



Report

BUILDING SERVICES

65 Kingsmill St, Port Hedland - Dust Report Megara

CONFIDENTIAL

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Table of Contents

1. TOWN OF PORT HEDLAND REQUIREMENTS	1
1.1. RECOMMENDATIONS TO REDUCE DUST INGRESS	1
1.2. FILTRATION RATINGS	2
1.3. OUTSIDE AIR UNIT	2
2. APPENDIX A	3
MARKED UP DRAWINGS SHOWING POSITIONS OF DUST PROTECTION MEASURES	3
3. APPENDIX B	4
EXTRACT FROM CA&MJ LOMMERS PTY LTD	4
4. APPENDIX C	5
CLAUSE 6.3 TOWN OF PORT HEDLAND	5
5. APPENDIX D	6
LOCATION OF THE SITE IN RELATION TO POINT FINUCANE	6
6. APPENDIX E	7
AS1668.1 EXTRACT – RELATING TO BATHROOM EXHAUST PROVISIONS	7



1. TOWN OF PORT HEDLAND REQUIREMENTS

We understand that the residential development at 65 Kingsmill St is within the West End Residential Zone and is adjacent the waterfront. The site is bounded to the south by Kingsmill Street and located adjacent to Crowe St, in Port Hedland. The development plan/design guideline adopted by the council detail the building design and performance standards to reduce exposure to dust and to include, but not necessarily be limited to:

- Filtration of incoming air into the building
- Location of operable windows and doors on the western and southern building facades only;
- Use of deflection screens on the northern and eastern edges of operable windows;
- Use of eaves;
- Protective screens and porticos at building entrances to reduce the direct impact of wind onto the opening.

As per Councils legal advice, Clause 6.3.9 of the Scheme (TPS5) is prescriptive and does not allow innovative design solutions and therefore all applications are to be accompanied by a report prepared by a certified Mechanical Engineer, certifying that the design will mitigate dust exposure and achieves the same intent as the prescriptive provisions of clause 6.3.9 of TPS5. This report has examined the proposed design of the 65 Kingsmill St development and by incorporating the recommendations made within confirms that the design will mitigate dust ingress impacts and achieves the same intent as TPS5, as per our assessment below.

1.1. Recommendations to Reduce Dust Ingress

Therefore to maintain an energy efficient design to meet BCA section J requirements we offer the following solutions to comply and where possible to mitigate the dust issue.

1. The north facing aspect is considered to be unaffected by the entrainment of dust due to the northerly prevailing winds as shown in appendix D. The prevailing north westerly winds crossing Point Finucane may contain a low quantity of entrained dust which can be mitigated by the provision of the balcony walls, pressurisation of the apartment and self closing doors.
2. Units are all fitted with ducted split type air conditioning systems. Outside air is filtered and preconditioned by a dedicated outside air unit then ducted into the main air conditioning system, with return air which is again filtered and conditioned to meet the heating and cooling requirements of the spaces. See notes below on outside air.
3. The quantity of outside air will be determined by meeting the exhaust air rates, BCA code requirements for mechanical ventilation as well as over supplying to provide a positive pressurisation of the units to stop uncontrolled outside air ingress.
4. The outside air will be provided at a sufficient quantity to pressurise the space to reduce dust being drawn into the building due to wind pressure on the building.
5. The internal and outside air will be filtered to the standards required by the Town development standards. Outside air shall be filtered by a coarse filter and higher grade filter of G4 and F4 classification filters respectively. The internal air mixed with the filtered outside air will be filtered by a high grade F4 filter.
6. Entry door and balcony doors will be fitted with dust seals.



7. The toilet and bathroom would be fitted with vertical discharge exhaust systems. The total exhaust air quantity would be 50% lower than the fresh air intake to provide a positive pressure within the unit.
8. Referring to the floors plans provided there are no additional screening devices required as the balcony walls form a deflection screen along the Western facade, while there are no operable windows along the eastern or southern facades of the building.

We consider these measures demonstrate that the proposed design achieves the same intent as the provisions within Clause 6.3.9 of Town of Port Hedland Planning Scheme No. 5.

1.2. Filtration Ratings

The following air filter grade list is for BS EN779 and BS EN1822 tests. The tests apply to filters used for HVAC, controlled zones and other process control requirements.

BS EN 779 Arrestance		Test type/application
G1	<65	Average value for collection of large particles using synthetic dust. Filters installed to prevent mechanical system fouling and as pre-filters to secondary and semi-HEPA range.
G2	65<80	
G3	80<90	
G4	>90	

BS EN 779 Efficiency %		Test type/application
F5	40<60	Average percentage value (for atmospheric dust spot efficiency) using atmospheric air. Filters installed to keep buildings and process spaces clean and free from airborne pollution.
F6	60<80	
F7	80<90	
F8	90<95	
F9	>95	

BS EN 1822 Min MPPS %		Test type/application
H10	85	EN 1822 – Oil mist aerosol MPPS.
H11	95	Filters for specific (high efficiency) air quality control
H12	99.5	
H13	99.95	
H14	99.995	

1.3. Outside Air Unit

Inclusion of an outside air unit providing a quantity of approximately 100 litres per second of filtered, pre conditioned outside air to pressurise each apartment and provide outside air to the areas which do not have operable windows, is a required feature of any HVAC design for these apartments in the North West location.

The outside air unit would generally be located above the entry hall way. The fresh air intake would ideally be located on the east side of the apartments. However if this is not possible for all of the apartments, intakes on the southern facade are also acceptable.

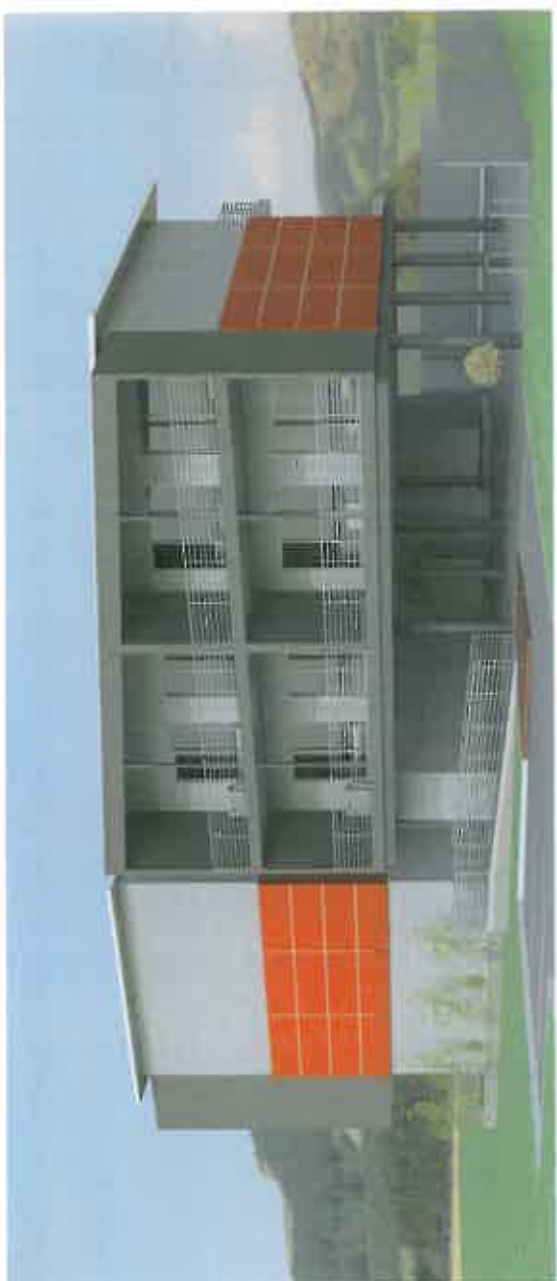
The air conditioning units are to be designed and selected to handle Port Hedland conditions and provide an air off condition which leads to a maximum internal humidity in the range of 55% RH \pm 5% under design conditions.

Any unit selected will have to handle the additional static pressure capacity that will be present in the air distribution system, as a result of the presence of high efficiency air filters.



2. APPENDIX A

Marked Up Drawings Showing Positions of Dust Protection Measures





Level 1, 2D Perspective View
 Project: Water Purification
 11/2023
 © 2023

11/2023
 © 2023



PROJECT NO.	11/2023	DATE	11/2023
PROJECT NAME	Water Purification	SCALE	1:100
CLIENT	MEASATA	DESIGNER	MEASATA



3. APPENDIX B

Extract from CA&MJ Lommers Pty Ltd

Report Pages 56-57.

The following figure 3 illustrates how air flows around rectangular buildings. It can be established from the streamlines, in the illustration, that wind velocities on the leeward side of the building are lower than the windward side due to the re-circulating of wind down-wind from the building.

This reduction in wind velocity may provide air-borne dust opportunity to settle out of the air and not be drawn into the building.

3. WINDOW AND DOOR ORIENTATION (cont.)

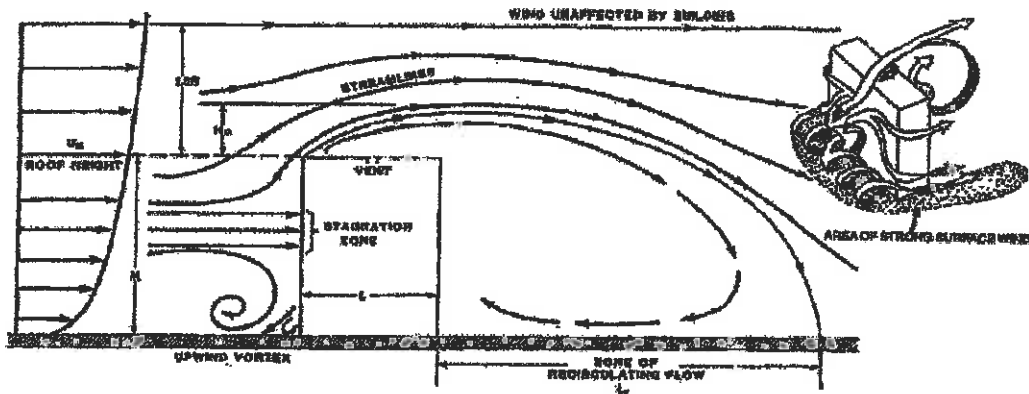
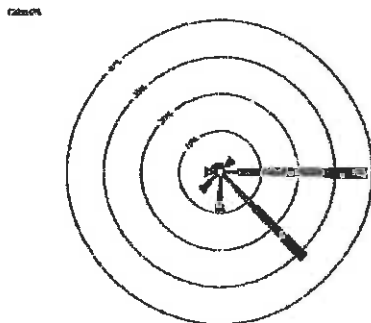


Figure 3 – Flow Patterns around a Rectangular Building (ASHRAE – Fundamentals 2001)

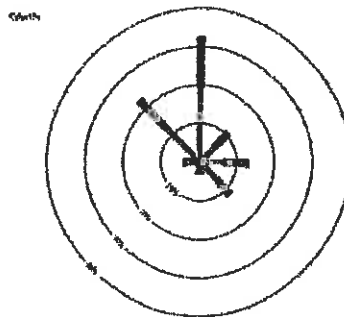
For this reason, openings should be limited to walls on the leeward side of the prevailing winds in Port Hedland.

We have assessed wind rose data for the area, provided by the Bureau of Meteorology, and as such it can be concluded that operable openings on Northern or Eastern facades should be avoided to reduce direct ingress of airborne dust particles.

The prevailing winds in the Northern Dry Season (May to September) indicate the vast majority of the time the wind comes from East-South-Easterly in the morning swinging around to North-Nor-Westerly in the afternoon.⁽⁵⁾



Wind Rose - Dry Season – 9am



Wind Rose - Dry Season – 3pm

Figure 4a & 4b – Wind Rose Illustrations for Port Hedland (Bureau of Meteorology)

Protective screens or louvers may be implemented to reduce the direct impact of winds onto the windows and produce slow moving re-circulating air zones such as those depicted in Figure 3. In the same manner, eaves provided at roof level are expected to function in a similar way.

By reducing the localised wind velocity, it is expected more dust will settle out from the air, lessening ingress into the dwelling.

3. WINDOW AND DOOR ORIENTATION (cont.)

Windows on the west facades should be protected on the left hand side of the opening, windows on the south facade should be protected on the right hand side of the opening.

These screens should be the full height of the windows and designed such that wind may be directed away from the window whilst still maintaining vision out of the window.

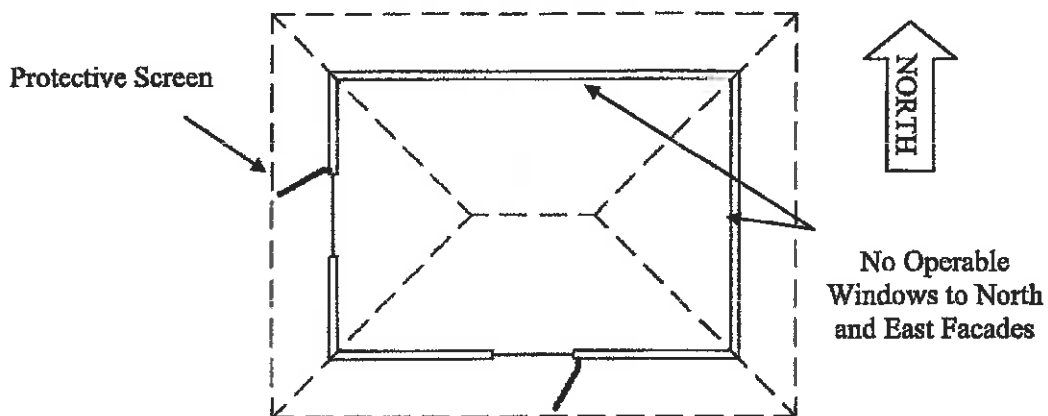


Figure 5 – Window and Deflection Screen Locations

High density developments and high roofs of buildings can be effective to create a building boundary layer that may reduce the direct air-flow into the building. ⁽⁴⁾

By grouping dwellings together atmospheric boundary layers are formed, reducing the local wind velocity in proportion to the height and density of building.

Orienting buildings such that wind-tunnelling effects of prevailing winds amplifying wind velocity should be avoided.

Protective screens and porticos in front of the main building entrance may be of assistance to reduce the direct impact of wind onto the opening.



4. APPENDIX C

Clause 6.3 Town of Port Hedland

6.3.9 Residential development within the West End Residential Zone and within the area bounded by Withnell, McKay and Anderson Streets, and The Esplanade, Port Hedland shall be in accordance with a local planning policy, development plan or design guideline adopted by Council that incorporates building design and performance standards to reduce exposure to dust, and to include but not necessarily be limited to—

- filtration of incoming air into the building designed to utilise coarse disposable pre-filtration (i.e. G3 or G4 rated) and then a finer filter (i.e. F4 rated);
- location of operable windows and doors on the western and southern building facades only;
- use of deflection screens on the northern and eastern edges of operable windows;
- use of eaves;
- orienting buildings to avoid wind tunnelling effects; and
- protective screens and porticos at building entrances to reduce the direct impact of wind onto the opening.

6.3.10 Notwithstanding anything contained within the Residential Design Codes, all residential development in the West End Residential Zone shall comply with the following—

- (a) Residential development must be between a minimum yield equivalent to the R30 density and a maximum yield equivalent to the R80 density for all land and/or any individual lot included within an application for planning approval.
- (b) The maximum internal floor area for all dwellings is 110 m².
- (c) No dwelling shall have greater than two (2) bedrooms or rooms capable of being used as bedrooms.

6.3.11 When considering an application for planning approval within the West End Residential Zone, Council shall consider the purpose of the zone and recommendations of any formal risk study undertaken by or endorsed by the Department of Health.

6.3.12 Notwithstanding Clause 6.1.1 of the Residential Design Codes of Western Australia 2008, Council shall not recommend approval for the creation of lots that are less than 600 m² unless the lots are already developed or it is demonstrated that the lots may be developed for grouped or multiple dwellings.

6.4 URBAN DEVELOPMENT ZONE

6.4.1 The purpose of the Urban Development zone is to identify land where detailed planning and the provision of infrastructure is required prior to the further subdivision and development of land. This planning should be documented in the form of a Development Plan. Although subdivision and development may take place prior to the Scheme maps being amended to reflect the details of Development Plans; the Scheme maps should be amended as soon as practicable following the creation of lots and Crown reserves.

6.4.2 Subject to the provisions of clause 5.2, the Council may require the preparation of a Development Plan for the whole or any part of the Urban Development zone.

6.4.3 The Development Plan shall address the matters outlined in Appendix 6.

6.4.4 A Development Plan may require additional conditions and these shall be outlined in Appendix 10. AMD 14 GG 22/8/08

Amendment 22 aims to:

- provide a mechanism to control the demographic for the area;
- create a new residential zone, the 'West End Residential Zone' with the intention of discouraging long term residency by families with children or elderly people;
- add vibrancy to both the West End and the nearby commercial area;
- maximise opportunities for workers in nearby employment nodes to reside close to work; and
- provide alternative opportunities, and commercial and entertainment facilities.

A summary of the mechanisms proposed to achieve these aims is shown in the table below.

Table 3 (c): Changes to West End Development

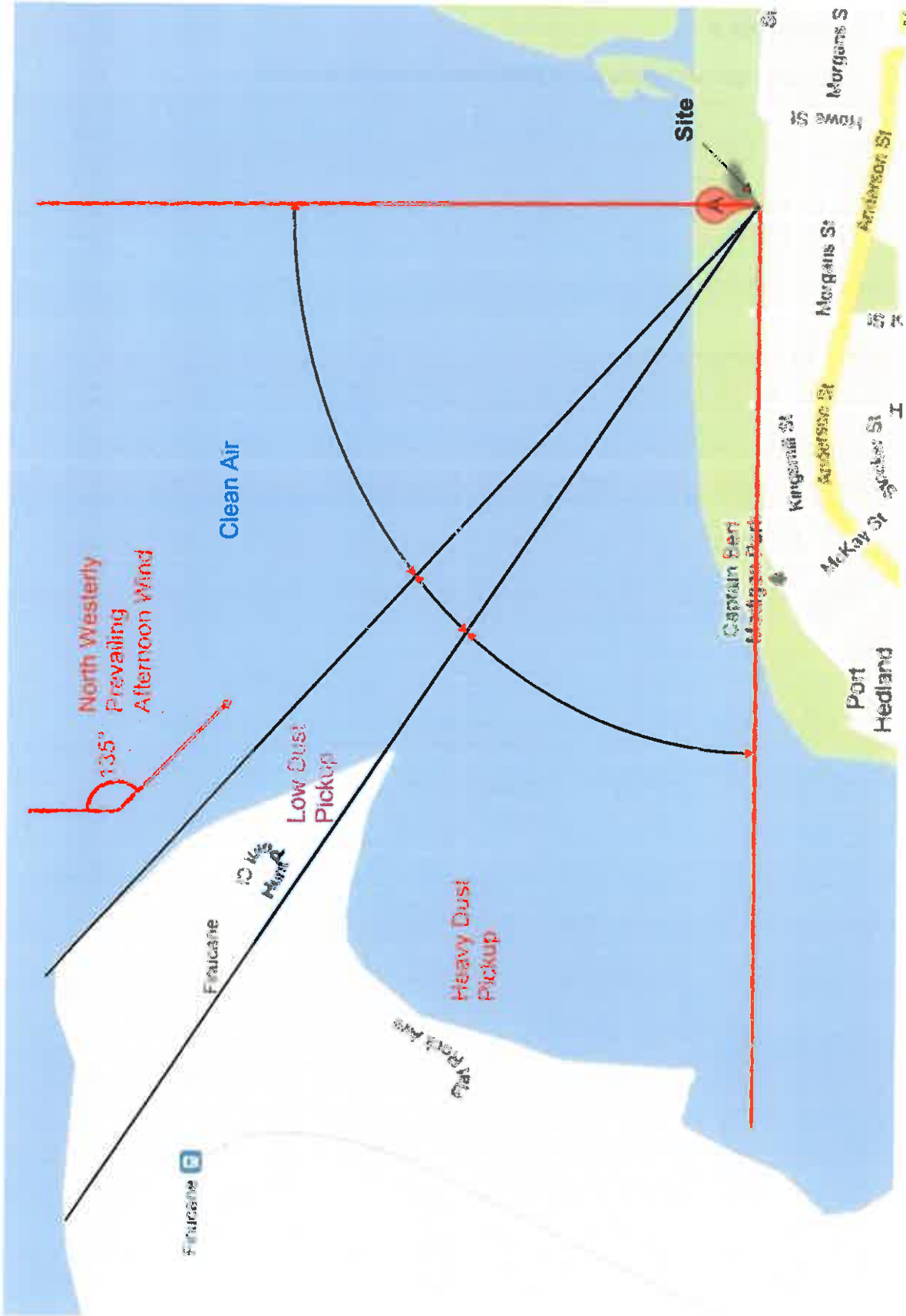
West End	Current zoning	Proposed zoning
Density	R30 or R50 (depending on location)	Minimum R30
Maximum Dwelling Size	No limit	110m ²
Maximum No. Bedrooms per dwelling	Not limited <i>Predominantly 3 to 4</i>	2
Potential Bedroom Yield	3,476 <i>Assuming all landowners developed their land with residential buildings to their maximum capacity</i>	2,312 <i>Assuming an average of R60 density is achieved with maximum of 2 bedrooms per dwelling</i>
Grouped Dwellings	Currently possible to create lots with development potential for only a single dwelling	Any new subdivision/amalgamation to be designed to permit development of grouped dwellings
Single Dwellings	Currently a permitted use. New development doesn't require planning approval, subject to compliance with the R Codes	To become prohibited use. Existing dwellings to be listed as 'additional uses' to protect landowner rights
Building Design Guidelines	None	Proposed
Aged or Young Persons Facilities Permitted	Yes	No
Notification of Potential Health Concerns on the Certificate of Title	This is Council's current practice	This will become a standard for new developments

The Taskforce sought advice on the effectiveness of the measures proposed in Amendment 22. To this end, a report was commissioned from CA and MJ Lommers Pty Ltd on potential modification measures to building design. A full copy of the Lommers Report is provided at Appendix 4.



5. APPENDIX D

Location of the Site in relation to Point Finucane





6. APPENDIX E

AS1668.1 Extract – Relating to Bathroom Exhaust Provisions

TABLE B1 (continued)

Enclosure type	Quantity	Unit	Comments
Laundry			
Residential			Rate is independent of enclosure size. Operation of the system may be intermittent Where a laundry is located within a bathroom, the greater quantity of either space shall apply
No dryer	20	L/s.room	
Condensing dryer	20	L/s.room	The greater of 110% of the dryer airflow (where this is known) or 20 L/s room.
Non-condensing dryer	40	L/s.room	The greater of 110% of the dryer airflow (where this is known) or 40 L/s room.
Sanitary compartment			
Bath			
Shower	10	L/s.m ² floor	
Urinal	or 25	L/s per listed fixture	Greater value shall be taken. For calculation purposes, floor area per fixture shall be no greater than 2.5 m ² ; 0.6 m length of urinal shall be equivalent to one fixture
Water closet			Sanitary compartments subject to high level of use (e.g. airports, entertainment venues, and similar venues may require an increased ventilation rate) Where privacy locks or airlocks are included, provision should be made for their ventilation at 5 L/s.m ² of floor area (e.g. via make-up air) (Handbasins are not considered as a 'listed fixture')
Bathroom/Toilet	25	L/s/room	May include bath, shower and water closet in one compartment. Rate is independent of room size (see Note 2) Higher air quantities may be required for vapour control or removal (Handbasins are not considered as a 'listed fixture') Operation of the system may be intermittent
Private dwellings and attached to bedroom of hotels, motels, resorts, private hospital rooms and the like			
Sewage ejection	100	L/s	Minimum

(continued)

