



**BUILDING CODE OF AUSTRALIA 2016 –
Amendment 1
REPORT**

Revision: C

9 July 2018

**Proposed IMCD 8A2 and Speculative
Warehouse 8A1 Development
585-649 Mamre Road, Orchard Hills**

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Executive Summary

Development Overview

The proposed development is two new combined warehouse facilities being IMCD 8A2 and a Speculative Warehouse 8A1. The project also include two associated offices, car parking area, pavements for yard / hardstand and stormwater services. The site is located at 585-649 Mamre Road, Orchard Hills.

Compliance Summary

As Accredited Certifiers, we have reviewed architectural design documents prepared by Nettletontribe (refer appendix A) for compliance with the Building Code of Australia 2016 Amendment 1.

The assessment of the design documentation has revealed that the following areas are required to be assessed against the relevant performance requirements of the BCA. The submission for Construction certificate will need to include verification from a suitably accredited fire engineer: -

No.	Alternative Solution Description	DTS Clause	Performance Requirement
Fire Safety Items			
1.	Extended Travel Distances The following extended travel distance has been identified for warehouse 8A2, <ul style="list-style-type: none"> Travel distance to an exit is up to 67m in lieu of 40m. Travel distance between alternative exits is maximum of 103m in lieu of 60m. 	D1.4 & D1.5	DP4 & EP2.2
2.	Extended Travel Distances Travel distances to exits exceeds the limit of DtS provisions of BCA within the warehouse 8A1 part of it. Only one exits are shown on warehouse part. Amended plans or Performance solution is to be provided.	D1.4 & D1.5	DP4 & EP2.2
4.	Smoke Hazard Management Automatic Smoke Exhaust throughout the Warehouse will be rationalised through the fire engineering process for the Warehouse, pursuant to Performance Requirement EP2.2 of the BCA.	E2.2, Table E2.2	EP2.2
5.	Extended Coverage of Fire Hose reel It has been anticipated to provide Fire Hose Reel covering up to 50m in length.	E1.4	EP1.1
6.	Exit Signs Locations It is anticipated that a fire engineered solution will be proposed to permit exit signage to be mounted at a height greater than the maximum height permitted by AS2293.2 (2.7m).	E4.5, E4.8	EP4.2
7.	Fire hydrant Coverage It is anticipated that the Fire Hydrants to be included in the FER to assessed hydrant under awnings as external hydrants for coverage.	E1.3	EP1.3

Following areas in particular require further review as the project develops:

No.	Items for review	Responsibility
1.	Please advise if there are any proposed alternative building solutions with regard to design of the building services for the project.	Services Consultants
2.	Travel distances to exits exceeds the limit of DtS provisions of BCA within the warehouse 8A1. Only one exit is shown on warehouse part. Performance solution to be provided.	Architect
4.	Discharge from northern exits of warehouses leads to perimeter accessway. The unobstructed path of travel to the road must be provided and nominated in the plan.	Architect

The fire engineered solution relating to EP2.2 will be subject to consultation with the NSW Fire Brigade as part of the Construction Certificate process under Clause 144 of the Environmental Planning & Assessment Regulation 2000.

The application for Construction Certificate shall be assessed under the relevant provisions of the Environmental Planning & Assessment Act 1979 (As Amended) and the Environmental Planning & Assessment Regulation 2000.

1.0 Introduction

The proposed development comprises of two new combined warehouse facilities being IMCD 8A2 and a Speculative Warehouse 8A1. The project also include two associated offices, car parking, pavements for yard / hardstand and stormwater services.

The site is located at 585-649 Mamre Road, Orchard Hills.

This report is based upon the review of the design documentation listed in Appendix A of this Report

The report is intended as an overview of the relevant provisions of the Building Code of Australia for assistance only. Detailed drawings and associated review will still be required as the final design is developed.

1.1 Current Legislation

The applicable legislation governing the design of buildings is the Environmental Planning and Assessment Act 1979. This Act requires that all new building works must be designed to comply with the BCA.

The version of the BCA applicable to the development, is version that in place at the time of the application to the Certifying authority for the Construction Certificate. For the purposes of this Report, BCA 2016 Amendment 1 has been utilised as the version of the BCA applicable at the time of preparation this Report.

2.0 PRELIMINARIES

2.1 Building Assessment Data

Summary of Construction Determination: -

Part of Project	Building 8A1 & 8A2
Classification	7b
Number of Storeys	1
Rise In Storeys	1
Type of Construction	C
Effective Height (m)	0

Summary of the floor areas and relevant populations: -

Part of Project	BCA Classification	Approx. Floor Area (m ²)	Approximate Volume (m ³)	Assumed Population
Warehouse 8A2	7b	13,375m ²	183238m ³	50*
Office 8A2	5	500m ²	1700m ³	20*
Warehouse 8A1	7b	5500m ²	75350m ³	25*
Office 8A1	5	600m ²	2040m ³	25*

Notes:

- Population numbers, owing to the size, configuration and use of the facility have been assumed. If these numbers are incorrect, please provide further details for further review and comment.

2.2 Structural Provisions (BCA B1)

Any new structural works are to comply with the applicable requirements of AS/NZS 1170.1.

Glazing is to comply with AS1288, and AS2047.

Prior to the issue of the Construction Certificate structural certification is required to be provided, including determination of the importance level of the development.

This is to include assessment against the provisions of BCA Clause B1.6 – Construction of Buildings in Flood Areas

2.3 Development Approval

A Development Approval will be required from the Local Authority for the development. A copy of the Development Permit conditions and approved drawings will be required prior to the issuing of the Building Approval for that component of works.

The proposed development must not be inconsistent with the endorsed drawings and all relevant conditions will need to be satisfied and accurately reflect the construction issue drawings.

2.4 Copy of Certificate of Title:

A copy of the current Certificate of Title and Registered Plan / Plan of Subdivision is required. Where it is proposed to construct any part of the building work within an easement, the consent of the relevant authority and /or Council is required prior to the issue of the Construction Certificate.

3.0 FIRE PROTECTION

3.1 Fire Compartmentation (BCA C1.1)

The BCA stipulates three levels of fire resistant construction, which is based upon the rise in storeys and classification of the building. Each of these types of construction has maximum floor area and volume limitations as per BCA Table C2.2.

Based upon the rise in storeys and use of the Building, the building is required to be **Type C** Construction in accordance with Table 5 & 5.2 of Specification C1.1 of the Building Code of Australia 2016 Amendment 1.

The maximum floor area and volume limitations of a fire compartment as nominated in the deemed to satisfy provisions are as follows:

Classification		Type of Construction
		C
7	max floor area—	2 000 m ²
	max volume—	12 000 m ³

As the building exceeds the area / volume limitations of the BCA provisions, the building is therefore considered a large isolated building and the following provisions will apply:

- Automatic sprinkler protection to AS2118.1 and BCA specifications E1.5 throughout the development / smoke detection and alarm system in accordance with AS1670,
- Perimeter emergency vehicular access 6m wide located within 18m of the entire building perimeter,
- Smoke exhaust or smoke and heat vents required throughout the development

3.5 Fire Resistance (BCA C1.1)

The building should be constructed generally in accordance with the relevant provisions of Specification C1.1 of the BCA applicable to Type C Construction, Please refer to Appendix C which outlines the required fire rating to be achieved by the development. These fire ratings are summarised below:-

Building Element		7b
Fire Walls	Loadbearing	90/90/90
	Non-loadbearing	
Fire Stair / Shaft Walls	Loadbearing	60/60/60
	Non-loadbearing	

Other passive fire protection issues that will need to be addressed in detailed documentation phase include:

- Electricity Supply,
- Hydrant Pump Rooms,
- Sprinkler Pump Rooms,
- Fire Control Room

The above areas are to be separated from the remainder of the building by construction achieving a minimum fire resistance level of 120 minutes.

3.6 Fire Hazard Properties (BCA C1.10 and BCA C1.12)

The fire hazard properties of fixed surface linings and mechanical ductwork will also need to be addressed within the detailed documentation phase pursuant to specification C1.10 Building Code of Australia. The following requirements apply:

Sprinkler Protected Areas

- a) Floor Coverings – Critical radiant Flux not less than (insert) kW/m²
- b) Wall and Ceiling Linings – Material Group No. (insert)
- c) Other Materials – Spread of Flame Index not exceeding (insert) and Smoke Developed Index not exceeding (insert)

Rigid and flexible air handling ductwork must comply with AS4254 parts 1 & 2 2012.

Floor linings and floor coverings used in wall and ceiling linings must be a Material Group No. 1 or 2.

3.10 Protection of Openings in fire rated building elements (BCA C3.5 and BCA C3.10)

The prescriptive provisions of the BCA stipulate that openings within building elements required to have an FRL shall be protected as follows:

- a) Any penetration through a wall or room required to have an FRL (e.g. substation, boiler room etc) is to be protected either by a tested prototype (e.g. fire collar, fire damper, etc) or be installed within a shaft achieving an FRL of 90/90/90 (or 120/120/120 where it is a room such as a substation);
- b) Self-closing -/60/30 fire doors to the doors opening to the fire isolated stairs (note that this also includes the access doors to the condenser units on the plant platforms).

Note that where fire dampers, fire collars, etc are utilised, allowance needs to be made for access hatches to be provided within the walls / ceilings to ensure that maintenance access is provided.

As the design develops, details will need to be included in relation to sealing of penetrations / construction of fire rated shafts.

4.0 EGRESS PROVISIONS

4.1 Provisions for Escape (BCA D1)

The egress provisions from the proposed building are provided by:

- External perimeter doorways

Other detailing issues that will need to be addressed include:

- Door Hardware
- Exit door operation
- Details of the egress provisions to the Road.

4.3 Exit Travel Distances (BCA D1.4)

The travel distances to exits should not exceed:

Class 7b

- 20m to a single exit or point of choice and where two exits are provided, a maximum of 40m to one of those exits; and
- exits shall be located to not be more than 60m apart and not closer than 9m

The locations of the proposed exits indicate that the deemed to satisfy requirements in terms of travel distances would be satisfied, with the exception of the following:

The following extended travel distance has been identified for warehouse 8A2,

- Travel distance to an exit is up to 67m in lieu of 40m.
- Travel distance between alternative exits are 103m in lieu of 60m.

Travel distances to exits exceeds the limit of DtS provisions of BCA within the warehouse 8A1 and office part of it. Only one exits are shown on warehouse and office part. Amended plans or Performance solution is to be provided.

Amended architect plan complying with DtS provision of BCA or Performance Solution Report addressing performance requirements DP4 & EP2.2 need to be provided.

4.4 Dimensions of Exits (BCA D1.6)

Minimum dimensions of 1000mm and 2000mm height to be provided within exits, with the paths of travel should provide a minimum width of 1000mm (note that all maintenance access, cat walks, etc may comply with AS1657 in which case a 600mm clear width is required).

Doorways are permitted to contain a clear opening width of the required width of the exit minus 250mm, with a height of 1980mm as part of egress requirements. Access for persons with disabilities however requires a clear doorway opening width of 850mm (i.e minimum 920 mm doors).

Discharge from northern exits of warehouses leads to perimeter accessway. The unobstructed path of travel to the road must be provided and nominated in the plan.

4.6 Slip Resistance

The adoption of BCA 2014 introduced a requirement for slip resistance of stairway treads and ramp surfaces. The requirements are as follows:

Table D2.14 SLIP-RESISTANCE CLASSIFICATION

<u>Application</u>	<u>Surface conditions</u>	
	<i>Dry</i>	<i>Wet</i>
<i>Ramp steeper than 1:14</i>	<i>P4 or R11</i>	<i>P5 or R12</i>
<i>Ramp not steeper than 1:14</i>	<i>P3 or R10</i>	<i>P4 or R11</i>
<i>Tread or landing surface</i>	<i>P3 or R10</i>	<i>P4 or R11</i>
<i>Nosing or landing edge strip</i>	<i>P3</i>	<i>P4</i>

5.0 ACCESS FOR PEOPLE WITH DISABILITIES

5.1 General Building Access Requirements (BCA D3.1)

Access for people with disabilities shall be provided to and within the building in accordance with the requirements of Clause D3.2, D3.3 and D3.4 of the BCA 2016 Amendment 1. Parts of the building required to be accessible shall comply with the requirements of:-

- AS1428.1-2009 General Requirements for Access – New Building Work;
- AS1428.4-2009 Tactile Ground Surface Indicators
- AS2890.6-2009 Car Parking for People with Disabilities

Access for persons with a disability is to be provided as follows:-

Warehouse and production/Manufacturing facilities

To and within all areas normally used by the occupants, but as the uses of these areas could be deemed inappropriate, confirmation is required as the appropriateness of the areas in question by the owners or tenant.

5.2 Provision for Access to Buildings

The BCA prescribes access to be provided to and within the building as follows:

- Via the principle public entry and at least 50% of all other entrances
- From designated car parking spaces for the use of occupants with a disability.
- From another accessible building connected by a pedestrian link.
- All areas used by the public.

In buildings over 500m² in floor area, a non-accessible entrance must not be located more than 50m from an accessible entrance.

And where a pedestrian entry contains multiple doors, the following is required;

- Entrance containing not more than 3 doors, at least one of the door leaves must be accessible.
- Where an entrance contains more than 3 doors, not less than 50% of the door leaves must be accessible.

A door is considered to be accessible if it is automatic (open and closing) or is more than 850mm in clear opening width and contains the required door circulation space.

5.3 Provisions for Access within Buildings (BCA D3.3)

A building required to be accessible is required to be equipped with either a 1428.1 compliant lift or 1428.1 compliant ramp, (but the maximum vertical rise of a ramp must not exceed 3.6m).

Within the building the following are required;

- Door circulation space as per AS1428.1 Clause 13.3;
- Doorways must have a clear opening of 850mm;
- Passing spaces (1.8m wide passages) must be provided at maximum of 20m intervals
- Within 2.0m of end access ways/corridors, turning areas spaces are required to be provided.
- Carpet pile height of not more than 11mm to an adjacent surface
- Any glazed capable of being mistaken for a doorway or opening must be clearly marked (or contain chair rail, hand rail or transom as per AS 1288 requirements)

The design would generally comply with the prescriptive provisions of the BCA with additional ongoing review being undertaken as to door widths, circulation, etc. Further details are to be provided or access to these areas is to be assessed by an access consultant.

5.4 Car parking (BCA D3.5)

Accessible car parking spaces are required to comply with AS 2890.6-2009 at the rate of 1 space for every 100 car parking spaces or part thereof.

A 'shared zone' of minimum 5400mm x 2400mm is required adjacent to accessible car parking spaces, protected with a bollard.

5.5 Tactile Indicators (BCA D3.8)

Tactile indicators are required to be provided to warn occupants of all stairs (except Fire Isolated stairs) and ramps regardless of public nature or private environment and where an overhead obstruction occurs less than 2.0m above the finished floor level.

Exemptions apply in aged care facilities to include a down button to handrails in lieu of tactile indicators.

5.9 Provisions for Accessible Sanitary Facilities (BCA F2.4)

Unisex Accessible Sanitary Facilities

An accessible unisex sanitary facility must be located so that it can be entered without crossing an area reserved for one sex only and provided in accordance with AS 1428.1-2009 and must contain a closet pan, washbasin, shelf or bench top and adequate means of disposal of sanitary towels and as per following.

Building Type	Minimum accessible unisex sanitary compartments to be provided
Office, industrial facility	a) 1 on every storey containing sanitary compartments; and b) Where a storey has more than 1 bank of sanitary compartments containing male and female sanitary compartments, at not less than 50% of those banks.

Ambulant Facilities

At each bank of toilets where there is one or more toilets in addition to an accessible unisex sanitary compartment, a sanitary compartment suitable for a person with an ambulant disability in accordance with AS 1428.1-2009 must be provided for use by males and females.

Where male sanitary facilities are provided at a separate location to female sanitary facilities, accessible unisex sanitary facilities are only required at one of those locations.

An accessible unisex sanitary compartment or an accessible unisex shower need not be provided on a storey or level that is not provided with a passenger lift or ramp complying with AS1428.1-2009

Sanitary compartments for people with ambulant disabilities need to comply with the requirements of BCA and section 16 of AS1428.1-2009.

5.10 Signage (BCA D3.6)

As part of the detailed design package, specifications will need to be developed indicating:

- Sanitary Facility Identification Signs (note that they are to comply with BCA Specification D3.6 and include the use of Braille, Tactile, etc and be placed on the wall on the latch side of the facility);
- Directional / Way Finding signs to the Lifts, Sanitary Facilities, etc;
- Hearing Augmentation System;
- Identify each door required by BCA Clause E4.5 to be provided with an exit sign, stating 'EXIT' and 'Level' number

6.0 FIRE SERVICES AND EQUIPMENT

The following section of this report describes the essential fire safety measures and the minimum performance requirements of those measures. A draft essential fire safety schedule can be found in Appendix B.

6.1 Fire Hydrants (BCA E1.3)

A system of Fire Hydrants is required to be provided in accordance with BCA Clause E1.3 and AS2419.1-2005, please provide pressure and flow calculations for review.

Pressure and flow information will be required to confirm the required pressures and flow to the system, depending on the type of hydrant to be utilized;

- Feed hydrants (within 20m of hard stand for pumping appliance), 150 kPa
- Attack hydrant (within 50m of hard stand) 250 kPa
- Hydrants on a pump station, 700 kPa

The building is required to be provided with a booster assembly as part of the fire hydrant requirements. The booster is required to be located attached to the building at the main entry. If remote from the building, the booster is to be located at the main vehicle entry and within sight of the main entry of the building within 20m of a hardstand area.

It is anticipated that the Fire Hydrants to be included in the FER to assessed hydrant under awnings as external hydrants for coverage. FER need to address performance solution EP1.3.

6.2 Fire Hose Reels (BCA E1.4)

A Fire Hose Reel System is required to BCA Clause E1.4 and AS2441-2005

Fire hose reels are to be located within 4m of exits and provide coverage within the building based on a 36m hose length. Where required, additional fire hose reels shall be located internally as required to provide coverage.

Fire Hose reel are not to extend through Fire and Smoke Walls.

It has been anticipated to provide Fire Hose Reel covering up to 50m in length. FER addressing performance solution EP1.1 is required to be provided.

6.3 Fire Extinguishers (BCA E1.6)

The provision of portable fire extinguishers is required to BCA Clause E1.6 and AS2444-2001.

Table E.6 details when portable fire extinguishers are required:

Occupancy Class	Risk Class (as defined in AS 2444)
General provisions – Class 2 to 9 buildings (except within sole-occupancy units of a Class 9c building)	<ul style="list-style-type: none">(a) To cover Class AE or E fire risks associated with emergency services switchboards. (Note 1)(b) To cover Class F fire risks involving cooking oils and fats in kitchens.(c) To cover Class B fire risks in locations where flammable liquids in excess of 50 litres are stored or used (not excluding that held in fuel tanks of vehicles).(d) To cover Class A fire risks in normally occupied fire compartments less than 500m² not provided with fire hose reels (excluding open deck carports).

Occupancy Class	Risk Class (as defined in AS 2444)
	(e) To cover Class A fire risks in classrooms and associated schools not provided with fire hose reels.
	(f) To cover Class A fire risks associated with Class 2 or 3 building or class 4 part of building.

Fire extinguishers are to be located in accordance with AS 2444, often collocated with fire hydrants and/or fire hose reels.

6.4 Automatic Sprinkler Protection (BCA E1.5)

Automatic sprinkler protection is required to Specification E1.5 and AS2118.1-2017 to the following areas:

- Throughout the entire building if it is classified as large isolated under BCA Clause C2.3;

Location of pumps, tanks, FIP, control valves and booster assemblies will be subject to review.

An occupant warning system should be provided in accordance with BCA Specification E1.5.

6.5 Exit Signs and Emergency Lighting (BCA E4.2 and BCA E4.5)

Emergency Lighting and Exit Signs indicating exit location paths of travel to exits to be provided in accordance with AS2293.1-2005

It is anticipated that a fire engineered solution will be proposed to permit exit signage to be mounted at a height greater than the maximum height permitted by AS2293.2 (2.7m). FER addressing performance solution EP4.2 need to be provided.

Details are required to be provided for review.

6.7 Fire Control Centre (BCA E1.8)

As the building contains a floor area of greater than 18,000m², a fire control centre is required in accordance with BCA Specification E1.8.

Details are required to be provided for review.

6.8 Smoke Hazard Management (BCA E2.2)

Smoke hazard management shall be provided throughout the building by means of the following systems:

- Automatic Smoke Exhaust System activated by Automatic Smoke Detection & Alarm System in accordance with the requirements of BCA Spec E2.2a and AS1670.1-2015
- Automatic Smoke Detection and Alarm System in accordance with the requirements of BCA Spec E2.2a and AS 1670.1-2004

Automatic Smoke Exhaust throughout the Warehouse will be rationalised through the fire engineering process for the Warehouse, pursuant to Performance Requirement EP2.2 of the BCA.

A fire indicator panel is required as part of the detection system. This panel is to be located within 4m of the main entry and should be incorporated within the fire control room. Any variation to the prescriptive provisions will require the consent of the fire brigade and should form part of the fire safety engineering report to verify the performance requirements of the BCA.

7.0 HEALTH AND AMENITY

7.1 Sanitary Facilities (BCA F2.2 and BCA F2.3)

Subject to the provision of population numbers to both the Warehouse and the Office, Sanitary Facility numbers will be calculated against the prescriptive provisions of the BCA.

Note:

1. The Unisex facilities provided for people with disabilities may be counted once for each sex. These facilities are to be provided in accordance with AS1428.1-2009.

Bathroom Construction

Where bathrooms or rooms containing water closets have the WC within 1200mm of the doorway, the door shall be either sliding, open outwards, or be provided with removable hinges.

7.3 Light and Ventilation (BCA Part F4)

Class 7

Natural Ventilation is required to be provided to rooms at a rate of 5% of the floor area in openings. Alternatively, mechanical ventilation is required in accordance with AS1668.2-2012. The architect is to provide calculations to verify compliance is achieved.

Artificial lighting complying with AS/NZS1680.0-2009 is to be incorporated with the final detailed design to be developed to confirm this.

7.5 Weatherproofing of External Walls (BCA FP1.4)

Performance Requirement FP1.4 which relates to the prevention of the penetration of water through external walls, must be complied with. It is noted that there are no Deemed-to-Satisfy Provisions for this Performance Requirement in respect of external walls.

As such, a performance solution is to be prepared by a suitably qualified professional that demonstrates that the external walls of the proposed building complies with Performance Requirement FP1.4 which reads as follows:

A roof and external wall (including openings around windows and doors) must prevent the penetration of water that could cause—

- a) unhealthy or dangerous conditions, or loss of amenity for occupants; and*
- b) undue dampness or deterioration of building elements.*

8.0 ENERGY EFFICIENCY

The proposed development shall comply with Part J of the BCA. To achieve compliance, there are two options available:

1. The building can comply with the deemed-to-satisfy provisions of the BCA, relating to the following areas:
 - Building Fabric
 - Glazing
 - Building Sealing
 - Air Conditioning & Ventilation Systems
 - Artificial Lighting & Power
 - Hot Water Supply
2. The building can be verified against a reference building as per Verification Method JV3. This requires that the proposed building and its services be shown to have an annual energy consumption of equal or less than the reference building which has been modelled as per the requirements of Part J of the BCA.

Certification from an appropriately qualified engineer should be provided for either option with a report / computations outlining how compliance is achieved.

Access for maintenance is to be provided to the building in accordance with the requirements of BCA Part J8.

The proposed site will be located in a climate zone 6.

Due to special nature of the building some energy provisions may not be appropriate.

10.1 Roof and Ceiling Construction

Roofs and or Ceilings are to be constructed to provide an R rating of 3.2.

Where the layer of insulation is penetrated by the percentages as tabled below, additional upgrading of the remainder of the insulation level is required to be provided as follows:

Percentage of ceiling are uninsulated	Minimum R-Value of ceiling insulation required to satisfy J1.3(a)							
	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
	Adjusted minimum R-Value of ceiling insulation required to compensate for loss of ceiling area insulation							
0.5% to less than 1.0%	2.8	3.4	4.0	4.7	5.4	6.2	6.9	
1.0% to less than 1.5%	2.9	3.6	4.4	5.2	6.1	7.0		
1.5% to less than 2.0%	3.1	3.9	4.8	5.8	6.8			
2.0% to less than 2.5%	3.3	4.2	5.3	6.5				
2.5% to less than 3.0%	3.6	4.6	5.9					
3.0% to less than 4.0%	4.5	5.7						
4.0% to less than 5.0%	5.0							
5.0% or more								

Not permitted

Where roof lights are installed, we will require the size of roof lights and the depth of the shaft to work out the roof light shaft index and extent of glazing as per the table below which would dictate the glazing to be used.

Roof light shaft Constant index (see Note 1)		Total area of roof lights serving the room or space as a percentage of the floor area of the room or space			
		Up to 2%	More than 2% and up to 3%	More than 3% and up to 4%	More than 4% and up to 5%
Less than 0.5	SHGC	Not more than 0.83	Not more than 0.57	Not more than 0.43	Not more than 0.34
	Total U-Value	Not more than 8.5	Not more than 5.7	Not more than 4.3	Not more than 3.4
0.5 to less than 1.0	SHGC	Not more than 0.83	Not more than 0.72	Not more than 0.54	Not more than 0.43
	Total U-Value	Not more than 8.5	Not more than 5.7	Not more than 4.3	Not more than 3.4
1.0 to less than 2.5	SHGC	Not more than 0.83	Not more than 0.83	Not more than 0.69	Not more than 0.55
	Total U-Value	Not more than 8.5	Not more than 5.7	Not more than 4.3	Not more than 3.4
2.5 or more	SHGC	Not more than 0.83	Not more than 0.83	Not more than 0.83	Not more than 0.83
	Total U-Value	Not more than 8.5	Not more than 5.7	Not more than 4.3	Not more than 3.4

10.2 External Walls

External Walls are to be constructed to provide the following:

- (a)
 - (i) Achieve a minimum Total R-Value of 2.8
 - (ii) The minimum total R-Value in (i) is reduced
 - (A) For a wall with a surface density of not less than 220 kg/m², by 0.5; and
 - (B) For a wall that is –
 - (aa) Facing the south orientation by 0.5; or
 - (bb) Shaded with a projection shade angle in accordance of (AA) 30 degrees to not more than 60 degrees, by 0.5; or (BB) More than 60 degrees, by 1.0
- (b) Where the only space for insulation is provided by a furring channel, top hat section, batten or the like
 - (i) Achieve a minimum Total R-Value of 1.4; and
 - (ii) Satisfy glazing energy index increase in glazing performance

10.3 Floors

Floors are to achieve an R rating of 1.25.

10.4 Glazing

This section relates to the conductance and solar heat gain of the windows, taking into consideration of the type of window frame, orientation and whether there are overhangs / shadings.

A glazing calculator will be required to be undertaken and results provided for assessment.

10.5 Building Sealing

A Seal to restrict air infiltration must be fitted to each edge of the external doors and openable windows. The seals may be foam or compressible strip, fibrous seal or the like. The main entry doors must have either an airlock, or self-closing doors, or a revolving door.

Miscellaneous exhaust fans must be fitted with a sealing device such as a self-closing damper.

An evaporative cooler must be fitted with a self-closing damper.

10.6 Air Conditioning

- Be capable of being inactivated in each Sole Occupancy Unit.
- Where motorised dampers, be close when system is inactivated
- Have any supply and return ductwork installed
 - Heating or Cooling only R1.0
 - Heating and Cooling R1.5
 - Where ductwork is conveying cold air, a vapour barrier must be installed on the outside of the insulation.

When an air conditioning system provides mechanical ventilation as well and the capacity exceeds 35 kwr (in climate zone 4-8), the system must be equipped with an outdoor air economy cycle.

Air Flow Rate:

When the air flow rate exceeds 1000L/s, it must be designed so the total motor shaft powers of the fans do not exceed the following;

Air-conditioning sensible heat load (W/m ² of the floor area of the conditioned space)	Maximum fan power (W/m ² of the floor area of the conditioned space)	
	For an air-conditioning system serving not more than 500m ²	For an air-conditioning system serving more than 500m ²
Up to 100	4.1	6.4
101 to 150	7.3	10.4
151 to 200	10.5	14.1
201 to 300	17.1	21.5
-301 to 400	23.6	28.4

Requirements do not apply to packaged Air Conditioned Units, exhaust systems, high efficiency air filters, or energy reclaim systems.

Mechanical:

- Be capable of being inactivated.
- When serving a conditioned space, not provide ventilation in excess of 20% of the rate of required (as determined) other than to;
 - (i) Balance the required ventilation, due to exhaust ventilation
 - (ii) Part of an exhaust system in a health care building
 - (iii) As free cooling, with air conditioner switched off i.e. when external temperature is less than indoor temperature.

Air Flow Rate in Excess of 1000 L/S

- Comply with the fan to motor shaft power to air flow ratio.
 - (i) an energy reclaim system that preconditions outside air or L/s without filters;
 - (ii) the ability to modulate the system in pursuant to the number of occupants in lieu of the maximum or 0.75 L/s where filters are installed.

Air Conditioned Packaged Units

- Must have an energy efficiency ratio of (Watts);
 - 65 kW_r to 95 kW_r 2.7
 - 95 kW_r to more 2.8

Heating and Cooling systems

Systems that provide heating or cooling for mechanical or air conditioning systems must –

- (i) Have any *piping*, vessels, heat exchangers or tanks containing heated or chilled fluid, other than those with insulation levels covered by Minimum Energy Performance Standards (MEPS) must be insulated in accordance with Specification J5.4
- (ii) Where water is circulated by pumping at greater than 2 L/s

Be designed in accordance to the following table:

Maximum Pump Power

Cooling or heating load (W/m ² of the floor area of the conditioned space)	Maximum pump power (W/m ² of the floor area of the conditioned space)		
	Chilled water	Condenser water	Heating water
Up to 100	1.3	0.9	1.0
101 to 150	1.9	1.2	1.3
151 to 200	2.2	2.2	1.7
201 to 300	4.3	3.0	2.5
301 to 400	5.0	3.6	3.2
More than 400	5.6	5.6	3.6

- have the pump capable of varying its speed in response to varying load when it is rated at more than 3kW of pump power, except where the pump is needed to run at full speed for safe or efficient operation; and
- if the system contains more than one water heater used for heating a building, chiller or coil, be capable of stopping the flow of water to those not operating.

Heaters

Boilers used to heat space via water must be:-

- a) In accordance with the following table and
- b) Where reticulated gas is available at the allotment boundary

Minimum Thermal Efficiency of a water heater

Fuel Type	Rated capacity (kW _{heating})	Minimum gross thermal efficiency (%)
Gas	Not more than 750	80
	More than 750	83

Oil	All capacities	80
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For heating a space other than via water, must be –

- A solar heater; or
- A gas heater; or
- An oil heater if reticulated gas is not available at the allotment boundary; or
- A heat pump heater; or
- A solid-fuel burning heater; or
- A heater using reclaimed heat from another process such as reject heat from refrigeration plant; or
- A combination of 2 or more of the above.

Where a fixed space heating appliance is installed outdoors (such as wall mount heaters), it must be controlled to automatically turn off when not needed by an outdoor air temperature sensor, timer, motion detector, or the like.

Refrigerant chillers

A refrigerant chiller up to 350 kW capacity that is part of an air-conditioning system, must have an energy efficiency ratio as per:

Equipment	Minimum energy efficiency ratio ($W_r/W_{\text{input power}}$)	
	For full load operation	For integrated part load
Water cooled chiller	4.2	5.2
Air cooled or evaporative cooled chiller	2.5	3.4

Air Condensers

The fan motor of an air cooled condenser that is part of an air-conditioning system, other than one that is part of package air-conditioning equipment in or part of a Liquid Chilling Package, must not use more than 42 W of fan power, for each kW of heat rejected from the refrigerant.

Cooling Towers

The fan of a cooling tower that is part of an air-conditioning system must not use more than-

- If a propeller or axial fan, 310 W of fan power for each L/s of cooling water circulated.
- If a centrifugal fan, 590 W of fan power for each L/s of cooling water circulated.

Closed Circuit coolers

The fan of a closed circuit cooler that is part of an air-conditioning system must not use more than-

- If a propeller or axial fan, 500 W of fan power for each L/s of cooled fluid circulated; and
- If a centrifugal fan, 670 W of fan power for each L/s of cooled fluid circulated.

Evaporative condenser

The fan of an evaporative condenser that is part of an air-conditioning system must not use more than-

- If a propeller or axial fan, 18 W of fan power for each kW of heat rejected; and
- If a centrifugal fan, 22 W of fan power for each kW of heat rejected.

Water pumps

The spray water pump of a closed circuit cooler or evaporative condenser that is part of an air-conditioning system must not use more than 150 W of pump power for each L/s of spray water circulated.

Time Switch

Time switch must be provided to control each of the following;

- (i) Air Conditioning system of more than 10 Kw
- (ii) Ventilation system with an air flow rate of 1000 L/S
- (iii) Heating system of more than 10 Kw heating.

10.7 Interior Artificial Lighting

The maximum design illumination load is not to exceed;

Office	9W/m ²
Warehouse	10W/m ²

Artificial Lighting must be controlled by a time switch, occupant sensor or a security swipe pass system.

Each light control in a building must not operate lights within an area of more than;

- 250m² for a space of not more than 2000m²
- 1000m² for a space of more than 2000m²

Artificial lighting around the lighting. If it exceeds a total of 100W must;

- Be controlled by a day light sensor or time switch and
- Be controlled by motion detection or have an average light source efficiency of not less than 60 Watts / Lumens.

10.8 Access for Maintenance

Access is to be provided to all plant, equipment and components associated with the provision of the above energy requirements i.e.

- Adjustable or monitored shading devices
- Time switches and motion detectors
- Room temperature thermostats
- Plant thermostats such as boilers or refrigeration units
- Motorised air dampers and central valves
- Reflectors, Lenses and Diffusers of light fittings
- Heat transfer equipment

Appendix A - Design Documentation

The following documentation was used in the assessment and preparation of this report: -

Drawing No.	Title	Date	Drawn By	Rev
10868_DA001	Master Plan	06/07/18	Nettletontribe	P7
10868_DA002	Site Plan	06/07/18	Nettletontribe	P7
10868_DA011	Ground Floor Plan	06/07/18	Nettletontribe	P7
10868_DA012	Roof Plan	06/07/18	Nettletontribe	P7
10868_DA021	Elevations	06/07/18	Nettletontribe	P7
10868_DA022	Elevations	06/07/18	Nettletontribe	P8
10868_DA023	Office Elevations	06/07/18	Nettletontribe	P6

Appendix B - Draft Fire Safety Schedule

Essential Fire Safety Measures		Standard of Performance
1.	Access Panels, Doors and Hoppers	BCA Clause C3.13
2.	Automatic Fire Detection and Alarm System	BCA Spec. E2.2a & AS 1670.1 – 2015, AS/NZS 1668.1 - 2015
3.	Automatic Fire Suppression System	BCA Spec. E1.5 & AS 2118.1 – 2017, AS 2118.6 – 2012 (Combined sprinkler & hydrant)
4.	Building Occupant Warning System	BCA Spec. E1.5, BCA Spec. E2.2a & AS 1670.1 – 2015 – Clause 3.22
5.	Emergency Lighting	BCA Clause E4.2, E4.4 & AS/NZS 2293.1 – 2005 Amdt 1 & 2
6.	Emergency Evacuation Plan	AS 3745 – 2002
7.	Exit Signs	BCA Clauses E4.5, NSW E4.6 & E4.8 and AS/NZS 2293.1 – 2005 Amdt 1 & 2
8.	Fire Control Centres and Rooms	BCA Spec. E1.8
9.	Fire Dampers	BCA Clause C3.15, AS/NZS 1668.1 – 2015 & AS 1682.1&2 - 1990
10.	Fire Doors	BCA Clause C3.2, C3.4, C3.5, C3.6, C3.7 & C3.8, Spec C3.4 and AS 1905.1 – 2015
11.	Fire Hose Reels	BCA Clause E1.4 & AS 2441 – 2005 Amdt 1
12.	Fire Hydrant System	BCA Clause E1.3 & AS 2419.1 – 2005 Amdt 1
13.	Fire Seals, Collars	BCA Clause C3.15, C3.16 & AS 1530.4 – 2014
14.	Lightweight Construction	BCA Clause C1.8, C3.17 & AS 1530.3 – 1999
15.	Mechanical Air Handling System	BCA Clause E2.2, AS/NZS 1668.1 – 2015
16.	Paths of Travel	EP&A Reg 2000 Clause 186
17.	Perimeter Vehicular Access for emergency vehicles	BCA Clause C2.4
18.	Portable Fire Extinguishers	BCA Clause E1.6 & AS 2444 – 2001
19.	Smoke Detectors and Heat Detectors	BCA Spec E2.2a & AS 1670.1-2015, AS/NZS 1668.1-2015
20.	Warning and Operational Signs	EP&A Reg 2000 Clause 183, BCA Clause C3.6, D2.23, E3.3 & H101.8

Appendix C - Fire Resistance Levels

The table below represents the Fire resistance levels required in accordance with BCA 2016 Amendment 1:

Table 5 TYPE C CONSTRUCTION: FRL OF BUILDING ELEMENTS

Building element	Class of building—FRL: (in minutes)			
	<i>Structural adequacy/Integrity/Insulation</i>			
	2, 3 or 4 part	5, 7a or 9	6	7b or 8
EXTERNAL WALL (including any column and other building element incorporated within it) or other external building element, where the distance from any fire-source feature to which it is exposed is—				
Less than 1.5 m	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90
1.5 to less than 3 m	—/—/—	60/ 60/ 60	60/ 60/ 60	60/ 60/ 60
3 m or more	—/—/—	—/—/—	—/—/—	—/—/—
EXTERNAL COLUMN not incorporated in an <i>external wall</i> , where the distance from any <i>fire-source feature</i> to which it is exposed is—				
Less than 1.5 m	90/—/—	90/—/—	90/—/—	90/—/—
1.5 to less than 3 m	—/—/—	60/—/—	60/—/—	60/—/—
3 m or more	—/—/—	—/—/—	—/—/—	—/—/—
COMMON WALLS and FIRE WALLS—	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90
INTERNAL WALLS-				
Bounding <i>public corridors</i> , public lobbies and the like—	60 / 60/ 60	—/—/—	—/—/—	—/—/—
Between or bounding <i>sole-occupancy units</i> —	60/ 60/ 60	—/—/—	—/—/—	—/—/—
Bounding a stair if <i>required</i> to be rated—	60/ 60/ 60	60/ 60/ 60	60/ 60/ 60	60/ 60/ 60
ROOFS	—/—/—	—/—/—	—/—/—	—/—/—