



1-3 Holdsworth Avenue and 10-12 Marshall Avenue, St Leonards

Natural Ventilation Assessment

PTW Architects

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Prepared by:

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Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
1.3	11 November 2024	Dr Farzin Ghanadi	Dr Neihad Al-Khalidy	Dr Neihad Al-Khalidy
1.2	16 October 2024	Dr Farzin Ghanadi	Dr Neihad Al-Khalidy	Dr Neihad Al-Khalidy
1.1	15 October 2024	Dr Farzin Ghanadi	Dr Neihad Al-Khalidy	Dr Neihad Al-Khalidy

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with PTW Architects (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.



Executive Summary

SLR Consulting Pty Ltd (SLR) has been engaged by PTW Architects to assess the natural ventilation potential for the proposed 1-3 Holdsworth Avenue and 10-12 Marshall Avenue, St Leonards development. This report will focus specifically on the sites potential for natural ventilation under the Apartment Design Guide (ADG). This report will form part of the development application to Lane Cove Council.

The State Environmental Planning Policy (SEPP) 65 supported by the Australian Design Guide (ADG) is relevant to assessing the cross ventilation through residential components of the proposed development. Section 4B-3 of the Australian Design Guide states that:

At least 60% of apartments are naturally cross ventilated in the first nine storeys of the building. Apartments at ten storeys or greater are deemed to be cross ventilated only if any enclosure of the balconies at these levels allows adequate natural ventilation and cannot be fully enclosed.

Developments that seek to vary from the minimum standards must demonstrate how natural ventilation can be satisfactorily achieved, particularly in relation to habitable rooms.

Natural Ventilation Potential

The proposed development has been provided with openings on multiple sides of apartments for the majority of proposed floor plans, allowing it to make use of wind-induced natural ventilation throughout the year and thereby minimising energy costs.

Based on our best engineering judgment, the qualitative study concluded that for the development:

- A significant proportion of those deemed to be ADG compliant will also have naturally cross-ventilated kitchens.
- Based on a qualitative study 61.2% (41 out of 67) of the apartments within the proposed development comply with the cross-ventilation requirements of the Australian Design Guide for the first nine stories (Refer **Table 1**).

This analysis has been made based on our best engineering judgment and on experience gained from model-scale wind tunnel testing or Computational Fluid Dynamics (CFD) analysis of a range of developments of similar magnitude to the currently proposed development. Quantitative modelling can be carried out to confirm the potential for natural cross ventilation at the proposed site.



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1.0 Introduction

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2.0 Proposed Development Overview

2.1 Development Site Location

The proposed building at 3 Holdsworth Avenue, St Leonards, bordered by Holdsworth Avenue to the east, Marshall Avenue to the north and existing low-rise residential development to the other directions - refer **Figure 1**.

Figure 1 Project Site Location



Image: Courtesy Nearmap, September 2024

2.2 Development Description

From the plans provided the proposed Development comprises the following:

- Four levels of basement car parking;
- Lower Ground Level with Holdsworth Avenue lobby entry, residential apartments and the car park entrance;
- Upper Ground Level with residential apartments, plant spaces and public open space;
- Level 1 with residential apartments and communal open space;
- Level 2-15 with residential apartments;



3.0 Natural Ventilation

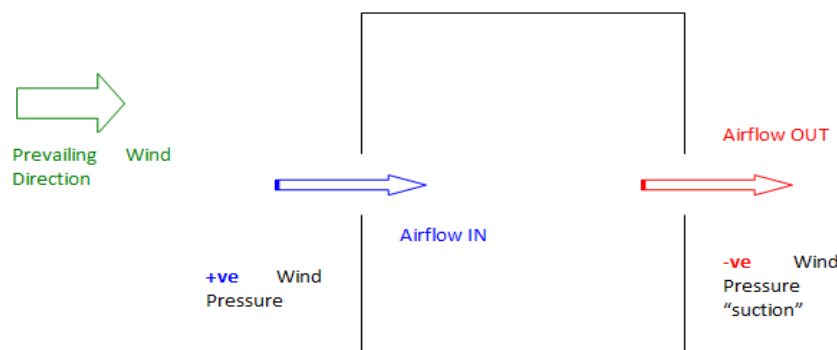
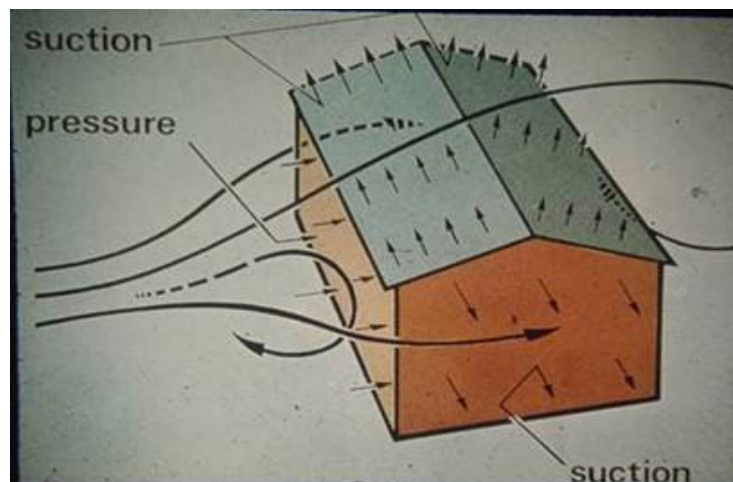
3.1 General Principles

A key feature of the proposed development is the incorporation of façade openings designed to enable various spaces within the development buildings to make use of wind-induced natural ventilation throughout the year thereby minimising energy costs.

Wind-induced natural ventilation works on the straightforward principle of differential pressure. If a building envelope has multiple openings and there exists a pressure difference between those openings, e.g. the wind pressure at one opening is greater than the pressure at the other opening; airflow will be pushed through the building in the direction positive to negative.

The resulting amount of airflow through the building envelope will be a function of the magnitude of the pressure differential, the size of the various building openings and degree of “blockage” in between. These features are illustrated in **Figure 2**.

Figure 2 Wind-Induced Natural Ventilation via Differential Pressure



4.0 Apartment Design Guide Requirements

The State Environmental Planning Policy (SEPP) 65 supported by the Australian Design Guide is relevant to the assessment of the natural ventilation through residential components of proposed development. Section 4B-3 of the Australian Design Guide states that:

At least 60% of apartments are naturally cross ventilated in the first nine storeys of the building. Apartments at ten storeys or greater are deemed to be cross ventilated only if any enclosure of the balconies at these levels allows adequate natural ventilation and cannot be fully enclosed.

The following points from the design guide are also noted.

- Overall depth of a cross-over or cross-through apartment does not exceed 18m, measured glass line to glass line.
- Natural ventilation to single aspect apartments is achieved with a light well or stack effect ventilation (or similar) or courtyards or building indentations have a width to depth ratio of 2:1 or 3:1 to ensure effective air circulation and avoid trapped smells.
- In cross-through apartments external window and door opening sizes/areas on one side of an apartment (inlet side) are approximately equal to the external window and door opening sizes/areas on the other side of the apartment (outlet side).



5.0 Qualitative Assessment

The natural ventilation for the proposed residential development has been qualitatively assessed. Ventilation is achieved by the differential pressure between the different building facades. Examples of the natural ventilation principles that apply for the proposed development are shown in **Figure 3**. Full diagrams for natural ventilation can be found in **Appendix A**.

The following comments are made regarding the proposed natural ventilation system for the development:

- Operable windows are provided on all facades.
- Balconies featuring sliding doors are positioned on all facades above the lower ground level, offering openings to various directions, thus significantly improving airflow, which makes it a favourable design selection. Reduced shielding is anticipated for the upper levels as a result.; therefore, the proposed development benefits from all prevailing Sydney winds, creating the potential for cross ventilation, refer to **Appendix A** for all flow paths.
- The ventilating area, constituting a minimum of 5% of the room's floor area, must be openable, though it doesn't need to remain fully open at all times, as clarified in the NCC. This design meets the criteria, satisfying the 5% effective opening area requirement outlined in the National Construction Code (NCC).
- Based on a qualitative study 61.2% (41 out of 67) of the apartments within the proposed development comply with the cross-ventilation requirements of the Australian Design Guide for the first nine stories (Refer **Table 1**).
- SLR also advises conducting a thorough ventilation assessment using CFD modelling to demonstrate its potential in promoting cross ventilation throughout these apartments.

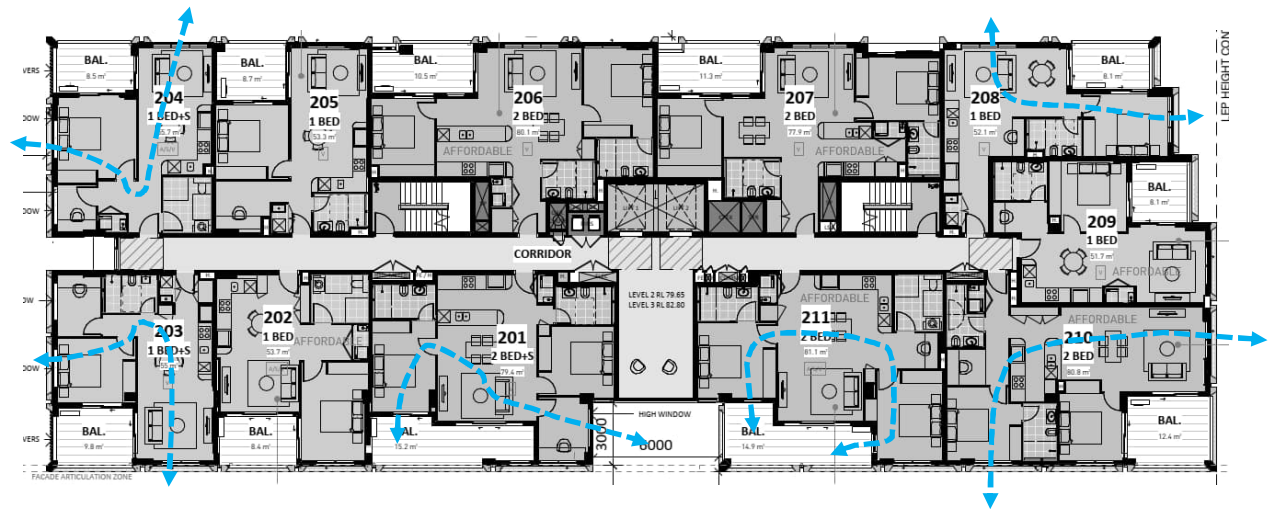
The following details the qualitative assessment as well as general comments.

Table 1 Apartments with Openings to Support Natural Ventilation

Level	Number of Apartments	No. Apartments Cross Ventilated	Total (%)
Lower Ground level	3	1	33.3%
Upper Ground level	3	1	33.3%
Level 1	9	6	66.6%
Level 2	11	6	54.5%
Level 3	11	6	54.5%
Level 4	7	5	71.4%
Level 5	8	6	75%
Level 6	8	6	75%
Level 7	7	4	57.1%
Total	67	41	61.2%



Figure 3 Natural Ventilation Flow Paths for Levels 2-3



6.0 Conclusion

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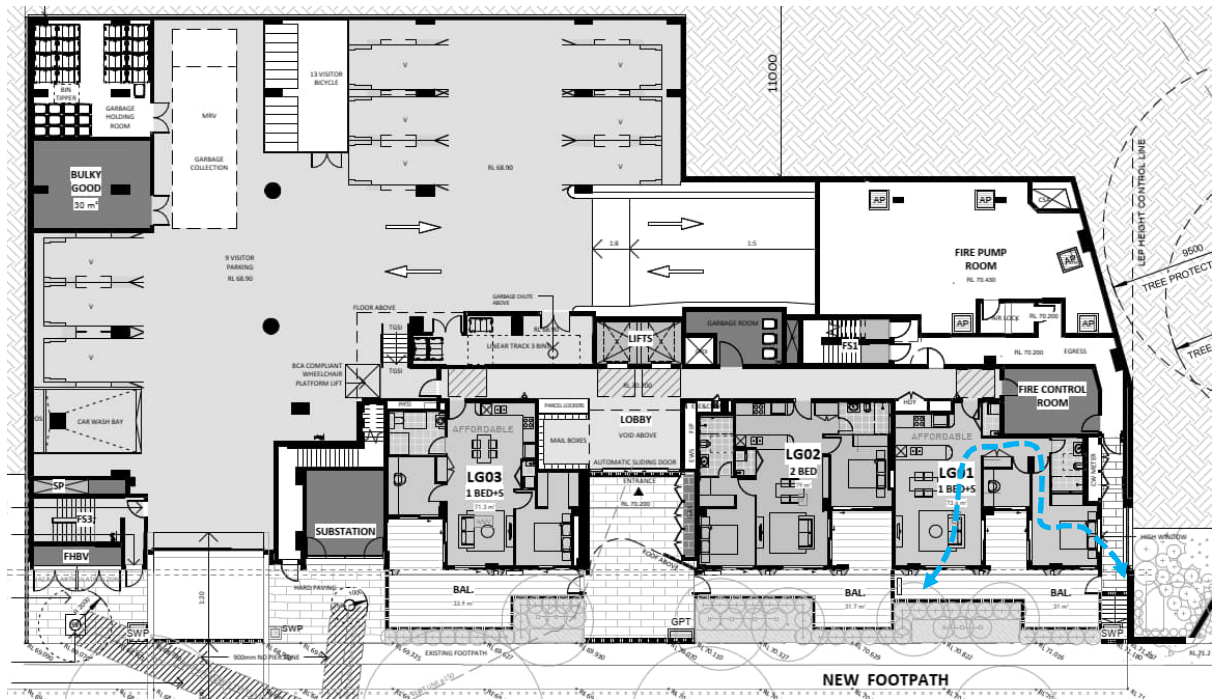
This analysis has been made based on our best engineering judgment and on experience gained from model-scale wind tunnel testing or Computational Fluid Dynamics (CFD) analysis of a range of developments of similar magnitude to the currently proposed development. Quantitative modeling can be carried out to confirm the potential for natural cross-ventilation at the proposed site.



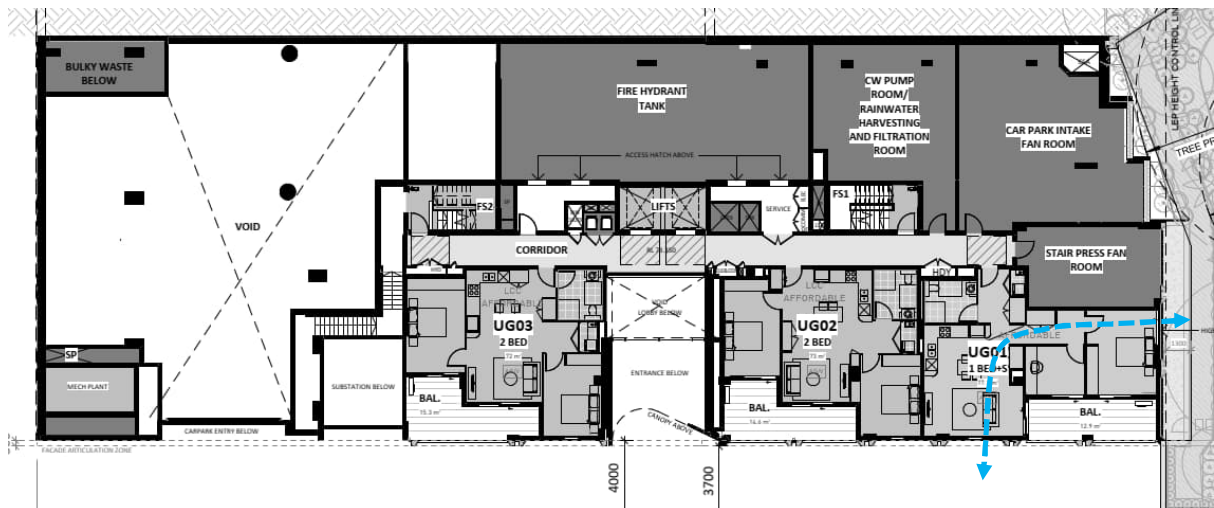
Appendix A Natural Ventilation Flow Paths



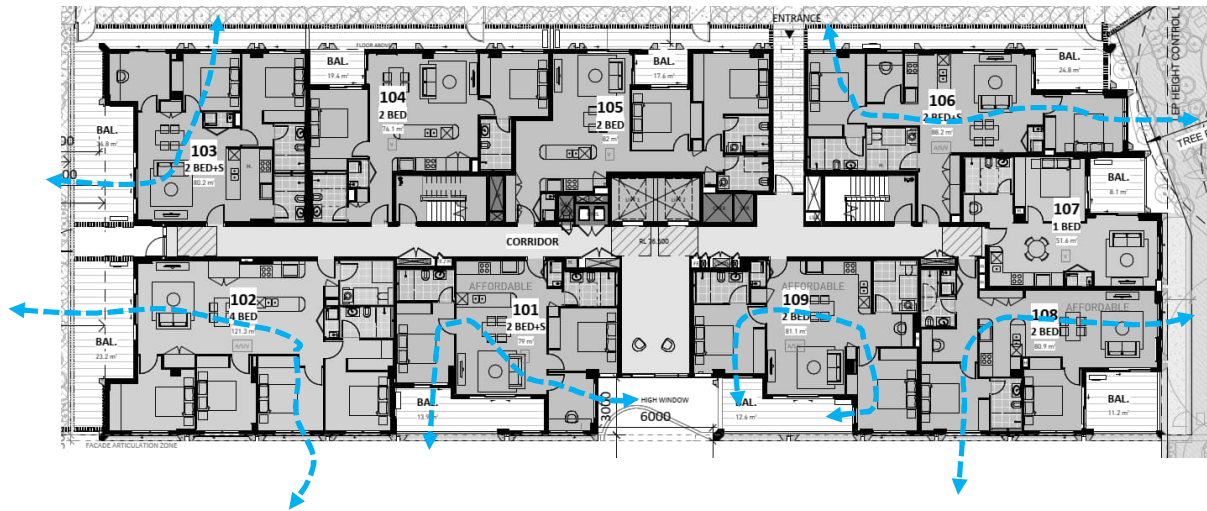
Lower Ground Level



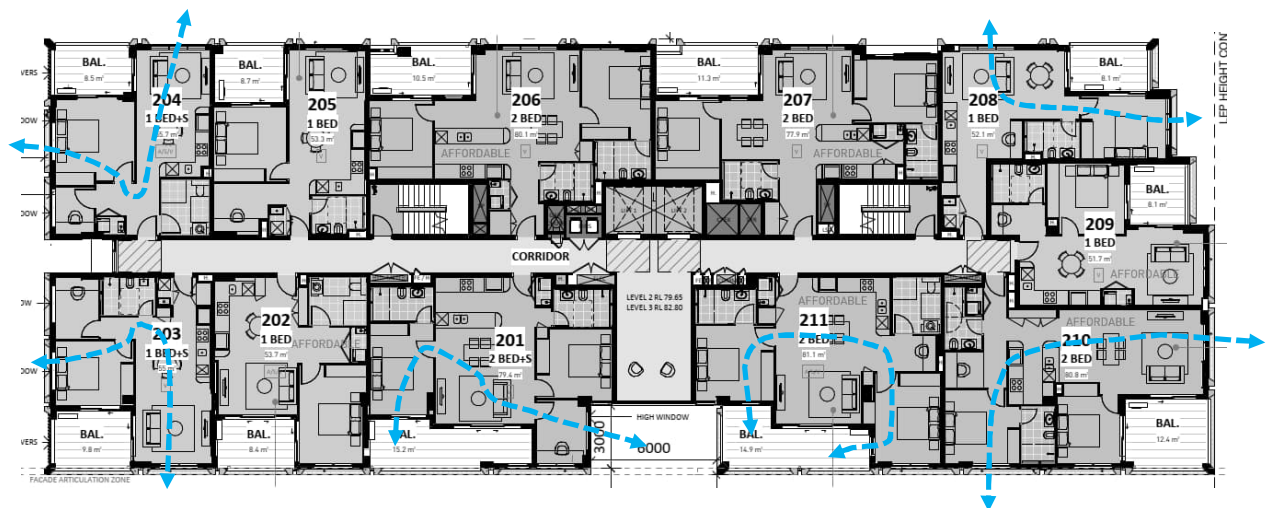
Upper Ground Level



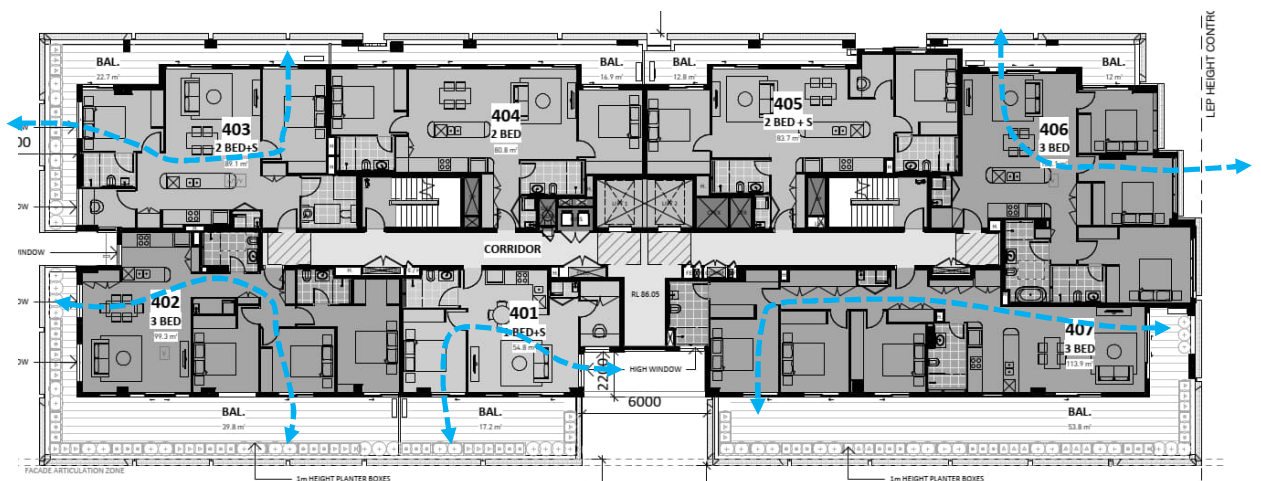
Level 1



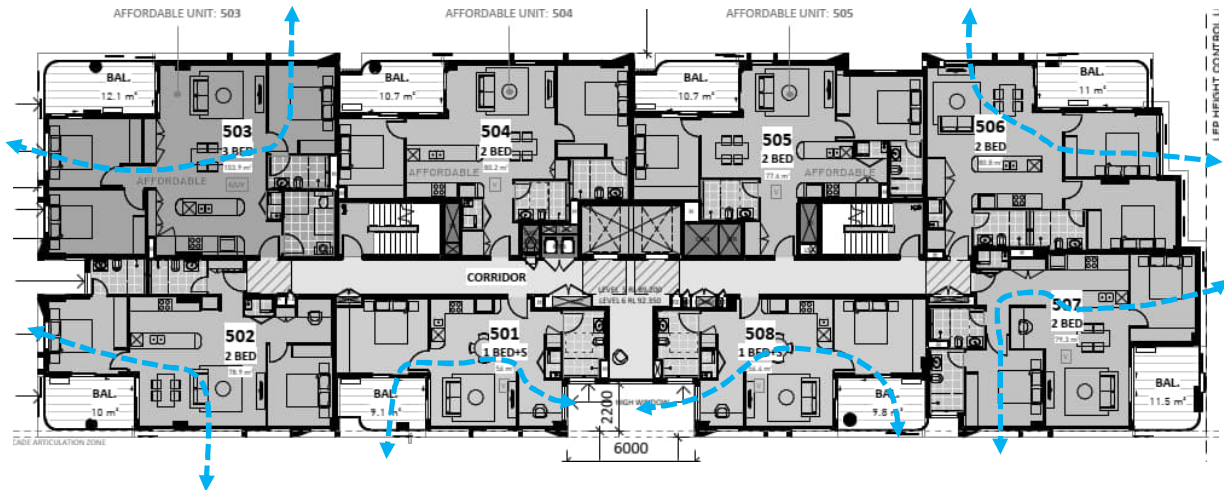
Levels 2 - 3



Level 4



Levels 5 - 6



Level 7





Making Sustainability Happen