WINDTECH

NATURAL VENTILATION STATEMENT

19-25 COLLEGE CRESCENT, ST IVES

WL119-01F02(REV1)- NVS REPORT

JUNE 4, 2026

Prepared for:

Equity Development Management

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AT THE LEADING EDGE

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DOCUMENT CONTROL

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EXECUTIVE SUMMARY

This natural ventilation study report has been prepared by Windtech Consultants to accompany a State Significant Development Application (SSDA) for the development of seniors housing accommodation at 19 - 25 College Crescent, St Ives, NSW, in the Ku-ring-gai Local Government Area (LGA). The site is legally described as Lot 2 and Lot 3 in DP616326. This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) (SSD-98363228) issued by the Department of Planning, Housing and Infrastructure on 10th November 2025.

This report presents an opinion on the natural ventilation performance of the various residential apartments of the proposed development located at 19-25 College Crescent, St Ives, based on our extensive experience in this field and the architectural drawings prepared by the project architect Jackson Teece, dated 25 May 2026. The results of the assessment are based on our extensive experience in modelling of natural ventilation in buildings and our understanding of the guidelines for wind-driven natural cross ventilation provided in the Apartment Design Guide (ADG) as per the State Environmental Planning Policy (Housing) 2021 Chapter 4 Design of residential apartment development.

The results of the assessment indicate that with the inclusion of treatment measures (plenums and louvres) a total of 72% (91 out of 126) of the residential apartments will achieve adequate levels of natural cross ventilation as per the ADG, which is more than the required minimum of 60%.

Initial Assessment (without the consideration of treatments)
Considering the design as per the most recent architectural drawings, a total of 55% (69 out of 126) of the residential apartments will achieve adequate levels of natural cross ventilation as per the ADG. Natural cross ventilation has been achieved through openings on orthogonal or opposite aspects (for example corner or through apartments), with direct exposure to prevailing winds or windows located in significantly different pressure regions as defined within Section 4B of the ADG.

Further Assessment (with the consideration of treatments)
A further assessment of the current design has been undertaken to determine additional apartments that could be considered as adequately naturally ventilated with the inclusion of additional openings in significantly different pressure regions. It has been determined that the following apartments are suitable for treatment with treatments described below:

Table 1: Apartments Suitable for Treatments

Building	Level	Apartment Number
D	Ground	DGF-02, DGF-03
	1	D01-04, D01-05
	2	D02-04, D02-05
	3	D03-04, D03-05
	4	A04-04, A04-05
	5	A05-04, A05-05
	6	D06-03, D06-04

Building	Level	Apartment Number
C	1	C01-04, C01-05
	2	C02-04, C02-05
	3	C01-04, C01-05
	4	C04-03, C04-04

- These non-corner/non-cross-through apartments are suitable candidates for treatment with the implementation of one of three of the following options:
    - Option 1: Plenum ducts connecting the apartment to the external façade of the building. The plenum must connect the apartment to the external façade on the opposite aspect of the building to attain a pressure differential high enough to achieve natural ventilation.
    - Option 2: Plenum ducts connecting the apartment to the lobby, and louvers above the lobby window/door, creating a breezeway from the external façade.
    - Option 3: Louvers above both the main entrance to the apartment and the lobby window/door to the external façade, creating a direct flow path between the apartment and external façade.

Note: The use of horizontal plenum ducts is a suitable means to ventilate apartments that are otherwise single aspect. Recent wind tunnel studies also show that the air flow through mid-façade apartments such as the above listed (which are connected to the opposite aspect via plenums) is comparable to the air flow through corner units and cross-through units that satisfy the ADG. It is also worth noting that, in the past, apartment designs incorporating horizontal plenums have been considered to satisfy the ADG guidelines by council authorities. Design guidelines on ventilated plenum ducts are listed in Section 4 of this report.

With the consideration of the above listed treated apartments, 72% (91 out of 126) of the residential apartments will achieve adequate levels of natural cross ventilation as per the ADG.

Further, an additional 7 apartments in building D (DGF-06, D01-08, D02-08, D03-08, A04-08, A05-08, and D06-06) could potentially achieve natural ventilation, subject to further modelling and testing. Apartments C04-01 and C04-06 in building C could also achieve natural ventilation through the implementation of operable skylights. With the inclusion of these 9 apartments and the treated apartments, 79% (100 out of 126) of the residential apartments could achieve adequate levels of natural cross ventilation.

Note that each habitable room should have an unobstructed opening size of at least of 5% of the floor area served by the opening, in accordance with Objective 4B-1 of the ADG and have a minimum free area of 0.4m2 in order to provide effective natural ventilation.

A list of architectural drawings referenced in this report is shown in in Table 2 below.

Table 2: List of Architectural Drawings Referenced

Drawing Number/Name	Revision Number	Date
DA-110-1 FLOOR PLAN – GROUND FLOOR – NORTH	1	25/05/2026
DA-110-2 FLOOR PLAN – GROUND FLOOR – SOUTH	1	25/05/2026
DA-111-1 FLOOR PLAN – LEVEL 01 – NORTH	1	25/05/2026
DA-111-2 FLOOR PLAN – LEVEL 01 – SOUTH	1	25/05/2026
DA-112-1 FLOOR PLAN – LEVEL 02 – NORTH	1	25/05/2026
DA-112-2 FLOOR PLAN – LEVEL 02 – SOUTH	1	25/05/2026
DA-113-1 FLOOR PLAN – LEVEL 03 – NORTH	1	25/05/2026
DA-113-2 FLOOR PLAN – LEVEL 03 – SOUTH	1	25/05/2026
DA-114-1 FLOOR PLAN – LEVEL 04 – NORTH	1	25/05/2026
DA-114-2 FLOOR PLAN – LEVEL 04 – SOUTH	1	25/05/2026
DA-115-1 FLOOR PLAN – LEVEL 05 – NORTH	1	25/05/2026
DA-115-2 FLOOR PLAN – LEVEL 05 – SOUTH	1	25/05/2026
DA-116-1 FLOOR PLAN – LEVEL 06 – NORTH	1	25/05/2026
DA-116-2 FLOOR PLAN – LEVEL 06 – SOUTH	1	25/05/2026
DA-117-1 FLOOR PLAN – LEVEL 07 – NORTH	1	25/05/2026
DA-117-2 FLOOR PLAN – LEVEL 07 – SOUTH	1	25/05/2026

CONTENTS

1 INTRODUCTION

A State Significant Development Application (SSDA) has been prepared in support of the proposed seniors housing development at 19 – 25 College Crescent, St Ives. The proposed development comprises:

- Site preparation and demolition of existing structures.
- Construction of four buildings ranging in heights from five to eight storeys comprising:
    - approximately one hundred and twenty-six (126) Independent Living Units
    - approximately forty-eight (48) residential care beds.
    - a range of resident amenities and facilities.
    - basement car parking containing approximately 260 spaces.
- Vehicular and pedestrian access from Link Road and College Crescent.
- Associated landscaping works.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) and accompanying cover letter issued for the project (reference SSD-98363228) dated 10th November 2025.

Specifically, this report has been prepared to respond to the SEARs requirement issued below.

Table 3: SEARs Requirements

SEARs Item	Description of requirement	Report Reference
6. Built Form and Urban Design	If relevant, provide an assessment of the development against: • the design principles for residential apartment development set out in Schedule 9 of the Housing SEPP and the Apartment Design Guide (ADG). This should include a table which demonstrates how each dwelling (including affordable dwellings) performs against the ADG design criteria.	Section 4
7. Environmental Amenity	• Assess amenity impacts on the surrounding locality, including solar access, visual privacy, view loss and view sharing, as well as wind, lighting and reflectivity impacts. A high level of environmental amenity for any surrounding residential or other sensitive land uses must be demonstrated.	Section 4

The Site

The primary area of the site is located at 19-25 College Crescent, St Ives, within the Ku-ring-gai Local Government Area and is approximately 10 kilometres north of Chatswood and 19 kilometres north of Sydney CBD. This primary site is legally described as Lot 3 in DP 616326.

A small part of site to be developed is the adjoining lot upon which the Masada College is located at 9-15 Link Road, St Ives (legally described as part of Lot 2 in DP 616326). This part of the development site will specifically be used for access purposes and provide a direct connection from the proposal to the Link Road frontage.

On this basis, the site (for the purpose of this SSDA) comprises:

- the (primary) residual land, being 14,480 square metres (accommodating the proposed buildings and associated spaces); and
- part of the adjoining land, being 1,060 square metres (accommodating the proposed access driveway and pedestrian link from the proposed buildings to the Link Road frontage)

The site is zoned SP2 Infrastructure under the Ku-ring-gai LEP 2015.

The surrounding area is characterised by residential flat buildings, aged care facilities, educational uses and commercial/retail uses within St Ives Town Centre, which is located approximately 400 metres west of the site on Mona Vale Road.

- To the north of the site is 132-138 Killeaton Street, which comprises a residential development with six residential flat buildings.
- To the east of this development (at 142 Killeaton Street) comprises town houses and further east (at 144-146 Killeaton Street on the corner of Yarrabung Road) exists an aged care facility (Estia Healthcare). The site is bounded to the east by College Crescent, with tall street trees providing partial screening of the site. On the eastern side of College Crescent are detached houses, set back from the road and generally below street level, with significant street-front planting.
- To the south of the site is Chabad North Shore. Further south are large, detached houses along Stanley Street and Lancaster Avenue, and residential flat buildings to the south-west along Stanley Street
- To the west of the site is Masada College, which includes early learning, junior and secondary schools. An easement will be created on the edge of the campus to provide vehicle access from Link Road for the development. Link Road, a four-lane regional road, runs west of the school campus and connects to Mona Vale Road. West of Link Road are residential buildings along Newhaven Place, and further west are medium and higher-density housing and commercial premises in St Ives Town Centre. This includes five-six -storey buildings along Porters Lane, St Ives Shopping Centre and St Ives Village Green. The shopping centre precinct is expected to be subject to future major redevelopment.

A map of the regional context of the site and an aerial of the site is shown in Figure 1 and Figure 2.

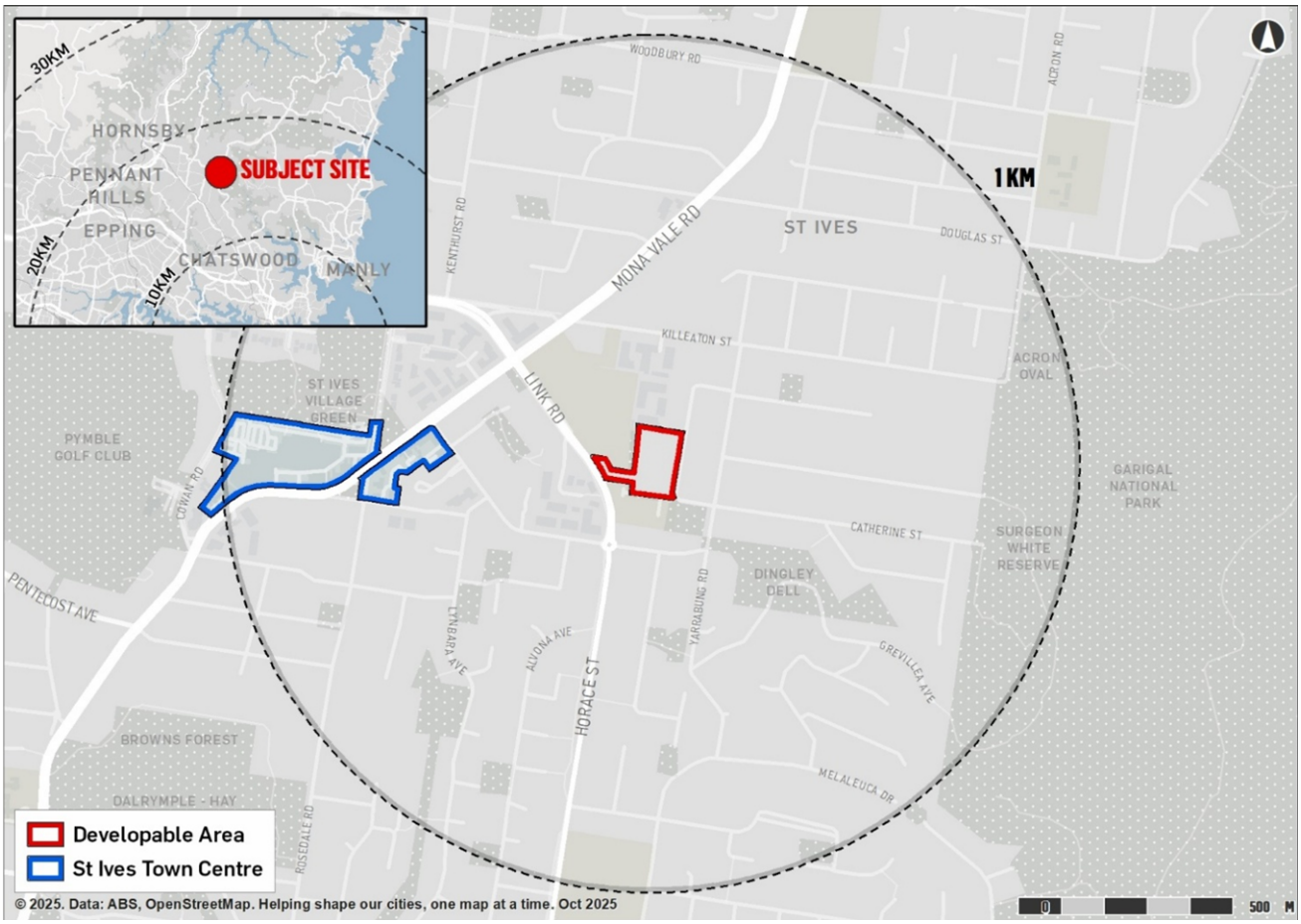

Figure 1: Regional Context (Source: Urbis)

Figure 2: Aerial Photography (Source: Urbis)

2 REGIONAL WIND CLIMATE

The Sydney region is governed by three principal wind directions, and these can potentially affect the subject development. These winds prevail from the north-east, south and west. This summary is based on an analysis of wind rose data obtained by the Bureau of Meteorology from Kingsford Smith Airport between 1995 and 2016. Directional plots of the daily average winds when temperatures are between 20-29.5°C; which is the thermal comfort range for this region is shown in Figure 3 below (when occupants tend to open windows for ventilation). These plots have been produced based on an analysis of recorded wind speed data obtained from Kingsford Smith Airport from 1995 to 2016.

Natural ventilation for a residential apartment is most beneficial during the warmer times of the year, when the occupants of the apartment are most likely to open the windows and/or doors and also when the cooling effect of airflow through the apartment is most effective. An analysis of the Sydney wind climate data within the thermal comfort zone range indicates that more than half of the wind events occur from the 'NNE' to 'S' sector, where the 'NNE' to 'NE' and 'SE' to 'S' sector winds are the most dominant.

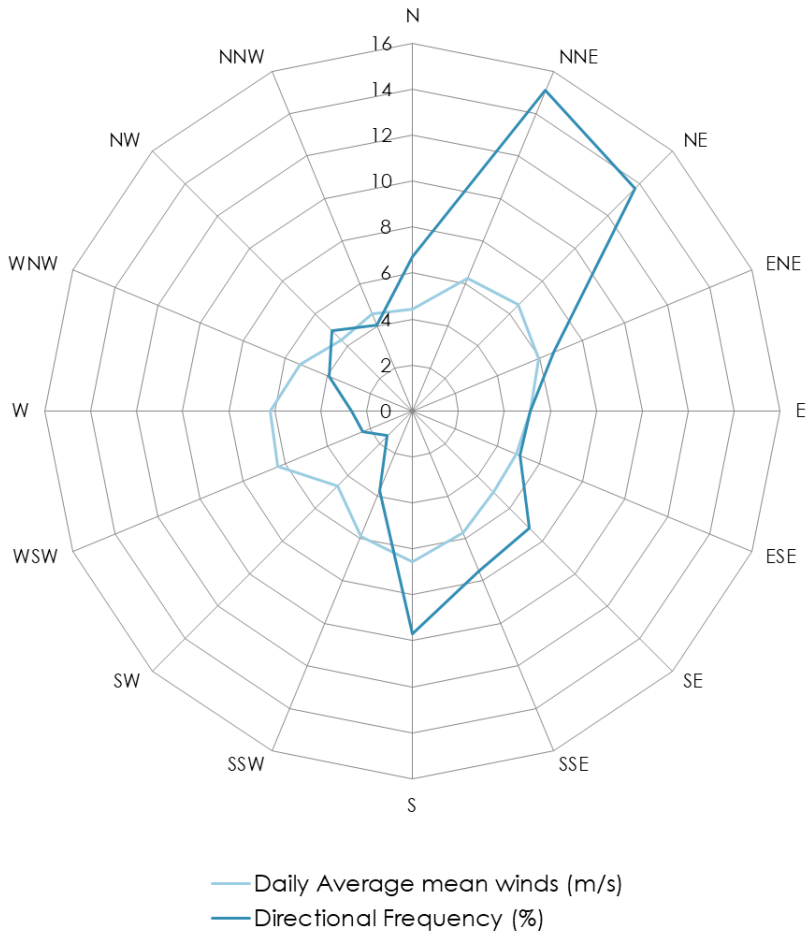

Figure 3: Daily Average Hourly Mean Wind Speeds, and Frequencies Occurrences,
for the Sydney Region for Outdoor Temperatures between 20-29.5°C
(based on observations from Kingsford Smith Airport from 1995 to 2016, corrected to open terrain at 10m)

3 NATURAL CROSS VENTILATION OF DEEMED TO SATISFY APARTMENTS

Natural ventilation of indoor areas can be used to improve both the level of occupant comfort and the air quality of an internal space. Natural ventilation is beneficial in improving occupant comfort during the warmer months of the year when the occupants will generally have windows and doors open, while during the winter months it is considered primarily beneficial for air quality purposes only.

The predominant wind directions for the region have been analysed in Section 2 of this report, and from this analysis only the north-easterly and southerly winds should be considered as contributors to natural ventilation for occupant comfort purposes, since these are the predominant wind directions during the warmer months of the year. The westerly winds are predominant during the cooler winter months and would be beneficial for air quality purposes only.

The Apartment Design Guide (ADG) as per the State Environmental Planning Policy (Housing) 2021 Chapter 4 Design of residential apartment development. states that, for a development to be considered naturally ventilated, at least 60% of the individual apartments in the first nine storeys of the building must be considered to be naturally cross ventilated. 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. To be considered to be naturally cross ventilated, the overall depth of a cross-over or cross-through apartment must not exceed 18m, measured glass line to glass line. Examples of apartments which are classified as being naturally ventilated by the Apartment Design Guide are shown in Figure 4 below, which also show the flow paths for natural cross ventilation through the apartments.

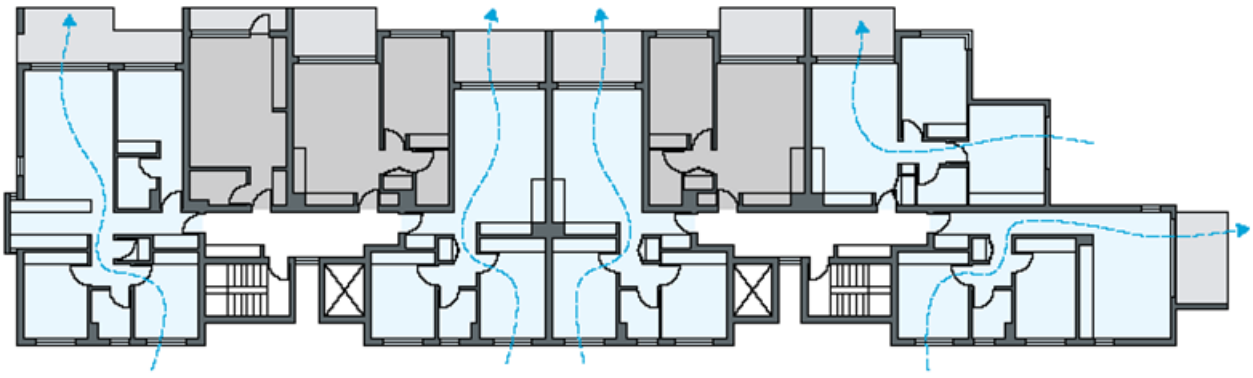

Figure 4a: Examples of Apartments Achieving Effective Natural Cross Ventilation
(from Apartment Design Guide, floor plan of a typical residential building)

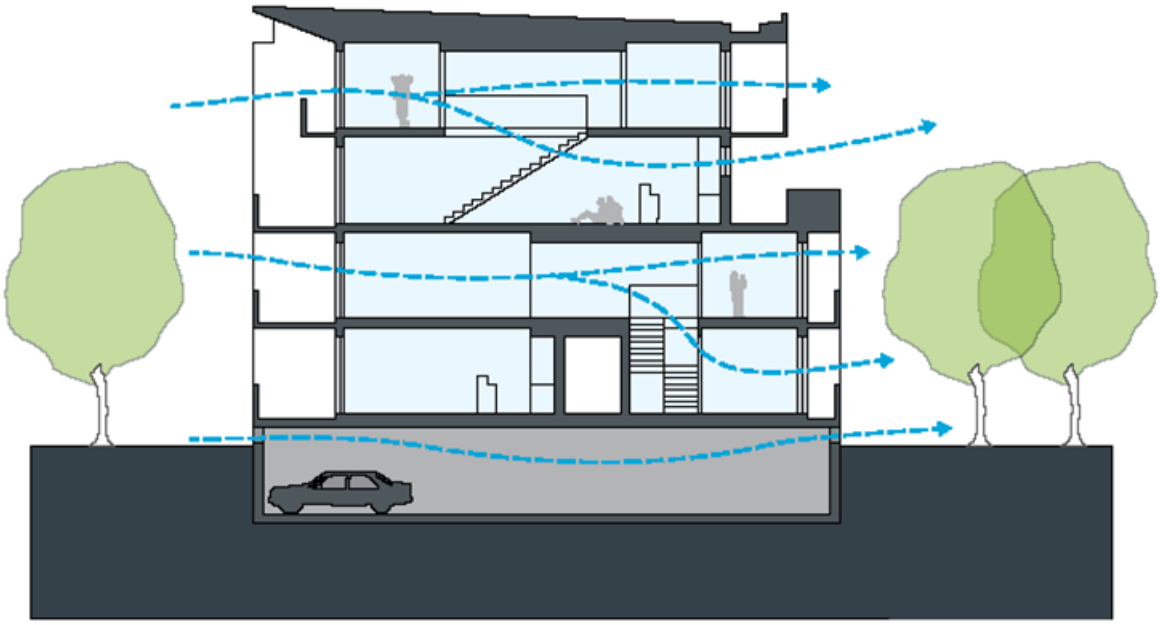

Figure 4b: Examples of Apartments Achieving Effective Natural Cross Ventilation
(from Apartment Design Guide, section elevation of a typical residential building)

Apartments have been considered to have dual aspects if the two openings are able to be located on aspects which are less than 135° in plan orientation from each other. Openings which are located on aspect orientations greater than this are more likely to have similar pressures at the opening, and their performance cannot be considered to satisfy based on the ADG guidelines. These apartments may still be considered to be naturally ventilated, but will require further analysis, as outlined in Section 4.

The Apartment Design Guide does provide design guidance for the layout and design of single aspect apartments to maximise natural ventilation. While these are not considered naturally cross ventilated, they allow for site restraints for design excellence in single aspect apartments. The design allows for the inclusion of plenums, vertical ventilation shafts and building indentations with a width to depth ratio of 2:1 or 3:1 to ensure effective air circulation and avoid trapped smells.

It is important that the naturally cross ventilated flow path does not flow through a bathroom in order to avoid issues with odours.

It should be noted that deviations in the apartment layout shown in the Apartment Design Guide can have the potential to provide effective natural ventilation through the apartment. However, due to the complicated nature of flow paths driven by pressure differentials at different openings of an apartment, the effectiveness of natural ventilation for apartments which are outside of those presented in Figure 4 should be demonstrated by means of a detailed wind tunnel study. A comparison between the predicted natural ventilation characteristics of an apartment obtained from wind tunnel testing with the observed full-scale characteristics of the same apartment have been published in the paper titled 'Designing for Natural Ventilation for Tall Residential Buildings' by Peddie and Rofail (2011), which demonstrates close agreement.

4 RESULTS AND DISCUSSION

The results of the assessment indicate that with the inclusion of treatment measures (plenums and louvres) a total of 72% (91 out of 126) of the residential apartments will achieve adequate levels of natural cross ventilation as per the ADG, which is more than the required minimum of 60%.

Initial Assessment (without the consideration of treatments)
Considering the design as per the most recent architectural drawings, a total of 55% (69 out of 126) of the residential apartments will achieve adequate levels of natural cross ventilation as per the ADG. Natural cross ventilation has been achieved through openings on orthogonal or opposite aspects (for example corner or through apartments), with direct exposure to prevailing winds or windows located in significantly different pressure regions as defined within Section 4B of the ADG.

Further Assessment (with the consideration of treatments)
A further assessment of the current design has been undertaken to determine additional apartments that could be considered as adequately naturally ventilated with the inclusion of additional openings in significantly different pressure regions. It has been determined that the following apartments are suitable for treatment with treatments described below:

Table 4: Apartments Suitable for Treatments

Building	Level	Apartment Number
D	Ground	DGF-02, DGF-03
	1	D01-04, D01-05
	2	D02-04, D02-05
	3	D03-04, D03-05
	4	A04-04, A04-05
	5	A05-04, A05-05
	6	D06-03, D06-04
C	1	C01-04, C01-05
	2	C02-04, C02-05
	3	C01-04, C01-05
	4	C04-03, C04-04

- These non-corner/non-cross-through apartments are suitable candidates for treatment with the implementation of one of three of the following options:
    - Option 1: Plenum ducts connecting the apartment to the external façade of the building, as shown in Figure 5. The plenum must connect the apartment to the opposite aspect of the external façade to attain a pressure differential high enough to achieve natural ventilation.
    - Option 2: Plenum ducts connecting the apartment to the lobby, and louvers above the lobby window/door, creating a breezeway from the external façade, as shown in Figure 6.

- Option 3: Louvers above both the main entrance to the apartment and the lobby window/door to the external façade, as shown in Figure 7.

Note: The use of horizontal plenum ducts is a suitable means to ventilate apartments that are otherwise single aspect. Recent wind tunnel studies also show that the air flow through mid-façade apartments such as the above listed (which are connected to the opposite aspect via plenums) is comparable to the air flow through corner units and cross-through units that satisfy the ADG. It is also worth noting that, in the past, apartment designs incorporating horizontal plenums have been considered to satisfy the ADG guidelines by council authorities. Design guidelines on ventilated plenum ducts are listed in Section 4 of this report.

With the consideration of the above listed treated apartments, 72% (91 out of 126)) of the residential apartments will achieve adequate levels of natural cross ventilation as per the ADG.

Further, an additional 7 apartments in building D (DGF-06, D01-08, D02-08, D03-08, A04-08, A05-08, and D06-06) could potentially achieve natural ventilation, subject to further modelling and testing. Apartments C04-01 and C04-06 in building C could also achieve natural ventilation through the implementation of operable skylights. With the inclusion of these 9 apartments and the treated apartments, 79% (100 out of 126) of the residential apartments could achieve adequate levels of natural cross ventilation.

The natural ventilation performance of the various residential apartments of the subject development is summarised in Table 5.

Note that it is important that the naturally cross ventilated flow path does not flow through a bathroom in order to avoid issues with odours. Additionally, each habitable room should have an unobstructed opening size of at least of 5% of the floor area served by the opening, in accordance with Objective 4B-1 of the ADG and have a minimum free area of 0.4m2 in order to provide effective natural ventilation.

Table 5: Natural Ventilation Performance

Building	Unit Number	Meets ADG Guidelines for Natural Cross Ventilation
A	A01-01	YES
	A01-02	YES
	A01-03	NO
	A01-04	YES
	A01-05	YES
	A02-01	YES
	A02-02	YES
	A02-03	NO
	A02-04	YES
	A02-05	YES
	A02-06	NO
	A03-01	YES
	A03-02	YES

Building	Unit Number	Meets ADG Guidelines for Natural Cross Ventilation
	A03-03	NO
	A03-04	YES
	A03-05	YES
	A03-06	NO
	A04-01	YES
	A04-02	YES
	A04-03	NO
	A04-04	YES
	A04-05	YES
	A04-06	NO
	A05-01	YES
	A05-02	YES
	A05-03	NO
	A05-04	YES
	A05-05	YES
	A05-06	NO
	A06-01	YES
	A06-02	NO
	A06-03	YES
	A06-04	YES
	A06-05	NO
	A07-01	YES
	A07-02	YES
C	CGF-01	NO
	CGF-02	YES
	CGF-03	YES
	CGF-04	NO
	CGF-05	NO
	C01-01	NO
	C01-02	YES
	C01-03	YES
	C01-04	YES, with the inclusion of treatments described in Section 4
	C01-05	YES, with the inclusion of treatments described in Section 4
	C01-06	YES

Building	Unit Number	Meets ADG Guidelines for Natural Cross Ventilation
	C01-07	YES
	C01-08	NO
	C02-01	NO
	C02-02	YES
	C02-03	YES
	C02-04	YES, with the inclusion of treatments described in Section 4
	C02-05	YES, with the inclusion of treatments described in Section 4
	C02-06	YES
	C02-07	YES
	C02-08	NO
	C03-01	NO
	C03-02	YES
	C03-03	YES
	C03-04	YES, with the inclusion of treatments described in Section 4
	C03-05	YES, with the inclusion of treatments described in Section 4
	C03-06	YES
	C03-07	YES
	C03-08	NO
	C04-01	NO[1]
	C04-02	YES
	C04-03	YES, with the inclusion of treatments described in Section 4
	C04-04	YES, with the inclusion of treatments described in Section 4
	C04-05	YES
	C04-06	NO[1]
D	DGF-01	YES
	DGF-02	YES, with the inclusion of treatments described in Section 4
	DGF-03	YES, with the inclusion of treatments described in Section 4
	DGF-04	YES
	DGF-05	YES

Building	Unit Number	Meets ADG Guidelines for Natural Cross Ventilation
	DGF-06	NO[1]
	D01-01	NO
	D01-02	YES
	D01-03	YES
	D01-04	YES, with the inclusion of treatments described in Section 4
	D01-05	YES, with the inclusion of treatments described in Section 4
	D01-06	YES
	D01-07	YES
	D01-08	NO[1]
	D02-01	NO
	D02-02	YES
	D02-03	YES
	D02-04	YES, with the inclusion of treatments described in Section 4
	D02-05	YES, with the inclusion of treatments described in Section 4
	D02-06	YES
	D02-07	YES
	D02-08	NO[1]
	D03-01	NO
	D03-02	YES
	D03-03	YES
	D03-04	YES, with the inclusion of treatments described in Section 4
	D03-05	YES, with the inclusion of treatments described in Section 4
	D03-06	YES
	D03-07	YES
	D03-08	NO[1]
	D04-01	NO
	D04-02	YES
	D04-03	YES
	D04-04	YES, with the inclusion of treatments described in Section 4

[1] Apartments that could potentially achieve natural ventilation, subject to further modelling and testing or using operable skylights.

Building	Unit Number	Meets ADG Guidelines for Natural Cross Ventilation
	D04-05	YES, with the inclusion of treatments described in Section 4
	D04-06	YES
	D04-07	YES
	D04-08	NO[1]
	D05-01	NO
	D05-02	YES
	D05-03	YES
	D05-04	YES, with the inclusion of treatments described in Section 4
	D05-05	YES, with the inclusion of treatments described in Section 4
	D05-06	YES
	D05-07	YES
	D05-08	NO[1]
	D06-01	NO
	D06-02	YES
	D06-03	YES, with the inclusion of treatments described in Section 4
	D06-04	YES, with the inclusion of treatments described in Section 4
	D06-05	YES
	D06-06	NO[1]
	D07-01	YES
	D07-02	YES
	D07-03	YES

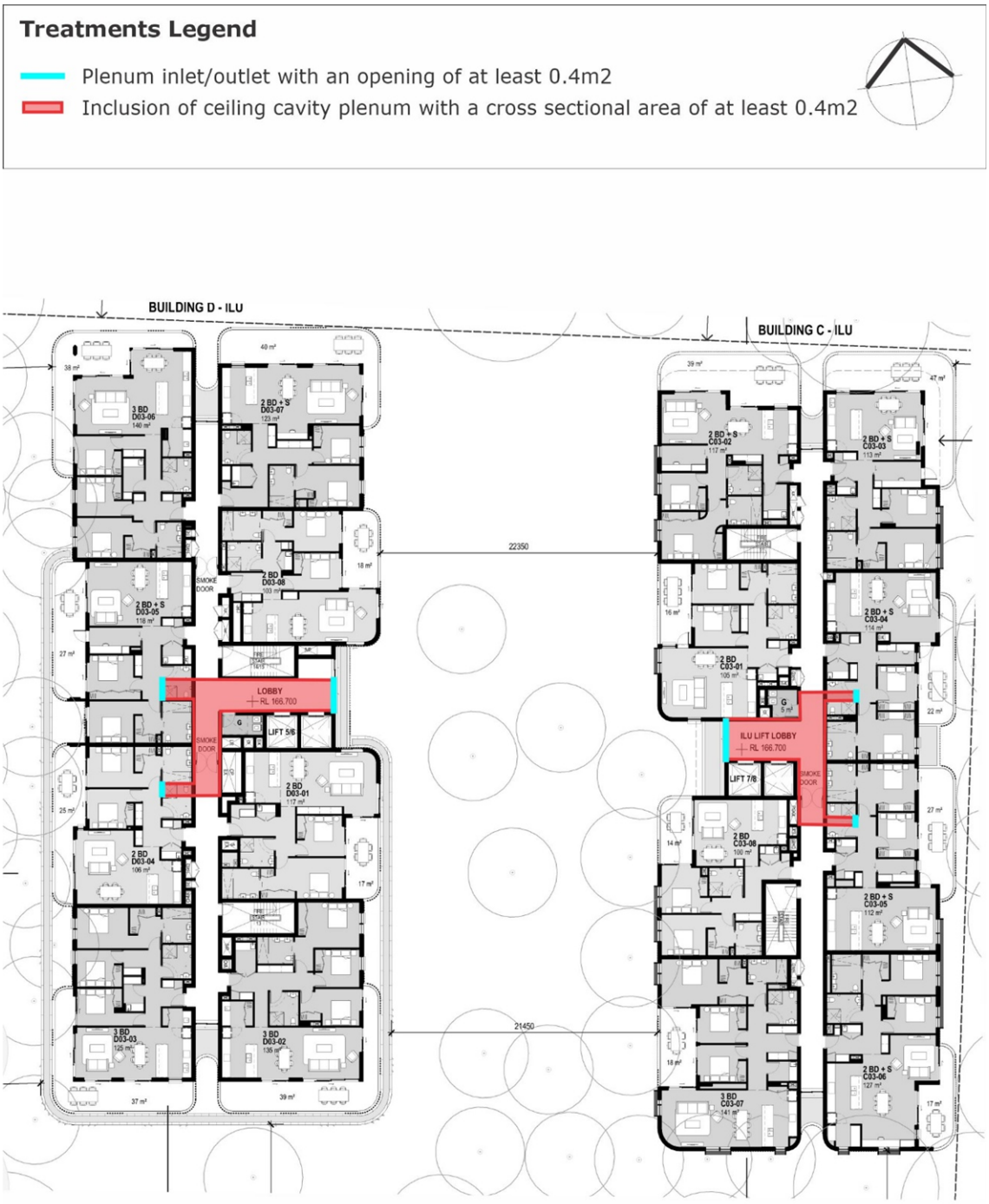

Figure 5: Plenum Treatment for a Typical Level

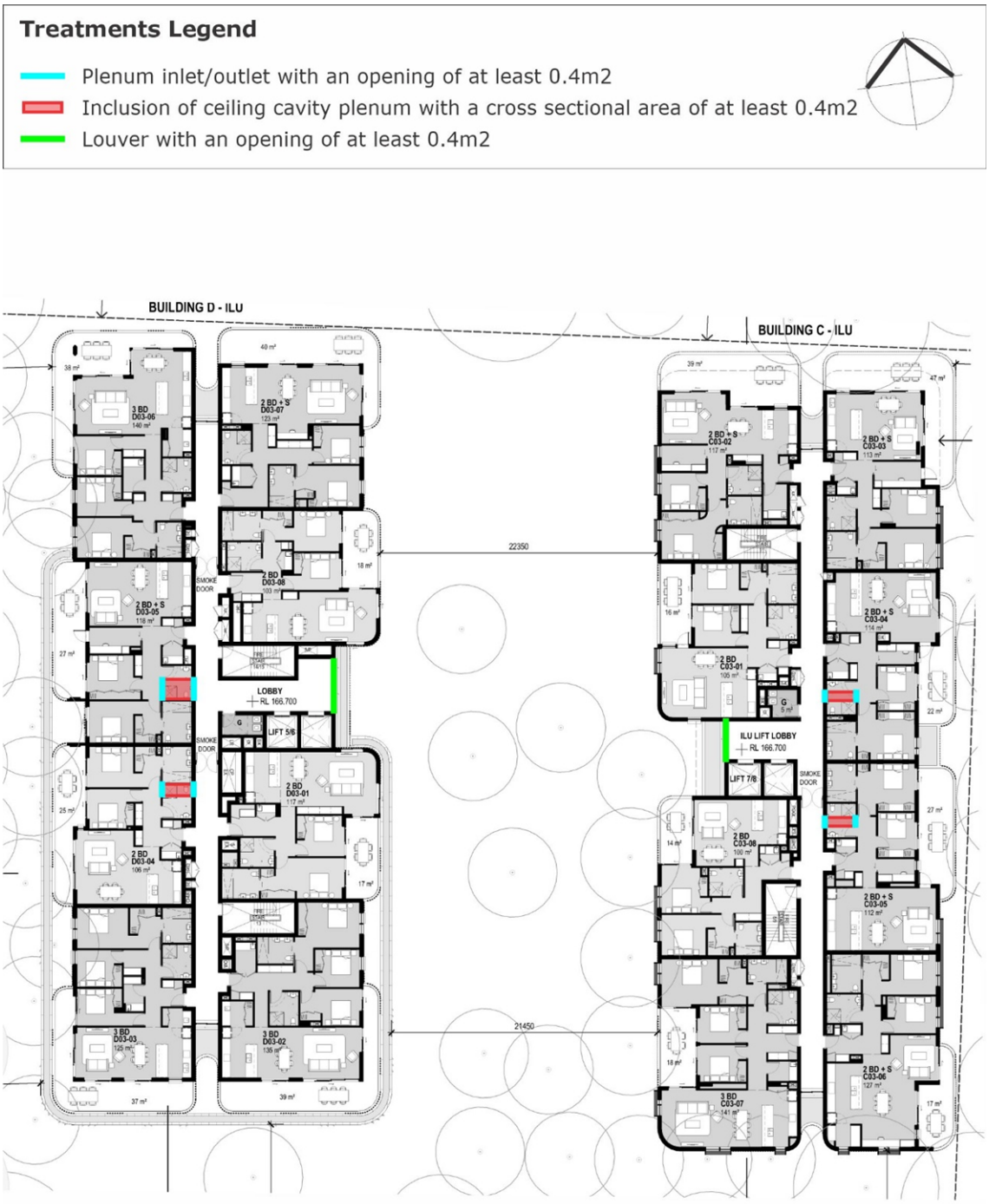

Figure 6: Plenum and Louver Treatment for Typical Level

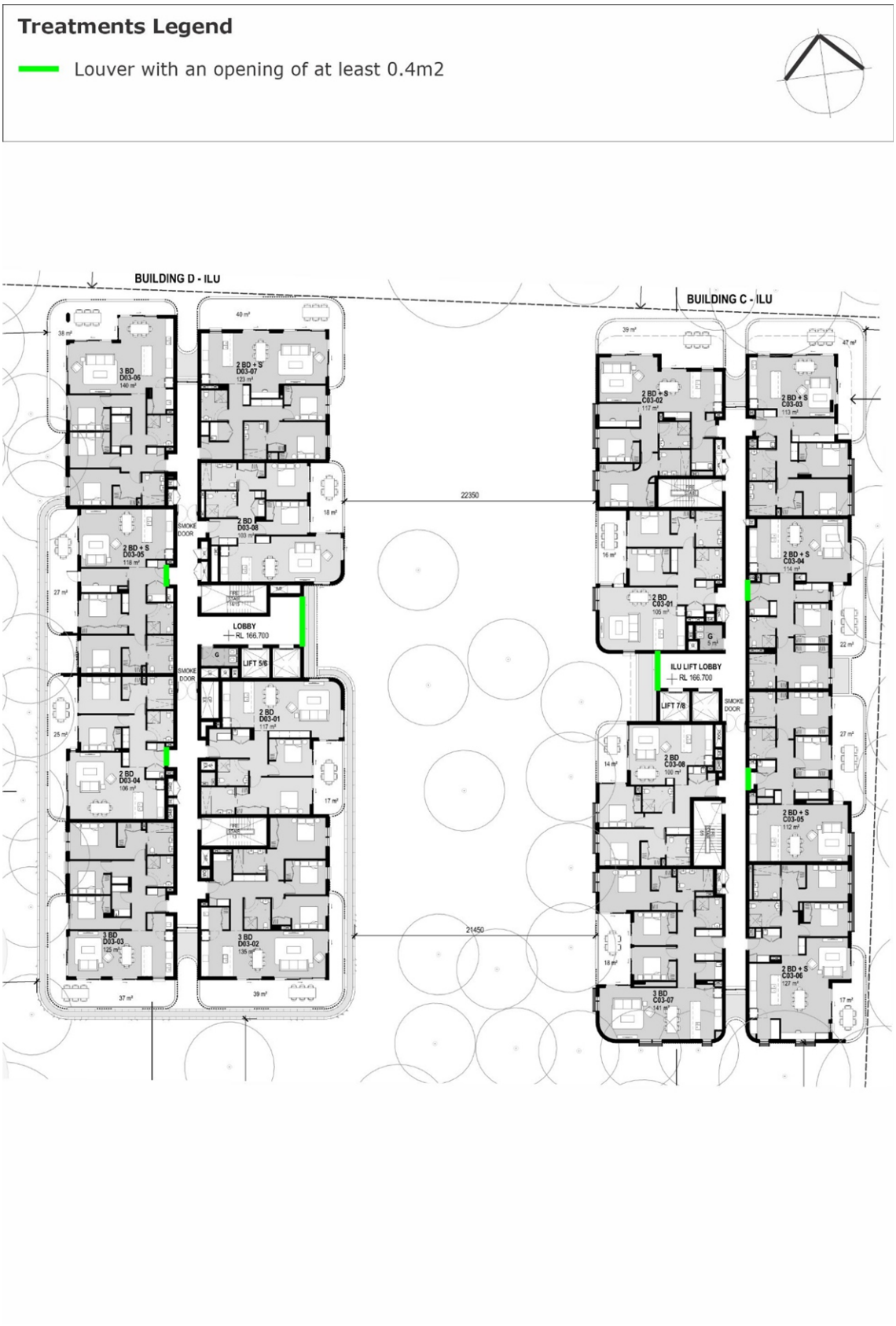

Figure 7: Louver Treatment for Typical Level

5 DESIGN GUIDELINES

To ensure effective natural cross ventilation is achieved for at least 60% of apartments, the following design details are recommended to be incorporated into the final design of the apartments. It is recommended that the minimum effective openable area of these openings to be a minimum of 0.4m^2 or at least of 5% of the floor area served by the opening, in accordance with Objective 4B-1 of the ADG. They are summarised as follows:

5.1 Plenum Ducts

- Natural ventilation is a product of pressure driven flow between two openings, in this case flow between an opening along the external apartment's façade, which is more positively pressurised and one on the directly opposite lobby façade (hallway), which is more negatively or neutrally pressurised.
- The plenum ducts are to extend within the ceiling's spaces above the habitable space for which natural ventilation is sought, where the inlet is best situated at the rear of habitable space and the internal hallway.
- The inlet openings and the plenum duct should have a **minimum cross-sectional free area of 0.4m^2** in order to provide effective natural ventilation for a single apartment connected to a single shaft.
- The plenum duct should connect the inlet/outlet openings with minimal bending to prevent pressurisation losses within the duct.
- Obstructions to flow within the duct such as pipes are recommended to be kept to a minimum.
- Provisions may need to be made for acoustic lining to mitigate the potential noise transfer, as well as for the inclusion of fire dampers in the shaft. The design and location of these should be verified by the fire engineer as requirements for access may be stipulated.
- Provisions may need to be made for the inclusion of operable or one-way louvres at the inlet opening in the rear of the apartment to mitigate the potential smell transfer.

6 REFERENCES

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