DUE DILIGENCE REPORT - BLDG 3120

REVEDEVELOPMENT PROPOSAL FOR A 9 STORY COMMERCIAL BUILDING

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75 LONGLAND STREET, NEWSTEAD 4006
LOT 5 - RP 226469

EXECUTIVE SUMMARY

This due diligence report aims to check the compliance of the building proposal to determine whether the proposal has any value. The proposed site, 75 Longland St, Newstead, 4006 will be analysed to see if it will fit the clients company. Specifically, an approach that encompasses energy efficiency, human comfort and well-being, and innovative low carbon construction. The key points that will be investigated in this project are:

1.0 - Environment
2.0 - Local Context
3.0 - Urban Design and Planning
4.0 - Building Code and Standards Compliance
5.0 - Design Aspirations and Best Practice
6.0 - Alternative Building Frame Strategies
7.0 - Best Practice Facade

The analysis of these key points will demonstrate that the property presents a unique opportunity for company seeking to establish itself as a leader in the low carbon futures space.

DUE DILIGENCE REPORT - BLDG 3120

CONTENTS

FACADE SOLAR ANALYSIS - SUMMER

1.0 ENVIROMENT

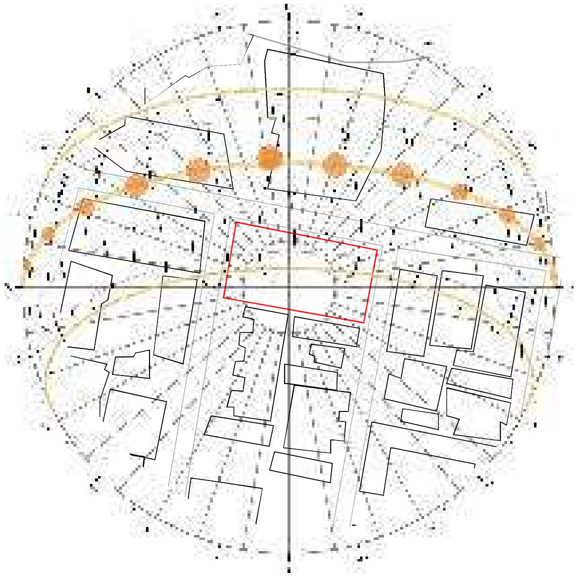
PARAGRAPH HEADING

From the summer solar analysis, it can be noted that the sun's solar radiation is tending to hit the north-western facade of the building. During summer, the sun's path is tilted because of the south pole and consequenetly, the sun path is higher. Thus, this sun's path will be the most enlongated of the year, illustrating the overexposure of solar radiation on the north-western facade.

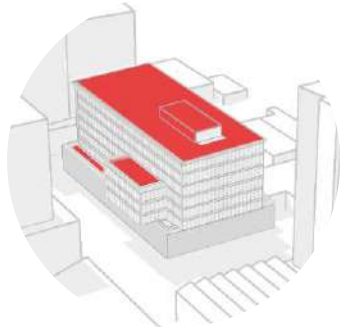
The analysis of this study demonstrates that overheating and an excessive use of cooling facilities could be an issue for the building. thus, the following designs princibles will be considered

- Utilising lightweight wall consturction
- Fully openable windows and sliding doors
- Shading of all eastern and western walls through all seasons
- Internal walls being insulated from exterior mass heat
- Roof spaces being utilised to accomidate for heat flow buffer zones by ventlating them in summer and spring and sealing them in winter and autumn.
- A utilisation of low ghsc and low u value glazing in all windows with thermally split frames that accomidate for cool winter and hot summers
- A utilisiation of reflective vapour barriers in rooms with air conditioning

A attentive utilisation of pasive shaded glass in the north-facing facad.



NORTH WEST ISOMETRIC VIEW



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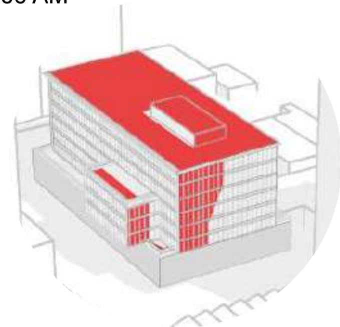

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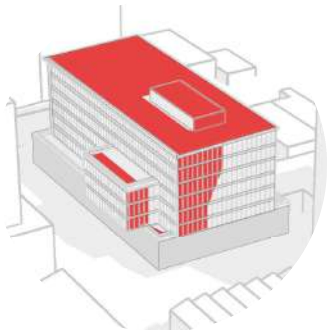

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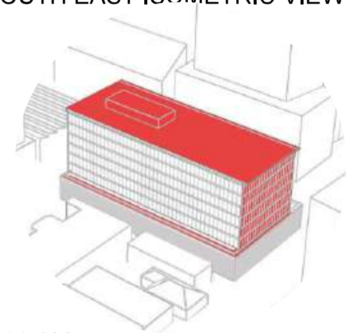
SOUTH EAST ISOMETRIC VIEW



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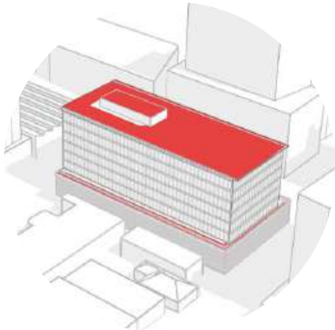

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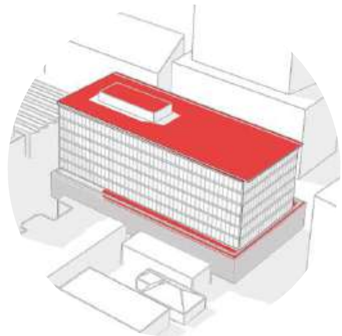

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FACADE SOLAR ANALYSIS - EQUINOX

1.0 ENVIROMENT

PARAGRAPH HEADING

From the equinox solar analysis, it can be noted that the sun's solar radiation is tending to hit the north-western facade of the building. At the equinoxies of each year, the sun's path is directly alligned when rises on the east and setting on the west. Thus, this sun's path will be the most enlongated of the year, illustrating the overexposure of solar radiation on the north-western facade.

The analysis of this study demonstrates that overheating and an excessive use of cooliang facilities could be an issue for the building. thus, the following designs princibles will be considered

- Utilising lightweight wall consturction
- Fully openable windows and sliding doors
- Shading of all eastern and western walls through all seasons
- Internal walls being insulated from exterior mass heat
- Roof spaces being utilised to accomidate for heat flow buffer zones by ventlating them in summer and spring and sealing them in winter and autumn.
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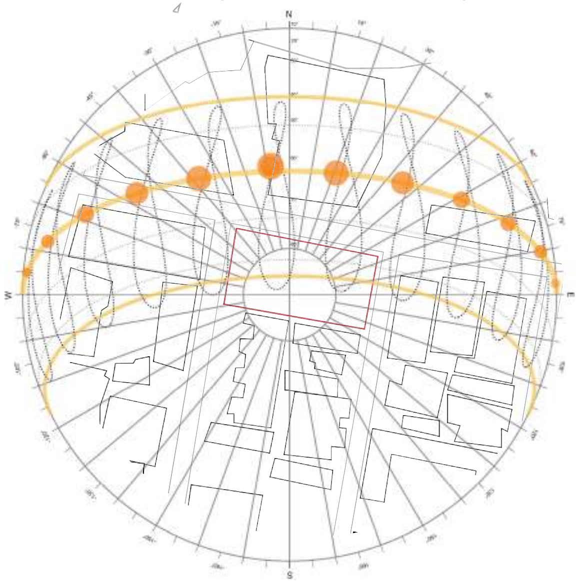

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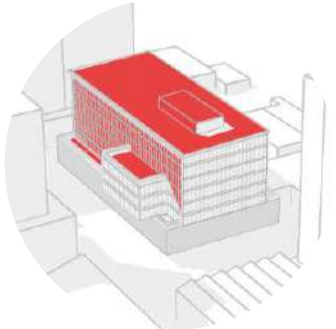

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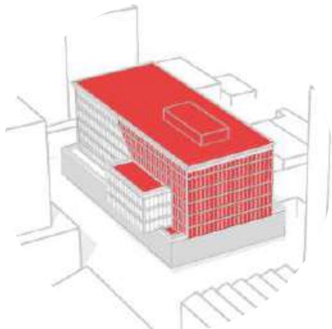

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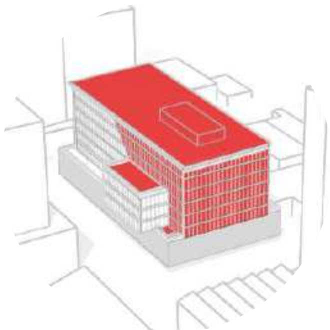

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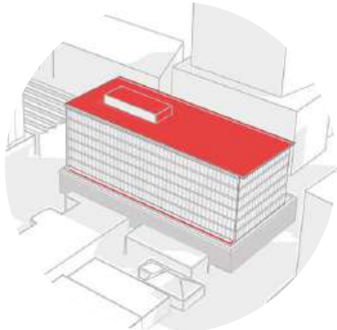

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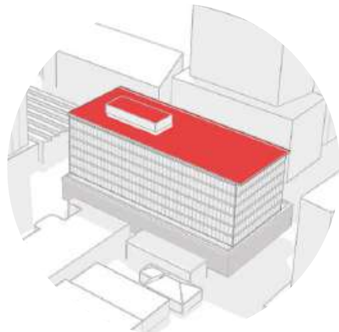

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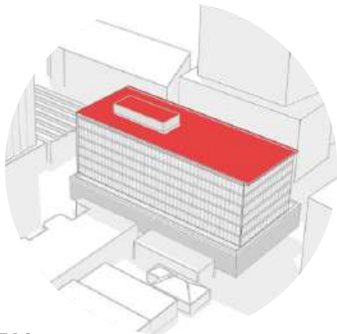

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FACADE SOLAR ANALYSIS - WINTER

1.0 ENVIROMENT

PARAGRAPH HEADING

From the winter solar analysis, it can be noted that the sun's solar radiation is tending to hit the north facade of the building and the roof. Due to the orientation of the sun in Australia is to the north, north facing rooms will recieve the most solar radiation during a winter day.

The analysis of this study allows it to be concluded that the other rooms will need to retain heat and warming methods shall be implaced so that cool air does not enter the building. Thus, the following designs princibles will be considered

- Utilising lightweight wall consturction
- Fully openable windows and sliding doors
- Shading of all eastern and western walls through all seasons
- Internal walls being insulated from exterior mass heat
- Roof spaces being utilised to accomidate for heat flow buffer zones by ventlating them in summer and spring and sealing them in winter and autumn.
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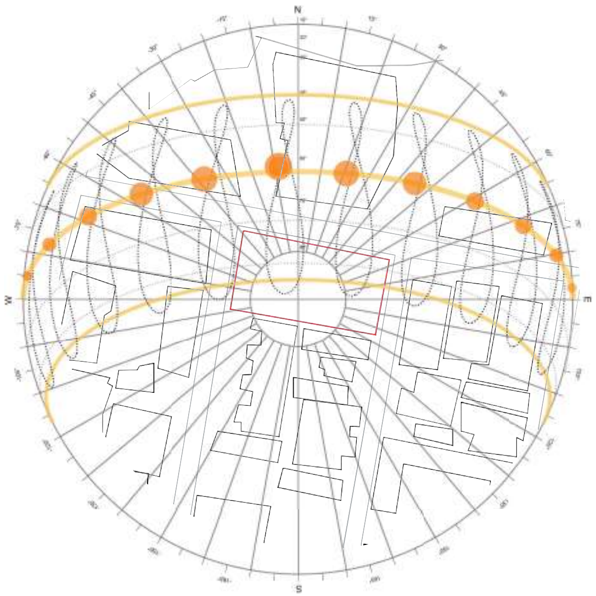

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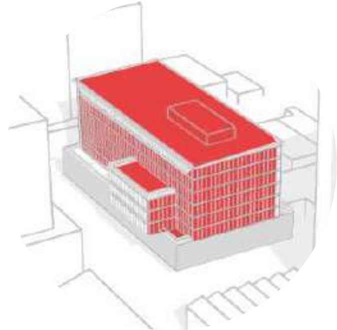

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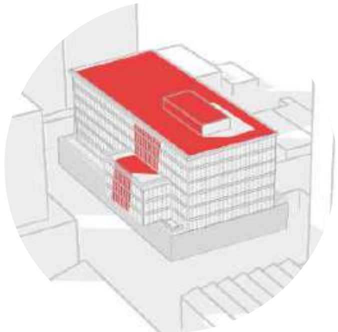

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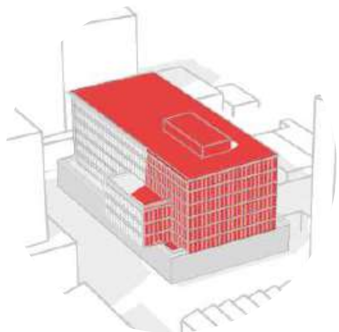

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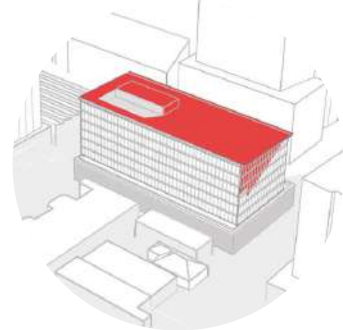

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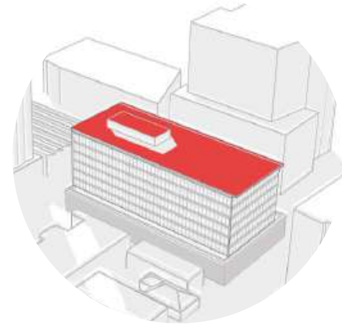

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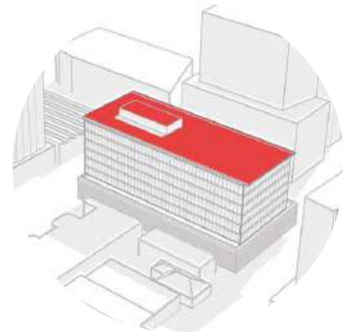

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SEASONAL TEMPERATURE & HUMIDITY VARIATIONS

1.0 ENVIROMENT

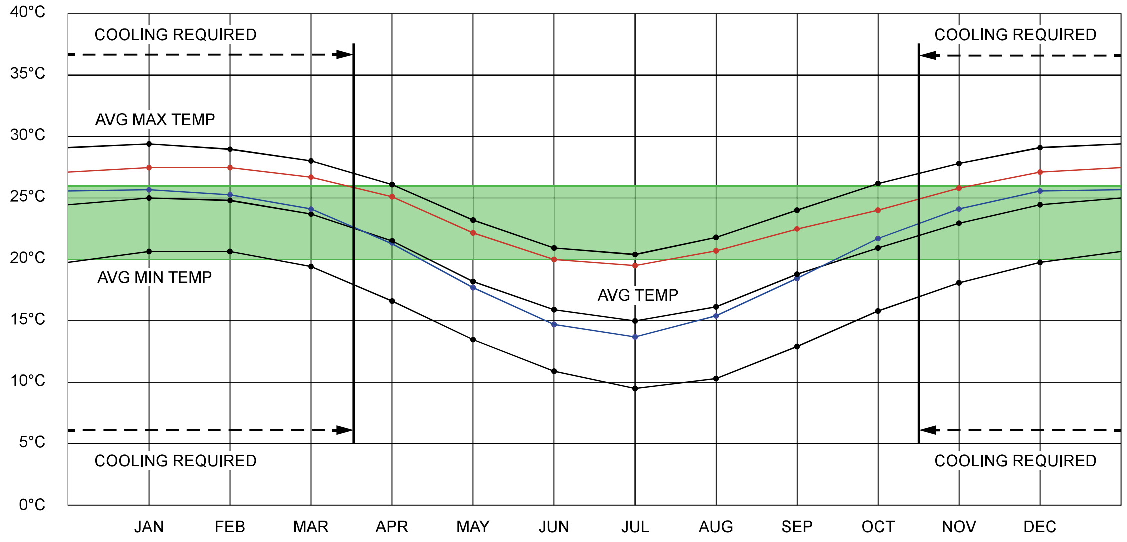
TEMPERATUIRE

Brisbane has distinctive summer & winter seasons; the temperature, on average, remains above 25°C only dipping down mid-year during the short winter period. The temperature stays relatively constant throughout the day, as shown by data recorded at 9 am & 3 pm, except for winter when the cold season is signified by colder mornings. The comfort range (shown in green) determines the months when cooling is required for comfortable occupation; this can be achieved through air-conditioning, but preferably, through harnessing prevailing winds.

(9AM) YEAR AVERAGE TEMPERATURE - Obtained from the Australian Bureau of Meteorology

(3PM) YEAR AVERAGE TEMPERATURE - Obtained from the Australian Bureau of Meteorology

TEMPERATURE COMFORT ZONE- Obtained from the Australian Bureau of Meteorology



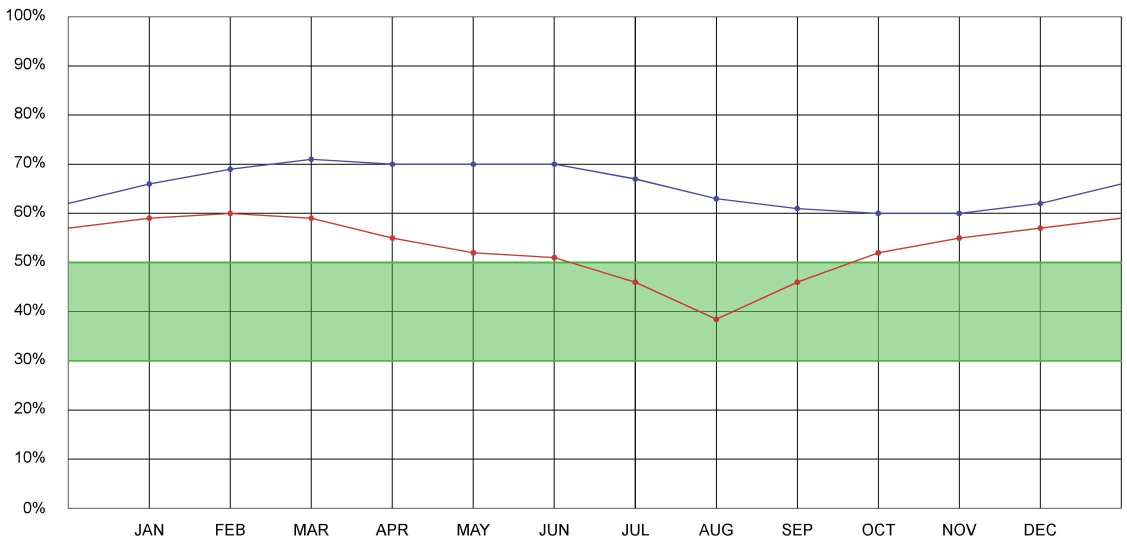
HUMIDITY

Brisbane's subtropical climate results in humid summers with mild to dry winters. Humidity data collected over past decades indicates Brisbane sits above the comfort zone almost year-round resulting in the need for constant humidity control. Typically air-conditioning controls humidity in office buildings, but preferably, it can be achieved through de-humidifiers, properly vented wet areas and reduced use of moisture-trapping materials. These systems can be designed to be especially affective in summer months, when most required.

(9AM) YEAR AVERAGE RELATIVE HUMIDITY - Obtained from the Australian Bureau of Meteorology

(3PM) YEAR AVERAGE RELATIVE HUMIDITY - Obtained from the Australian Bureau of Meteorology

RELATIVE HUMIDITY COMFORT ZONE- Obtained from the Australian Bureau of Meteorology



SEASONAL WIND DIRECTION VARIATIONS

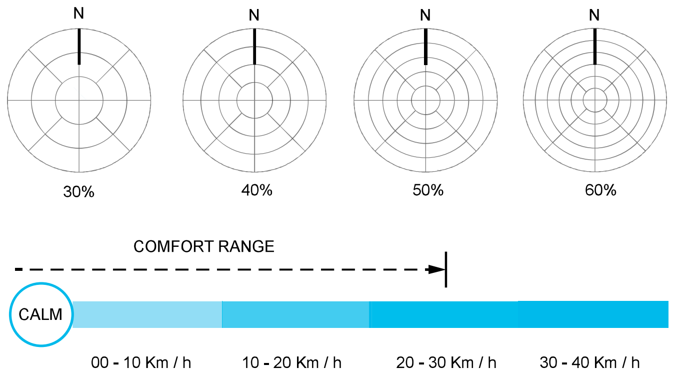
1.0 ENVIROMENT

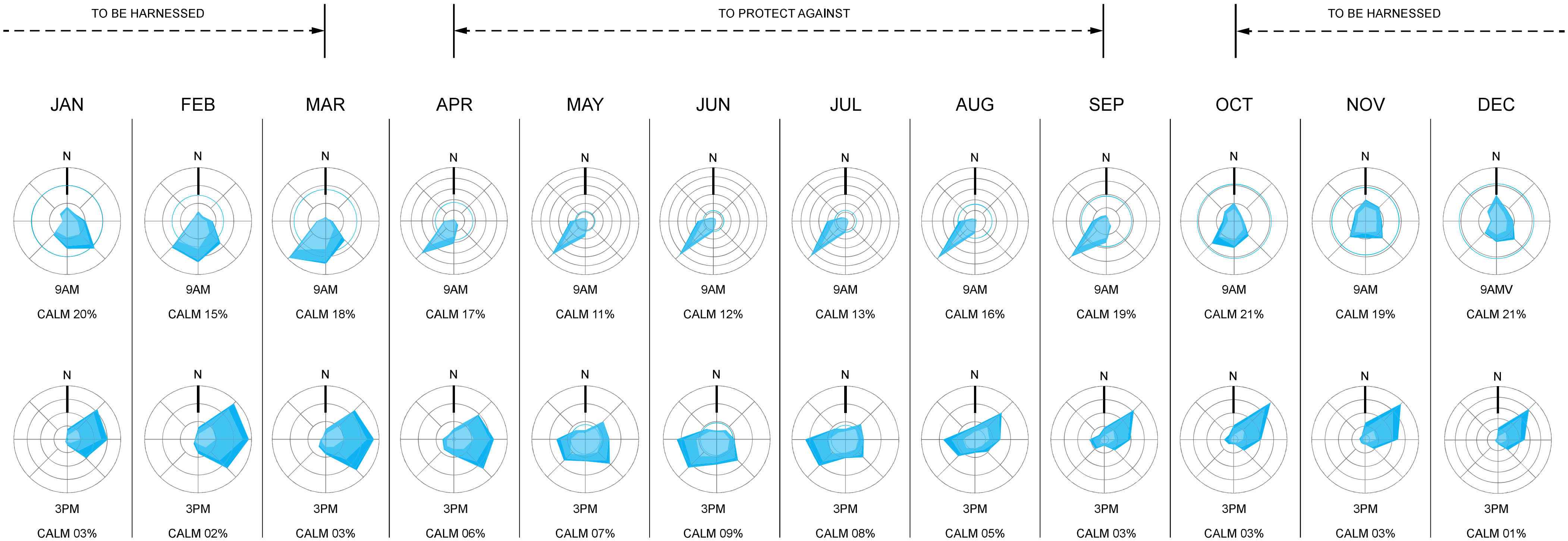
CONDITIONS

The following wind rose diagrams represent the seasonal shifts in wind direction across Brisbane between 9 am & 3 pm respectively. Morning winds tend to be calm in summer & strong & direct in winter; afternoon winds tend to be strong & direct in summer & even in winter. This results in a trend of harsh & direct winterly winds from the South-West & cool passive summer winds from the North-East. This data set was collected over the past few decades and represents the average, any considerations are to be done knowing conditions may vary in future years.

CONSIDERATIONS

Winterly winds often exceed the comfort range for occupation (shown right), hence these highly direct winds will need to be protected against if incorporating natural ventilation is to be considered. This can be achieved by designing the South & West facades to shed these directional winds (shown below). Summer winds are passive & less directional, hence harnessing them for ventilation would be reasonable. If this were to be considered the North & East facades would need to be designed to slow down but accept these winds (shown below).



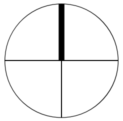


POTENTIAL FOR REQUIRED NOISE REDUCTION

1.0 ENVIROMENT

CONSIDERATIONS

While required noise reduction is specific to residential buildings within noise corridors, this data can provide important information regarding the level of noise caused by transport in a given area, & can be used to determine products that can reduce noise to the desired amount. The site sits within MP4.4 Category 1 which suggests that the site experiences between 58 - 62 dB(A) from transport on Ann Street. If this were a residential building it would require 25 dB (A) of noise reduction. As this building is intended to be an office space, this level of noise reduction is not required, but should definitely be considered in order to create an effective working environment.



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MP4.4 CATEGORY 3

68 - 72 dB(A) - Requires 35 dB (A) of noise reduction in a habitable spaces

MP4.4 CATEGORY 2

63 – 67 dB(A) - Requires 30 dB (A) of noise reduction in a habitable spaces

MP4.4 CATEGORY 1

58 - 62 dB(A) - Requires 25 dB (A) of noise reduction in a habitable spaces

MP4.4 CATEGORY 0

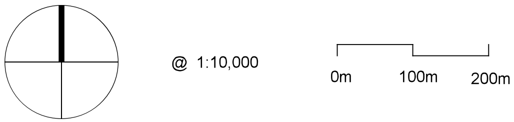
≤ 57 dB(A) - Does not require noise reduction

POTENTIAL FOR FLOODING

1.0 ENVIROMENT

CONSIDERATIONS

'Potential for flooding' is determined by the Brisbane City Council based on previous flood data & future predictions. They outline 'Brisbane River Planning Zones' that entail the levels of planning required for buildings within these flood zones. While the majority of the site is within Brisbane River Planning Zone 5, portions of the site are within the Brisbane River Planning Zone 4 which entails that flooding is likely on this site. While the water may be shallow and slow-moving, special consideration to the structure's ability to resist water damage will have to be made.



BRISBANE RIVER PLANNING ZONE 1

FPA1 Flooding is very likely and/or there may be very deep and/or very fast moving water.

BRISBANE RIVER PLANNING ZONE 2

FPA2 Flooding is likely and there may be deep and/or fast moving water.

BRISBANE RIVER PLANNING ZONE 3

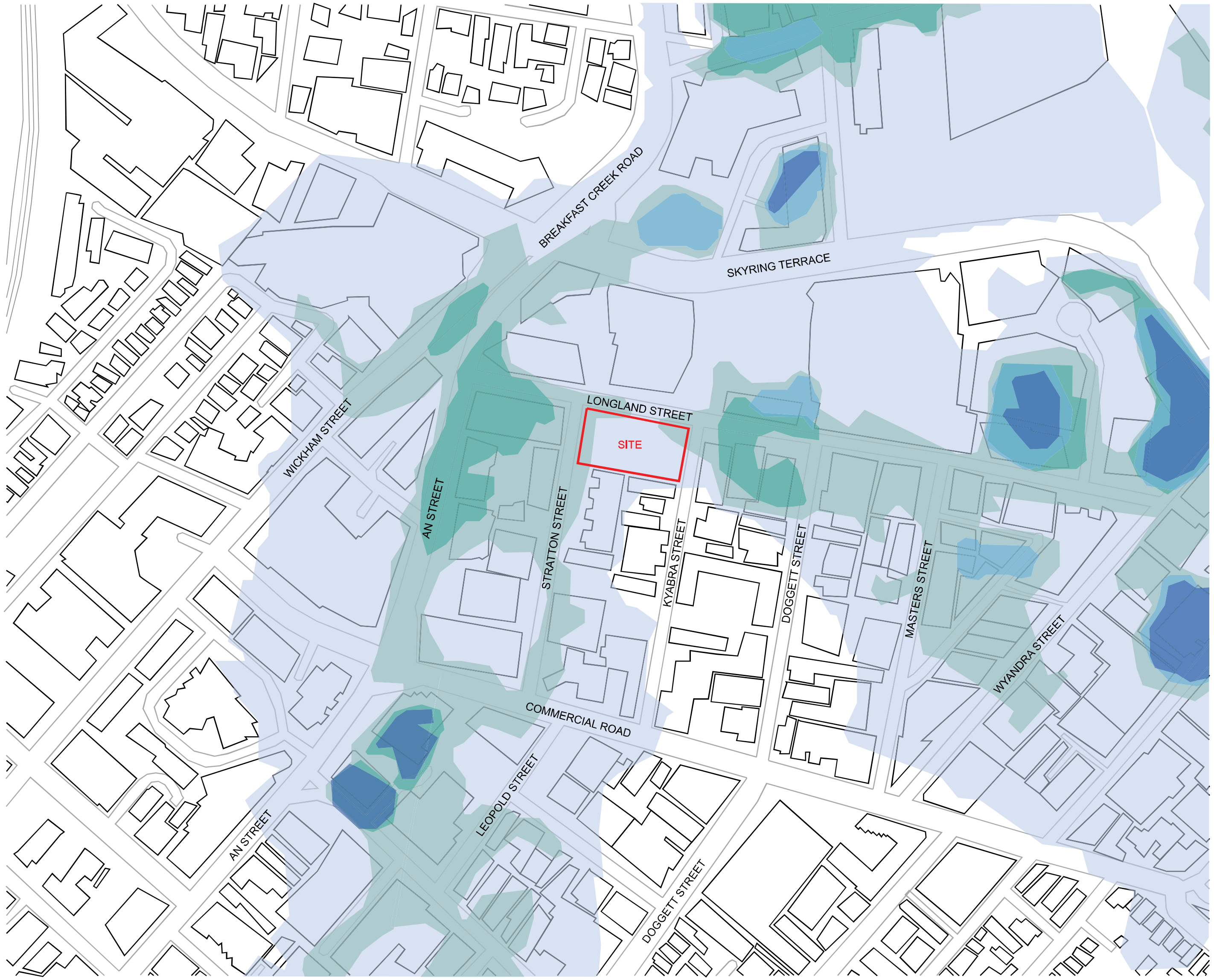
FPA3 Flooding is likely and there may be deep and/or moderate-fast moving water.

BRISBANE RIVER PLANNING ZONE 4

FPA4 Flooding is likely and there may be shallow and/or slow moving water.

BRISBANE RIVER PLANNING ZONE 5

FPA5 There is no recent history of flooding but there is potential for flooding.

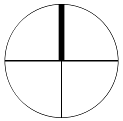


POTENTIAL FOR OVERLAND FLOW FLOODING

1.0 ENVIROMENT

CONSIDERATIONS

Overland flow is the most common type of flooding in Brisbane. Local overland flow flooding is water that runs across the ground after heavy rain and occurs very quickly. Water may rise quickly and move with speed, but will recede quickly. The site sits within the local overland flow flood potential zone, which indicates it is likely to experience this type of flooding. While the water may be shallow, special consideration to the structure's ability to resist water damage should be made. To mitigate the risk of structural damage from overland flow, the following measures can be implemented: construct stormwater drainage infrastructure that exceeds requirements, install flood warning systems, and develop floodplain management plans for diverting stormwater.



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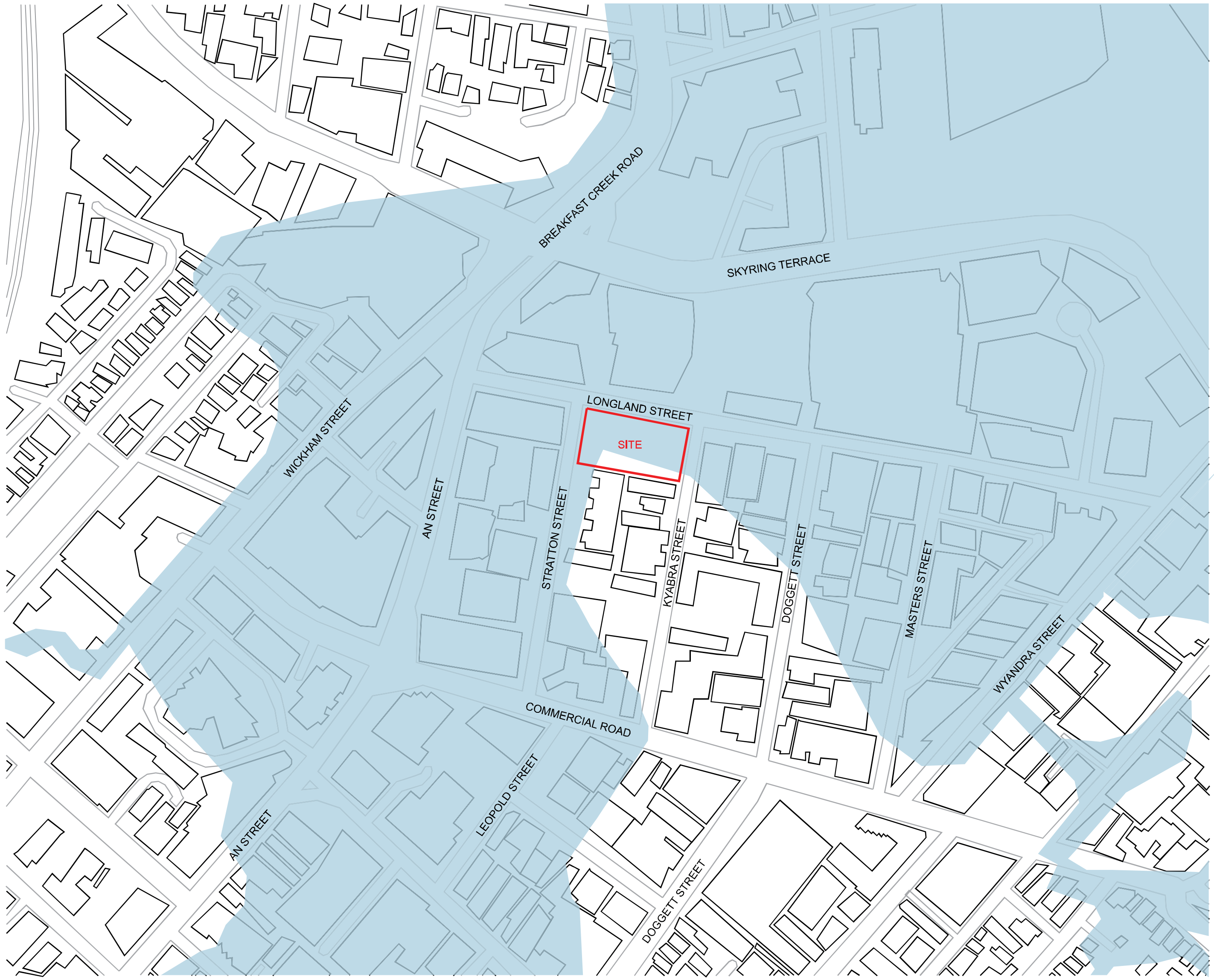
LOCAL OVERLAND FLOW

Local overland flow flooding is water that runs across the ground after heavy rain and occurs very quickly.



SITE VIEWPOINTS

2.0 SITE CONTEXT

SURRONDING BUILDINGS

The following viewpoints were found on the 07/03/2023 site visit. From the north aspect of the site, facing toward Longland street, to the left is Kennard's Self Store which is a long orange and blue building approximately three storeys high. As shown in figure sets 1 & 2, this building is substantially contrasting to the rest of the street scape & is likely to be undesirable for viewing.

FIGURE SET 1

FIGURE SET 2

SURROUNDING BUILDINGS

Longland Street features prevalent greenery, especially in the building facades, as shown in figure set 2 & 3. This may coincide with council regulations for the treatment of the streetscape, however, we recommended considering green facade detailing despite regulatory requirements.

FIGURE SET 3

LOCAL AMENATIES WITHIN WALKING DISTANCE

2.0 LOCAL CONTEXT

CONSIDERATIONS

On 75 Longland Street in Newstead, there are many local amenities within walking distance. Supermarkets within walking distance include: ALDI, Standard Market and Woolworths. Cafes within walking distance include: CAFE 63, Industry Beans and NO. 68 Bar & Cafe. Gyms within walking distance include: Atheltic zone and f45 fitness. These local amenities are particularly useful in creating a healthy environment for employees; they provide nearby resources & communities that greatly strengthen a workplace. Specifically, good food options allow for close business lunches and expansive variety for employees.

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RESTERAUNT / CAFE - Closest available

WALKING ROUTE - From resteraunt & cafe facilities

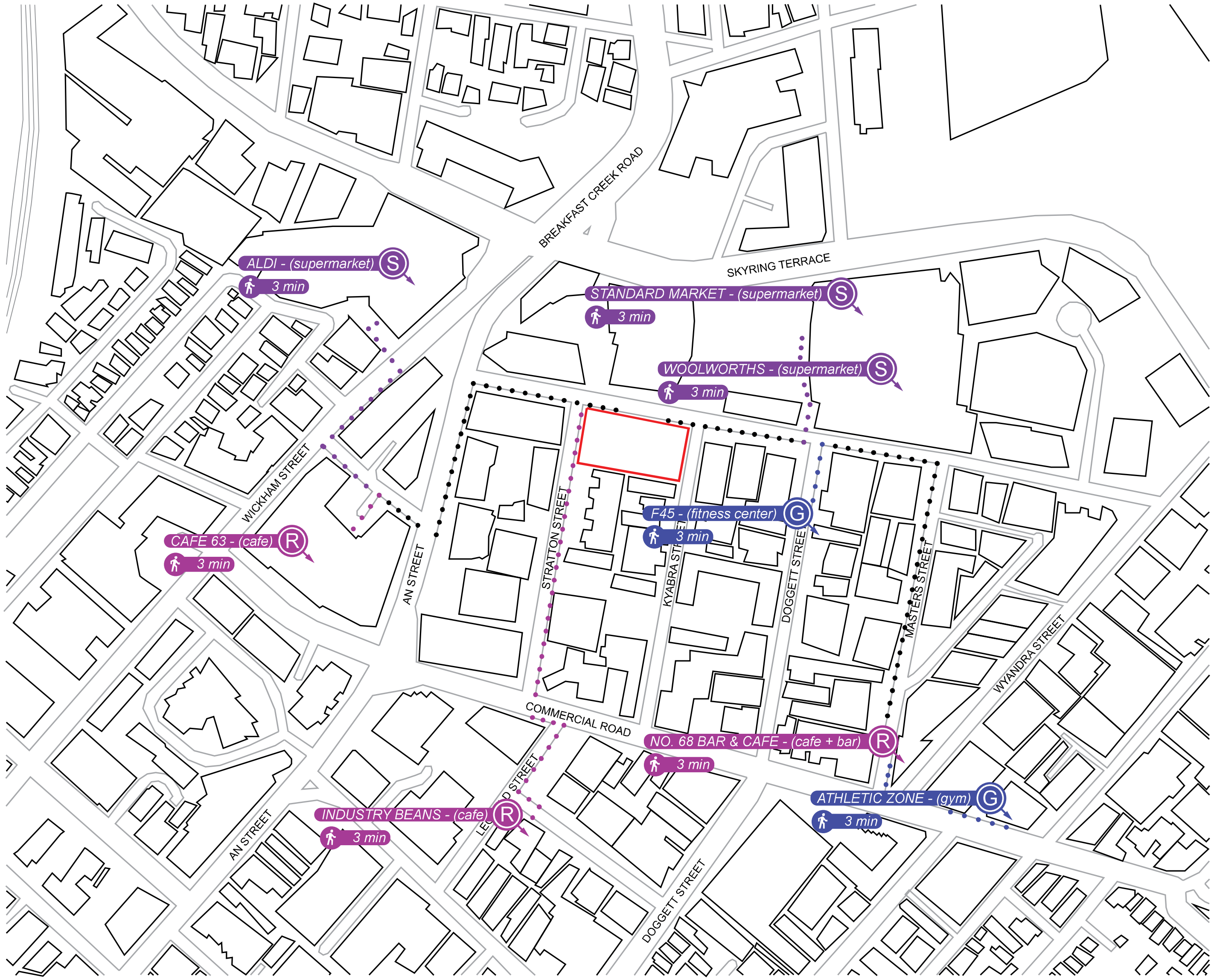
SUPERMARKET / GROCER - Closest available

WALKING ROUTE - From supermarket & grocery facilities

GYM / FITNESS - Closest available

WALKING ROUTE - From gym & fitness facilities

COMMON WALKING ROUTE - Common among facilities



SITE ACCESS - PUBLIC TRANSPORT & CYCLISTS

2.0 SITE CONTEXT

CONSIDERATIONS

Good transportation routes for public transport and cycling are essential for a functioning workspace. The site is located near a variety of accessible public transport. There are three bus stops within walking distance and two bus lines reach these stops. The Bowen Hills Train Station is a 12-minute walk away & the Teneriffe Ferry Terminal is a 9-minute walk away. The Brisbane City Council has identified cycling routes that have, or are planned to have, dedicated cycling lanes or safe cycling conditions in future planning maps; these maps indicate good cycling connectivity to the site & lots of future improvements.

@ 1:10,000

0m 100m 200m

ARTERIAL ROAD
(60 KM/H) High capacity urban roads that service distrit roads.

DISTRIC ROAD
(50 KM/H) Medium capacity urban roads that service neighborhood roads.

NEIGHBORHOOD ROAD
(50 - 40 KM/H) Low capacity roads, in some cases with street parking.

BUS STOP - Closest available bus stops per available bus route

WALKING ROUTE - From public transport facilities

SECONDARY CYCLE ROUTE - Has, or is planned to have, a dedicated cycling lane

LOCAL CYCLE ROUTE - Has wide roads / footpaths where cycling is deemed safe

SITE ACCESS - VEHICLES & PARKING

2.0 SITE CONTEXT

CONSIDERATIONS

The existing DA features 108 employee car parks in the building, which is compliant for the current occupancy, & 68 excess car parks for expected visitors, which is more than enough for the building's expected use case. However, if amendments were to be made, external public parking options are readily available within a 5-minute walk of the site; the closest being Gasworks Carpark which is only a 1-minute walk away from the site.

@ 1:10,000

0m 100m 200m

ARTERIAL ROAD
(60 KM/H) High capacity urban roads that service distrit roads.

DISTRIC ROAD
(50 KM/H) Medium capacity urban roads that service neighborhood roads.

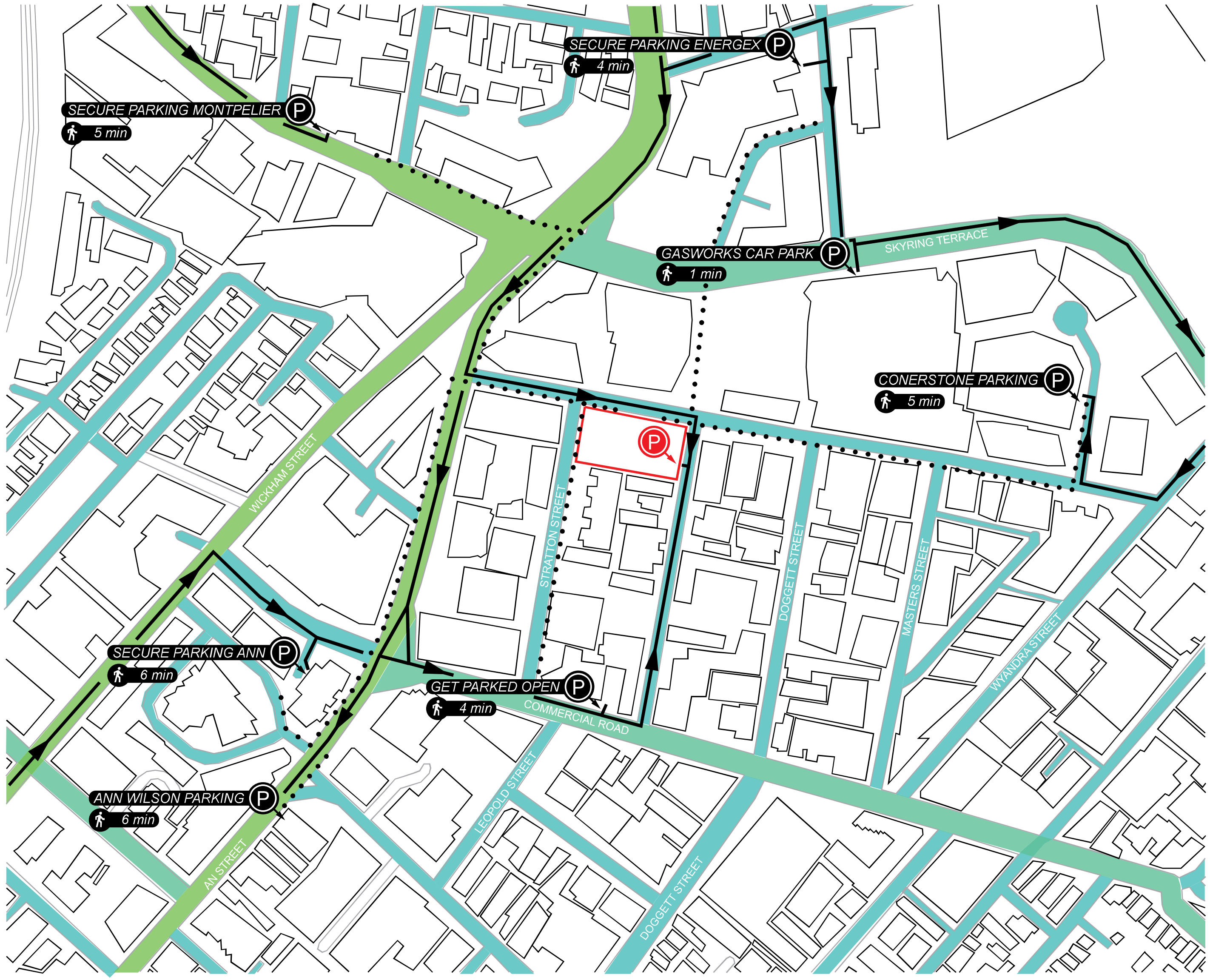
NEIGHBORHOOD ROAD
(50 - 40 KM/H) Low capacity roads, in some cases with street parking.

PUBLIC CAR PARK - Available for daily use (Bookings option)

SITE CAR PARK - From proposed DA

CAR ACESS - Likley directional traffic

WALKING ROUTE - From public car parks to site



PERMITTED USES FOR THE SITE/ZONING

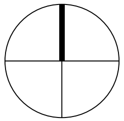
3.0 URBAN DESIGN AND PLANNING

Mixed use zone code:
According to the 2014 Brisbane City Plan the site is defined as - MU1 Mixed Use (Inner City)

Referring to the Brisbane City Plan 2014 - 6.2.6.4 4e, the food and beverage zones cannot operate after hours or have the option to generate wider patronage such as bars, hotels, and night clubs.

Referring to the Brisbane City Plan 2014 - 6.2.6.4 4f, the food and beverage tenancy is appropriately scaled, positioned, and operated if used as restaurant.

- The development complies with the corresponding sections of 6.2.6.4.4 ie. ai-iv, b, c, i.
- The development complies with 6.2.6.4.5 a-i



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MU1 Mixed use (Inner city)

LMR2 Low-medium density residential (2 or 3 storey mix)

OS3 Open space (Metropolitan)

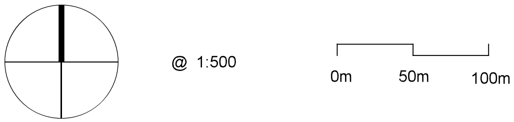
SR2 Sport and recreation (District)

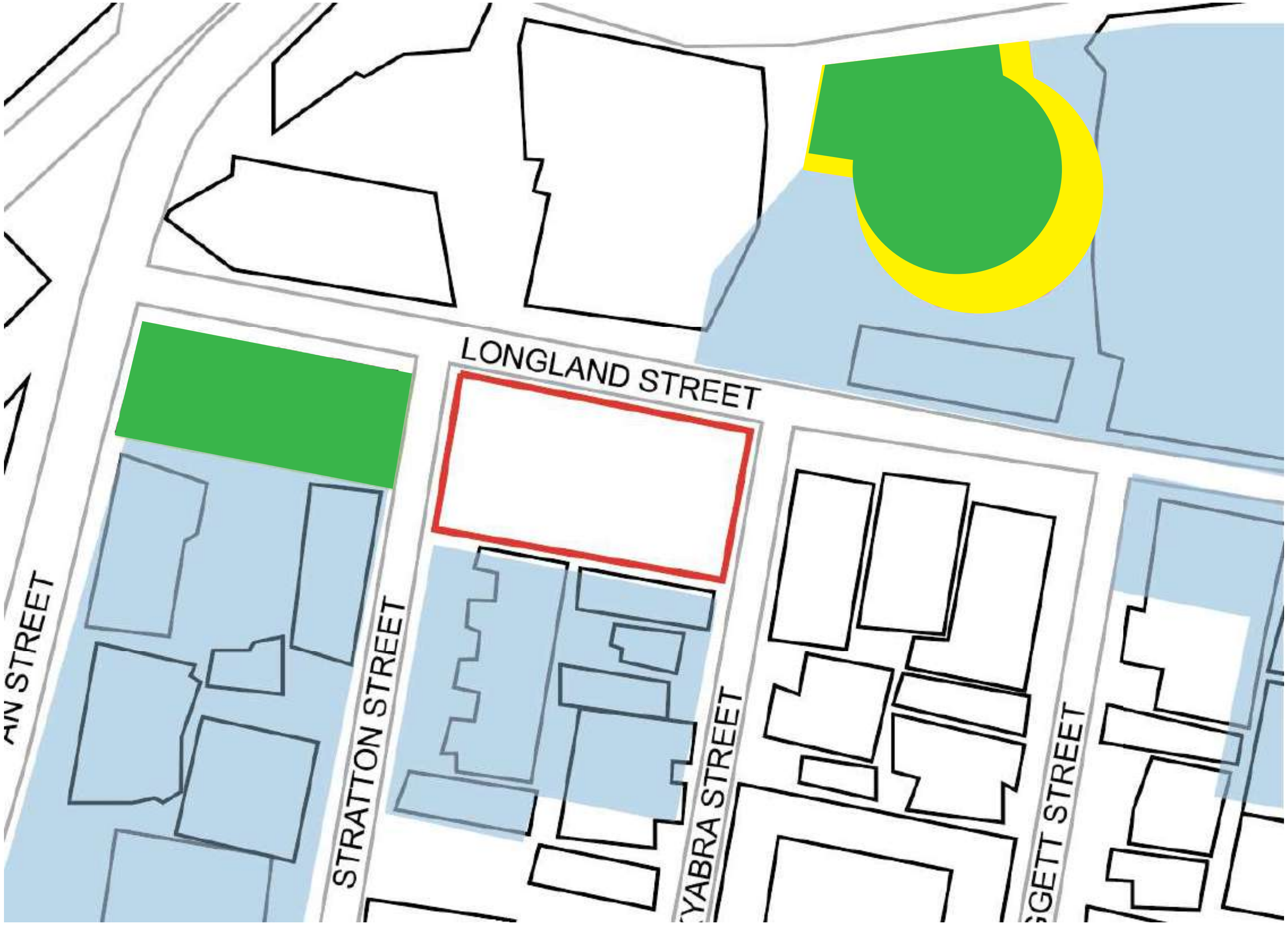
HERITAGE COMPLIANCE

3.0 URBAN DESIGN & PLANNING

CONSIDERATIONS

The development cannot damage or diminish its cultural heritage significance. Whilst is based on and takes account of all aspects of the cultural significance of the heritage place, protects the fabric and setting of the heritage place and provide the landscape and building elements does not impair the views of the heritage place





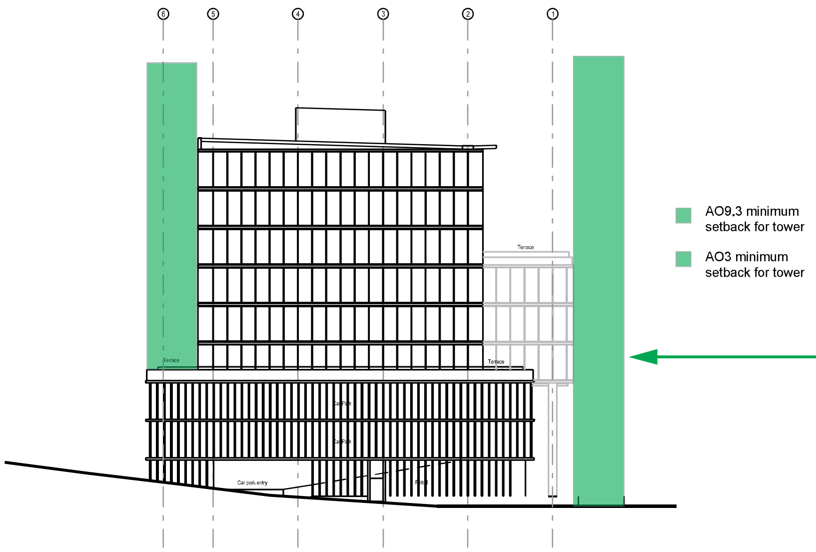
LOCAL HERITAGE PLACE

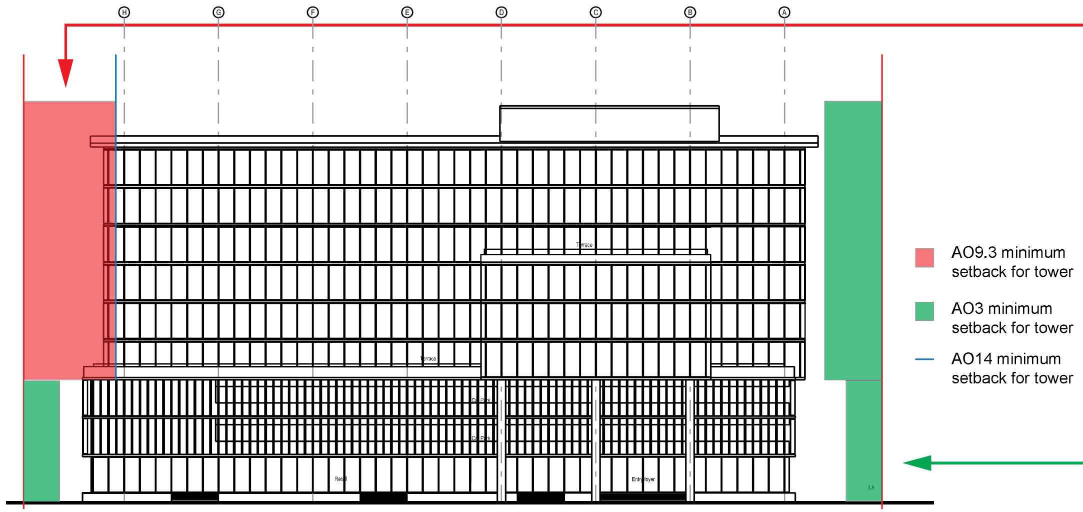
AREA ADJOINING HERITAGE

STATE HERITAGE PLACE

SET BACK COMPLIANCE

3.0 URBAN DESIGN & PLANNING





MIXED USE ZONE CODE

The development is only in accordance with 6.2.6.4.F, if food and beverage is appropriately scaled, and operated as a restaurant. Development complies with 6.2.6.4.4 – a-I. Development complies with 6.2.6.4.5 – a-I. Development complies with 6.2.6.4.6 – a-b

NEWSTEAD AND TENERIFE WATERFRONT NEIGHBOURHOOD PLAN CODE

The development complies with all relevant sections of 7.2.14.2.2
The development complies with all relevant section of 7.2.14.2.3.A-C, G
The development complies 7.2.14.2.3A
The development complies with A09.1 as the site is greater than 2,500m square metres, located along long land street, primary frontage of 30m or greater, complies with max 4 stories podium height and 15 stories. The Development does comply with A09.2 as it does not exceed 55m AHD. The development complies with A010.1 and A010.2. The Development complies with A011, P012. The development complies with P014. The Development complies with P04. The development achieves the minimum front setback for podiums along Longland, Stratton, Kyabra street and minimum side setback on the side boundaries.

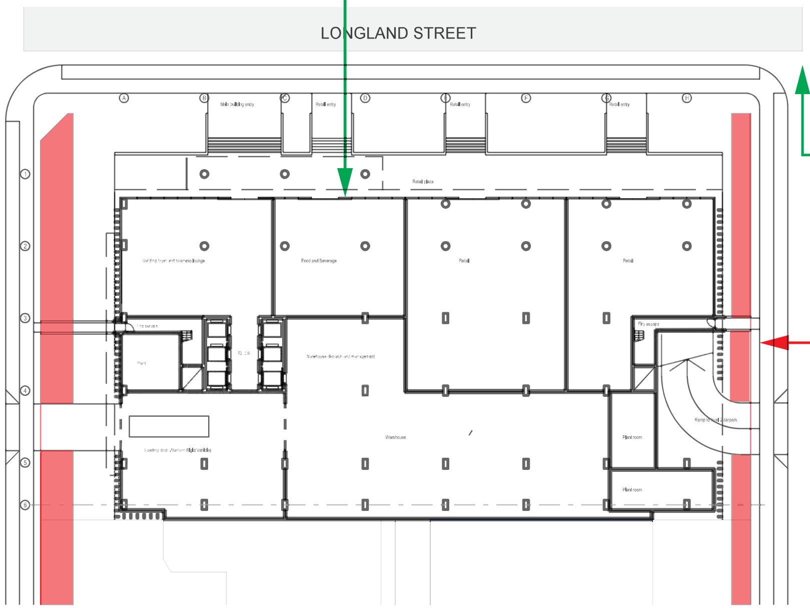
The development does not comply with A09.5 as it exceeds horizontal dimensions of 50m
The development does not supply adequate room for in-ground deep planting and minimum building set back so therefore does not comply A014.
The minimum tower front setbacks are not achieved therefore do not achieve 7.2.14.2.3.C

BRISBANE CITY COUNCIL CITY PLAN 2014

The development complies with 8.2.1 A03 and A04. The development use and occupancy comply with 8.2.11 A03 and Table 8.2.11.3.C given it falls under Brisbane River Flood Planning sub-categories 4 and 5 and its land use is compatible with the flood hazard subject to meeting further requirements.

ZONING & NEIGHBOURHOOD PLANNING COMPLIANCE

3.0 URBAN DESIGN & PLANNING



AO14 in-ground deep planting

MIXED USE ZONE CODE

The development is only in accordance with 6.2.6.4.F, if food and beverage is appropriately scaled, and operated as a restaurant. Development complies with 6.2.6.4.4 – a-I. Development complies with 6.2.6.4.5 – a-I. Development complies with 6.2.6.4.6 – a-b

NEWSTEAD AND TENERIFE WATERFRONT NEIGHBOURHOOD PLAN CODE

The development complies with all relevant sections of 7.2.14.2.2
The development complies with all relevant section of 7.2.14.2.3.A-C, G
The development complies 7.2.14.2.3A
The development complies with A09.1 as the site is greater than 2,500m square metres, located within 50 meters of Longland Street, the priamry frontage being over 30 meters, complies with a maximum of 4 storeys podium height and 15 storeys. The Development does comply with A09.2 as it does not exceed 55m AHD. The development complies with A010.1 and A010.2. The Development complies with A011, P012. The development complies with P014. The Development complies with P04. The development achieves the minimum front setback for podiums along Longland, Stratton, Kyabra street and minimum side setback on the side boundaries.

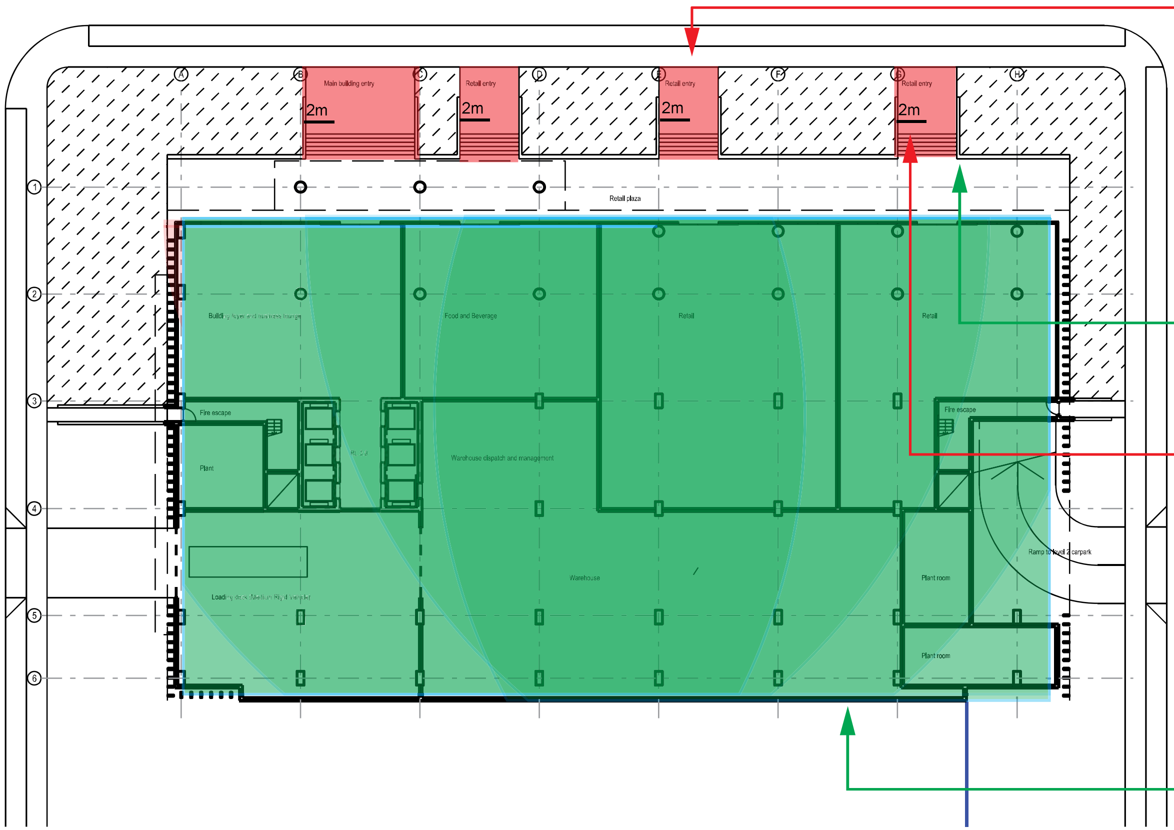
The development does not comply with A09.5 as it exceeds horizontal dimensions of 50m
The development does not supply adequate room for in-ground deep planting and minimum building set back so therefore does not comply A014.
The minimum tower front setbacks are not achieved therefore do not achieve 7.2.14.2.3.C

BRISBANE CITY COUNCIL CITY PLAN 2014

The development complies with 8.2.1 A03 and A04. The development use and occupancy comply with 8.2.11 A03 and Table 8.2.11.3.C given it falls under Brisbane River Flood Planning sub-categories 4 and 5 and its land use is compatible with the flood hazard subject to meeting further requirements.

GROUND LEVEL COMPLIANCE

4.0 BUILDING CODES AND STANDARDS COMPLIANCE



01 LEVEL 1 FLOOR PLAN
402 Not to Scale Drawn: MD

CLASSIFICATION :
Class 6 (Retail) + Class 7B (Warehouse)

AUSTRALIAN STANDARD: EQUITY OF ACCESS

AS1428.1:2009

states that “A continuous accessible path of travel shall not include a step, stairway, turnstile, revolving door, escalator, moving walk or other impediment”. This notion of continuous accessible paths is required for people with ambulatory disabilities and require wheelchair access as well as people with sensory disabilities. This building does not comply with this Australian standard as all the entrances (main and retail) include stairs, hence making the building inaccessible to people that require wheelchair access.

D2.16 BARRIERS TO PREVENT FALLS

Part (a) (ii) states that a continuous barrier must be provided along the side of a stairway or ramp which is complied

D2.17 HANDRAILS

Part (a) (j) (ii) state that “handrails must be located along at least one side of the ramp or flight; and located along each side if the total width of the stairway or ramp is 2 m or more”. The lack of handrail is visualised by the black line. This makes the place not accessible for allas Part C states that “handrails required to assist people with a disability”. Thus, the handrails for the entry stairs doesn’t comply with D.2.17

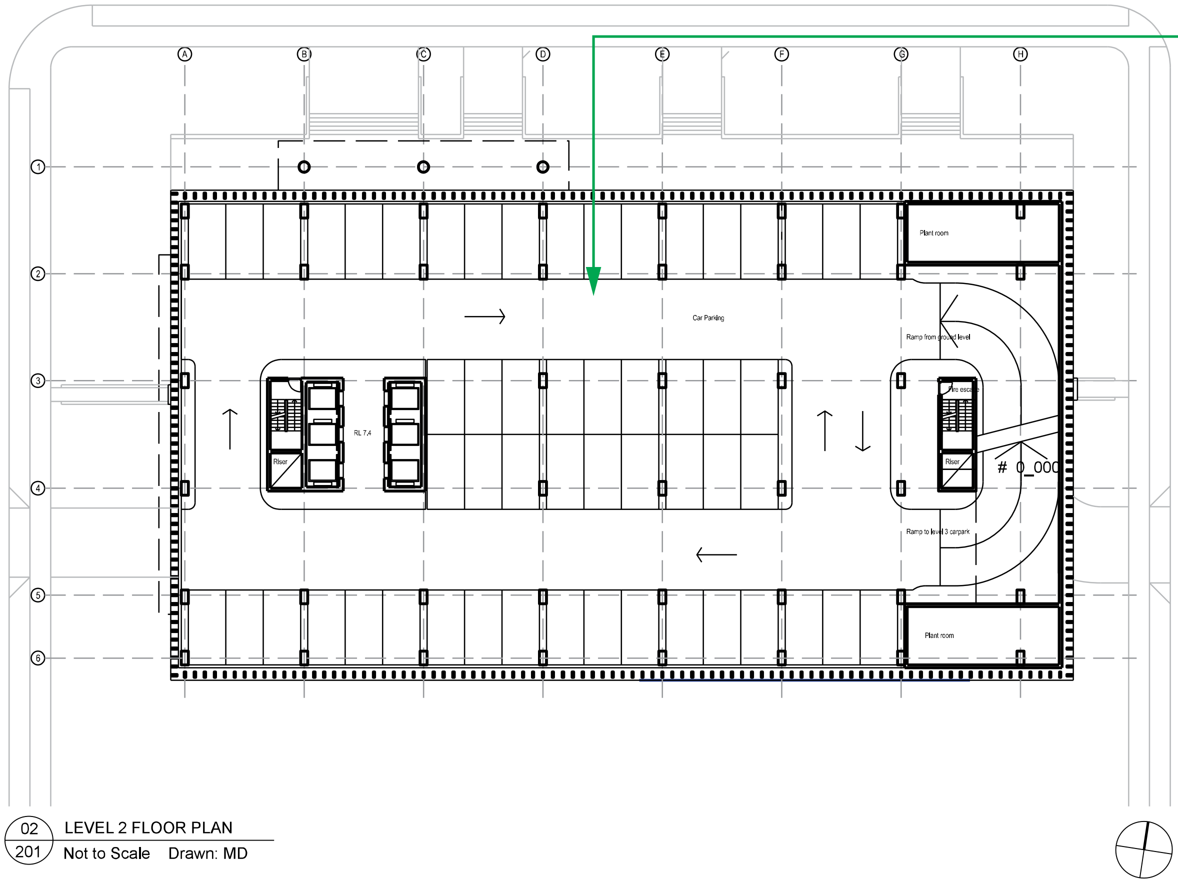
NATIONAL CONSTRUCTION CODE SECTION D: ACCESS AND EGRESS

D1.4 EXIT TRAVEL DISTANCES

Part (c) (ii) states that ”in a Class 5 or 6 building, the distance to a single exit serving a storey at the level of access to a road or open space may be increased to 30 m.” This building does comply with this all points on this level are within 30m from an exit. This is shown as circles with a radius of 30m are placed at each exit in green; there are no points on the floor plan that aren’t green.

LEVEL 2 COMPLIANCE

4.0 BUILDING CODES AND STANDARDS COMPLIANCE



02 LEVEL 2 FLOOR PLAN
201 Not to Scale Drawn: MD

CLASSIFICATION :
Class 7a (Carpark)

NATIONAL CONSTRUCTION CODE SETION D: ACCESS AND EGRESS

D3.5 ACCESSIBLE PARKING

In D3.5 for Class 5,7,8 or 9c it states "that for every 100 carpark spaces there must be one space of accessible carparking spaces required for people with a disability". Both level 2 and 3 floor plans do not Illustrate that there are any accessible carparking spaces for people with a disability. However through using NCC Volume 1 Table D1.13 (refer to appendix), it can be assumed that the building caters for a full occupancy of 1213 people:

Level 1 = $13m^2 + 116m^2 + 94m^2 + 59m^2 + 13m^2 + 3m^2$ = 298 people
Level 4/5/6 : $1614m^2/10m^2$ = 161 people per level
Level 7/8/9 : $1444m^2/10m^2$ = 144 people per level

NCC Volume 1 Table D.1.13 evidences that the area per person for carpark is $30m^2$ which is:

(Full Occupancy)1231 / (Carpark Area Per Person) 30 = 41

The building accomidates 108 carparks across Level 2 and 3, thus there is an excess of 67 carparks in the building. Thus, it can be assumed that there is accessible carpking space for people with a disability on both Level 2 and 3.

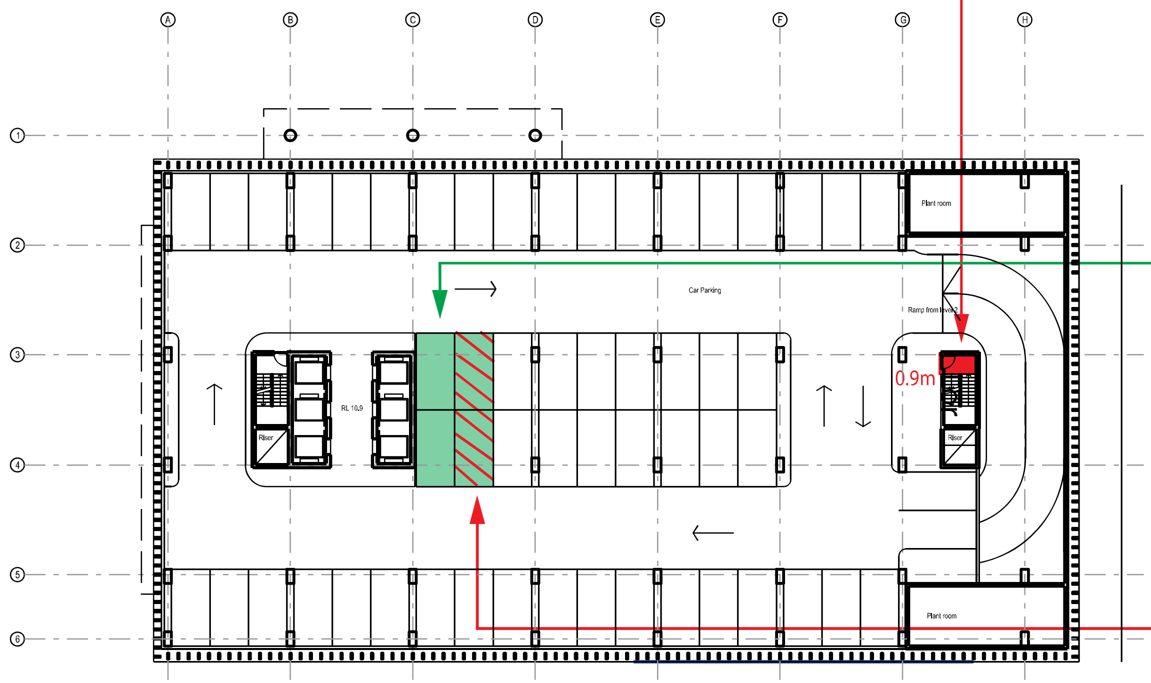
NATIONAL CONSTRUCTION CODE SECTION F: HEALTH AND AMMENITY

F2.3 SANITARY FACILITIES IN CLASS 3, 5, 6, 7, 8 OR 9 BUILDINGS

F2.3 (a) separate sanitary facilities for males and females must be provided for Class 3, 5, 6, 7, 8 or 9 buildings in accordance with Table F2.3. As such, this building does not comply with this construction code as the the carpark

LEVEL 3 COMPLIANCE

4.0 BUILDING CODES AND STANDARDS COMPLIANCE



03 LEVEL 3 FLOOR PLAN
202 Not to Scale Drawn: MD

CLASSIFICATION :
Class 7a (Carpark)

NATIONAL CODE CONSTRUCTION SETION D: ACCESS AND EGRESS

D1.6 DIMENSIONS OF EXITS AND PATHS OF TRAVELS TO EXIT

(b) (i) The unobstructed width of each exit or path of travel to an exit except for doorways must not be less than - 1m. The width of the stairwell is at 0.9 metres as illustrated by the red marker and thus is not compliant.

NATIONAL CODE CONSTRUCTION SECTION F: HEALTH AND AMMENITY

AS1735 + AS1735.12 + AS 1428.2

It is assumed that the disabled parking is situated closest to the elevator as seen in green. In AS1735.12 Clause 2.1 and AS 1428.2 Clause 12 it states that “lifts must be 1100mm wide x 1446mm.” The lifts portrayed in the floor plan are 1450 mm wide x 1800mm long thus they comply with the AS1735.12 and AS1735.15. The width of the lift door is at a clear opening of 1250mm which complies with AS1735.12 - Clause 2.2 stating “it must be 850mm or larger”

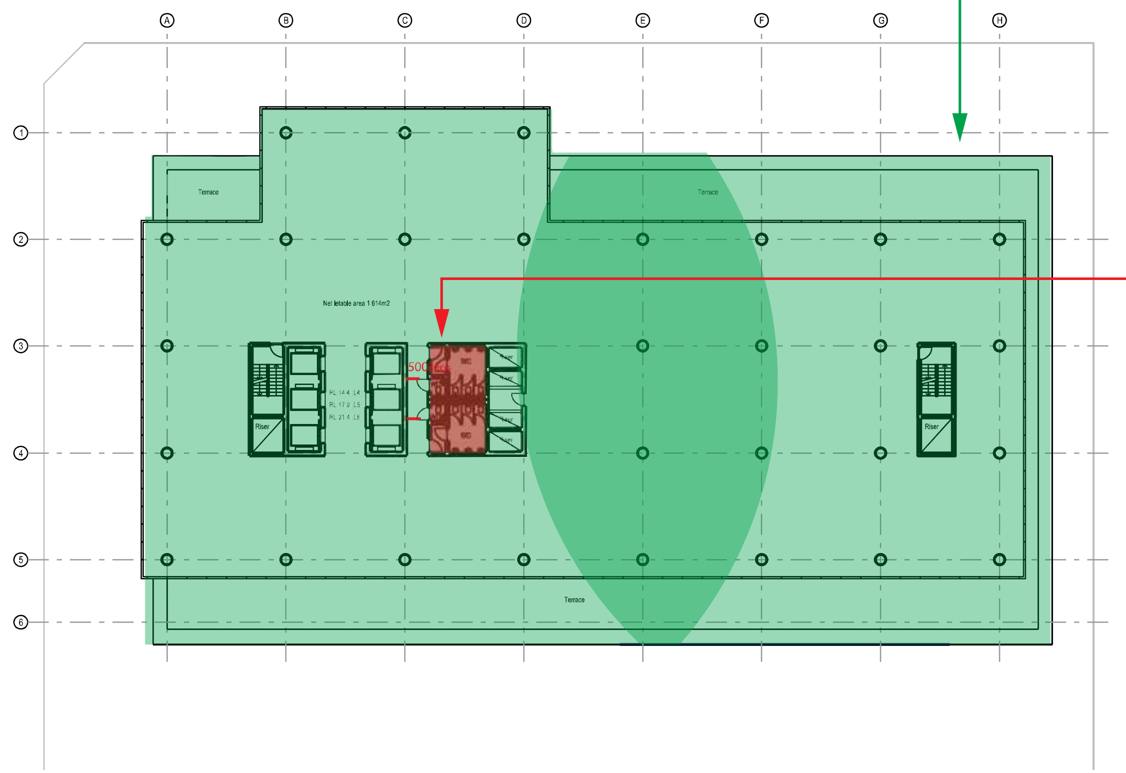
AUSTRALIAN STANDARD: OFF STREET PARKING

AS2890.1:2004 + AS2890.6:2009 2.2.1

AS2890.1:2004 details that the general requirements are for a dedicated carpark space is 2400mm x 5400mm. This carpark complies as it is 2700mm x 5400mm and the aisle width is 5600m which also complies for a one-way movement aisle. According to AS2890.6:2009 the disabled carpark spaces requires bollards and a shared area next to the disabled parking zone which arent illustrated in the diagrams.

LEVEL 4-5-6 COMPLIANCE

4.0 BUILDING CODES AND STANDARDS COMPLIANCE



04
203
LEVEL 4, 5 and 6 FLOOR PLAN
Not to Scale Drawn: MD

CLASSIFICATION :
Class 5: Office

NCC SECTION D: ACCESS AND EGRESS

D1.4 EXIT TRAVEL DISTANCES

Part (c) (1) states that “no point on a floor must be more than 20m from an exit, or a point from which travel in different directions to 2 exits is available, in which case the maximum distance to one of those exits must not exceed 40 m.” This building does comply with this all points on this level are within 20m from an exit. This is shown as circles with a radius of 20m are placed at each exit in green; there is no points on the floor plan that aren’t green.

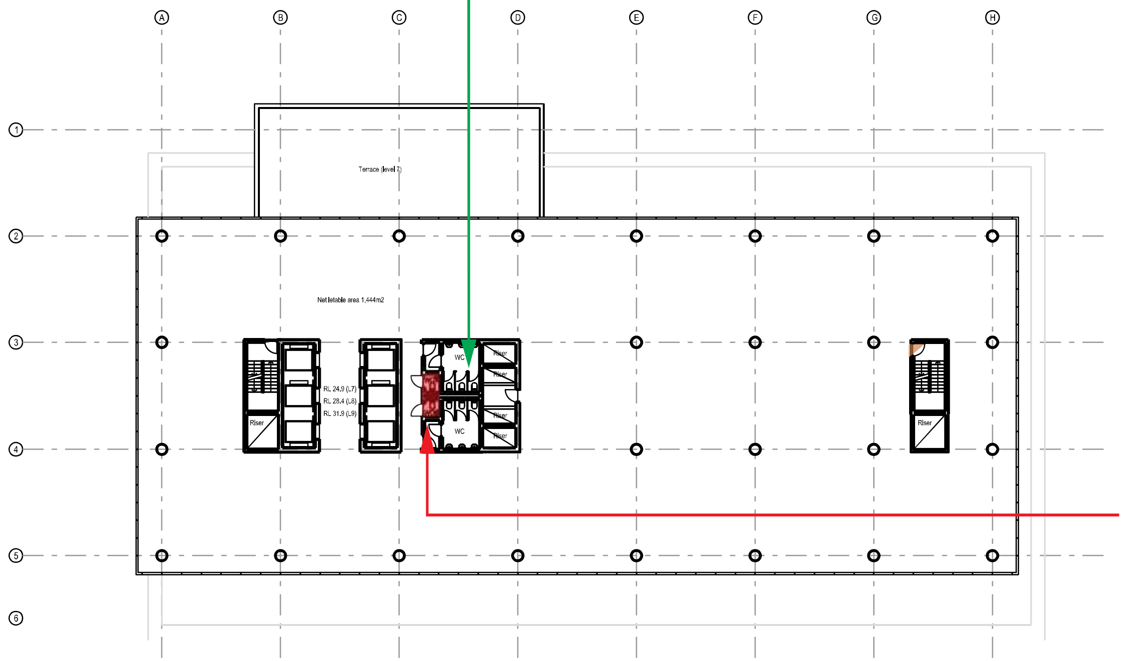
D2.20 SWINGING DOORS

D.2.20 (a) swinging doors state for a swining door in a required exit any part of it’s swing must not enroch (A) a stairway or (C) a passageway by more than 500mm if it’s likely to impede the path of travel of the people already using the exit. Under the assumption the doors of the PWD toilets swing outwards onto the passageway, as visualised by the red highlighting the PWD toilet’s swing enroaches more than 500mm. Similarly, the fire escape door enroaches more than 500mm on the stairway which makes both the PWD toilet doors and the fire escapes doors non-compliable with D.2.20 swinging doors (a).

However, in D2.20 (b) (ii) the NCC states it must swing in the direction of egress unless it serves a sanitary compartment in which case it may swing in either direction, which illustrates that the door may not impede on to the pathway.

LEVELS 7-8-9 COMPLIANCE

4.0 BUILDING CODES AND STANDARDS COMPLIANCE



05 / 204 LEVEL 7,8 AND 9 FLOOR PLAN
Not to Scale   Drawn: MD

CLASSIFICATION :
Class 5 (Office)

NATIONAL CONSTRUCTION CODE SECTION F: HEALTH AND AMMENITY

F2.3 FACILITIES IN CLASS 3-9 BUILDINGS

“(a) Separate sanitary facilities for males and females must be provided for Class 3, 5, 6, 7, 8 or 9 buildings in accordance with Table F2.3 (refer to appendix-)”.It was earlier calculated that design occupancy is 144 people per level. Utilising Table F2.3 Sanitary facilities highlights the washbasins needed in a Class 5 building. The design occupancy is one washbasin for every thirty people which would be 5 washbasins. However, F.2.2 (b) states “sanitary facilities must be provided on the basis of equal numbers of males and females”, thus in this case there must be 6 washbasins to provide an equal number of washbasins for each gender.

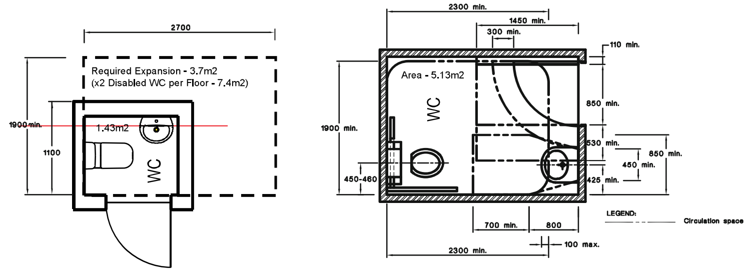
Table F2.3 (refer to appendix) states for Closet Pans in class 3,5,6 and 9 building it is stated that there should be one per twenty males and one per fifteen females. Due to there being an occupancy of 144 people on levels 7, 8 and 9 there should be a minimum of 4 toilets per gender which demonstrates that the building doesn’t comply with the F2.3. Furthermore, under the assumption that there is an equal split of females and males for each level, for the 72 males in level 7,8 and 9 there should be a minimum of 2 urnials as according to Table F.2.3 one toilet should be added per 50 males. The floor plans illustrate zero urinals which makes it not compliant.

AUSTRALIAN STANDARD EQUAL ACCESS

AS1428.1:2009

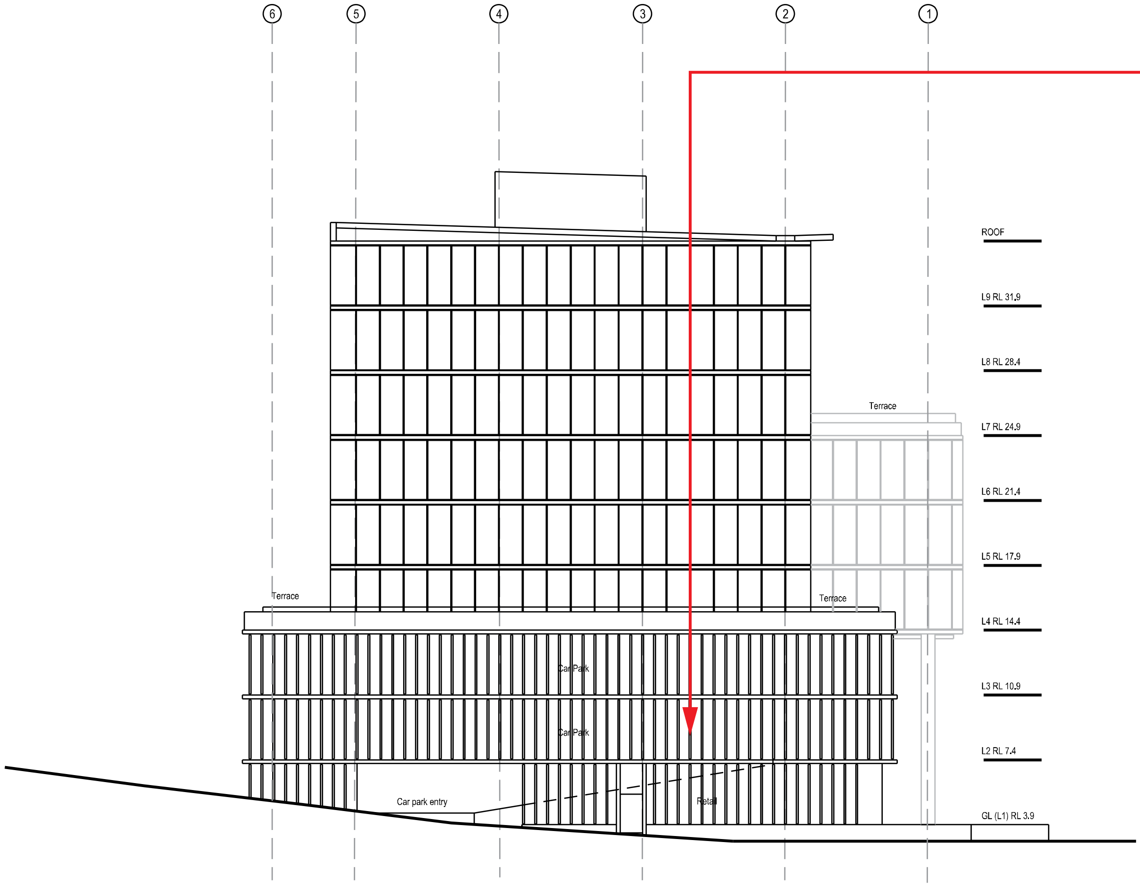
AS1428.1:2009 states for a disabled bathroom - “the circulation spaces of at least 900mm x 900mm on either side of the toilet door. Minimum 900 to 920mm width inside the cubicle. Doorway with at least 700mm width.” As seen in the diagram, the current disabled bathrooms do not meet this circulation space and thus do not allow for movement, additional help or wheelchairs to sit in the bathroom while in use. Each disabled bathroom ammentiy requires a 3.7m2 expansion (as evidenced below)

CURRENT   PROPOSED



ELEVATIONAL COMPLIANCE

4.0 BUILDING CODES AND STANDARDS COMPLIANCE



07 EASTERN ELEVATION
201 Not to Scale Drawn: MD

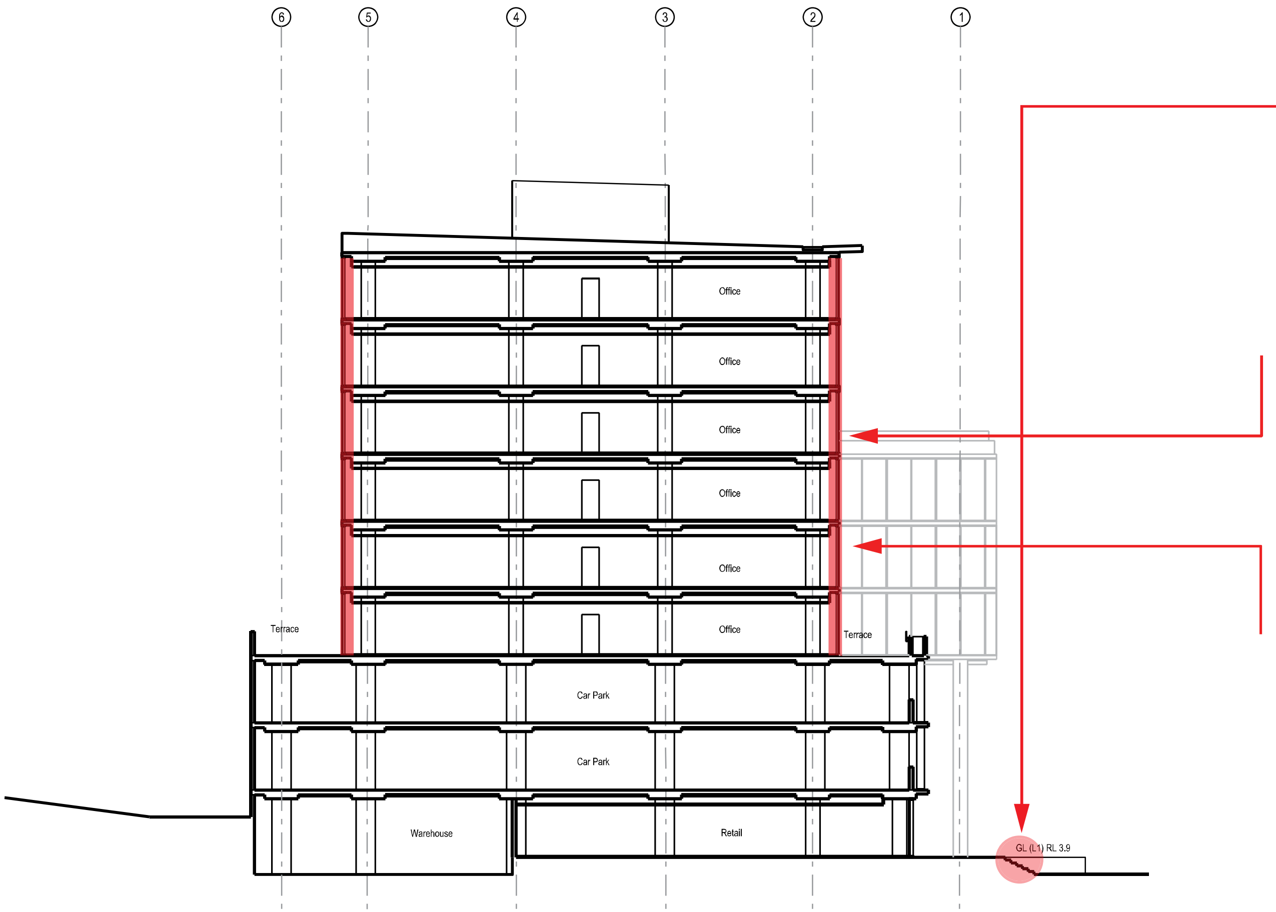
AS: OFF STREET PARKING

CLAUSE 2.52 AS2890

AS2890.1 OFF STREET PARKING states the maximum gradient for a carpark in 1:5 which complies with the eastern elevations ramp with having a 1:16 gradient. “Clause 2.5.2 in AS2890.1 requires that two-way ramps servicing car parks should achieve a minimum width of 5.5m, with an additional 300mm clearance to any obstructions. The minimum width of all ramps in the car park should therefore be 6.1m.” The ramp is too narrow at only 5.5 meters. Furthermore, Class 3A parking with 54 car parks should accommodate two entry/exit points.

CROSS SECTION COMPLIANCE

4.0 BUILDING CODES AND STANDARDS COMPLIANCE



06 CROSS SECTION
300 Not to Scale Drawn: MD

CROSS SECTION - CLASS 7A (CARPARKS)
NATIONAL CONSTRUCTION CODE SETION D: ACCESS AND EGRESS

D3.2 ACESS TO BUILDINGS

D3.2(a) access to bulding states that an accessway is required for a build-ng and for the accessway to be accessible: (i) from the main points of a pedestrian entry at the allotment boundary. D.3.2 (a) illustrates that a ramp must be accessible from main point of entry. Utilising the cross-section only a metre high stairs are the only provided entry to the building illustrating that the entry point is not compliable.

D3.3 PARTS OF BUILDINGS TO BE ACCESSIBLE

D3.3 (f) Furthermore, D.3.3 (f) states that a "ramp complying with AS 1428.1 or a passenger lift need to be provided to serve a storey or level other than the entrance storey in a three storey or more Class 5, 6, 7b or 8 building." The building is not compliant with D.3.3 (f) as the entrance story doesn't provide a lift or a ramp.

NATIONAL CONSTRUCTION CODE SETION F: HEALTH AND AMENITY

F4.5 VENTILATION OF ROOMS

F4.5(a)(b) Ventilation of rooms. a habitable room, office, shop, factory, workroom, sanitary compartment, bathroom, shower room, laundry and any other room occupied by a person for any purpose must have—natural ventilation complying with F.4.6; or, a mechanical ventilation or air-conditioning system complying with AS 1668.2 and AS/NZS 3666.1. Through the elevations and sections given it is assumed that the office levels 4-9 do not open which doesn't comply with F.4.6 (a) which states that levels "must consist of openings, windows, doors or other devices which can be opened." The building utilises cooling facilities such as air conditioning, so natural ventilation is unsatisfactory

WHAT IT TAKES TO DESIGN PASSIVE BUILDINGS

5.0 DESIGN ASPRIRATIONS & BEST PRACTICE

PASSIVE DESIGN INCORPORATED WITHIN LOW-CARBON COMMCIAL BUILDINGS

Passive design is a set of principles in which aim to reduce and negate energy consumption of buildings whilst maximizing the use of natural resources dependent on climate. Incorporating these principles into the floorplan of low-carbon commercial buildings will reduce the built environments energy demand and carbon footprint.

HOW PASSIVE DEISGN IS ACHEIVED FOR 25 KING STREET

Orientation - The building is orientated to take advantage and harness the sun path and prevailing winds of the surrounding landscape. The longest side faces north-south allowing for maximum natural daylight and ventilation whilst limiting solar gain. Orientating the built envelope this way allows for maximum solar gain in winter and minimizing solar gain during summer reducing the need for artificial heating and cooling. Like the current site it is located along a narrow street which allows for exposure to natural light and views.

Natural ventilation: The street context allows for a natural ventilation system that incorporates a series of operable windows and louvers that reduce the need for mechanically cooling and improving indoor air quality. This feature allows for cross-ventilation and maximum natural airflow between 'mega floors' whilst the north-facing core allows for stacked ventilation, drawing in fresh air and exhausting stale air.

Shading: The south facing façade offers shade and reduces heat gain via vertical fins and perforated metal screens which blocks direct solar radiation and concentration. These 'L' shaped solar shades arrayed across the east and west facades of the building reducing the exposure of solar heat gain and consumption to the most susceptible part of the building.

Thermal Mass: The use of natural materials in both the outside and interior, timber columns, beams and floor soffit as opposed to concrete, steel and plasterboard creates a natural, happier, and healthier workspace for occupants. Despite this positive social impact, these materials – CLT and exposed concrete – harbour high thermal mass which absorbs and stores heat to help maintain a consistent indoor temperature.

Natural Daylighting: The northern-façade street orientation – high floor to ceiling windows and central core – allows for a range of daylighting strategies. These strategies provide maximum natural light penetration and ventilation stack whilst providing natural warmth across the open and unencumbered floorplate, improving workplace productivity.

Insulation: 25 king is insulated with thermal batts and rigid insulation which reduce heat loss and gain whilst improving thermal performance and comfort for works within.

Renewable energy and technology: The built envelope include and incorporates a range of renewable energy systems. Given Brisbane sub-tropical environmental context, a 12 metre mega-litre detention basin and storm water culvert system is installed underneath the site alleviating on-site flooding for the precinct and beyond. One hundred percent of the timber is reused, recycled or certified sustainable. This holistic approach to architecture reduces the risk of flooding, energy consumption and carbon footprint.

Overall 25 King street, achieves a 27% reduction in potable waste consumption, uses 100% recycled water for irrigation and reduce 47% of energy consumption.

AUSTRALIAN CLT PRECEDENCE

6.0 ALTERNATIVE BUILDING FRAME STRATERGIES

INTERNATIONAL HOUSE SYDNEY

Constructed in 2017, International House Sydney (LHS) is noteworthy given it was one of the first in Australia to use CLT (cross-laminated timber) as its primary structural material. The six-story commercial building designed by Tzanne Architects encompasses 7,200 square metres. The strong and stable CLT Panels, made up of softwood and glued together at right angles, span up to 9 metres, 3 metres wide and 100 to 200mm are capable of supporting heavy loads; walls, floors, and the roof. The visually striking, 'timber ribbon' wraps around the building and consists of a series of Glulam columns and beams, which serve a structural purpose by providing lateral stability. The CLT panels are treated with a fire-resistant coating that prevents the spread of fire. CLT, a sustainable and environmentally friendly material, offered several benefits to LHS namely its unique modern and warm aesthetic and it's easily transportable and assemble process overall reducing construction time and cost.

Photo: Tzanne Architects

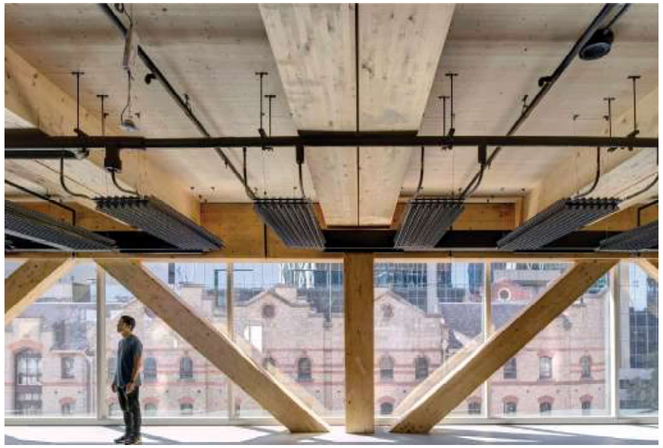


Photo: Tzanne Architects

Photo: COX Architecture

Photo: International Living Future Institute

MOLECULAR HORIZONS BUILDING

The university of Wollongong's Molecular Horizons building, designed by Cox architecture, boasts a completion of 7 'Petals' around categories that include energy, materials and water. The building was designed to generate positive health and well-being. The 'learning beacon' is made up of four stories and consists of 'double helix' built form that highlights CLT material versatility and sustainability. The panels were used for the building core structure – stairs, lifts, and service shafts whilst allowing for a faster construction time and reduced waste whilst reducing the overall weight. The molecular horizons building is orientated to maximize natural light and ventilation employing CLT interior finishes – wall panelling and flooring to add natural warmth and texture. Overall, this building demonstrates how CLT can create not just sustainable and innovative buildings but also benefit occupant comfort and well-being.

SEE REFERENCES 6.1

AUSTRALIAN CLT PRECEDENCE

6.0 ALTERNATIVE BUILDING FRAME STRATERGIES

CLT HOUSE

Designed by FMD Architects, 'CLT House,' a single-story residential home located along the Mornington Peninsula, uses CLT as its primary building material. Notably CLT is usually reserved for larger scale-built forms given its wide-span structural system however the panels were altered to 8 metres along, 2.8 metres wide and 90 to 145mm thickness to accommodate a smaller built envelope. This resulted in a faster construction time and reduced waste due to the panels being cut off-site; the project was completed in 2019. The CLT panels, from Stora Enso in Austria and XLAM in NSW, are used in the interior as well in the wall, flooring, bookshelves, desks and spruce and creates warmth and texture to the spaces, highlighting the natural beauty of the material. In addition, the home offers a range of sustainable features; rainwater harvesting, passive solar design, high-efficiency cooling, and heating system.

Photo: FMD Architects

Photo: FMD Architects

25 KING ST

Brisbane employment of CLT has created a unique, innovative commercial building that provides excellent sustainable performance, and aesthetic appeal. Designed by Bates Smart in 2018, the building has become renowned globally given its Australia tallest engineered building and the worlds largest in gross floor area. The structural system, comprised of CLT and Glulam is raised on timber v columns with a south facing veranda of engineered timber, provides excellent strength and stability given the building upwards of 10 stories and 14,000 square metres. The south façade offers shade and reduces heat gain. Set along a 6 x 8 metre grid determined by the span of Glulam ceiling beams, the scheme enables a 'mega-floor' system whilst are arranged – serviced via a north-facing core - to provide an intimate open-plan scale without hampering flexibility. The CLT panels, each measuring 16.5 meters long and 5.5 metres in width are stacked on top of one another to provide great acoustic and thermal performance. The schemes adherence to sustainable principles 'allowed a 74% reduction in embodied carbon, 46% reduction in energy, 20% weight saving compared to concrete, and a construction period of just 15 months aided by offsite prefabrication.'

Photo: Bates Smart Architects

Photo: Bates Smart Architects

SEE REFERENCES 6.2

CLT STRUCTURE PLAUSIBILITY

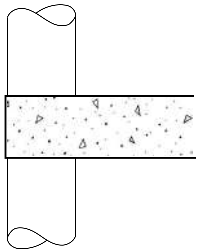
6.0 ALTERNATIVE BUILDING FRAME STRATERGIES

EXISTING CONCRETE FRAME GRID

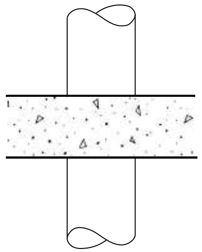
Grid size is a larger given the structural requirements and material properties around producing the built form. The existing frame grid comprises of a network of columns and connecting beans that form the structural 'skeleton of a building. Both framing grids are strong and durable however concrete is more fire-resistant than CLT. Concrete frame grids are more expensive, time consuming, less design flexible and more unsustainable. Concrete columns contain themal mass and are poured.

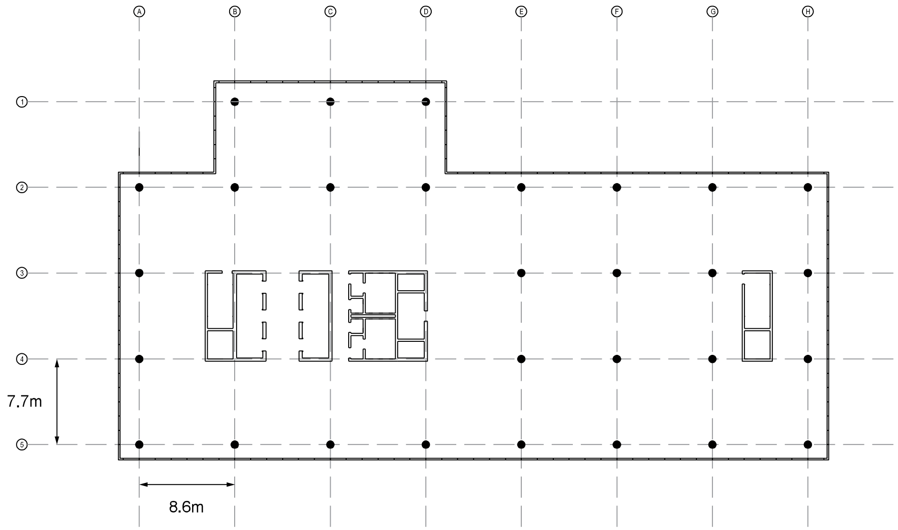
(SEE REFERENCES 6.3)

EDGE
COLUMN DETAIL



INTERIOR
COLUMN DETAIL



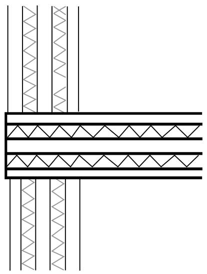


PROPOSED CLT FRAMING GRID

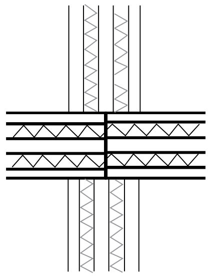
Grid size is smaller given the structural requirements around producing a large-scale prefrabicated timber structure. CLT frame grid and columns are strong and durable, produced offsite and glued in a perpendicular patter however are less fire-resistant compared to concrete. CLT offers more design flexibility, can be assembled faster, and are very cost effective.

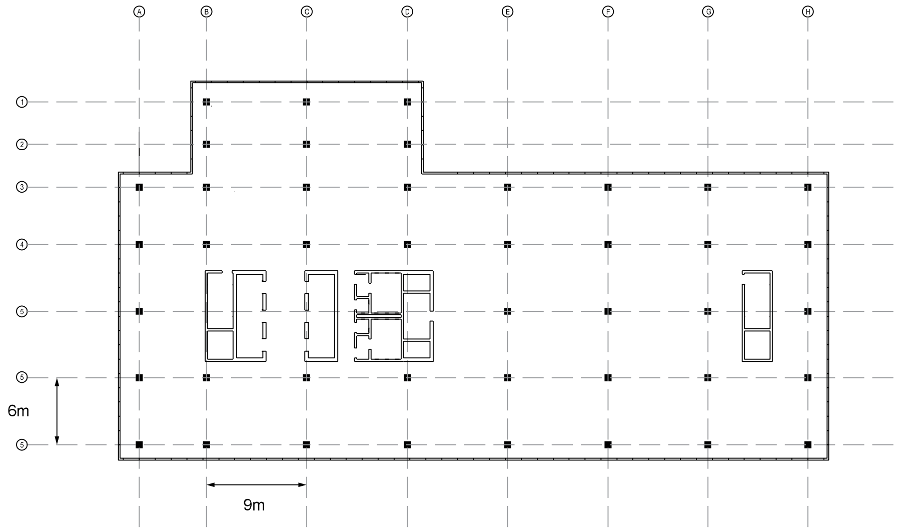
(SEE REFENCES 6.4)

EDGE
COLUMN DETAIL



INTERIOR
COLUMN DETAIL





ISSUES WITH CLT CONSTRUCTION IN AUSTRALIA

6.0 ALTERNATIVE BUILDING FRAME STRATERGIES

REGULATORY ISSUES

Another significant barrier for entry is the regulatory issues and policies surrounding CLT in Australia. Given that it's a unquiet building material compared to traditional materials and practices, it creates challenges for regulators and builders. In Australia the three main issues associated with CLT are fire safety, structural performance, and environmental sustainability. Fire safety is the most highly significant issue associated with CLT, given it's a timber-based product. This combustible vulnerability requires it to be treated and painted with fire-retardant chemicals to meet ABCB standards. The lack of clarity around safety requirements, supply issue with fire-retardant chemicals means it adds further cost and complexity to the construction, production and use of CLT. CLT requires high-tensile strength; structural performance that is another regulatory issue in Australia where's there's uncertainty around the long-term structural performance of the material. CLT construVction, under the Australian standard for timber design (AS 1720) requires and mandates careful considerations of loads and stresses under the guideline of outdated regulation. Environmental sustainability is the third and last prominent issue regarding regulatory. CLT under the guise of its low embodied energy and carbon sequestration properties is a highly sustainable material. However, the unknown environmental impacts around the production and transportation of the material – especially from overseas – is still unknown. Therefore, there's a lack of clarity around environmental standards that CLT must meet in Australia. Overall, the shipping, logistics and costs are multificated and require a more centralized response from government, industry and academia.

LIMITED PRODUCTION CAPACITY

The limited CLT production capacity, in Australia, is the most notable issue impacting the supply of the material around the country CLT is a highly specialized, technical, and demanding product to produce. Given that CLT is a relatively new building material, coupled with its increasing popularity there are relatively few companies to meet the ever-increasing demand. Currently there is a high barrier to entry for local companies looking to enter the market given the significant investment required to attain specialized machinery and equipment, limiting the number of companies in Australia. The industry relies upon a reliable and consist of supply. Given that Australia harbours one of the most vulnerable and variable climate and geography in the world, coupled with the strict standards for strength, stiffness and dimensional stability results in the supply always being vulnerable. CLT is a relatively new and niche product in the local market. Many Australian builders and developers are relatively unfamiliar and unaware of the material. Therefore, it impacts the decision behind prominent timber manufactures to justify investing the material.

SEE REFERENCES 6.5

SHIPPING LOGISTICS

Shipping costs and logistics have undoubtedly become a significant barrier for the consumption and widespread use of CLT. Given the products height, width, depth and weight transporting large panels becomes expensive and logistically challenging, due to the specialized equipment involved in the handling. Given that the two biggest producers and exporters of CLT are located on either side of the world - Canada and Austria – it becomes challenging and expansive for small-scale builders and developers to manager complex supply chains, long lead times and increasing costs. Another factor is the lack of ability and inability for transport infrastructure, and port infrastructure, to handle the size and weight of CLT panels; further adding to the costs. Limiting overseas suppliers desire to ship CLT to Australia and for builders and developers to access the material. Finally, there are regulatory and certification issues involved in shipping to Australia. Due to the strict standards regarding fire resistance, structural performance, and environmental sustainability, which adds significant costs and complexity to the process. In turn making it more difficult for international supplies to meet Australian regulation. Overall, the shipping, logistics and costs are multificated and require a more centralized response from government, industry and academia.

Photo: XLAM CLT supplier

Photo: XLAM CLT supplier

LOCAL FACADE PRECEDENCE - TRANSLATION RESEARCH INSTITUTE

7.0 BEST FACADE PRACTICE

BUILDING CONTEXT

The Translational Research Institute (TRI), designed collaboratively by Wilson Architects & BVN Donovan Hill, is a medical research and biopharmaceutical facility. The project brought together four different facets of research that were previously disjointed by providing a unified facility that inspires collaboration & innovation.

To achieve this, laboratories were visually connected through glass dividers & circulation was situated to be shared between different research divisions. The planning enables movement between laboratories & social spaces without having to leave the controlled environment minimising the opportunity for cross-contamination of work spaces.

THE FACADES

The TRI features different facades specific to orientation & use case; the two distinctive methods are perforated aluminium panels & rose-tinted engineered glass. The north facade utilises rose-tinted glass to protect from solar radiation while allowing for city views. The east & west utilise a perforated aluminium panel facade to reduce noise & light transmission.

ROSE TINTED GLASS

The north facade protects the laboratories from excessive UV radiation, which can affect scientific accuracy, by utilising a rose-tinted glass that neutralizes some of the harmful frequencies on the spectrum. The glass panels are slightly separated allowing for ventilation through the facade to the courtyard & open social areas. The facade acts as a rain screen with secondary glazing behind the rose-tinted glass that is appropriately sealed. This method makes the facade seem uniform due to the lack of visible mullions while also providing superior protection to a standard curtain wall facade.

BEFORE FACADE INSTALL

AFTER FACADE INSTALL

Several patterns of perforated panels were designed for different aspects of the facade. This can be seen above (Before Facade Install) where the interior layer of glazing works in conjunction with the perforations (After Facade Install) to reduce light transmission while still allowing for a degree of visibility. Where left without glazing (Before Facade Install), the facade allows for cross ventilation through to the building's distinctive courtyard by utilising open stairways and circulation. The facade panels are intrinsically layered to allow for uninterrupted - key city views to the south.

SEE REFERENCES 7.2

LOCAL FACADE PRECEDENCE - ADVANCED ENGINEERING BUILDING

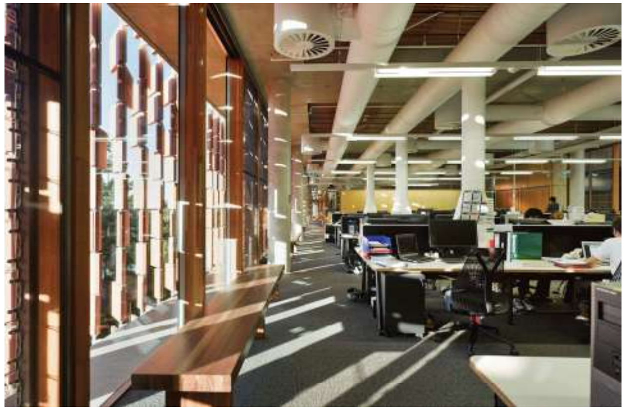
7.0 BEST FACADE PRACTICE

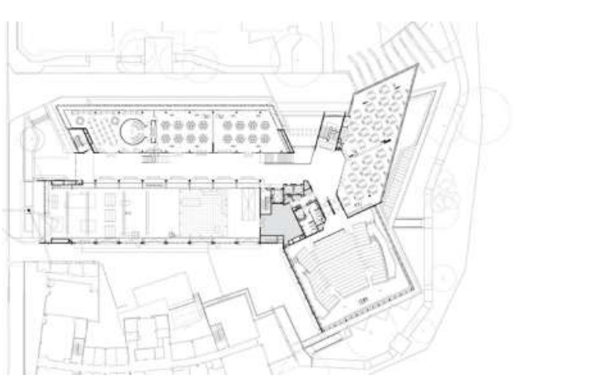
FACADE

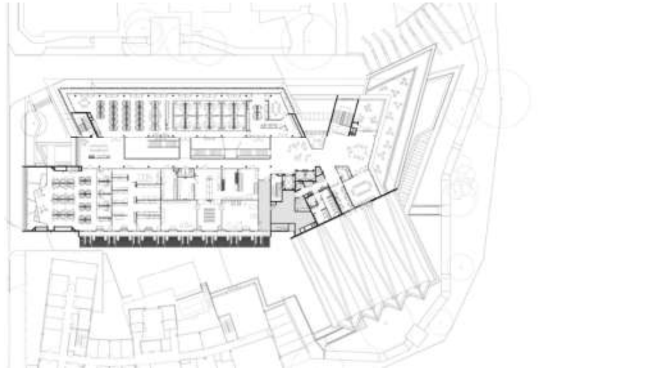
The Advanced Engineering Building (AEB) located in the University of Queensland is a benchmark for innovation in learning, research, and engineering disciplines. This focus on collaboration resulted in multi-use, active learning laboratories transforming the facility into a world-class environment for research and education. Designed by Richard Kirk Architect, in collaboration with Hassell Studio, the AEB façade incorporation pre-cast, bespoke terracotta panels which act as a mitigation tool to limit and reduce direct sun explosion which ultimately leads to a reduced heat load on the building. The perforations are aimed to mimic that pattern of a molecular structure which was created by an algorithm that simulates the behaviour of lighting through a translucent material. The façade reduces the need for artificial lighting and colling, thereby reducing energy consumption. Designed in vertical modules, the façade was orientated towards the lake therefore minimizing direct solar radiation and glare to achieve a targeted solar penetration value. This strategic module placement allows protected louvre openings, providing naturally cooled ventilation throughout the building. The perforated panels serve as a rain screen, protecting the built envelope from water infiltration while encouraging cross-ventilation through being strategically placed. The fenestrated façade pattern allows for ambient display of shadows inside the workplace whilst providing privacy. It creates a visual barrier without blocking natural light or ventilation. Finally, the façade design absorbs sound waves thus reducing noise pollution.

The AEB has a set a new benchmark for climatic design through utilizing passive façade over the mechanical – to harness nature rather than fighting against it. Given Queensland sub-tropical climate where all 70% of the year is comfortable, the façade opens the building up and lets it ‘breathe.’ It replicated the design of the quintessential Queenslander house where the passive was prioritized for the education setting; the façade has 4 modes, dependent on need and time of year. Interestingly ‘mode 4’ where the façade is completely closed off and all areas are mechanically cooled is only necessary for 17 days per year. The importance for an operable façade was important role in mitigating high winds and driven rain. Ultimately, the façade feature is a innovative and functional design which adds an aesthetic appeal whilst serving a functional purpose

SEE RERENCES 7.1.



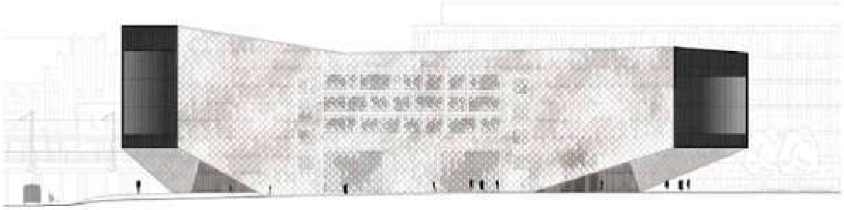




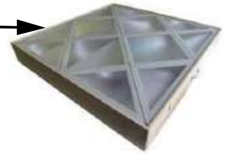
INTERNATIONAL FACADE PRECEDENCE - FUTURIUM

7.0 BEST PRACTICE FACADES

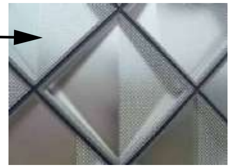
The Futurium is a museum located in Berlin, Germany and looks to spark conversation about the future of sustainability. Designed by Berlin Architectural group Musikowski Richter, the structure demonstrates revolutionary building technologies through its façade, thus rendering it an almost ‘zero energy building’1. Constructed in 2018, this façade design draws together the faceted and sharp-edged building form and protects it against various environmental conditions.



The facade acts as the building's second skin as it protects the inside exhibitions from the external climate and the ‘reality of the outside world’. The façade is constructed using over 8000 cassette panels, each of which contain uniquely folded metal reflectors encased in ceramic-printed cast glass2. The cassettes are approximately one squared metre, and together, create an iridescent cloud effect which is dependent on the viewers angle and the position of the sun.



This building was revolutionary as it was one of the first authority-approved projects of its scale the use of a curtain wall structural sealant glazing (SSG) system without mechanical restraints. Bundesanstalt für Materialprüfung (Federal Institute for Materials Research & Testing) tested the performance and durability of the structural silicone bonding under the combined effect of mechanical and climatic stresses3. The institute found that the façade itself has a glazing percentage of approximately 20%. This is representational for a cultural building with looking to maximise opaque façade areas that correspond to strict energy efficiency codes.



Overall, the Futurium façade design is unique and innovative as it represents the Musikowski Richter’s science, technology, and sustainability initiative. With the everchanging world today, prefabricated cassettes are important as they allow for design flexibility and adaptable rain screen systems. This versatile prefabrication approach requires a comprehensive technical analysis in the planning stages; however, this significantly reduces the costs during the final stages of construction and maintenance in the future.

SEE RERENCE 7.3.

INTERNATIONAL FACADE PRECEDENCE - LIFE SCIENCES

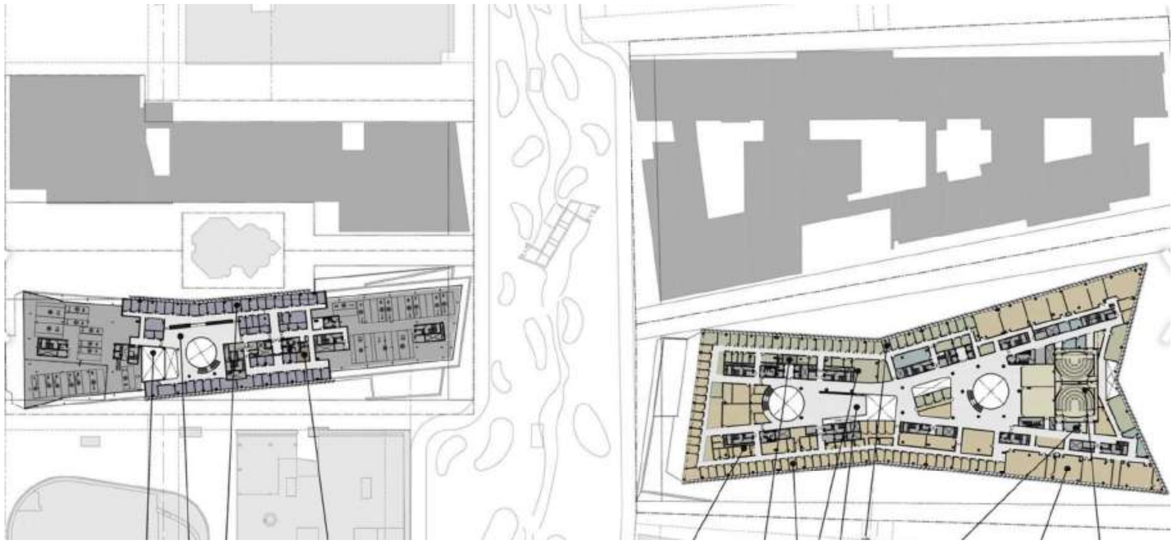
7.0 BEST PRACTICE FACADE

LEVEL 1 - CLASS 6 (RETAIL) AND 7B (WAREHOUSE)

The Kuwait University of Life Sciences (KULS) is designed by architects, Cambridge Seven and Gulf Consult is located in Kuwait, a Western Asian country. Kuwait is a country that has a hyper arid dessert climate with hot and dry summers and short winters with maximum daily temperatures reaching up to 45oC in summer. In response to this climate, Cambridge Seven and Gulf Consult constructed KULS with the intention to utilise a wide range of programmatic requirements in response to the hot climate. The most notable feature of the site-responsive building is its angular sloped façade with perforated diamond shaped forms. The array of fins and louvers are strategically placed throughout the building to filter natural daylight into the interior spaces whilst blocking the hot arid sun out. In turn of regulating temperature passively, the environmental façade design reduces the usage of facilities such as air-conditioning and lighting which minimises energy consumption and greenhouse gas emissions.

To minimize energy consumption and to improve the thermal performance of the building the façade utilises a range of technological facilities. This consideration for an controlling exterior environmental factors is best presented by the high performance glazing system, which helps the building be a comfortable space with causing heat gain during winter and heat loss in summer. The utilisation of the low-emissivity coating is the key reason to the high-performance glazing passive temperature control with allowing for transparent areas of the building whilst still keeping the heat out of the interior rooms of the building.

In addition to the façade's high-performance glazing system, the facade utilises a vapor barrier to improve the air quality and stop the usage of external water consumption. The vapor barrier is an effective answer to improve air quality as it acts by preventing moisture entering into the building, which ultimately reduces the humidity of the interior spaces. Furthermore, water consumption is reduced by the building's rainwater harvesting system, which collects and stores rainwater.



Overall, the façade of KULS is an important precedent for the façade design of 75 Longland Street with the façade utilising a range of features and technologies to minimize environmental impact whilst providing a comfortable space.

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APPENDIX

9.0 APPENDIX

TABLE F.2.3

User Group	Closet Pans		Urinals		Washbasins	
	Design Occupancy	Number	Design Occupancy	Number	Design Occupancy	Number
Class 3, 5, 6 and 9 other than *schools*						
Male employees	1 — 20	1	1 — 10	0	1 — 30	1
	> 20	Add 1 per 20	11 — 25	1	> 30	Add 1 per 30
			26 —50	2		
			>50	Add 1 per 50		
Female employees	1 — 15	1	N/A	N/A	1 — 30	1
	> 15	Add 1 per 15			> 30	Add 1 per 30
Class 7 and 8						
Male employees	1 — 20	1	1 — 10	0	1 — 20	1
	> 20	Add 1 per 20	11 — 25	1	> 20	Add 1 per 20
			26 —50	2		
			>50	Add 1 per 50		
Female employees	1 — 15	1	N/A	N/A	1 — 20	1
	> 15	Add 1 per 15			> 20	Add 1 per 20

TABLE D1.13

Type of use	Area per person
Art gallery, exhibition area, museum	4 m^2
Bar—standing	0.5 m^2
Bar—other	1 m^2
Board room	2 m^2
Boarding house	15 m^2
Cafe, church, dining room	1 m^2
Carpark	30 m^2
Computer room	25 m^2
Court room—judicial area	10 m^2
Court room—public seating	1 m^2
Dance floor	0.5 m^2
Dormitory	5 m^2
Early childhood centre	4 m^2
Factory— (a) machine shop, fitting shop or like place for cutting, grading, finishing or fitting of metals or glass, except	5 m^2
Gymnasium	3 m^2
Hostel, hotel, motel, guest house	15 m^2
Indoor sports stadium—arena	10 m^2
Kiosk	1 m^2
Kitchen, laboratory, laundry	10 m^2
Library—reading space	2 m^2
Library—storage space	30 m^2
Office, including one for typewriting or document copying	10 m^2
Patient care areas	10 m^2
Plant room—ventilation, electrical or other service units	30 m^2
Plant room—boilers or power plant	50 m^2
Reading room	2 m^2
Restaurant	1 m^2
School—general classroom	2 m^2
School—multi-purpose hall	1 m^2
School—staff room	10 m^2
School—trade and practical area—primary	4 m^2
School—trade and practical area—secondary	As for workshop
Shop—space for sale of goods— at a level entered direct from the open air or any lower level	3 m^2
Shop—space for sale of goods— all other levels	5 m^2
Showroom—display area, covered mall or arcade	5 m^2