

Report

Attachment 3 to Item 12.1.2 Proposed Six (6)
Grouped Dwellings on Lot 186 (53) Kingsmill
Street Port Hedland

Building Services

53 KINGSMILL ST, PORT HEDLAND - DUST INGRESS MITIGATION
REPORT

Design 58

Report

CONFIDENTIAL

Revision: 3.0 - FINAL
Issued: 14 May 2015



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1. TOWN OF PORT HEDLAND REQUIREMENTS

We understand that the proposed mixed use development at 53 Kingsmill Street, Port Hedland tilted *Reflections* is located within the West End Residential Zone adjacent the waterfront. The site is bounded to the south by Kingsmill Street and located between Darlot St and Crowe St, in Port Hedland. The development comprises of one building proposed to house 6 apartments over two floors and associated car parking facilities.

The development plan/design guideline adopted by the council details 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
- Pressurisation of the building to minimise outside air ingress
- 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.

The Town of Port Hedland Town Planning Scheme, Clause 6.3.9 requires that all development applications are to be accompanied by a report prepared by a 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 53 Kingsmill Street development and by incorporating the recommendations made within confirms that the design will mitigate dust ingress impacts and achieves the same intent as Clause 6.3.9, as per our assessment below.

1.1. Design Aspects to Reduce Dust Ingress

We note the following in relation to dust mitigation measures applied to the 53 Kingsmill St Development;

1. The northern aspect on both floors is only provided with fixed windows which will negate any potential dust ingress from this orientation.
2. The first floor western facing aspect to the development is provided with open able screened windows hence mitigating dust ingress to this orientation. The ground floor western orientation open able doors are provided with adjacent (to the right of the opening) blade walls and an 1800mm height boundary wall to mitigate dust ingress. The ground floor western orientation is also provided with windows however these are fixed thereby preventing any potential dust ingress.
3. The first floor southern facing aspect is provided with open able sliding balcony doors however the provision of the 1600mm privacy screens as well as the positive pressurisation of the building will mitigate dust ingress from these openings. Signage and a management statement clause relating to the closing of doors when not in use will also further mitigate dust ingress.
4. All units are recommended to be fitted with an outside air pre-conditioning and filtration system discharging into the return air intake of the proposed wall mounted split systems. This could be in the form of centralised outside air conditioning system or a small standalone system serving each apartment providing filtered and conditioned outside air to each apartment. Minimum filtration for the outside air intake is a G4 rated coarse pre-filter followed by a finer F4 type second stage filter which is in accordance with Clause 6.3.9 of the Town of Port Hedland Town



Planning Scheme 5. The dehumidification / filtration units are proposed to operate on a 24/7 basis.

5. 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. Based on the current layout provided we assume an exhaust rate of 25L/s per bathroom. Generally for a building of this type an over-pressurisation of 100% of the total exhaust air to each unit would be recommended. This equates to the following minimum exhaust and outside air rates recommended for each apartment type;

Exhaust & Outside Air Flow Rates

Apartment Type	Exhaust Air Flow Rate	Outside Air Flow Rate*
Type 1-5	75L/s	150 L/s
Type 6	100L/s	200 L/s

*Note – All outside air flow rates listed exceed the minimum required by AS1668.2

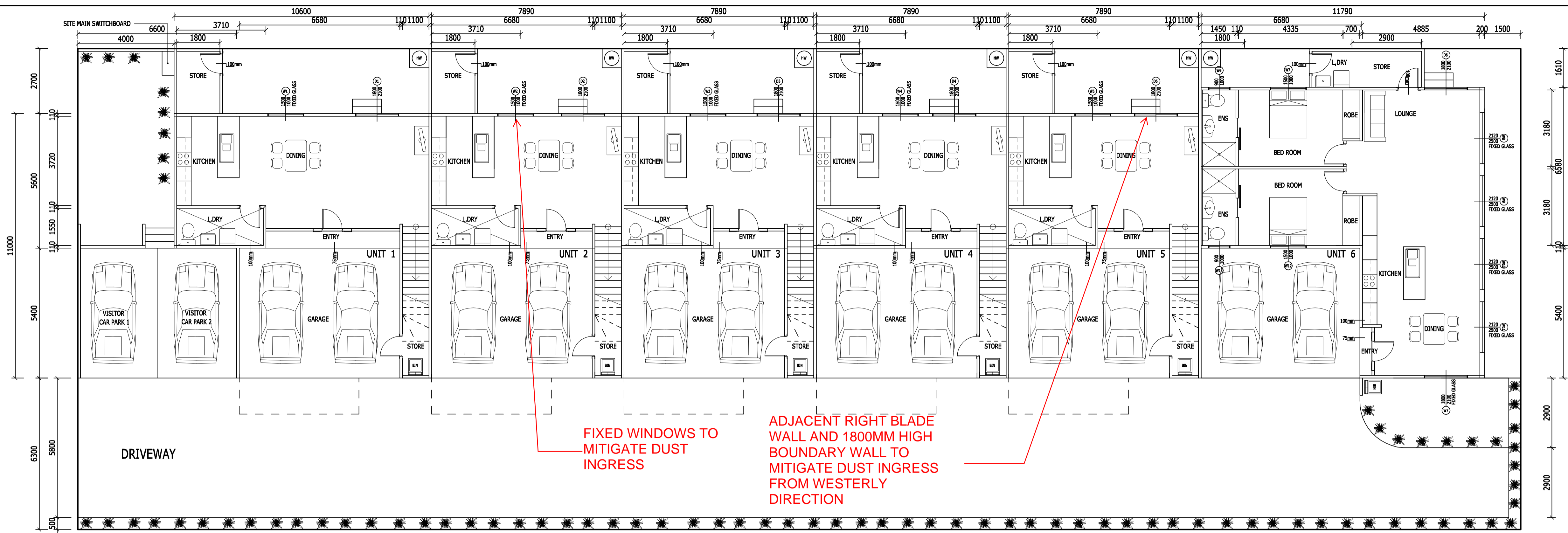
6. Entry door and balcony doors will be fitted with dust seals in accordance with the applicable NCC Section J requirements.

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.



2. APPENDIX A

Marked Up Drawing Illustrating Dust Protection Measures



GROUND FLOOR

AREAS

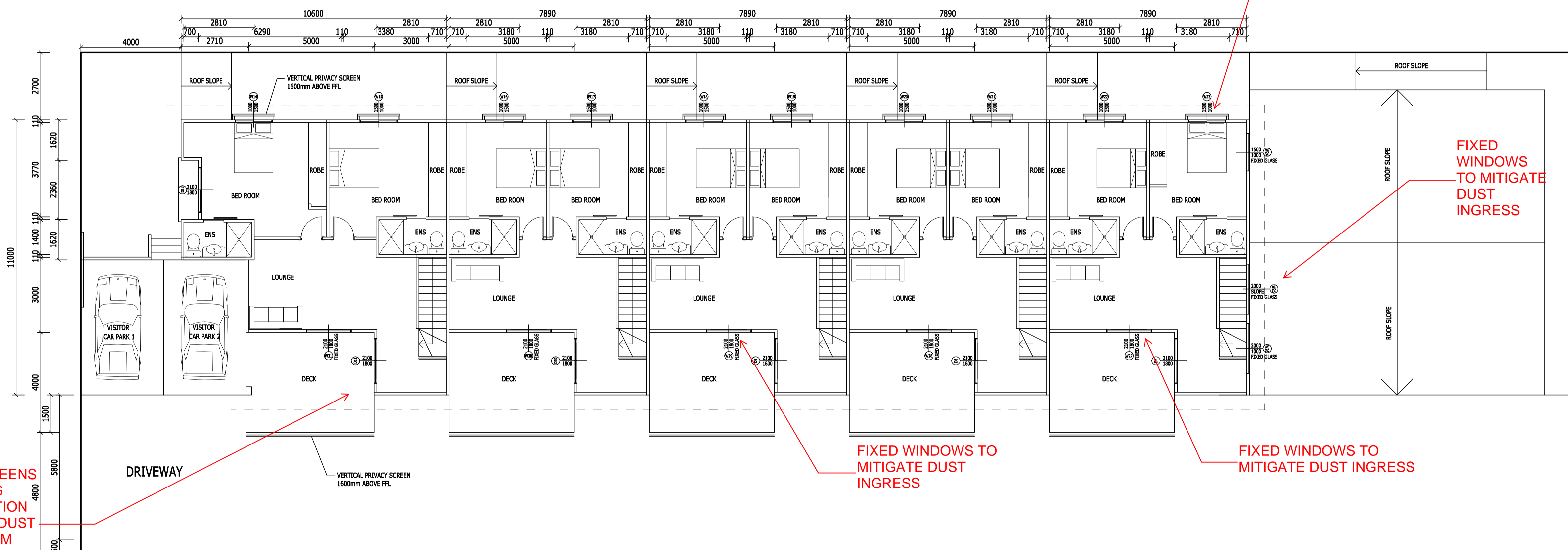
LOT AREA	1200 sqm
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UNIT 6	
GF	103 sqm
GARAGE	35.64 sqm
YARD	16.80 sqm
STORE	4.00 sqm

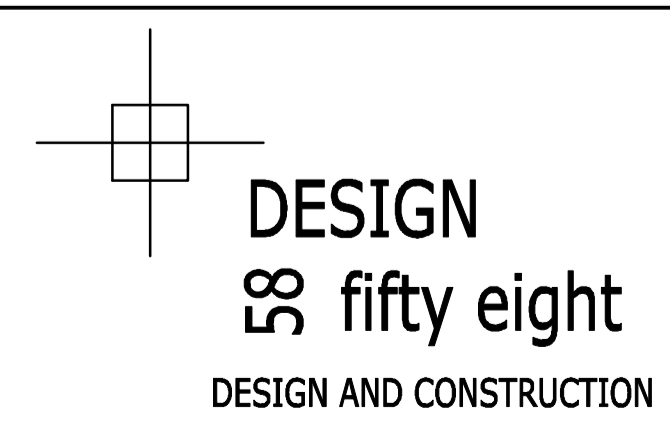
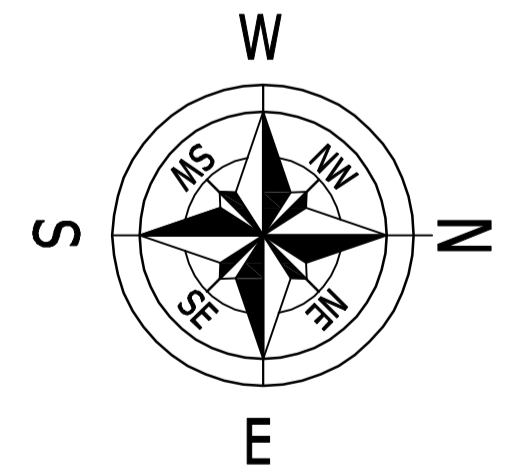
UNIT 5,4,3,2	
GF	39.5 sqm
FF	65.2 sqm
DECK	20 sqm
GARAGE	35.64 sqm
YARD	16.2 sqm
STORE	4 sqm

UNIT 1	
GF	51.3 sqm
FF	75.4 sqm
DECK	20 sqm
GARAGE	35.64 sqm
YARD	16.2 sqm
STORE	4 sqm

COMMON	428.4 sqm
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FIRST FLOOR



PROJECT

 SIX RESIDENTIAL DWELLING BUILDING

BYRON KEMP
 MOBILE 04 0369 9461

LOCATION
 53 KINGSMILL STREET
 PORT HEDLAND
 WA 6721
 LOT 186 ON DP 223066

CLIENT
 KEMP
 P.O BOX 1058
 PORT HEDLAND
 WA 6721

DRAWING
 - GROUND FLOOR PLAN
 - FIRST FLOOR PLAN

SCALE
 1:100

DWG No
 1/5

ISSUE
 DA

AMMENDMENTS & DATES
 00/0/00 DEVELOPMENT APPLICATION



3. APPENDIX B

Dust Mitigation Review provided by CA&MJ Lommers Pty Ltd

C.A. & M.J. LOMMERS PTY LTD

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Phone: (08) 9481 1008 • Fax: (08) 9481 5034
Email: admin@lommers.com.au
Trading for the LOMMERS FAMILY TRUST

Energy (ESD), Mechanical, Refrigeration
And Fire Safety Services Solutions
ABN 76 349 760 785
ACN 053 135 318

REF.: Z:\Projects\2007\2007.0106 L104 Dust Control.docx

Date: 18 September 2009

TOWN OF PORT HEDLAND

P.O. Box 41
PORT HEDLAND WA 6721

Attention Mr. T. Sargeant

Dear Sir,

PROJECT: PROPOSED "WEST END" DEVELOPMENTS – PORT HEDLAND

RE: COMMENT ON PROPOSED MEASURES TO REDUCE DUST IMPACT

In accordance with your instructions we have assessed the dust ingress minimisation guidelines provided including further suggestion as applicable.

The following commentary has been prepared with the intent to provide our assessment considering the effectiveness and practicability of the suggested dust minimisation options presented.

1. HERMETICALLY SEALED / POSITIVELY PRESSURISED BUILDINGS

- High levels of building sealing and/or positive pressurisation must be considered in conjunction with other dust ingress modes such as location of ventilation openings and filtration systems
- The effectiveness of the building sealing may be difficult to control for the life of the building due to tenant/owner modifications and maintenance regime. Detailed inspection and maintenance must be performed on a regular basis to ensure sealing components are effective.
- Due to the low occurrence of cracks or fissures expected in new or recently constructed buildings this is not considered a significant source of duct ingress.

We also note that BCA Vol 1 Clause J3.6 (also Volume 2 – cl 3.12.3.5) already requires a high level of construction to minimise air leakage from air-conditioned residential buildings.

- Further investigation should be performed to quantify the prevalence of dust ingress through cracks and fissures in existing buildings. In our opinion this mode of dust ingress is a low contributor to the overall level of dust ingress.
- It is also expected that costs may be excessive for little improvement in dust ingress.

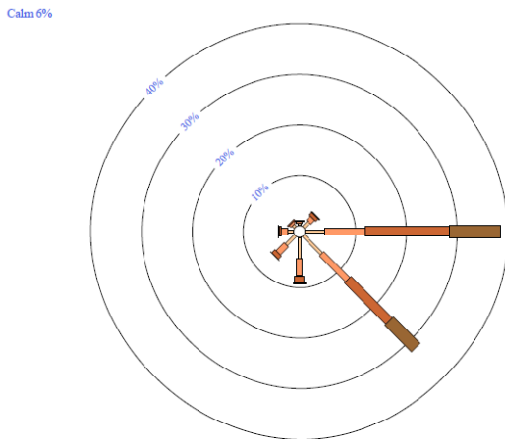
2. WINDOW AND DOOR ORIENTATION

- As the mode of dust ingress is similar for all openings in the building envelope, we have considered "Window Orientation" and "Door Orientation" simultaneously.
- The location and protection of openings is vital to reduce the ingress of dust into the space.

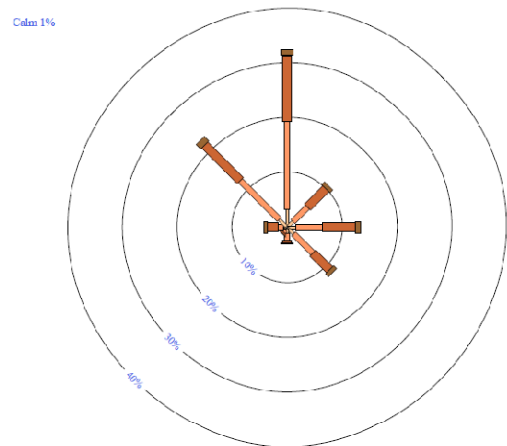
2. WINDOW AND DOOR ORIENTATION (cont.)

- 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, and as such recommend not to include operable openings on Northern or Eastern facades.

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.



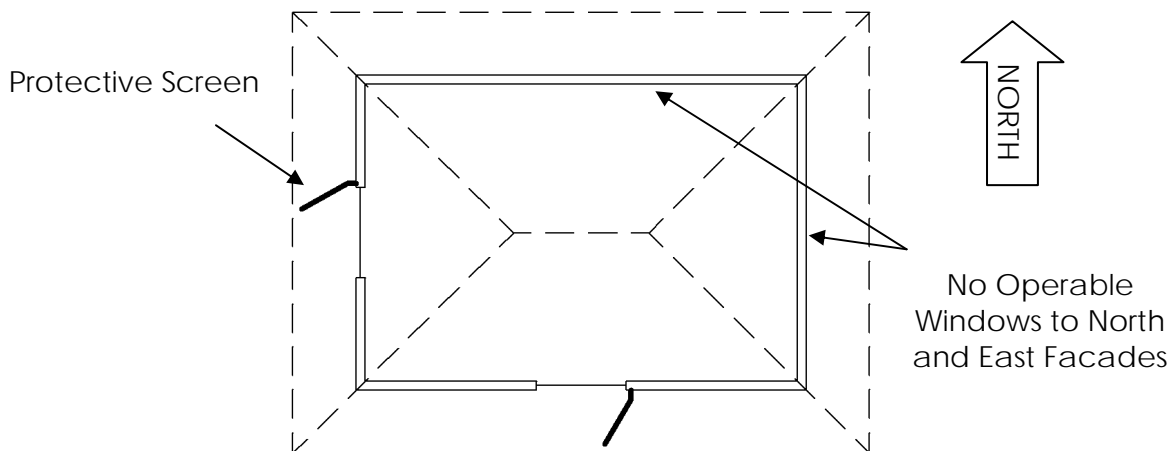
Wind Rose - Dry Season – 9am



Wind Rose - Dry Season – 3pm

- Protective screens or louvers should be implemented to reduce the direct impact of winds onto the windows. 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.



Window and Deflection Screen Locations

2. WINDOW AND DOOR ORIENTATION (cont.)

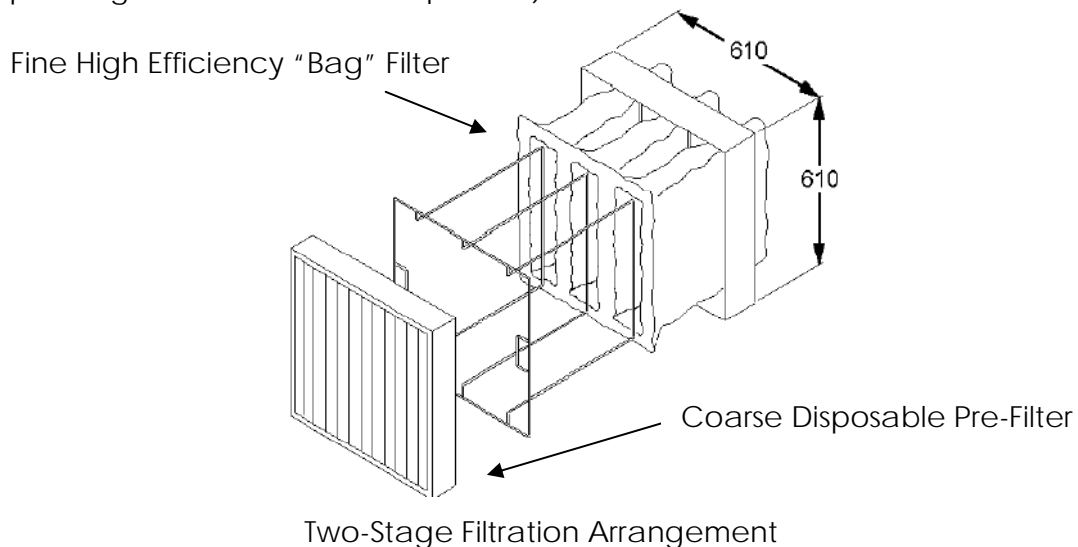
- The use of eaves to roofs of buildings can be effective to create a building boundary layer that may reduce the direct air-flow into the building. Orienting buildings such that wind-tunnelling effects of prevailing winds amplifying wind velocity should be avoided.
- Protective screens and porticos in front of the main building entrance may be of assistance to reduce the direct impact of wind onto the opening.

3. FILTERED AIR-CONDITIONING

- Air-filtration systems associated with air-conditioning equipment actively remove dust from the air. There is an ongoing requirement for maintenance, cleaning and replacement of the media to ensure adequate performance.
- Whilst the only "active" dust reduction strategy mentioned, it also carries with it the highest on-going cost for maintenance and replacement. Filtration medium must be checked and cleaned on a monthly basis and replaced annually.
- Selection of suitable filtration type and media may also be subject to a trial as the rate at which the dust builds up in the media is directly proportional to the hours of use of the air-conditioning system.
- The following filtration systems have been considered;
 - Disposable Media – includes a cardboard frame and is designed to be replaced when showing signs of clogging. It is not washable and has a shorter life-span to washable media, however cost less and are more reliable where maintenance practices may fall short. Due to their cost and convenience, these are considered to be the most effective filtration system.
 - Washable Media – usually consists of filter media supported by a metal frame and is designed to be washed when dirty. Washable filters progressively lose efficiency when washed and as such can become ineffective without the occupants knowledge.
 - Active Electrostatic – consisting of an array of alternately charged plates, electrostatic filters attract dust particles to the plates, removing them from the air-stream. Electrostatic filters can be "self-cleaning" however require a continuous power-source and specialist routine maintenance. This option is considered expensive in comparison to other filtration methods.
 - Cyclonic Filtration – is a process in which the air is accelerated in a circular chamber to remove the airborne particles via centrifugal force. Whilst effective and relatively maintenance free, these units are significantly noisier than other options due to the high fan power requirements. This option is considered expensive in comparison to other filtration methods.
- Consideration should be given to a system of "cheap" coarse disposable filtration upstream from effective fine washable media filtration. This system can serve multiple purposes by using inefficient filtration to protect fine filtration media from the effect of high duct environments.
- The location of fresh air intakes should be selected to ensure openings are oriented downwards, on the leeward side of the dwelling and sized to ensure low velocities are experienced and minimum dust pickup from the surrounding.

4. RECOMMENDATION AND DISCUSSION

- Filtration of incoming air into buildings is the only “active” mode of dust removal from air streams incoming into the dwelling. For this reason it is our opinion that it is the most reliable and effective “dust minimisation strategy” if designed intelligently.
- Filtration systems should be designed as “two stage” arrangements utilising coarse disposable pre-filtration (suggest G3 or G4 rated), cleaned regularly, and a fine filter (suggest F4 rated) to efficiently remove particulate matter from the air.
- We have estimated the cost of this filtration arrangement to be relatively in-expensive in the order of \$400 for supply and installation, with annual filtration media costs expected to be approximately \$150, plus maintenance personnel cost as required.
- The pre-filtration media should be cleaned monthly, by vacuuming or “banging” out as much dust as possible, with the fine filtration replaced annually (or sooner depending on actual dust level present).



- To further reduce dust ingress into dwellings, via openings, careful design of window and door locations should be carried out to restrict their locations to Western and Southern building facades only.
- Deflection screens to the northern and eastern edges of windows should also be considered to reduce the direct path of dust laden wind into the opening.

We trust the information provided meets your approval.
Please do not hesitate to contact our office if you have any queries.

Yours faithfully,

C.A. & M.J. LOMMERS PTY LTD

M.D. Lommers
Mechanical & Fire Safety Engineer

B.Eng (Mech), M.I.E.Aust, M.A.I.R.A.H.
Grad. Cert. Performance Based Building & Fire Codes
Grad. Dip. Building Fire Safety & Risk Engineering



4. APPENDIX C

Clause 6.3 Town of Port Hedland TPS 5

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 <i>(depending on location)</i>	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 <i>Existing dwellings to be listed as 'additional uses' to protect landowner rights.</i>
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

AS1668.2 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	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
Urinal	or 25	L/s per listed 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)



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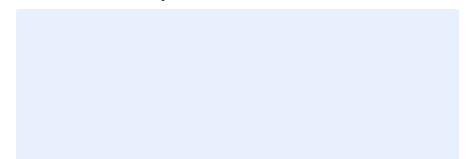
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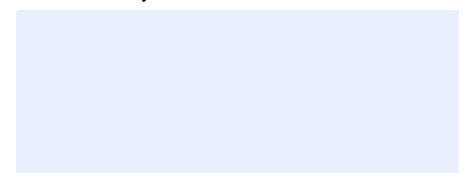
Revision No: 3.0
Revision Date: 14 May 2015
Reason Description: FINAL
File Location: W:\P673xx\P67349\001\00\24_Reports
Filename: rp150402p0020

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