm Sundays and Public Holidays	57
Night	▪ 10pm to 7am All Days	58

5.3 Road Traffic Noise Levels

Data from the background noise logging described in Section 5.2 was also used to establish the road traffic noise levels at the site.

Table 7 presents a summary of the measured Sound Pressure Levels. Graphs showing the variation of the Sound Pressure Level over the full measurement period are presented in Appendix D.

Only external noise levels between 8 am and 6 pm Monday to Friday have been considered as part of this assessment as these are the times when the proposed building is likely to be occupied.

Table 7 Measured Ambient Sound Pressure Levels – Location 1

Date	Measured Sound Pressure Level, dB(A) Day Period (8 am to 6 pm)	
	Full Period $L_{Aeq,\ 10hr}$	Highest Hour $L_{Aeq,\ 1hr}$
Saturday, 31 July 2021	73*#	73#
Sunday, 01 August 2021	74#	74#
Monday, 02 August 2021	74	75
Tuesday, 03 August 2021	74	76
Wednesday, 04 August 2021	74	75
Adopted Design Sound Level	**74**	**76**

*Partial measurement period: 11:30 am to 6:00 pm only.

#Measurements from this period have been excluded as they fell on a weekend.

6 Assessment Criteria

6.1 Internal Noise Levels

The design of the proposed office spaces will target the internal noise level criteria presented in Table 8, which are based on the recommendations of Australian Standard *AS/NZS 2107:2016 Acoustics – Design Sound Levels and Reverberation Times for Building Interiors* (Standards Australia, 2016).

Table 8 Internal Noise Level Criteria

Type of Occupancy / Activity	Design Internal Noise Levels, $L_{Aeq,10hr}$, dB(A) During Office Hours (8 am to 6 pm)
Meeting Room or Open Plan Office	40 to 45
Lift Lobby	45 to 50

6.2 EPA Noise Protocol

The noise limits presented in Table 9 have been determined to apply at the potentially most affected Noise Sensitive Areas in accordance with the EPA Noise Protocol. Details of the Zoning Level and noise limit calculations are presented in Appendix E.

Table 9 EPA Noise Protocol Noise Limits

Period	Applicable Times	Noise Limit, L_{eff}, dB(A)	
		NSA 1	NSA 2
Day	▪ 7am to 6pm Monday to Saturday	68	63
Evening	▪ 6pm to 10pm Monday to Saturday ▪ 7am to 10pm Sundays and Public Holidays	60	55
Night	▪ 10pm to 7am All Days	55	55

6.3 Sleep Disturbance – World Health Organization Guidelines

Sleep disturbance is commonly related to short term maximum noise levels due to individual noise events rather than overall (L_{Aeq}) noise levels as assessed by the EPA Noise Protocol.

In consideration of the above, guidance from The World Health Organization Guidelines for Community Noise (World Health Organization, 1999) has been used in determining appropriate internal noise levels to avoid sleep disturbance. The WHO Guidelines recommend the maximum noise levels shown in Table 10 to avoid sleep disturbance:

Table 10 L_{AFmax} Recommended Maximum Noise Levels

Environment	Recommended Maximum Sound Level, L_{AFmax}, dB(A)
Outside Bedrooms (Outdoors) – Night-Time (10 pm to 7 am)	≤ 60
Inside Bedrooms – Night-Time (10 pm to 7 am)	≤ 45

7 External Noise Intrusion

7.1 Adopted External Noise Levels

Table 11 presents the external noise levels that will be adopted at the proposed facades for the purpose of the external noise intrusion assessment. These have been calculated based on the results of noise measurements conducted in the vicinity of the site, and adjusted for distance of the proposed facades from the noise source.

Table 11 Adopted External Noise Levels

Facade	Floor Levels	Adopted External Noise Levels, dB(A) During Office Hours (8 am to 6 pm)	
		Full Period $L_{Aeq,\ 10hr}$	Highest Hour $L_{Aeq,\ 1hr}$
South and South West	Ground Level to Level 4	74	76
	Level 5	68	70
	Level 6 to Level 11	67	69
	Level 12 to Level 17	64	66
North	Ground Level to Level 4	70	72
	Level 5	64	66
	Level 6 to Level 11	63	65
	Level 12 to Level 17	60	62
North East	Ground Level to Level 4	67	69
	Level 5	61	63
	Level 6 to Level 11	60	62
	Level 12 to Level 17	57	59

Figure 4 presents the facade naming conventions that are referred to in Table 11 above.

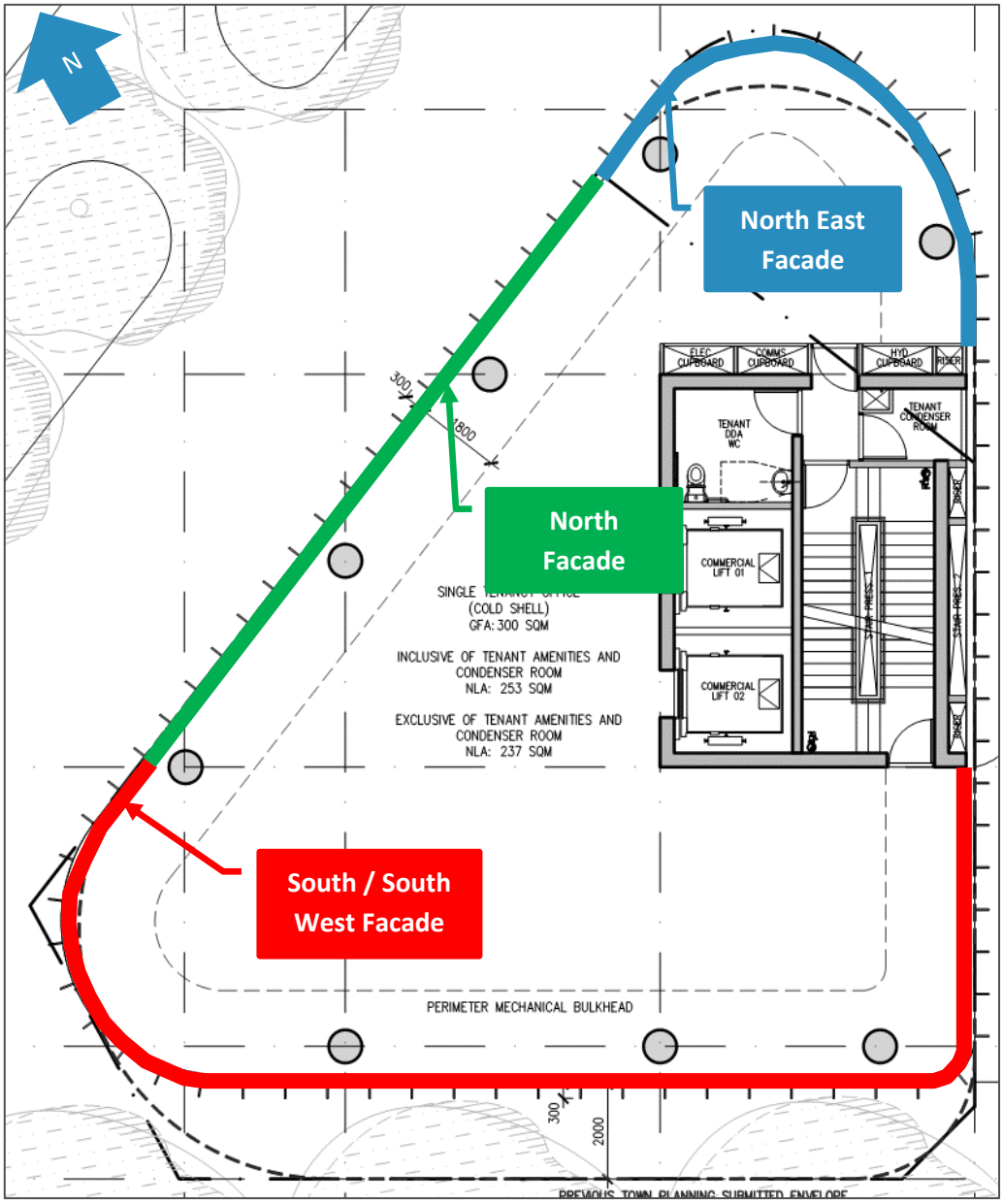


Figure 4 Facade Naming Conventions (Image Source: Elenberg Fraser)

7.2 Review of Baseline Building Design

Calculations of internal noise levels for the baseline design (i.e. without noise mitigation) have been conducted based on the building being constructed as detailed in Table 12. Room dimensions and areas of each facade material have been taken to be as per the reference drawings.

Table 12 Adopted Baseline Construction Parameters

Facade Element	Adopted Baseline Construction Parameters
External Facade	The external facade of the building is understood to be comprised entirely of glazing (i.e. curtain wall). Noise ingress calculations for the documented design (i.e. without noise mitigation) have been based on the curtain wall glazing having a minimum sound insulation rating of $R_w \geq 32$and $R_w + C_{tr} \geq 28$ such as: ▪ 6 mm thick single glazing; or ▪ Double glazing units comprising 6 mm glass + 12 mm air gap + 6 mm glass. Framing has been selected to match the minimum sound insulation rating. Where openable glazing is proposed, rubber acoustic seals are installed to the full perimeter of the glazing frame.
Roof	The roof above the top floor office area is understood to be comprised of a concrete slab, with a minimum thickness of 200 mm.

7.3 Calculated Internal Noise Levels – Baseline Construction

Table 13 presents the results of internal noise level calculations based on the adopted design external noise levels and the baseline building design.

Table 13 Calculated Internal Noise Levels with Recommended Design

Space	Calculated Internal Noise Levels, dB(A), and Compliance Status	
Design Criteria for Office Spaces	**$L_{Aeq,10hr} \leq 45$**	**Highest Hour $L_{Aeq,1hr} \leq 45$**
Meeting Room (Ground Floor)	49 ✗	51 ✗
Office Level 1 to Level 4	46 ✗	48 ✗
Office Level 5	40 ✓	42 ✓
Office Level 6 to Level 10	39 ✓	41 ✓
Office Level 11 to Level 12	38 ✓	40 ✓
Office Level 13 to Level 17	38 ✓	40 ✓
Design Criteria for Lobby	**$L_{Aeq,10hr} \leq 50$**	**Highest Hour $L_{Aeq,1hr} \leq 50$**
Ground Floor Lobby	43 ✓	45 ✓

7.4 Recommended External Glazing

Recommended curtain wall glazing specifications in order to satisfy the internal noise level criteria are presented in Figure 5 and Figure 6. For areas of curtain wall not highlighted in the following figures, construction according to the design details presented in Section 7.2 is acoustically acceptable.

Indicative glazing configurations that would be expected to meet the acoustic performance requirements are presented in Table 14.

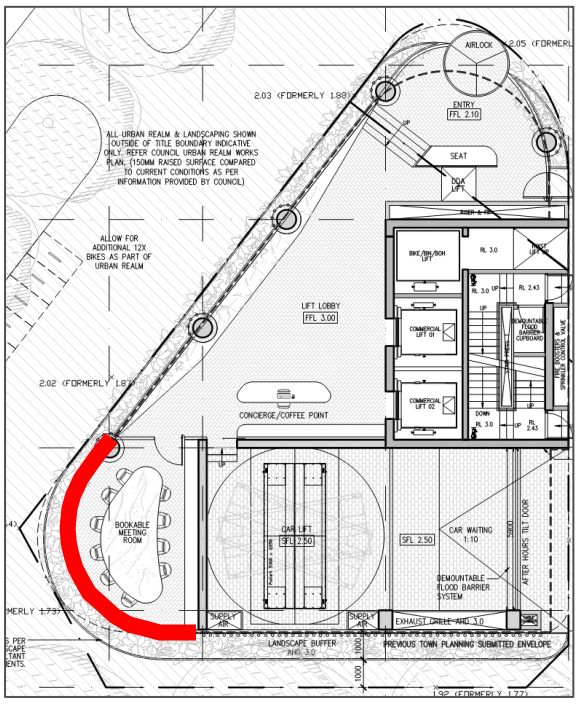


Figure 5 External Glazing Recommendations – Ground and Mezzanine Level (Image Source: Elenberg Fraser)

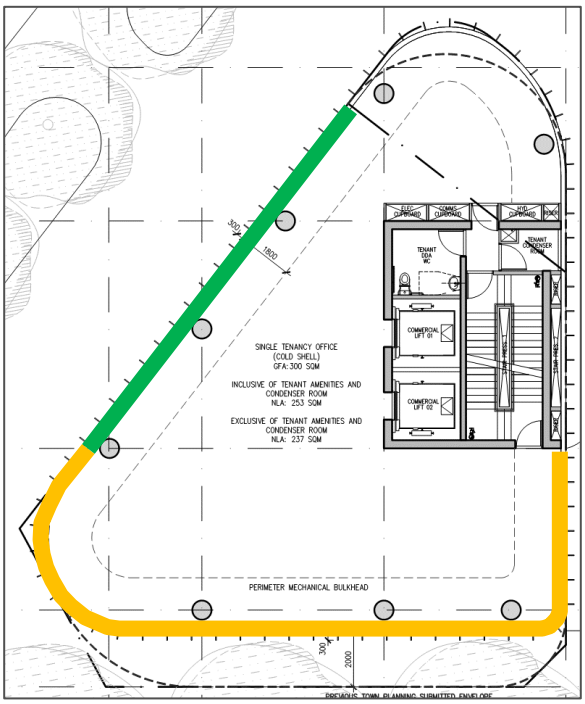


Figure 6 External Glazing Recommendations – Level 1 to Level 4 (Image Source: Elenberg Fraser)

Table 14 Required Sound Insulation Ratings and Indicative Glazing Constructions

Glazing Type	Minimum Required Sound Insulation Rating	Example Acceptable Glazing Configurations
	$R_w \geq 40$ and $R_w + C_{tr} \geq 35$	▪ Single glazing comprised of 12.5 mm thick VLam Hush glass. ▪ Double-glazed system comprised of 10 mm thick glass with a 12 mm air gap and 6.38 mm thick laminated glass.
	$R_w \geq 36$ and $R_w + C_{tr} \geq 31$	▪ Single glazing comprised of 8.38 mm thick glass laminated glass. ▪ Double-glazed system comprised of 10 mm thick glass with a 12 mm air gap and 4 mm thick glass.
	$R_w \geq 34$ and $R_w + C_{tr} \geq 30$	▪ Single glazing comprised of 6.38 mm thick laminated glass. ▪ Double-glazed system comprised of 6 mm thick glass with a 12 mm air gap and 6.38 mm thick laminated glass.
Un-Marked	$R_w \geq 32$ and $R_w + C_{tr} \geq 28$	▪ Single glazing comprised of 6 mm thick glass. ▪ Double-glazed system comprised of 6 mm thick glass with a 12 mm air gap and 6 mm thick glass.

Framing must be specified to match the required acoustic rating of the glazing. Openable windows and doors must include rubber or dense foam acoustic seals e.g. Schlegel Q-Lon or equivalent.

7.5 Calculated Internal Noise Levels – With Noise Mitigation Measures

Table 15 presents the results of internal noise level calculations with the recommended noise mitigation measures implemented. Only areas which did not meet the acoustic criteria when modelled under the baseline design scenario have been recalculated.

Table 15 Calculated Internal Noise Levels with Noise Mitigation Measures

Space	Calculated Internal Noise Levels, dB(A), and Compliance Status	
Design Criteria for Office Spaces	**$L_{Aeq,10hr}$ ≤ 45**	**Highest Hour $L_{Aeq,1hr}$ ≤ 45**
Meeting Room (Ground Floor)	41 ✓	43 ✓
Office Level 1 to Level 4	42 ✓	44 ✓

8 Review of Noise due to Car Park Entrance Door

Acoustic details of the car park entrance door were not available at the time of writing this report.

To control noise due to the car park entrance door to an acceptable level it is recommended that the car park entrance door should incorporate the following design features:

- A soft start motor with a Sound Power Level no greater than 74 dB(A);
- Rubber sealing strip / bump stops to prevent metal-on-metal contact at the limits of closure / opening;
- A guiderail system specifically designed for smooth operation;
- Where the door frame, guiderails and door motor are mounted to the building structure or floor slab, they should be isolated from the building structure using rubber vibration isolation mounts or pads with a static deflection of nominally 5 mm (e.g. Embelton NR series isolators) installed at all support points;
- The door should be installed and adjusted so as not to impact rigid surfaces at the ends of its travel.

9 Review of Noise due to Car Stacker System

9.1 Documented Design

It is understood that the proposed car stacker system is to be a Wohr Parksafe 580, which will provide both vertical and horizontal movement of platforms. The motor group is understood to be recessed 400 mm into the ground floor slab on vibration isolated mounts.

Wohr does not specify the Sound Power Level of this car stacker system, however it is considered that noise measurements of the Klaus Trendvario 4300 car stacker previously conducted by Cogent Acoustics, will be representative of typical operational noise due to movement of the car platforms. These measurements were conducted over multiple stacking cycles and found the motor group to generate typical Sound Power Levels of 74 dB(A) (L_{Aeq}), and the platforms to generate a typical maximum Sound Power Level of 85 dB(A) (L_{AFmax}).

The technical datasheet for the proposed Wohr Parksafe 580 is presented in Appendix F.

9.2 Noise Emissions Calculation Parameters

Noise levels at the potentially most-affected NSAs have been calculated based on the following parameters:

- The car stacker system has a maximum Sound Power Level of 74 dB(A) (L_{Aeq}) and 85 dB(A) (L_{AFmax}).
- Concrete walls, floor and ceiling to the car park resulting in a reverberation time approximately 1.5 to 2 seconds in the car park.
- The key path of noise transmission from the car stacker to outside will be via the entry located on the south east side of the building.
- The distance from the car park entrance to NSA 1 and NSA 2 is 13 m and 40 m, respectively.
- Calculations have been based conservatively on the car stacker system operating continuously for all periods.
- Each car stacker cycle is taken to comprise two-minute duration from start to finish.

Noise due to operation of the measured car stacker was noted to exhibit tonal characteristics arising from operation of the hydraulic power unit. As such a tonality adjustment of +5 dB(A) has been applied to the calculated noise levels in accordance with the procedures of the EPA Noise Protocol, to determine the 'Effective Noise Levels' to be assessed against the assessment criteria.

As the L_{AFmax} Sound Pressure Levels will be assessed against the WHO Guidelines, and are due to movement of the platform (which is not tonal), no adjustment to the L_{AFmax} levels has been applied.

9.3 Calculated Airborne Noise Levels

9.3.1 L_{Aeq} Sound Pressure Levels at Nearby Residences

Table 16 summarises the calculated effective noise levels, and assesses the noise levels in relation to the EPA Noise Protocol noise limits. The presented L_{eff} noise levels include the tonality adjustment that has been applied.

Table 16 Calculated Car Stacker Noise Levels (Outdoors) – L_{Aeq}, dB(A)

Receiver	Period	Calculated L_{Aeq} Sound Pressure Level at NSA, dB(A)	Tonality Adjustment, dB(A)	Effective Sound Pressure Level, L_{eff}, at NSA dB(A)	EPA Noise Limits, dB(A)	Compliance Status
NSA 1	Day	45	+5	50	68	✓
	Evening	45	+5	50	60	✓
	Night	45	+5	50	55	✓
NSA 2	Day	35	+5	40	63	✓
	Evening	35	+5	40	55	✓
	Night	35	+5	40	55	✓

The results above demonstrate that airborne noise levels due to the car stacker system in standard specification (without acoustic treatment to reduce airborne noise) are expected to comply with the adopted criteria.

9.3.2 L_{AFmax} Sound Pressure Levels at Nearby Residences

Table 17 presents the calculated L_{AFmax} noise levels, assessed in relation to the established sleep disturbance criteria.

Table 17 Calculated Car Stacker Noise Levels (Outdoors) – L_{AFmax}, dB(A)

Receiver	Period	Calculated L_{AFmax} Sound Pressure Level, dB(A)	L_{AFmax} Noise Criterion, dB(A)	Compliance Status
NSA 1	Night	58	60	✓
NSA 2	Night	48	60	✓

The results presented above demonstrate that the outdoor L_{AFmax} noise levels at nearby residences due to operation of the car stacker are expected to comply with the sleep disturbance criterion.

10 Review of Noise due to Air-Conditioning Condenser Units

10.1 Calculation Parameters

It is understood that air-conditioning condenser units for each floor will be located in a condenser room on the south east side of the building, as shown in Figure 7 below. Calculations have been based on the air-conditioning condenser units in each level's condenser room having a combined Sound Power Level of no more than 70 dB(A) (typical of a commercial air-conditioning condenser unit). A tonality adjustment of +2 dB has been applied in accordance with the procedures of the EPA Noise Protocol.

In order to yield a conservative calculation result, the condenser units have been assumed to be running for 100% of both the 'Day' and 'Evening' period.

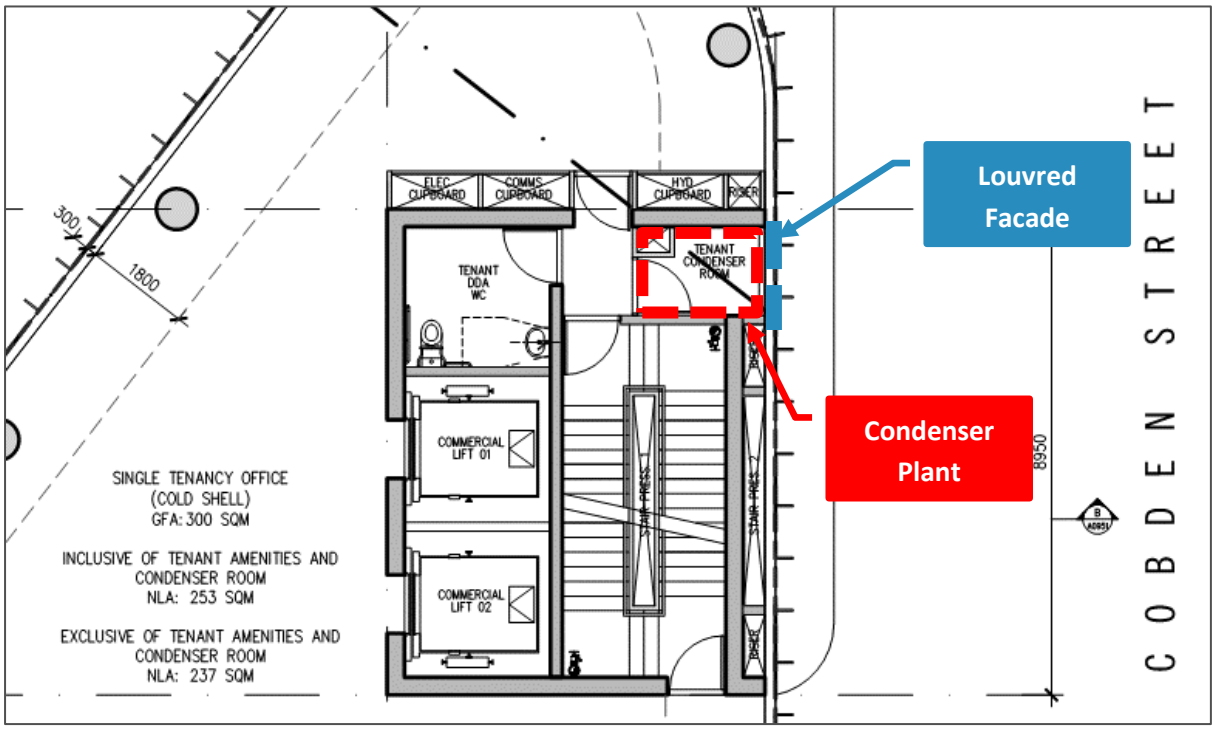


Figure 7 Proposed Air-Conditioning Condenser Unit Locations – Mezzanine to Level 17

10.2 Calculated Airborne Noise Levels

Table 18 summarises the calculated effective noise levels, and assesses the noise levels in relation to the EPA Noise Protocol noise limits.

Table 18 Calculated Air-Conditioner Condenser Unit Noise Levels (Outdoors) – L_{Aeq}, dB(A)

Receiver	Period	Calculated L_{Aeq} Sound Pressure Level at NSA, dB(A)	Tonality Adjustment, dB(A)	Effective Sound Pressure Level, L_{eff}, at NSA dB(A)	EPA Noise Limits, dB(A)	Compliance Status
NSA 1	Day	52	+2	54	68	✓
	Evening	52	+2	54	60	✓
NSA 2	Day	42	+2	44	63	✓
	Evening	42	+2	44	55	✓

The results above demonstrate that airborne noise levels due to the air-conditioning condenser units are expected to comply with the adopted criteria, provided that the combined Sound Power Level of the air-conditioning units in each floor's condenser room does not exceed 70 dB(A).

10.3 Triggers for Further Acoustic Review

It is recommended that further acoustic review to confirm compliance with EPA Noise Protocol noise limits should be undertaken at the design stage if any of the following occurs:

- If the selected air-conditioning condenser units in each floor's condenser room have a combined Sound Power Level greater than 70 dB(A) each.
- If the air-conditioning condenser units are to be installed at any location other than the proposed location shown in Figure 7.

11 Environmental Noise Emissions due to Commercial Tenancy Plant

Environmental noise emissions due to any mechanical plant serving commercial tenancies (e.g. the coffee point) will need to comply with the requirements of *EPA Publication 1826 – Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues* (EPA Noise Protocol) (EPA Victoria, 2021). It will be the responsibility of the commercial tenant to ensure that the selected mechanical plant (e.g. kitchen exhaust fan, air handling units, air-conditioning units etc.) achieves compliance with the EPA Noise Protocol noise limits.

From preliminary review, there are no material matters that would prevent compliance with the EPA Noise Protocol being practicably achieved with appropriate plant selection and/or acoustic treatment.

It is recommended that the requirement to provide any acoustic treatment necessary to comply with the EPA Noise Protocol should be included in the tenancy contract for the commercial spaces.

12 Music Noise from the Ground Floor Coffee Point

Music associated with operation of the ground floor coffee point will need to comply with the requirements of *EPA Publication 1826 – Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues* (EPA Noise Protocol) (EPA Victoria, 2021).

Based on the background noise levels measured at the site, it is considered that general background music played at the coffee point and within the lift lobby will not impact nearby noise sensitive areas.

It is recommended that a detailed acoustic assessment be undertaken in accordance with the EPA Noise Protocol if it is proposed to:

- Play music at higher levels than would be considered general background / ambience music for a restaurant / cafe; or
- Host live music entertainment; or
- Include outdoor / footpath dining; or
- Broadcast music to outdoor areas.

13 Conclusion

An environmental noise assessment has been performed for the proposed commercial development at 313-317 Kings Way, South Melbourne.

Assessment of traffic noise intrusion has been undertaken with regards to the recommendations of Australian Standard AS/NZS 2107:2016 *Acoustics – Design Sound Levels and Reverberation Times for Building Interiors*.

Assessment of the noise emissions has been conducted with regard to the requirements of *EPA Publication 1826 – Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues* (EPA Noise Protocol) (EPA Victoria, 2021) and the recommendations of the *World Health Organization Guidelines for Community Noise* (World Health Organization, 1999) for sleep disturbance.

Subject to implementation of the advice presented in this report, it is considered that the proposed commercial development will satisfy the applicable acoustic legislation and guidelines.

14 References

EPA Victoria. (2021, May). EPA Publication 1826.4 – Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues.

Standards Australia. (2016). AS/NZS 2107:2016 Acoustics - Recommended Design Sound Levels and Reverberation Times for Building Interiors.

Standards Australia. (2016, October). AS/NZS 2107:2016 Acoustics - Recommended Design Sound Levels and Reverberation Times for Building Interiors.

State of Victoria. (2021, May 25). *Environment Protection Regulations 2021 - Statutory Rule Number 47/2021.*

World Health Organization. (1999, April). World Health Organization Guidelines for Community Noise.

Appendix A Glossary of Acoustic Terms

dB / dB(A) — Decibels or 'A'-weighted Decibels, the units of Sound Pressure Level and Sound Power Level. 'A'-weighting adjusts the levels of frequencies within the sound spectrum to better reflect the sensitivity of the human ear to different frequencies at Sound Pressure Levels typical of everyday sounds. [Unit: dB / dB(A)]

The following are examples of the decibel readings of every day sounds;

- 0 dB The faintest sound we can hear
- 30 dB A quiet library or in a quiet location in the country
- 45 dB Typical office space. Ambience in the city at night
- 60 dB The sound of a vacuum cleaner in a typical lounge room
- 70 dB The sound of a car passing on the street
- 80 dB Loud music played at home
- 90 dB The sound of a truck passing on the street
- 100 dB The sound of a rock band
- 120 dB Deafening

Effective Noise Level — "Effective noise level" means the level of noise emitted from the commercial, industrial or trade premises and adjusted if appropriate for character and duration.

$L_{A90,T}$ — The value of A-weighted Sound Pressure Level which is exceeded for 90 percent of the time during given measurement period T. This is commonly used to represent the background noise level. [Unit: dB / dB(A)]

$L_{Aeq,T}$ — The Equivalent Continuous A-weighted Sound Pressure Level measured over the period T (also known as Time-Average Sound Pressure Level). The Equivalent Continuous A-weighted Sound Pressure Level is the constant value of A-weighted Sound Pressure Level for a given period that would be equivalent in sound energy to the time-varying A-Weighted Sound Pressure Level measured over the same period. In simple terms, this can be thought of as the average Sound Pressure Level. [Unit: dB / dB(A)]

$L_{AFmax,T}$ — The maximum value of A-weighted, F time-weighted Sound Pressure Level which occurs during a given measurement period T. [Unit: dB / dB(A)]

L_{eff} — See 'Effective Noise Level'.

Noise Sensitive Area — For the purposes of assessment of noise levels in relation to *Environment Protection Regulations 2021*, a Noise Sensitive Area is defined as:

a) That part of the land within the boundary of a parcel of land that is–

i. within 10 metres outside the external walls of any of the following buildings–
   A. a dwelling (including a residential care facility but not including a caretaker's house);
   B. a residential building;
   C. a noise sensitive residential use; or
ii. within 10 metres of the outside of the external walls of any dormitory, ward, bedroom or living room of one or more of the following buildings–
   A. a caretaker's house;
   B. a hospital;
   C. a hotel;
   D. a residential hotel;
   E. a motel;
   F. a specialist disability accommodation;
   G. a corrective institution;
   H. a tourist establishment;
   I. a retirement village;
   J. a residential village; or
iii. within 10 metres of the outside of the external walls of a classroom or any room in which learning occurs in the following buildings (during their operating hours)–
   A. a child care centre;
   B. a kindergarten;
   C. a primary school;
   D. a secondary school; or

b) subject to paragraph c), in the case of a rural area only, that part of the land within the boundary of–
   i. a tourist establishment;
   ii. a campground;
   iii. a caravan park; or

c) despite paragraph b), in the case of a rural area only, where an outdoor entertainment event or outdoor entertainment venue is being operated, that part of the land within the boundary of the following are not noise sensitive areas for the purposes of that event or venue–
   i. a tourist establishment;
   ii. a campground;
   iii. a caravan park.

Reverberation Time	Reverberation Time is defined as the time (in seconds) that would be taken for the Sound Pressure Level in a space to decay by 60 decibels after the source of sound has stopped. Spaces with excessively long reverberation times may be characterised by echoes and poor speech intelligibility, while spaces with very short reverberation times may sound 'dead'.
Sound Power Level	A measure of the total sound energy radiated by a source, per unit time. Mathematically, it is ten times the logarithm to the base ten of the ratio of the sound power (W) of the source to the reference sound power; where the reference sound power is $1x10^{-12}$ W. [Unit: dB]
Sound Pressure Level	A measure of the magnitude of a sound wave. Mathematically, it is twenty times the logarithm to the base ten of the ratio of the root mean square sound pressure at a point in a sound field, to the reference sound pressure; where sound pressure is defined as the alternating component of the pressure (Pa) at the point, and the reference sound pressure is $2x10^{-5}$ Pa. [Unit: dB]

Appendix B Proposed Floor Plans

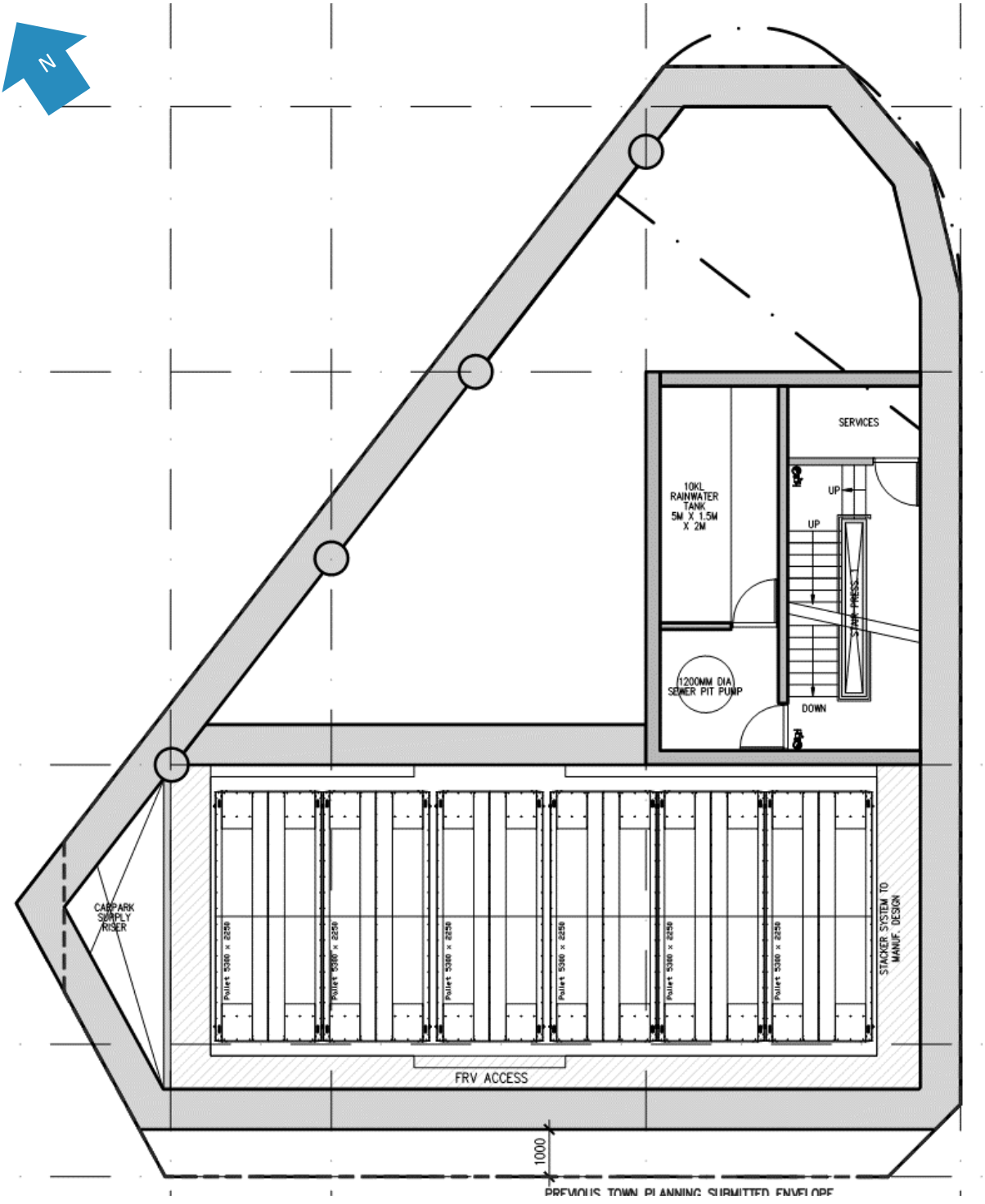


Figure 8 Proposed Floor Plans – Basement 4
(Image Source: Elenberg Fraser)

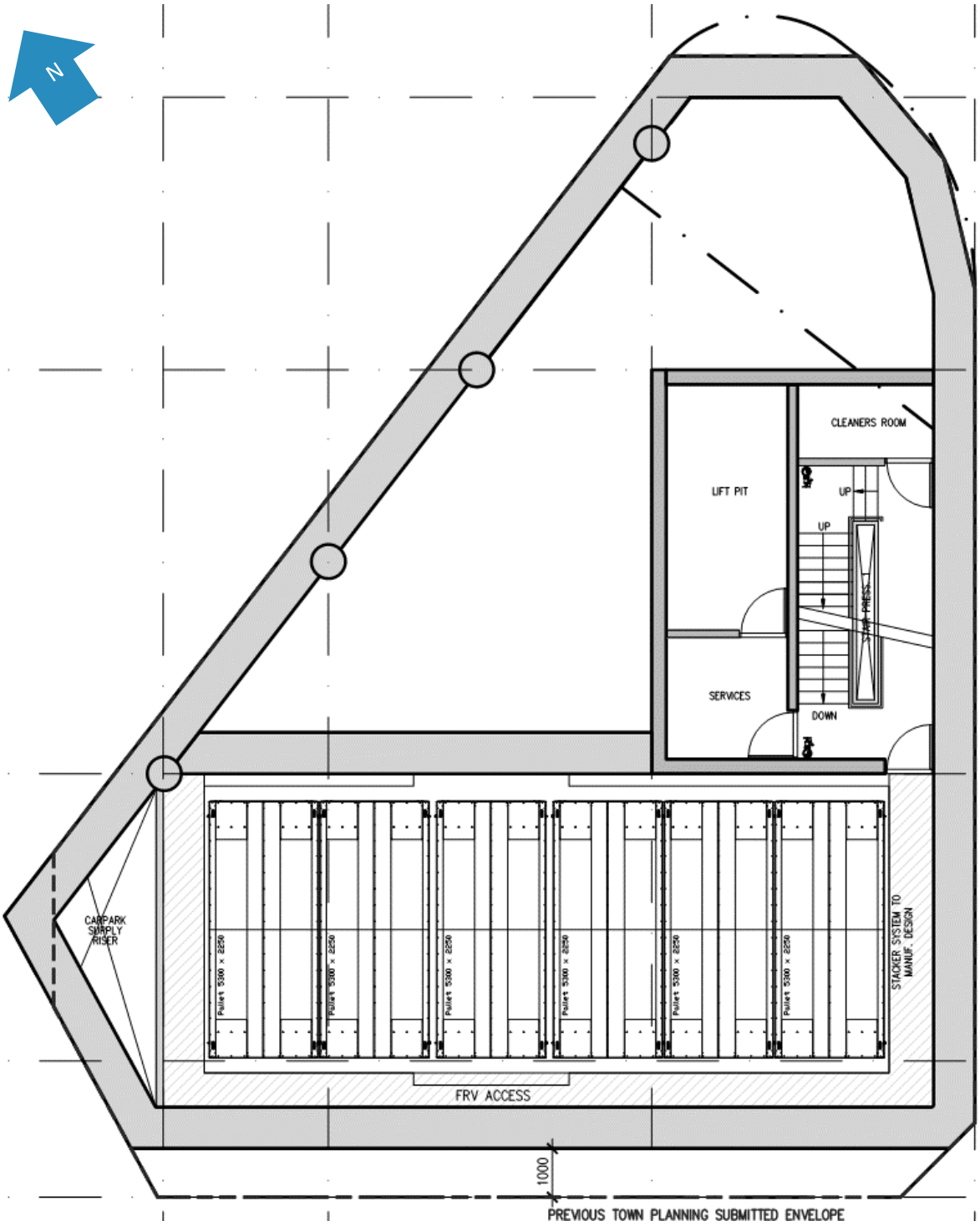


Figure 9 Proposed Floor Plans – Basement 3
(Image Source: Elenberg Fraser)

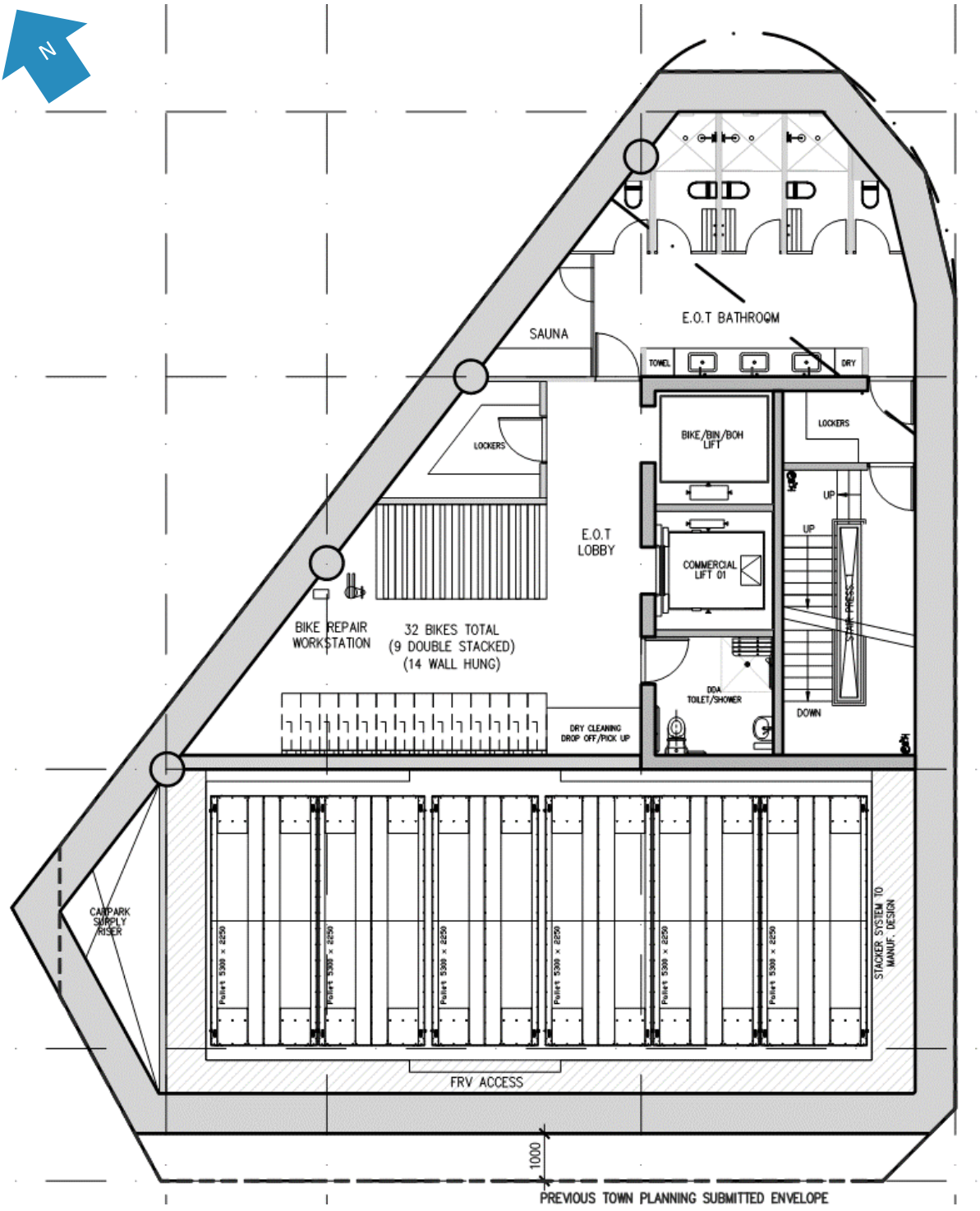


Figure 10 Proposed Floor Plans – Basement 2
(Image Source: Elenberg Fraser)

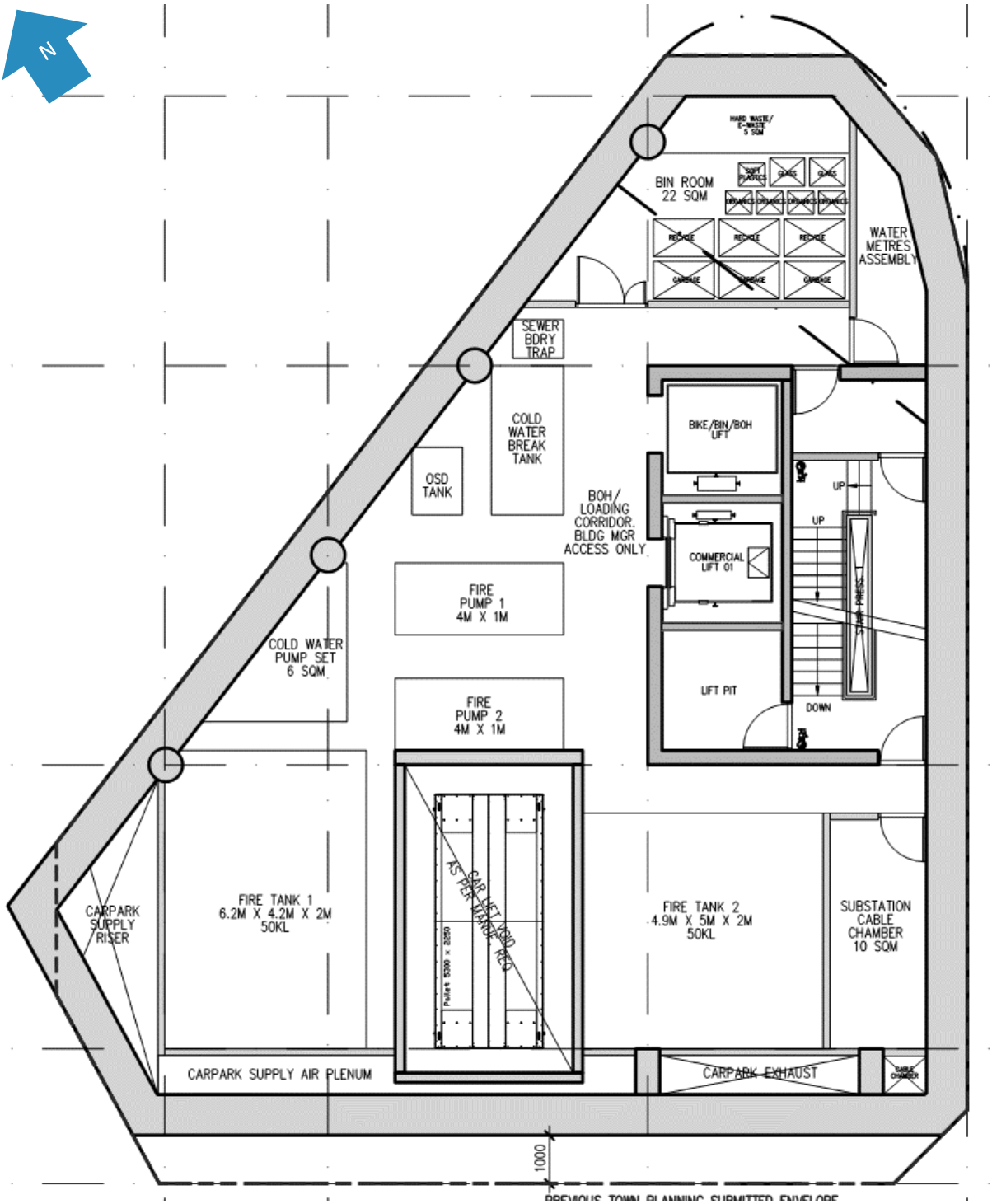


Figure 11 Proposed Floor Plans – Basement 1
(Image Source: Elenberg Fraser)

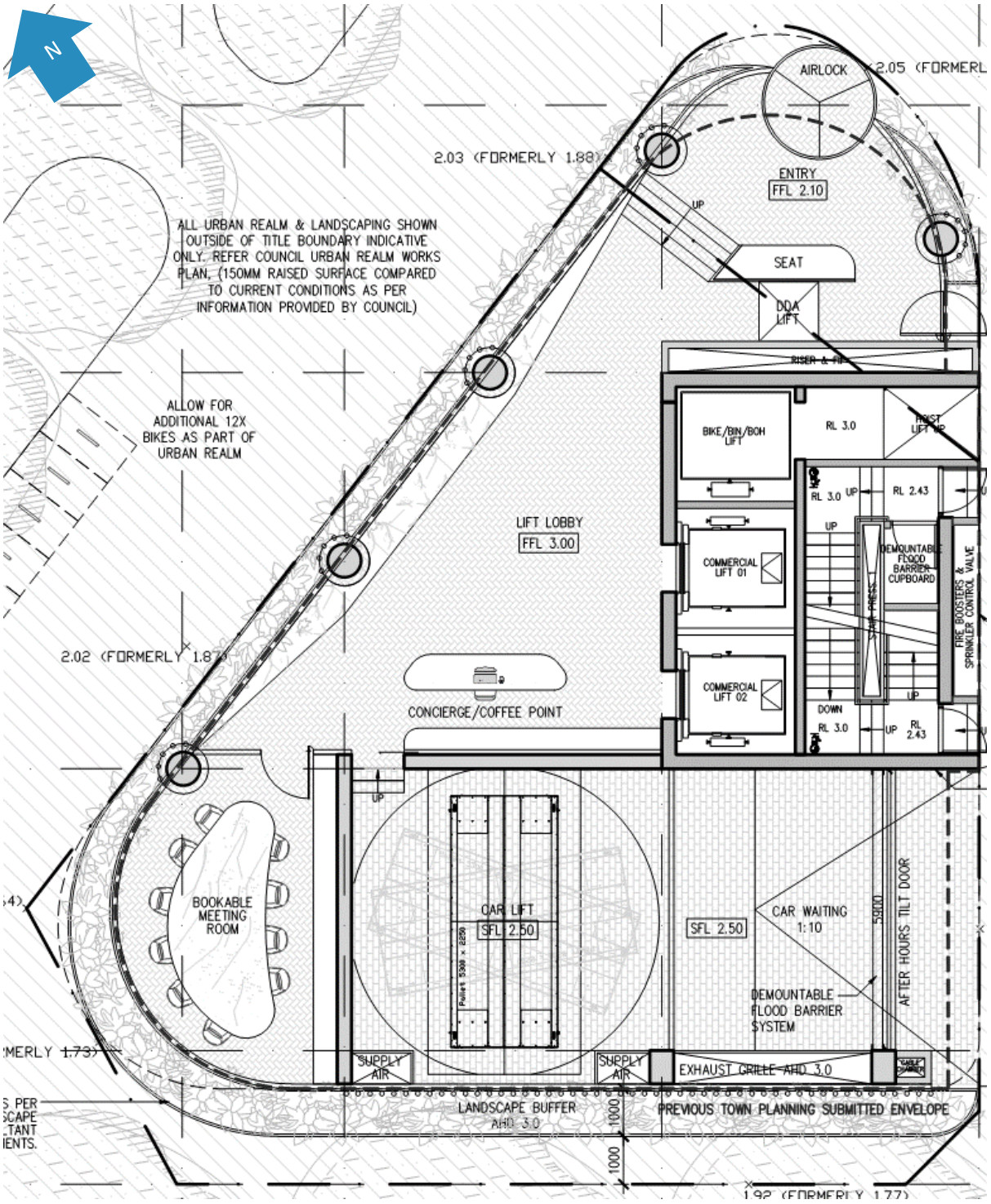


Figure 12 Proposed Floor Plans – Ground Level
(Image Source: Elenberg Fraser)

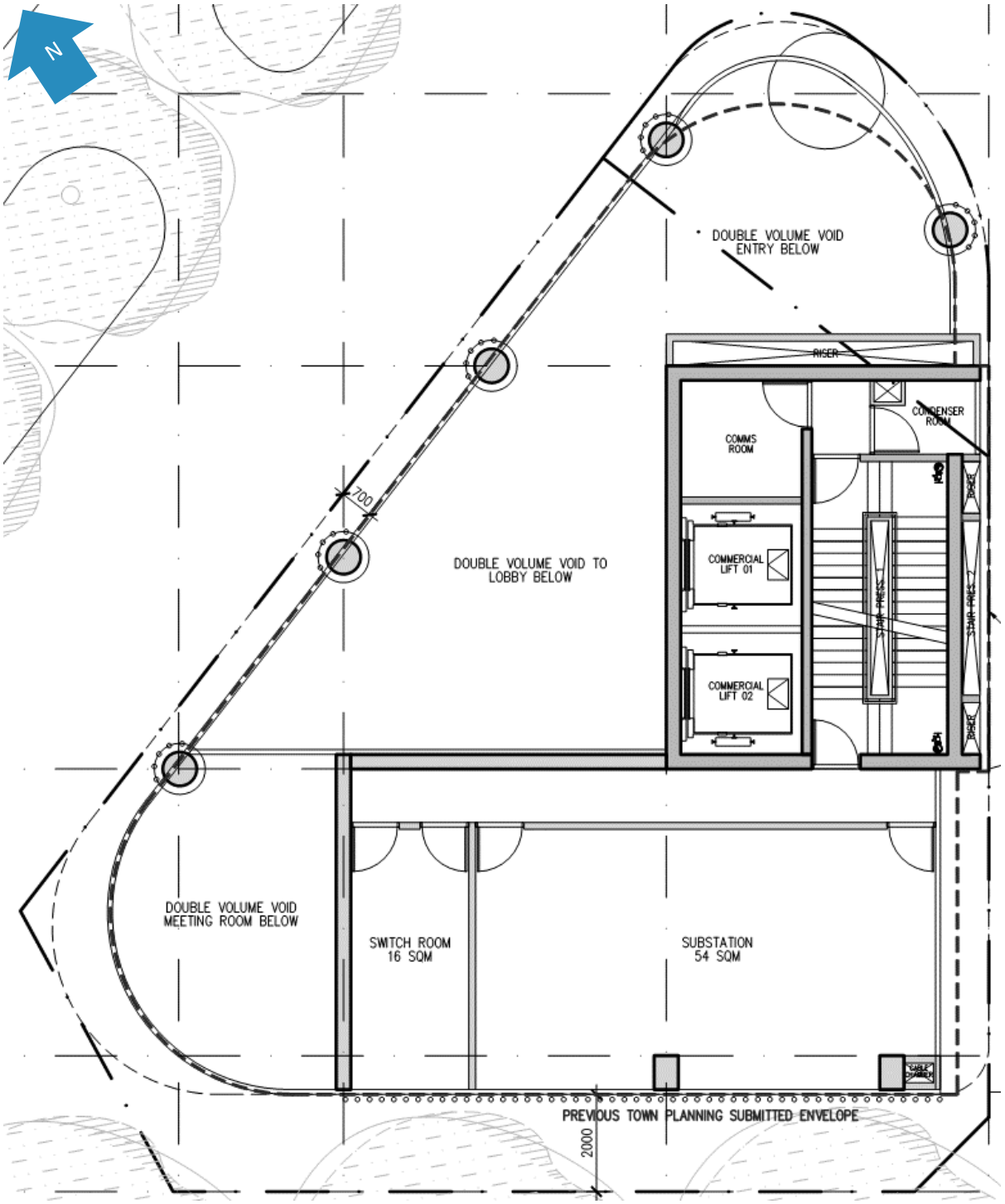


Figure 13 Proposed Floor Plans – Level 0 / Mezzanine
(Image Source: Elenberg Fraser)

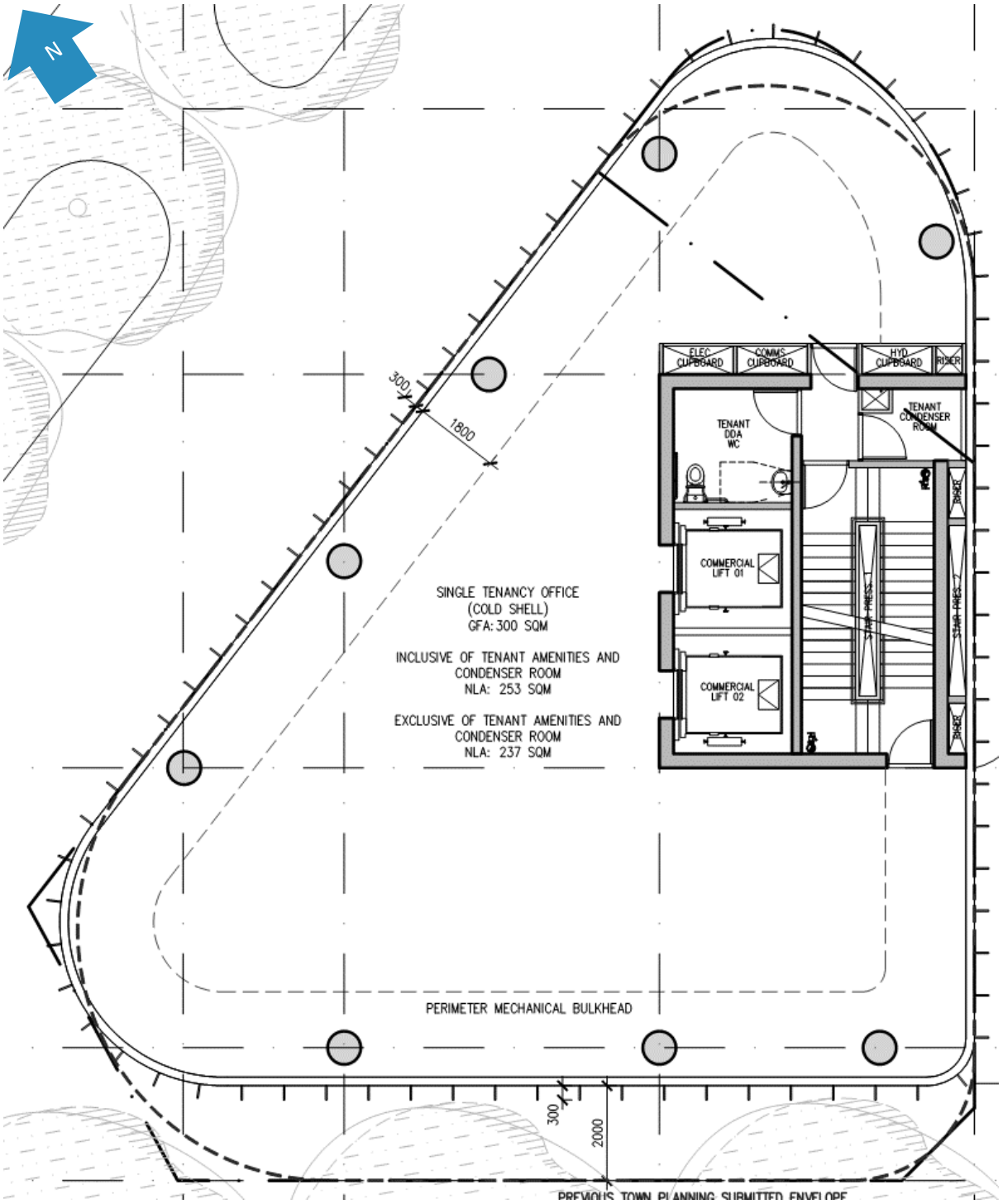


Figure 14 Proposed Floor Plans – Level 1 to Level 4
(Image Source: Elenberg Fraser)

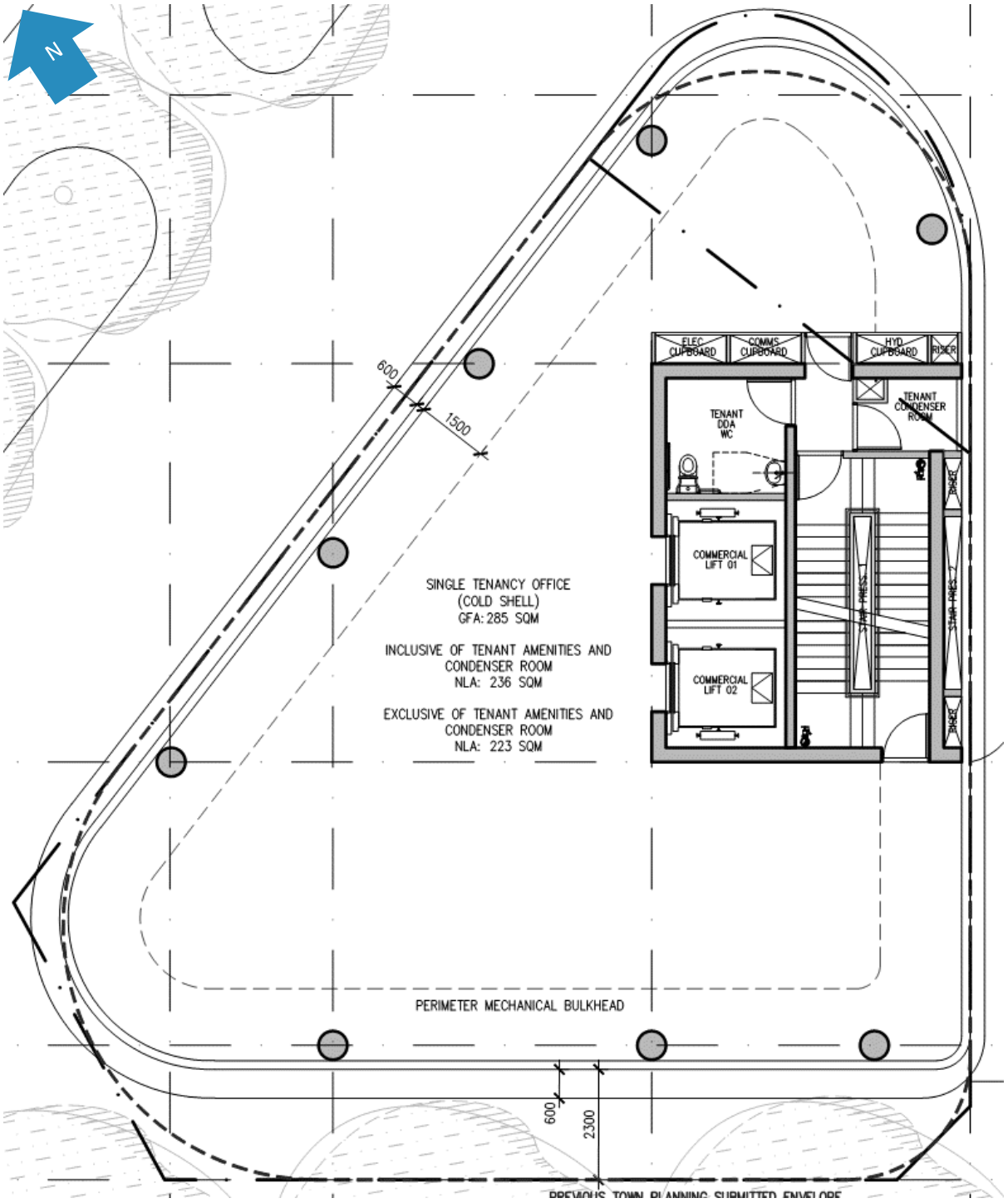


Figure 15 Proposed Floor Plans – Level 5
(Image Source: Elenberg Fraser)

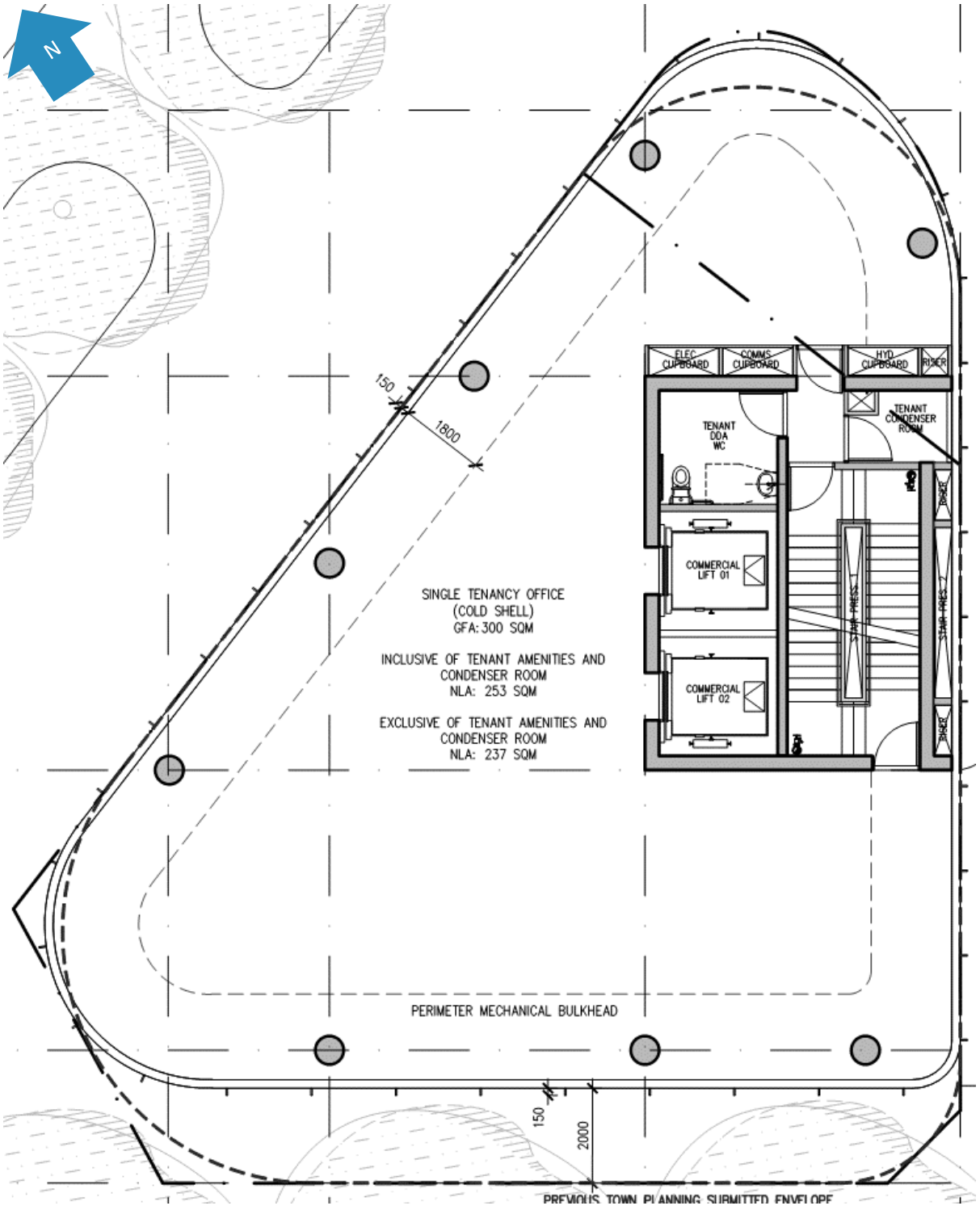


Figure 16 Proposed Floor Plans – Level 6 to Level 10
(Image Source: Elenberg Fraser)

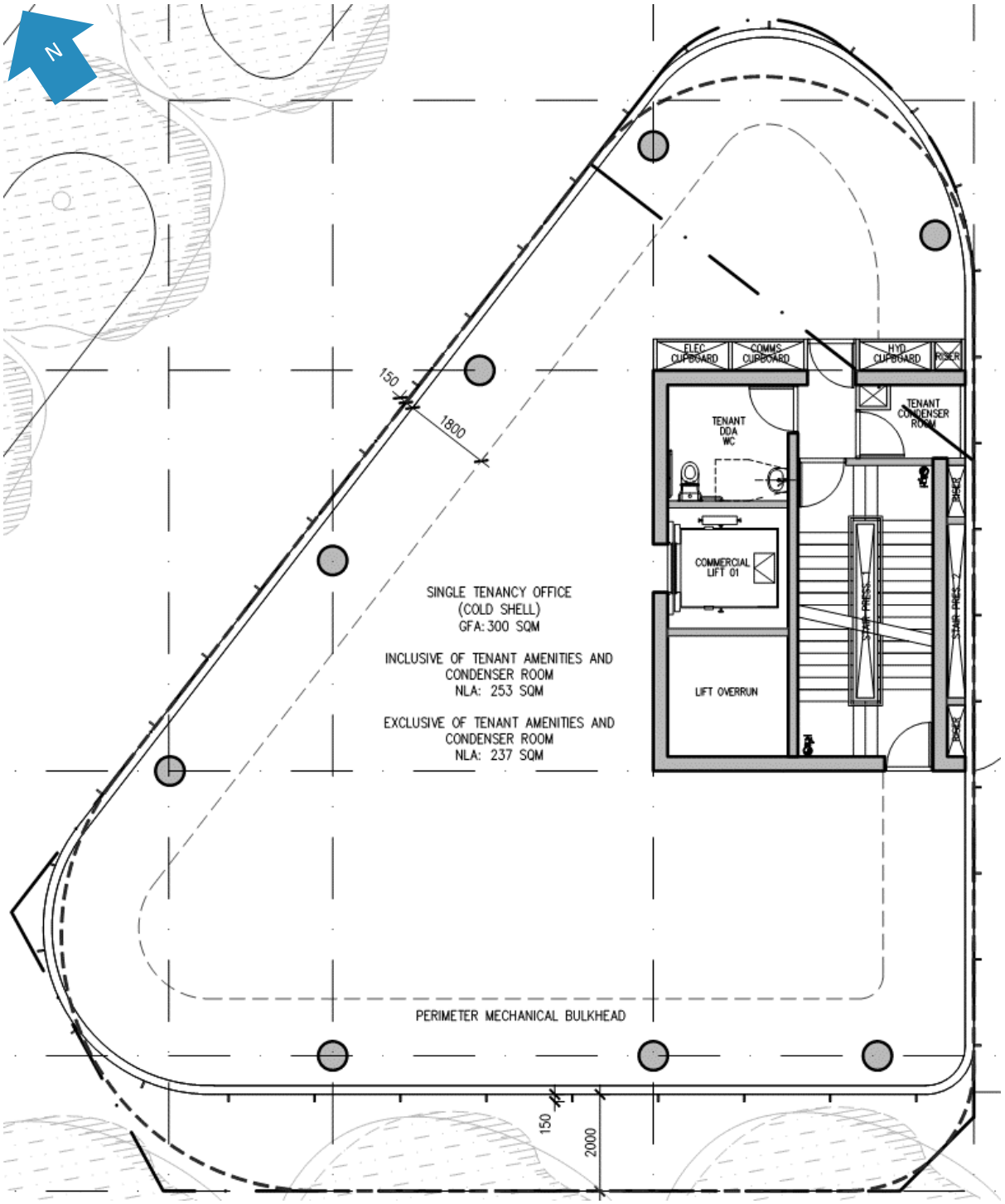


Figure 17 Proposed Floor Plans – Level 11
(Image Source: Elenberg Fraser)

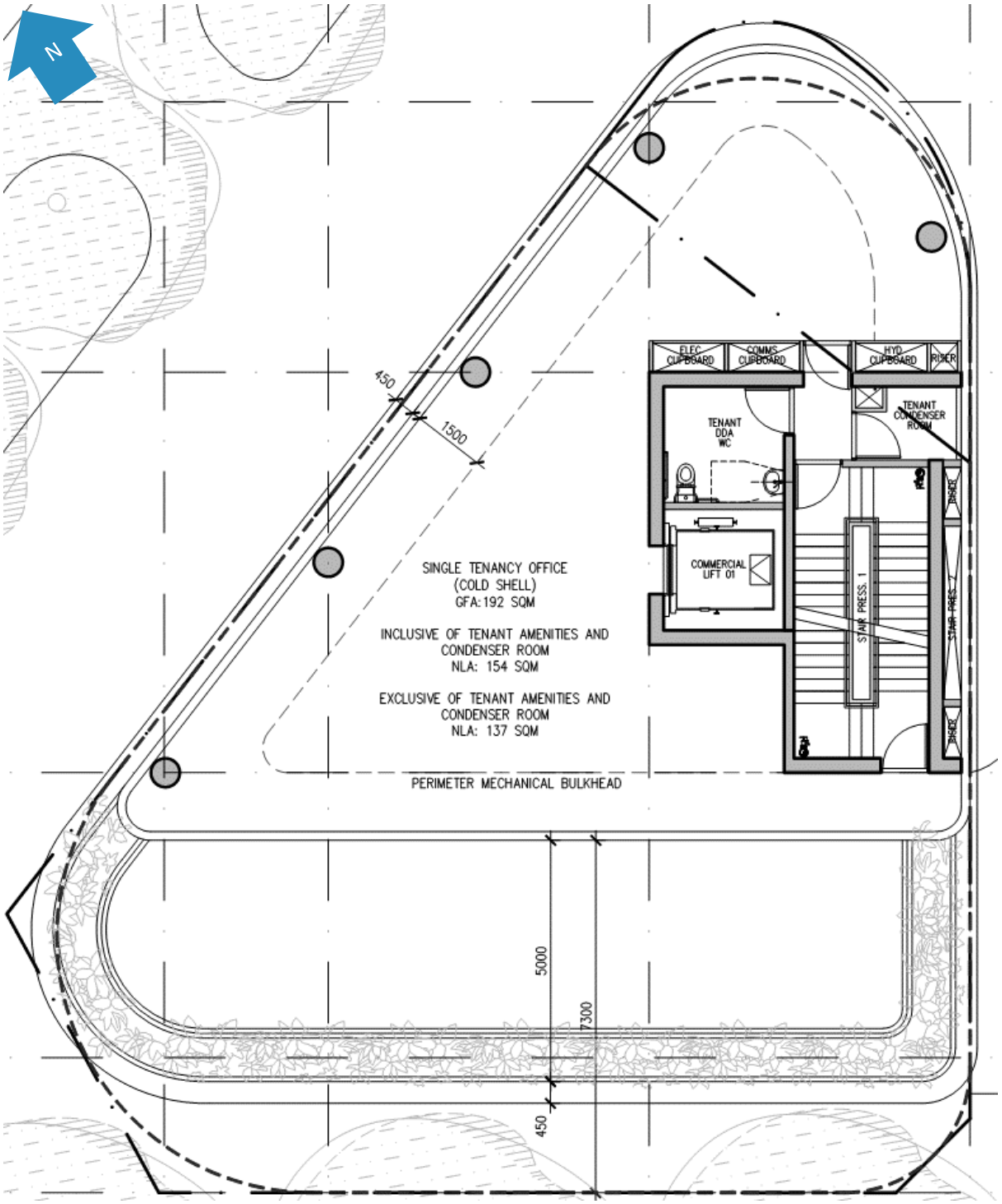


Figure 18 Proposed Floor Plans – Level 12
(Image Source: Elenberg Fraser)

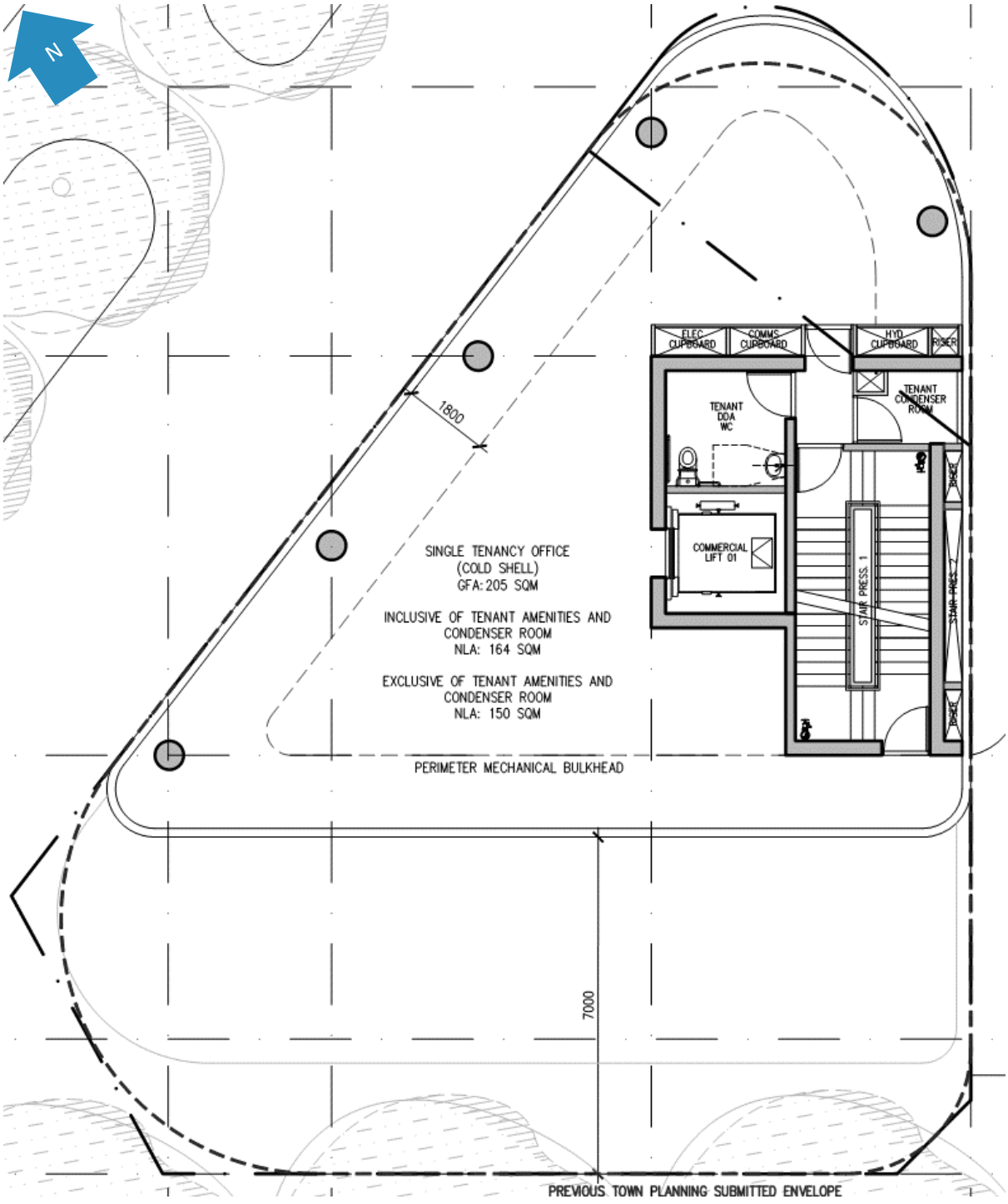


Figure 19 Proposed Floor Plans – Level 13 to Level 17
(Image Source: Elenberg Fraser)

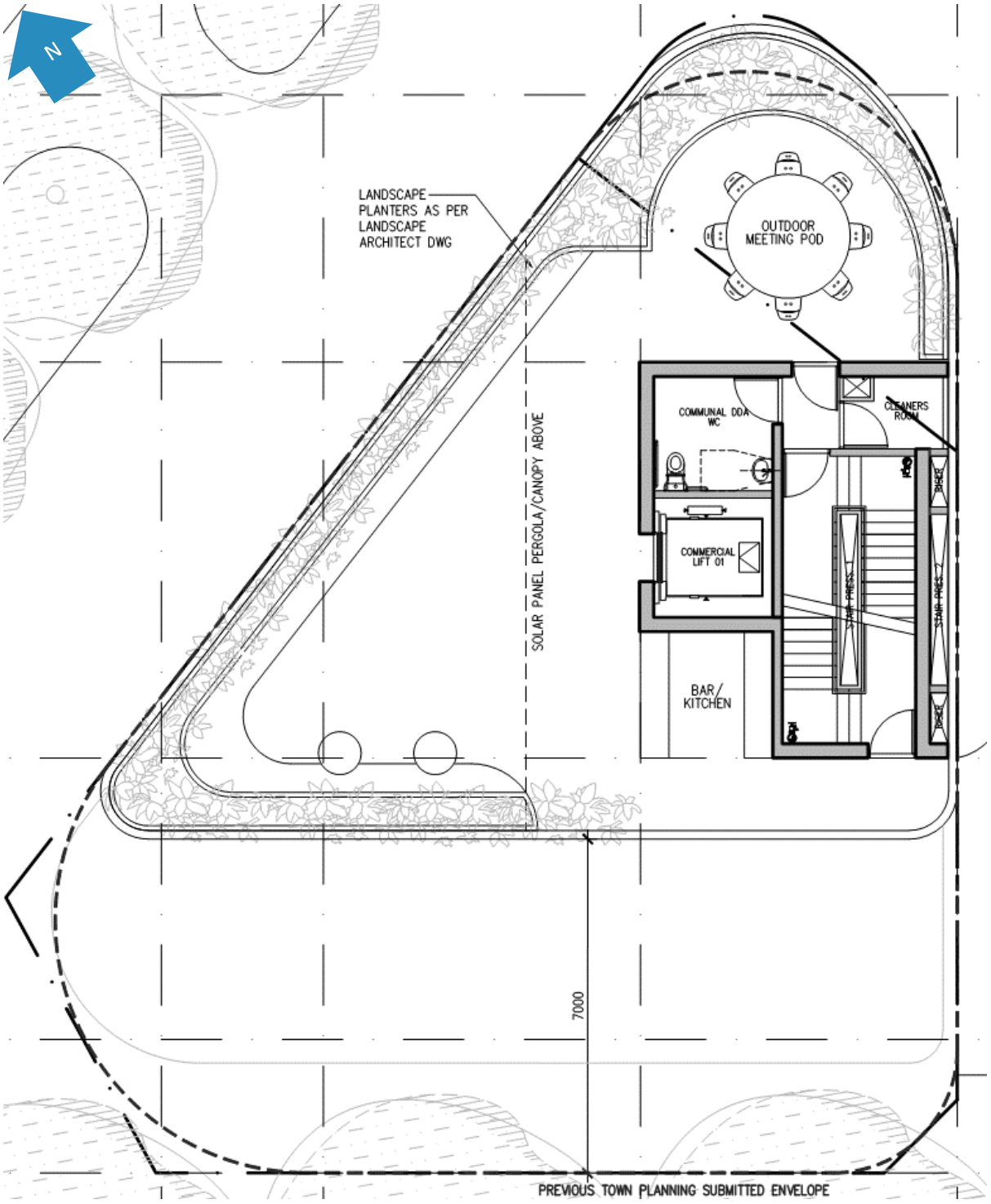


Figure 20 Proposed Floor Plans – Rooftop Plan
(Image Source: Elenberg Fraser)

Appendix C Noise Measurement Methodology

Measurement Location

Table 19 presents details of the noise measurement locations. Figure 21 to Figure 23 present a map and photographs of the noise measurement locations.

Table 19 Noise Measurement Location Details

Location Reference	Measurement Description	Microphone Height Above Ground Level
1	Environmental Noise Logging	2.5 m
2	Attended Noise Measurements	1.5 m

Figure 21 Noise Measurement Locations (Aerial Photo Source: Google Maps)

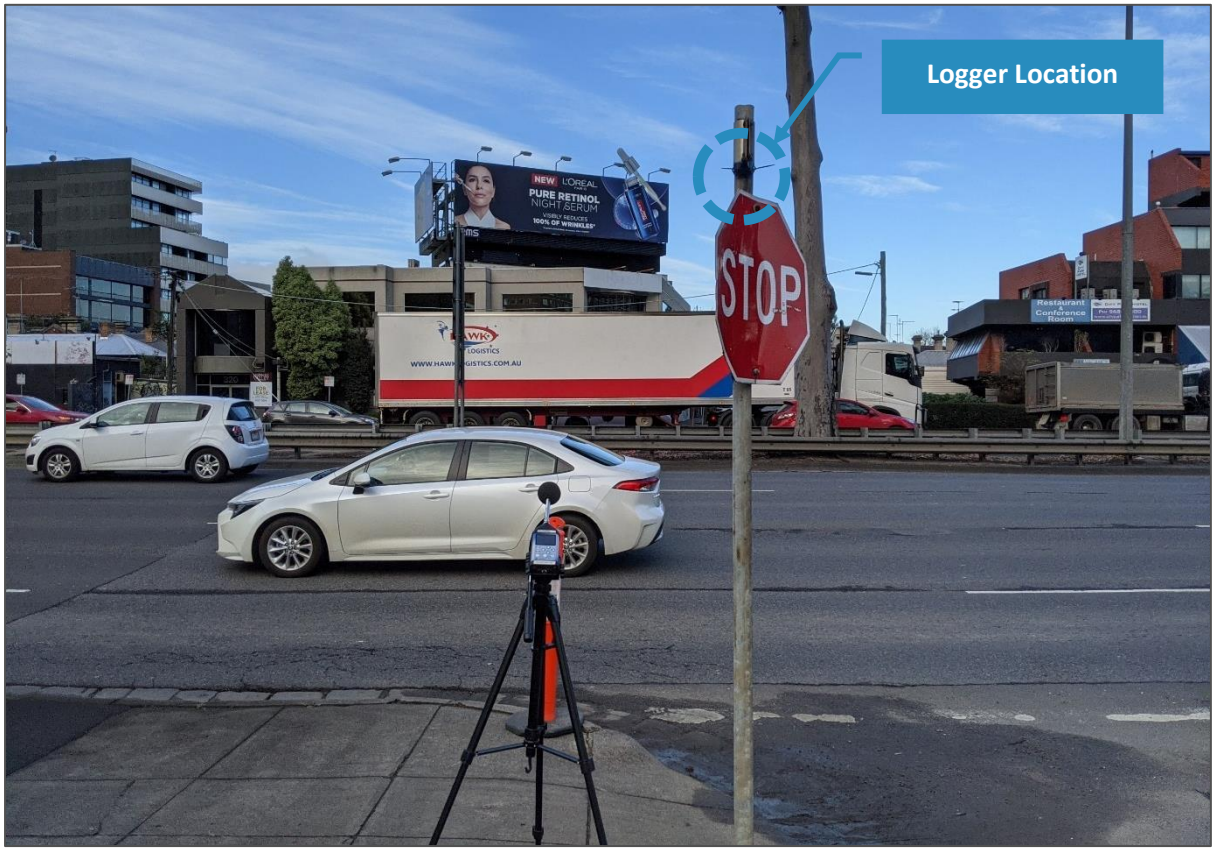


Figure 22 Noise Measurement Location 1 – Photo Facing South West

Figure 23 Noise Measurement Location 2 – Photo Facing North

Measurement Procedure

Noise measurements were performed at the site to establish the environmental noise levels. Table 20 presents details of each measurement:

Table 20 Details of Measurement Period

Location Ref.	Measurement Type		Start Time	Start Date	End Time	End Date
	Attended	Unattended				
1	☐	☒	11:30 AM	Saturday 31/07/2021	8:30 AM	Thursday 5/08/2021
2	☒	☐	8:31 AM	Thursday 5/08/2021	8:37 AM	Thursday 5/08/2021

The equipment was configured to provide the measurement results as a continuous series of 1 second A- and Z-weighted Sound Pressure Levels. Metrics used for the assessment were then post-processed from this data.

A foam windscreen was installed on each microphone to minimise the effect of wind-induced pressure fluctuations on the measurements.

Instrumentation

All acoustic instrumentation used for the measurements held a current certificate of calibration from a National Association of Testing Authorities (NATA) accredited laboratory or from the manufacturer at the time of the measurements.

A field check to confirm correct calibration of the instrumentation was performed at the beginning and end of the measurement period using a laboratory calibrated portable Sound Level Calibrator. At the time of each check the instrumentation was found to be reading correctly and the deviation between consecutive checks was found to be less than 1 dB.

Details of the acoustic instrumentation used for measurements are presented in Table 21.

Table 21 Acoustic Instrumentation Details

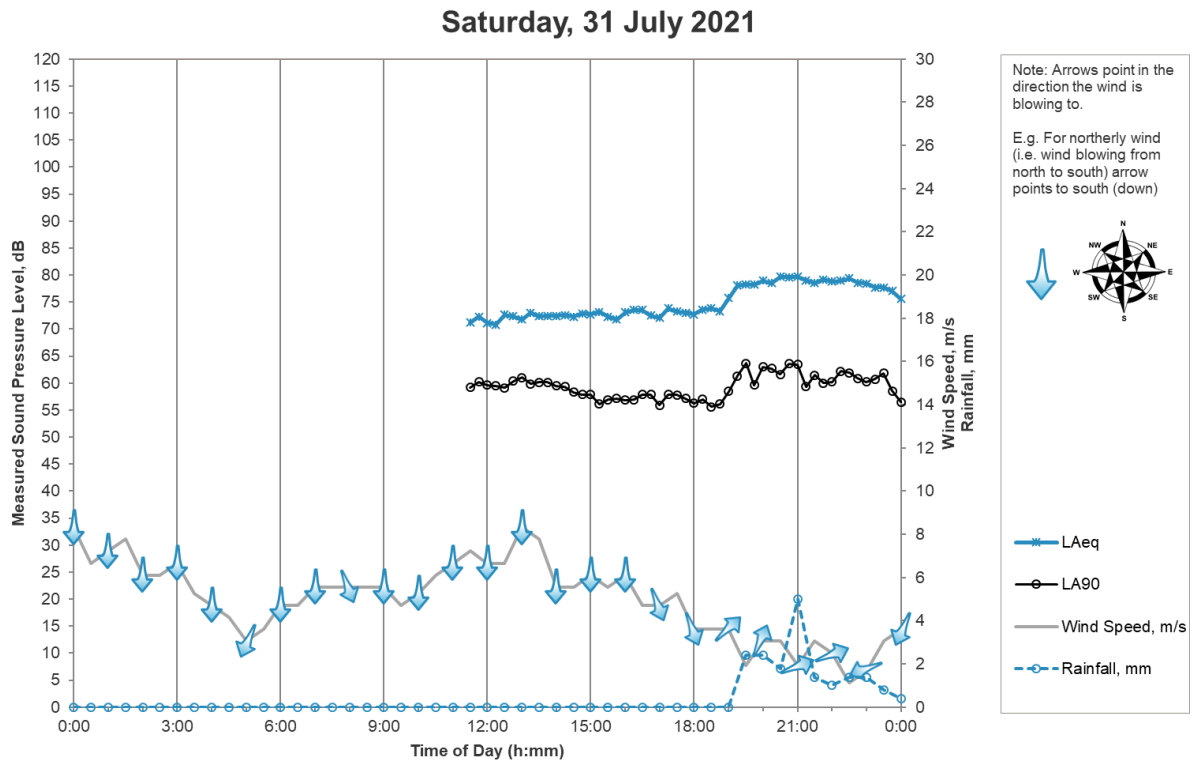
Location Reference	Instrument Description	Serial No.	Date of Last Laboratory Calibration
1	Convergence Instruments NSRT_mk2 Type 1 Sound Level Meter	CHv8JF04cfc9ipPCQ8L5PD	27/08/2018
2	Svantek 977 Class 1 Sound Level Meter	45763	5/02/2021
-	Svantek SV35A Portable Sound Level Calibrator	58054	10/06/2021*

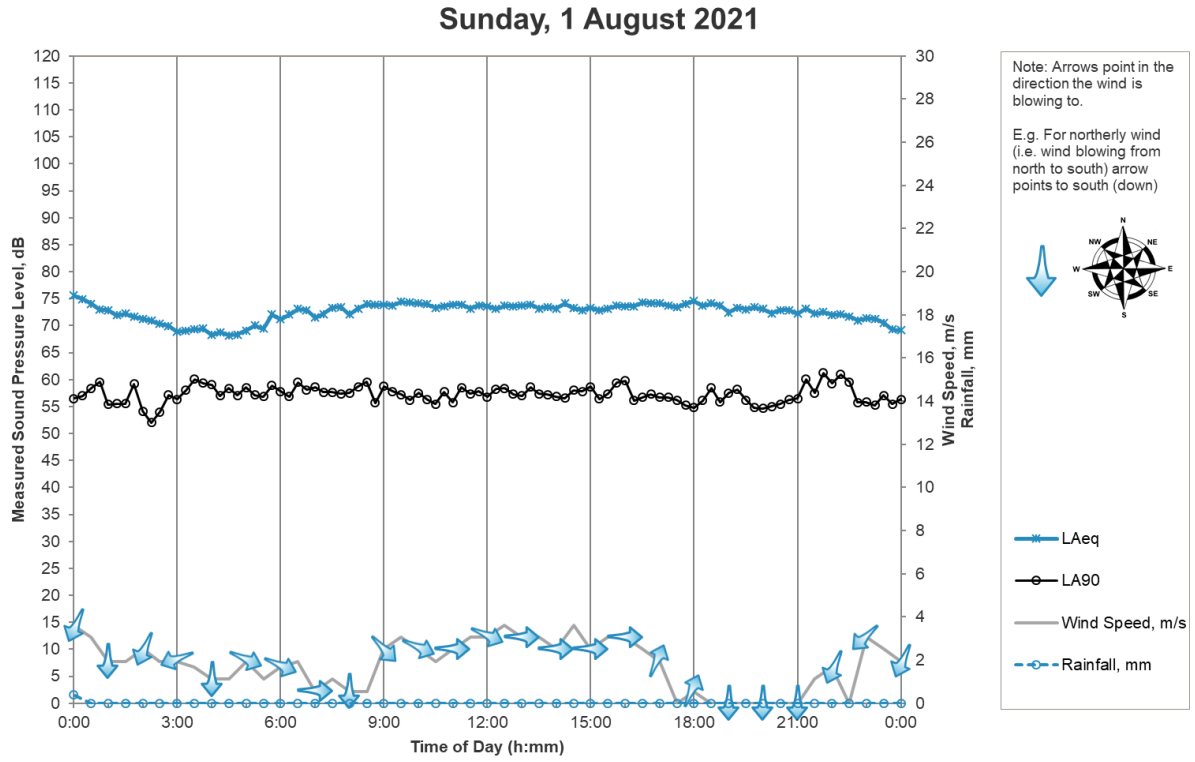
* In accordance with AS 1055.1-1997 and National Association of Testing Authorities Guidelines Sound Level Calibrators require calibration annually.

Meteorological Data

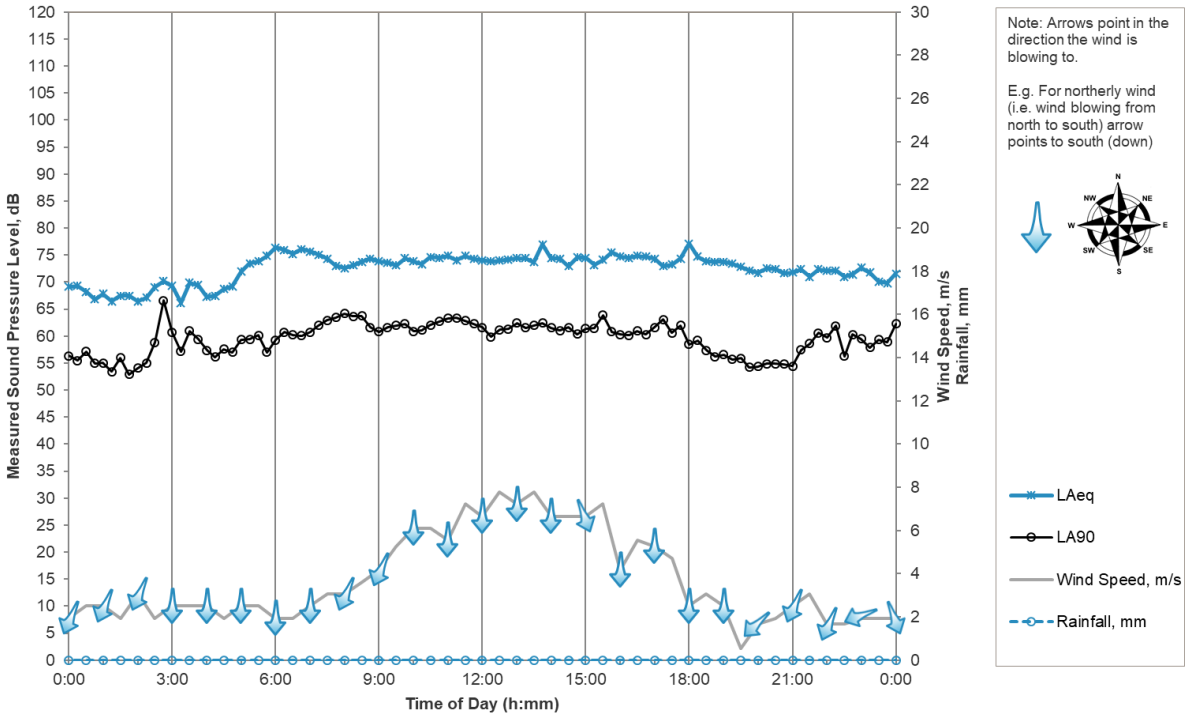
Weather observations during the monitoring period were taken from the Bureau of Meteorology Weather Station at Melbourne Olympic Park, approximately 2 km away. Appendix D shows the meteorological observations plotted against the measured L_{Aeq} and L_{A90} Sound Pressure Levels for the duration of the measurement period.

Appendix D Graphed Noise Measurement Results

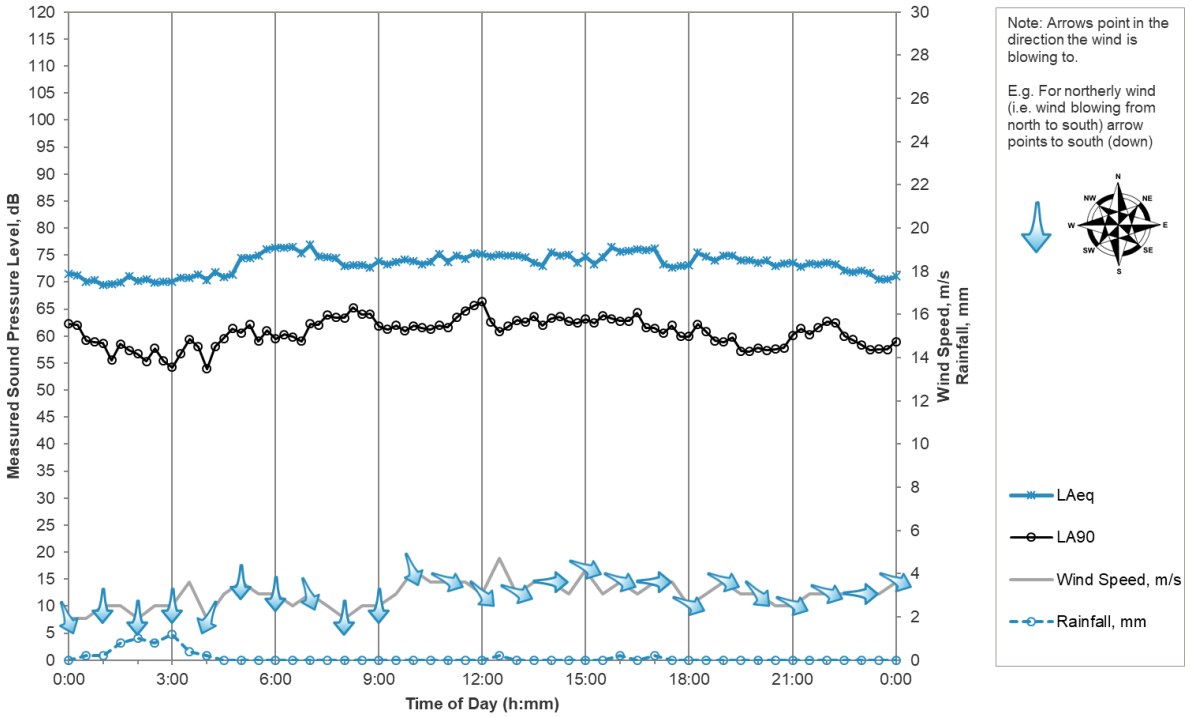




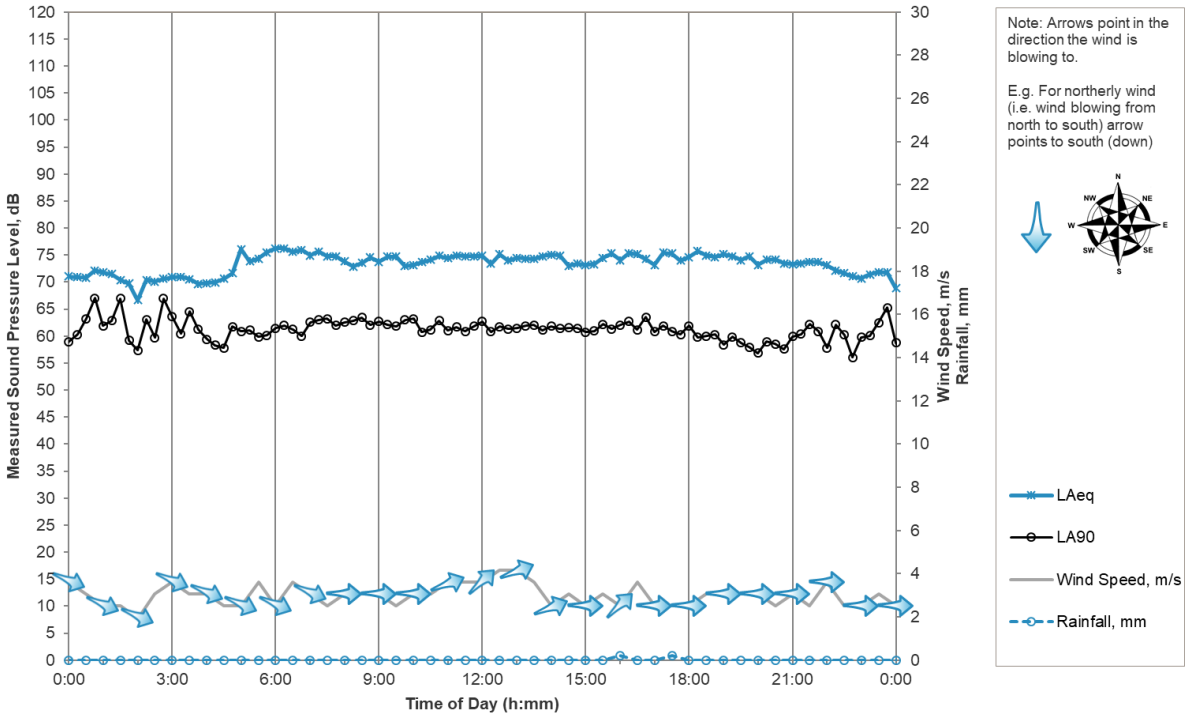
Monday, 2 August 2021



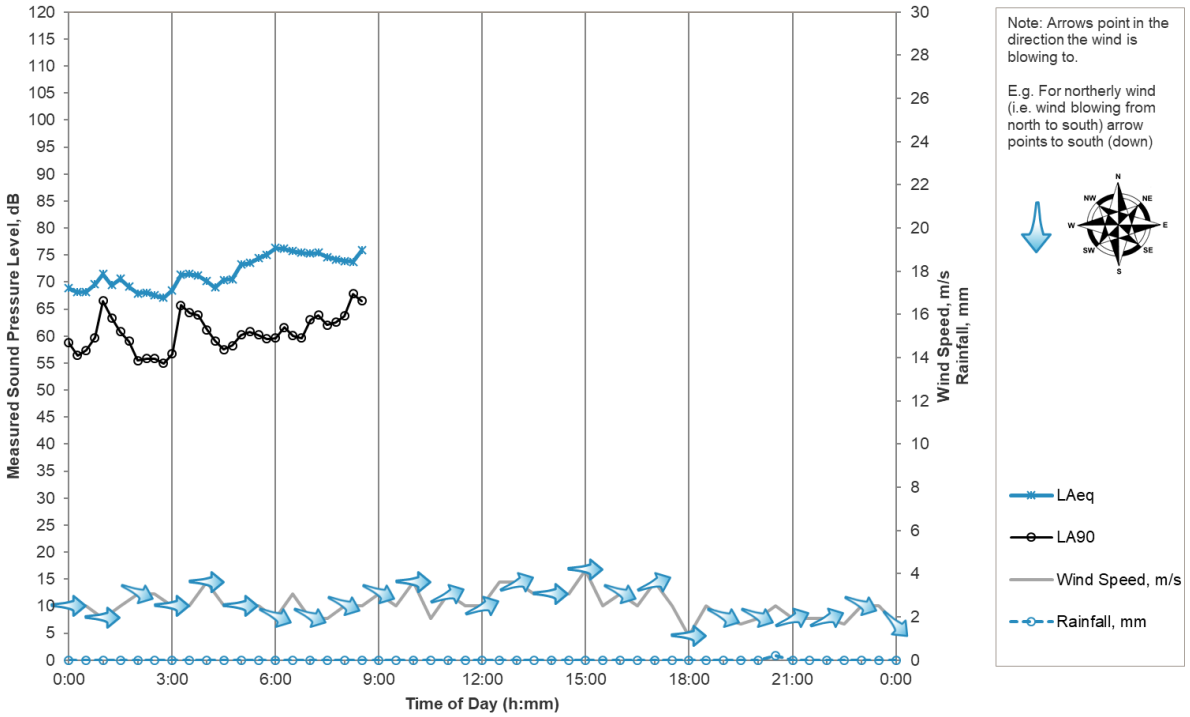
Tuesday, 3 August 2021



Wednesday, 4 August 2021



Thursday, 5 August 2021



Appendix E EPA Noise Protocol Zoning Level and Noise Limit Calculations

1-13 Cobden Street, South Melbourne

Zoning Map

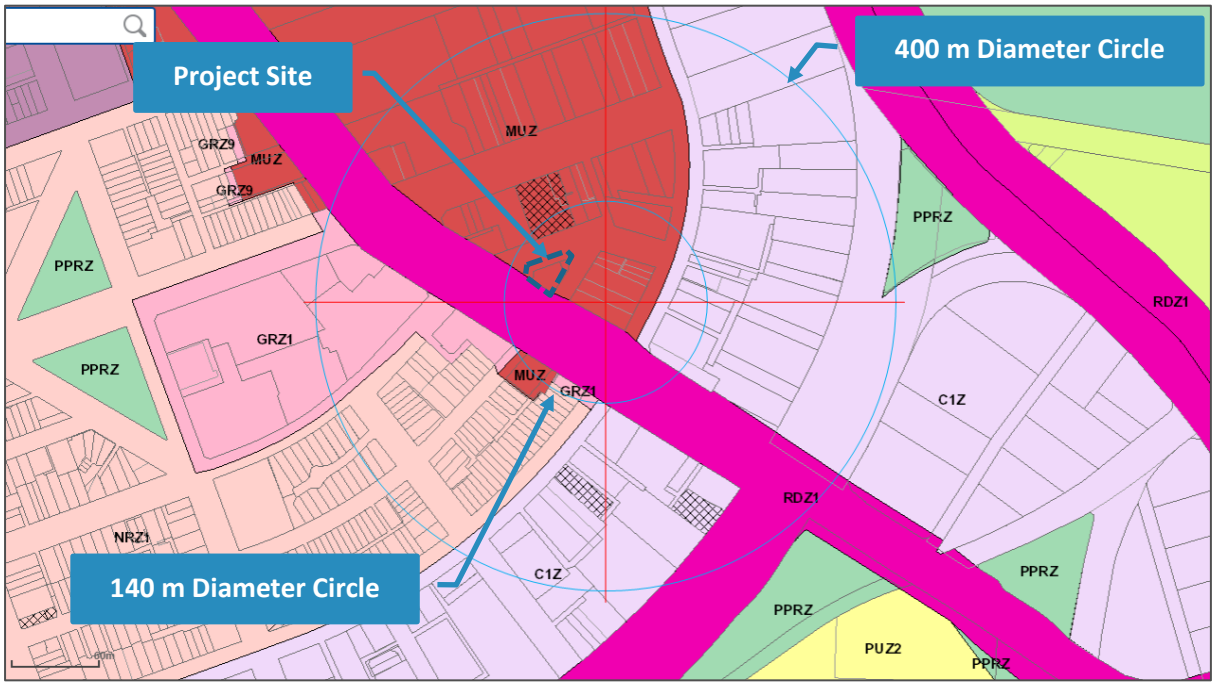


Figure 24 Zoning Circles (Image Source: https://mapshare.vic.gov.au/vicplan/)

Zone Areas

Zone Type Designation	Applicable Zones	% Area of 140m Circle	% Area of 400m Circle
Type 1	GRZ1, PPRZ, NRZ1	3%	18%
Type 2	MUZ, C1Z,	62%	66%
Type 3	RDZ1	35%	16%

Influencing Factor: 0.58

Zoning Levels and Noise Limits

Period	Zoning Level, dB(A)	L_{A90} Background Noise Level, dB(A)	Background Noise Classification	EPA Noise Protocol Noise Limits, dB(A)
Day	60	62	High	68
Evening	54	57	High	60
Night	49	58	High	55

14 Kings Place, South Melbourne

Zoning Map

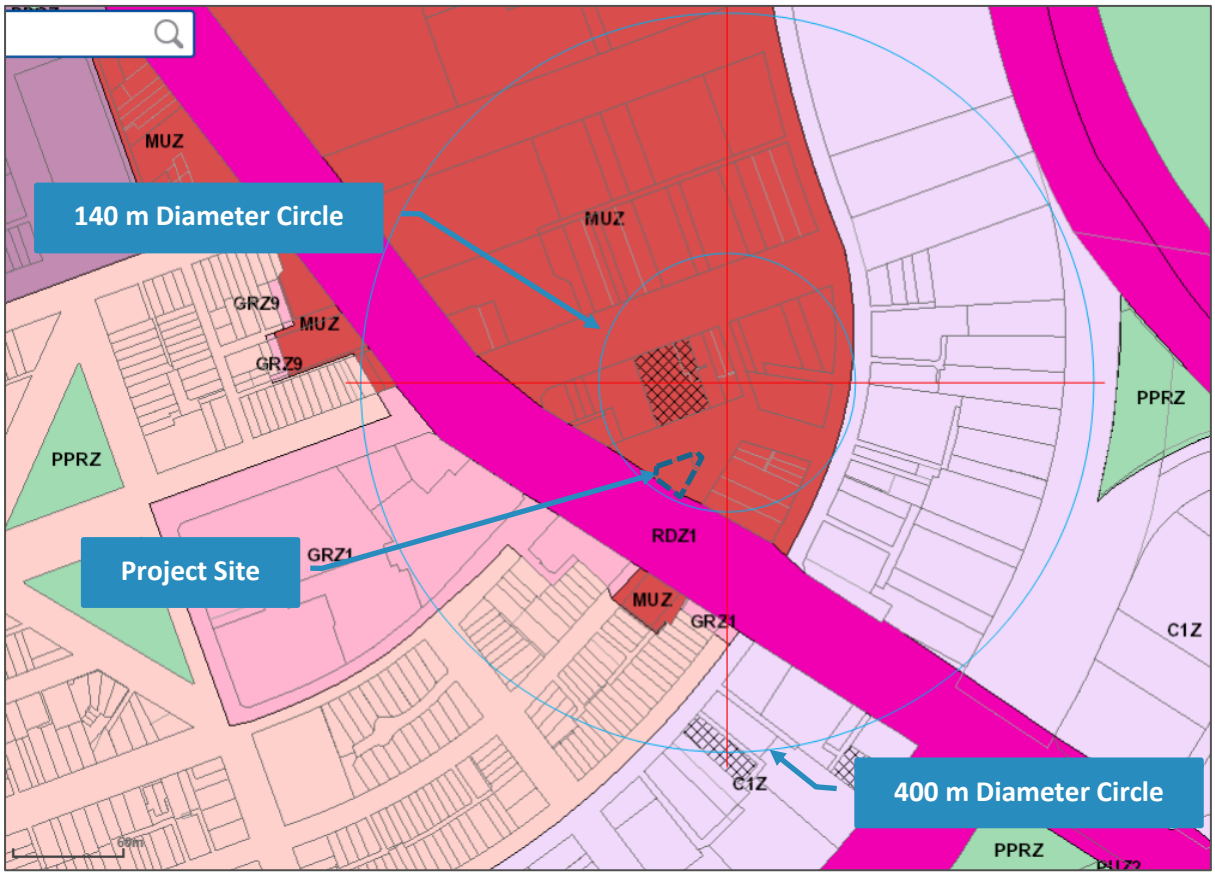


Figure 25 Zoning Circles (Image Source: https://mapshare.vic.gov.au/vicplan/)

Zone Areas

Zone Type Designation	Applicable Zones	% Area of 140m Circle	% Area of 400m Circle
Type 1	GRZ1, PPRZ, NRZ1	0%	13%
Type 2	MUZ, C1Z,	98%	74%
Type 3	RDZ1	2%	14%

Influencing Factor: 0.51

Zoning Levels and Noise Limits

Period	Zoning Level, dB(A)	L_{A90} Background Noise Level, dB(A)	Background Noise Classification	EPA Noise Protocol Noise Limits, dB(A)
Day	59	57	High	63
Evening	53	52	High	55
Night	48	53	High	55

Explanatory Notes to EPA Noise Protocol Noise Limit Derivation

In accordance with the EPA Noise Protocol, the Influencing Factor (IF) for an assessment location is calculated as follows:

$$IF = 0.25(Sum\ of\ Type\ 2\ fractions\ for\ both\ cicles) + 0.5(Sum\ of\ Type\ 3\ fractions\ for\ both\ circles)$$

The Zoning Levels are calculated according to the following equations:

$$Day\ Period\ Zoning\ Level = 18 \times IF + 50$$
$$Evening\ Period\ Zoning\ Level = 17 \times IF + 44$$
$$Night\ Period\ Zoning\ Level = 17 \times IF + 39$$

The Background Noise Levels are classified as follows:

Period	Classification Criteria	Background Noise Classification
Day	Background Noise Level > Zoning Level - 6 dB(A)	High
	Background Noise Level < Zoning Level - 12 dB(A)	Low
	Otherwise	Neutral
Evening and Night	Background Noise Level > Zoning Level - 3 dB(A)	High
	Background Noise Level < Zoning Level - 9 dB(A)	Low
	Otherwise	Neutral

The noise limits are determined based on the background noise classification, according to the following equations:

Period	Classification	Noise Limit
Day	High	Background Noise Level + 6 dB(A)
	Neutral	Zoning Level
	Low	0.5 x (Zoning Level + Background Noise Level) + 4.5 dB(A)
Evening and Night	High	Background Noise Level + 3 dB(A)
	Neutral	Zoning Level
	Low	0.5 x (Zoning Level + Background Noise Level) + 3 dB(A)

The Environment Protection Regulations 2021 specify that the noise limits may not be less than 45 dB(A) for the Day period, 40 dB(A) for the Evening period, and 35 dB(A) for the Night period.

The EPA Noise Protocol specifies that for High background noise classification, the Night period noise limit may not be more than 55 dB(A).

Appendix F Technical Datasheet – Wohr Parksafe 580

Technische Hinweise
Technical Notes

Flurparker 570 | Level Parker 570

Flurparker 590 | Level Parker 590

Parksafe 580

Multiparker 710

Parksafe 585

Multiparker 740

Otto Wöhr GmbH
Auto-Parksysteme

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71292 Friolzheim

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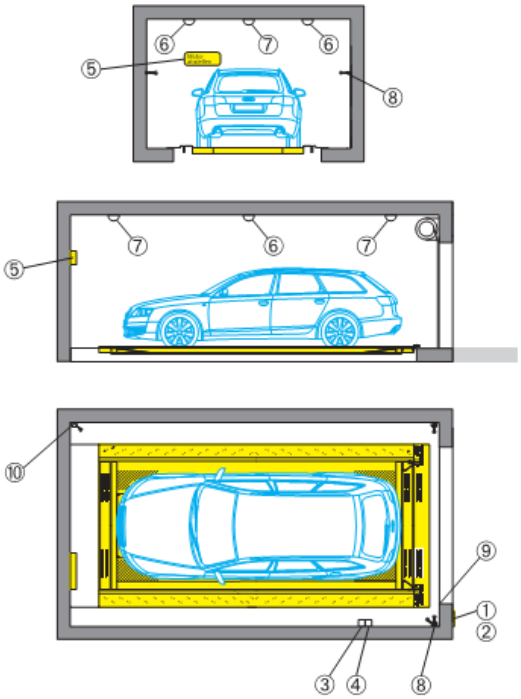
Fax +49 [0] 7044 46-149

www.woehr.de
info@woehr.de

Wir verdichten Parkraum
We compact parking space

WÖHR

Übergabebereich | Transfer area

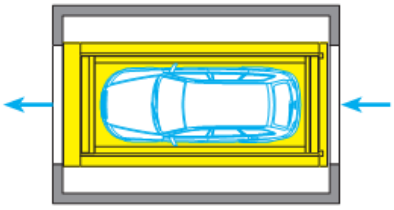


① Bedientableau Unterputz oder Aufputz. Bedienung mit Induktivchip
② Empfänger für Fernbedienung (optional)
③ NOT-HALT
④ Tor-Auf-Taster
⑤ Großtextanzeige
⑥ Kfz-Breitenüberwachung
⑦ Kfz-Längenüberwachung
⑧ Kfz-Höhenüberwachung
⑨ Torüberwachung
⑩ Palette belegt

① Flush-type or surface-mounted type operating panel. Operated by inductive chip
② Receiver for remote control (optional)
③ Emergency stop
④ Open-Gate button
⑤ Large text display
⑥ Car width monitoring
⑦ Car length monitoring
⑧ Car height monitoring
⑨ Gate monitoring
⑩ Car presence

Durchfahrbarer Übergabebereich
Bei vielen Anlagenkonstellationen kann der Übergabebereich auch durchfahrbar ausgeführt werden. Um diese Möglichkeit für Ihr Projekt zu prüfen, bitte Rücksprache mit Firma WÖHR nehmen.

Drive through transfer area
For many system constellations the transfer area can be built with the possibility to drive through. To check this option for your project, please contact WÖHR.



Tore | Gates

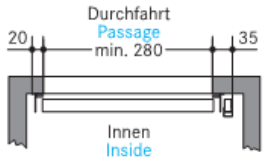
Standardmäßig werden Rolltore gemäß der Sicherheitsanforderungen des TÜV Südwest e.V. in Verbindung mit gültigen EU-Normen eingesetzt.

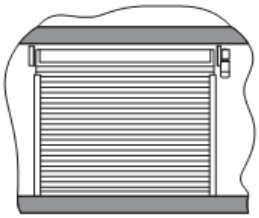
Denkbar ist auch eine Lösung mit einem Schiebetor. Für jede individuelle Lösung ist unbedingt eine Rücksprache mit der Firma WÖHR empfehlenswert.

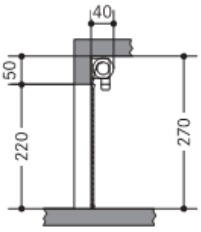
The standard version is provided with roller gates in accordance with the safety requirements in Europe.

Solutions with shifting gates are also possible. However, it is recommended to first discuss all individual solutions with WÖHR.

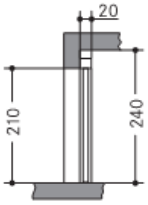
Rolltor | Roller gate







Schiebetor | Shifting gate



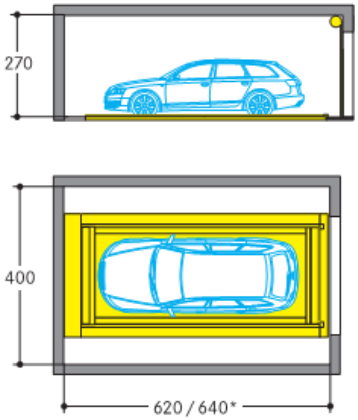
Drehvorrichtung | Turning device

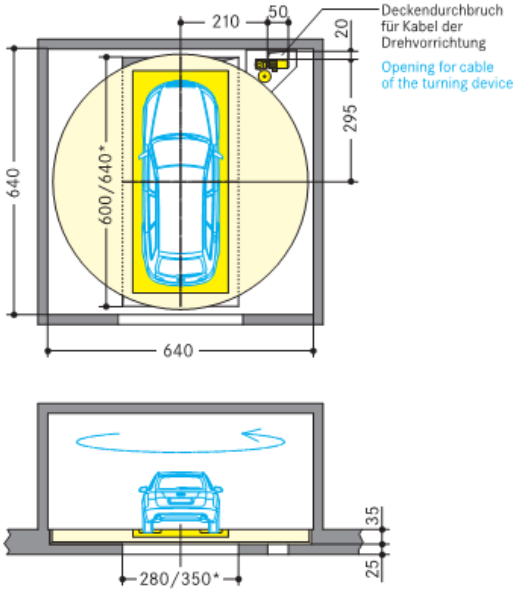
Drehen auf der Park- oder Zwischenebene
Wenn das Fahrzeug in der Anlage gedreht wird, muss der Übergabebereich so breit sein, dass rechts und links des Fahrzeugs genügend Ein- bzw. Aussteigefläche verfügbar ist.

Turning on a parking or intermediate level
When the car is turned in the system, the transfer area must be wide enough to allow sufficient space on the left and right side for getting in and out.

Drehen im Übergabebereich
Wenn das Fahrzeug im Übergabebereich gedreht wird, muss dieser im Vergleich zu Anlagen ohne Drehvorrichtung entsprechend vergrößert werden.

Turning in the transfer area
When the car is turned in the transfer area, this area must be wider than in the version without turning device.





Für behindertengerechte Ausführung bitte Rücksprache mit WÖHR nehmen.
Please contact WÖHR if you need a version that is specially designed for handicapped persons.

Alle Maße in cm
All dimensions in cm

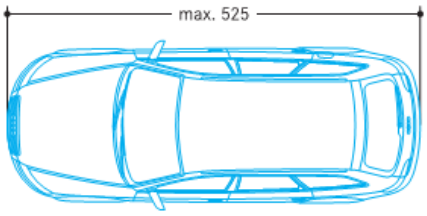
* Maß für Parksafe 580
* Dimension for Parksafe 580

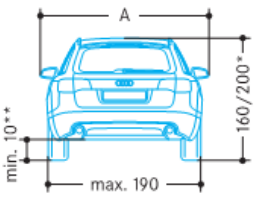
Wartungszugang und Schaltschrank | Maintenance access and switch cabinet

Ein Wartungszugang zur Anlage und ein Schaltschrankraum (mind. 2 x 5 m) sind notwendig (Rücksprache mit WÖHR erforderlich).

Maintenance access as well a room for the switch cabinet (min. 2 x 5 m) is required (please check with WÖHR).

Max. Fahrzeugabmessungen | Max. car dimensions





Palettenbreite Pallet width	Maß A Dimension A
220	210
230	220

Palettenbelastung max. 2500 kg, Radlast max. 625 kg.

Die hier genannten Fahrzeugmaße gelten für die in den jeweiligen Datenblättern angegebenen Einbaumaße. Andere Fahrzeugabmessungen sind bei entsprechenden Änderungen der Baumaße möglich.

Pallet load max. 2500 kg, wheel load max. 625 kg.

These car dimensions are valid for the building dimensions as mentioned in the respective data-sheets. If building dimensions are adjusted, other car dimensions are possible.

* Höhe über alles (Pkw mit Dachgepäckträgern, Dachreling, Antennen etc. dürfen die angegebene Höhe nicht überschreiten).
* Overall height (cars with roof racks, roof rails, antennas etc. should not exceed the mentioned overall height).

** Bodenfreiheit
** Clearance underneath the gear case

Erdung und Potenzialausgleich

Im Aufstellungsbereich des Schaltschranks ist bauseitig eine Anschlussmöglichkeit zum Erder vorzusehen, da die Potenzialausgleichsschiene (PAS) im Schaltschrank über eine möglichst kurze Leitung mit dem Erder verbunden werden muss. Im Aufstellungsbereich des Stahlbaus sind bauseitig mindestens alle 10–20 m (bzw. die im Blitzschutzkonzept vorgesehenen Abstände) Erder vorzusehen, da der gesamte Stahlbau über möglichst kurze Leitungen mit den Erden verbunden werden muss.

Grounding and Potential Equalisation

Customer has to provide a connecting outlet for grounding next to the control cabinet, because the Potential Equalisation Rail (PER) in the control cabinet has to be connected by a preferably short cable with the grounding outlet. In the area of the steel structure the customer has to provide at least every 10 to 20 meters (or in distances as required by the local lightning protection regulation) grounding outlets, because the total steel structure has to be connected with the grounding outlets by preferably short cables.

Steuerung

Die Stellplätze werden mit einem Induktivchip am Bedientableau angewählt, das direkt an der Zufahrt angebracht ist. Eine Anbindung an ein automatisches Kassenabrechnungssystem ist möglich. Durch einen Leitrechner können mehrere Systeme miteinander verknüpft werden.

Control

The parking operation is initiated by inductive chip touched to the operating panel, located at the entrance area. It is possible to connect it with an automatic cashier system. More than one system can be inter-linked by a master computer.

Statik und Bauausführung

Der Stahlbau dient als Rahmenkonstruktion für die Aufnahme der Fördereinrichtung und der Paletten. Er wird mit Metallspreizdübeln am Boden befestigt und seitlich zu den Außenwänden abgestützt. Hierfür ist eine Betongüte von C25/30 erforderlich. Statische Angaben können bei der Firma WÖHR für das jeweilige Projekt erfragt werden.

Statics, construction and steel structure

The steel structure serves as a frame-work for the lift system and the pallets. The steel structure is fastened to the floor with metal splaydowels and shored-up sidewise against the external walls. This requires a concrete quality of C25/30. Information with regard to the statics in question can be obtained from WÖHR.

Beleuchtung (bauseitig)

Im Übergabebereich mind. 500 Lux (vgl. EN 1837:1999).
Im Anlagenbereich mind. 50 Lux (vgl. EN 81-1:1998).

Lighting (provided by owner)

In the transfer area at least 500 lux, see EN 1837:1999.
In the system area at least 50 lux, see EN 81-1:1998.

Entwässerung

Die Fahrzeugpaletten sind komplett geschlossen, abtropfendes Wasser, Schnee etc. wird aufgefangen und kann zu keiner Verschmutzung von darunterstehenden Fahrzeugen führen. Wir empfehlen eine Entwässerung im Parkraum vorzunehmen und diese an einen Pumpensumpf anzuschließen.

Drainage

The pallets are watertight. Tripping water, snow etc. is caught and will not soil cars stored below. We recommend to provide a drainage in the parking area and to connect it to a pump sump.

Verfügbarkeit

Die Verfügbarkeit der Anlage richtet sich nach der VDI-Richtlinie 4466, Jan. 2001 (Punkt 6.4): »Sofern nicht anders vereinbart, erreicht die Gesamtverfügbarkeit des automatischen Parksystems nach sechsmonatiger Betriebszeit wenigstens 98 % (Berechnung nach VDI 3581).«

Availability

If not agreed otherwise, the overall availability of the automatic parking system will reach at least 98 % after a 6-month operation time.

Konformitätserklärung

Die von uns angebotenen Systeme entsprechen den Anforderungen der EG-Maschienen-Richtlinie 2006/42/EG im Allgemeinen und der DIN EN 14010 im Besonderen.

Certificate of conformity

The parking systems we offer fulfil the requirements of the EC-Machinery Directive 2006/42/EC in general and the requirements of DIN EN 14010 in particular.

Brandschutz (bauseitig)

Vorbeugende Brandschutzmaßnahmen sind vom Architekten mit dem jeweiligen Bauamt bzw. dem vorbeugenden Brandschutz abzustimmen.

Fire protection (provided by owner)

Preventive fire protection measures should be discussed between the architect and the building authority and/or the preventive fire protection authority.

Maße

Alle Maße sind Mindestfertigmaße. Toleranzen nach VOB Teil C (DIN 18330, 18331) sind zusätzlich zu berücksichtigen.
Alle Maße in cm.

Dimensions

All dimensions are minimum finished dimensions. Allowance must also be made for tolerances caused by the requirements of local builders.
Dimensions are given in cm.

Schallschutzmaßnahmen

Grundlage DIN 4109 »Schallschutz im Hochbaue, Nov. 1989. Danach muss bei Geräten, Maschinen und Einrichtungen haustechnischer Gemeinschaftsanlagen ein ausreichender Schallschutz gegen Übertragung von Luft- und Körperschall vorhanden sein. Der Schalldruckpegel darf nachts in Wohn- und Schlafräumen 30 dB (A) nicht überschreiten.

Luftschalldämmung
Mit unserer Standardausführung erfüllen wir in der Regel Anforderungen aus der DIN 4109, sofern sichergestellt ist, dass der Baukörper mind. R'w 57 dB (A) Schalldämmaß aufweist.

Körperschalldämmung
WÖHR bietet zusätzliche Maßnahmen zur Reduzierung von Körperschallübertragung an. (Bitte hierzu gesondertes Angebot der Firma WÖHR anfordern!) Wir empfehlen eine Abstimmung zwischen Schallgutachter und Firma WÖHR über eventuelle weitere Maßnahmen zur Körperschalldämmung herbeizuführen.

Sound insulation

Basis: »Sound insulation in buildings«, for technical facilities in buildings must be provided with adequate protection against air-borne and solid-borne sound. If the sound pressure level should not exceed 30 dB (A) in living- and sleeping-rooms at night, the following building requirements must be available:

Insulation against air-borne sound
The building unit must have a sound reduction index of at least R'w 57 dB (A).

Insulation against solid-borne sound
WÖHR offers additional measures for a reduction of solid-borne sound (please ask for optional quotation from WÖHR). We recommend consultation between a sound expert and WÖHR to discuss further possible steps for reduction of the solid-borne sound.

Lüftung/Umweltbedingungen (bauseitig)

Die elektrischen Steuerelemente sind nach EN 60204-1 und die Mechanik ist für den Temperaturbereich +5 – +40°C vorgesehen. Andere Umweltbedingungen bedürfen der besonderen Vereinbarung. Es ist eine Lüftungsanlage für den laufenden Luftaustausch, Reduzierung von Luftfeuchtigkeit, Verhinderung von Betauung, Abbau von Fahrzeugfeuchte (Regen, Schnee, Eis o.ä.) und Arbeitsschutzbestimmungen vorzusehen.

Ventilation/Environmental conditions (provided by owner)

The electrical control elements are in accordance with EN 60204-1 and the mechanical are provided for a temperature range +5 – +40 degrees Celsius. Other environmental conditions would require a special consideration.
A ventilation system is required by the client to provide continuous exchange of air, to effect a reduction in the level of atmospheric humidity, prevent condensation, remove moisture carried by vehicles (rain, snow, ice or the like) and in accordance with Health and Safety at Work Regulations.

Hinweise

Konstruktionsänderungen vorbehalten. Änderungen von Ausführungsdetails aufgrund des technischen Fortschrittes und aufgrund von Umweltauflagen bleiben vorbehalten.

Notes

We reserve the right to make design changes. We reserve the right to change construction details on the basis of technological progress and in the light of environment regulations.