

APPENDIX S



DOCUMENT CONTROL

This document may only be used for the purpose for which it was commissioned in accordance with the Terms of Engagement.

Document Status

Date of issue	Rev No.	Reason for Issue	Author	Reviewed By	Approved by
08/04/22	A	For Comment	PV,TD	PV	PV
31/05/22	B	For Development Approval	PV,TD	PV	PV
01/03/23	C	For Development Approval	PV,TD	PV	PV
13/11/2024	D	For Development Approval	PW,AW	PV	PV

CONTENTS

DOCUMENT CONTROL	II
CONTENTS	1
SITE ANALYSIS	2
KEY DESIGN CONSIDERATIONS	4
FIELD LAYOUT OPTIONS	8
DESIGN PRINCIPLES AND CONSIDERATIONS	10
SCHEMATIC ACTIVATION LOCATIONS	12
SOUTHERN PLAYSPACE DRAFT CONCEPT	14
PLANTING	16

SITE ANALYSIS

CONTEXT & ECOLOGICAL CORRIDOR

LEGEND

-  SITE BOUNDARY
-  ECOLOGICAL LINKS

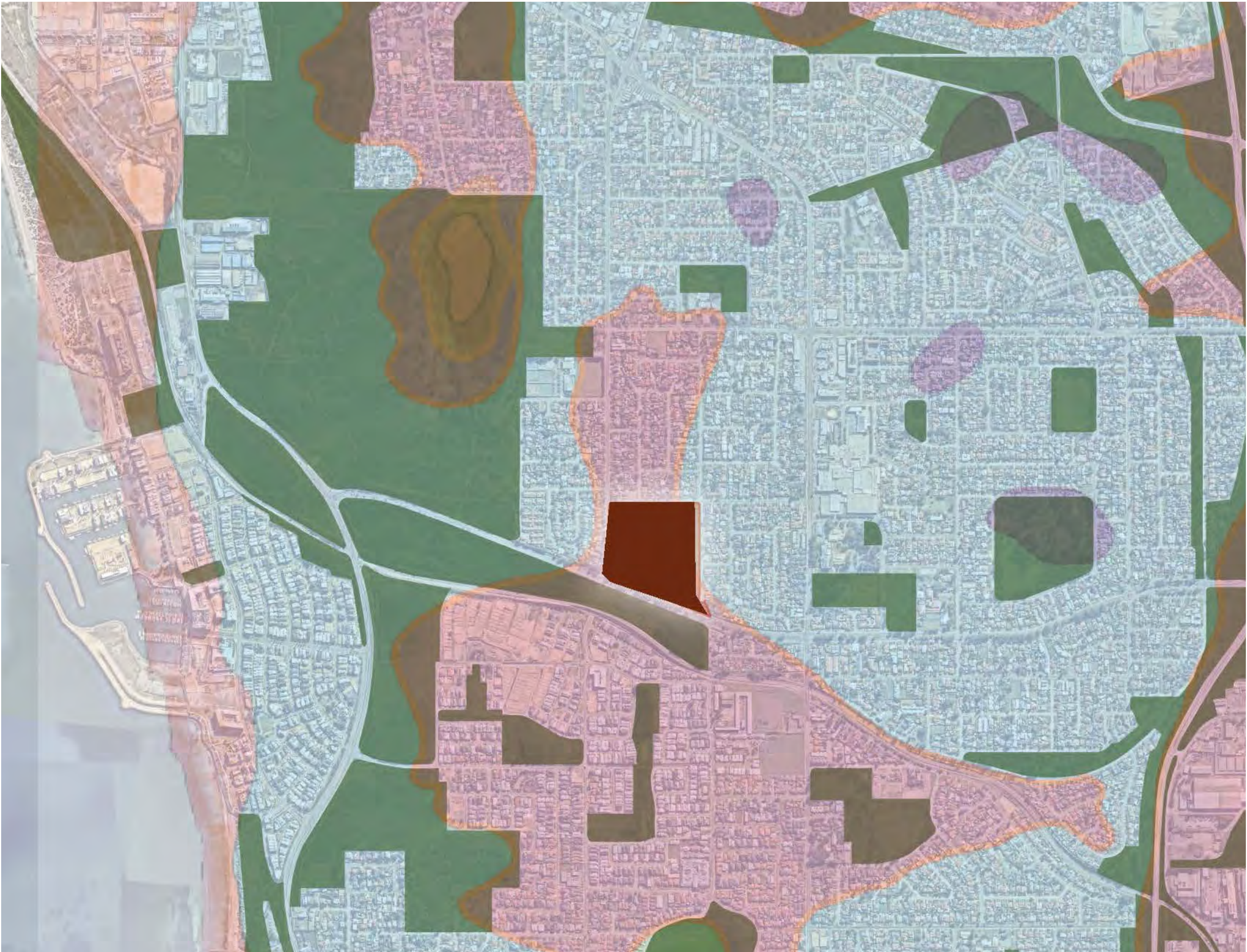


SOILS & VEGETATION

- The site sits as part of the Cottesloe vegetation complex, a woodland / open forest (10-30m tall) with closed heath
- Key species *jarrah*, *marri* and *wandoo*. *Eucalyptus marginata*, *Corymbia calophylla*, *Eucalyptus wandoo*.
- LIMESTONE - light, yellowish brown, fine to coarse-grained, sub-angular to well rounded, quartz, trace of feldspar, shell debris, variably lithified, surface kankar, of eolian origin. Minor heavy minerals.
- SAND - pale and olive yellow, medium to coarse-grained, sub-angular to sub-rounded quartz, trace of feldspar, moderately sorted, of residual origin

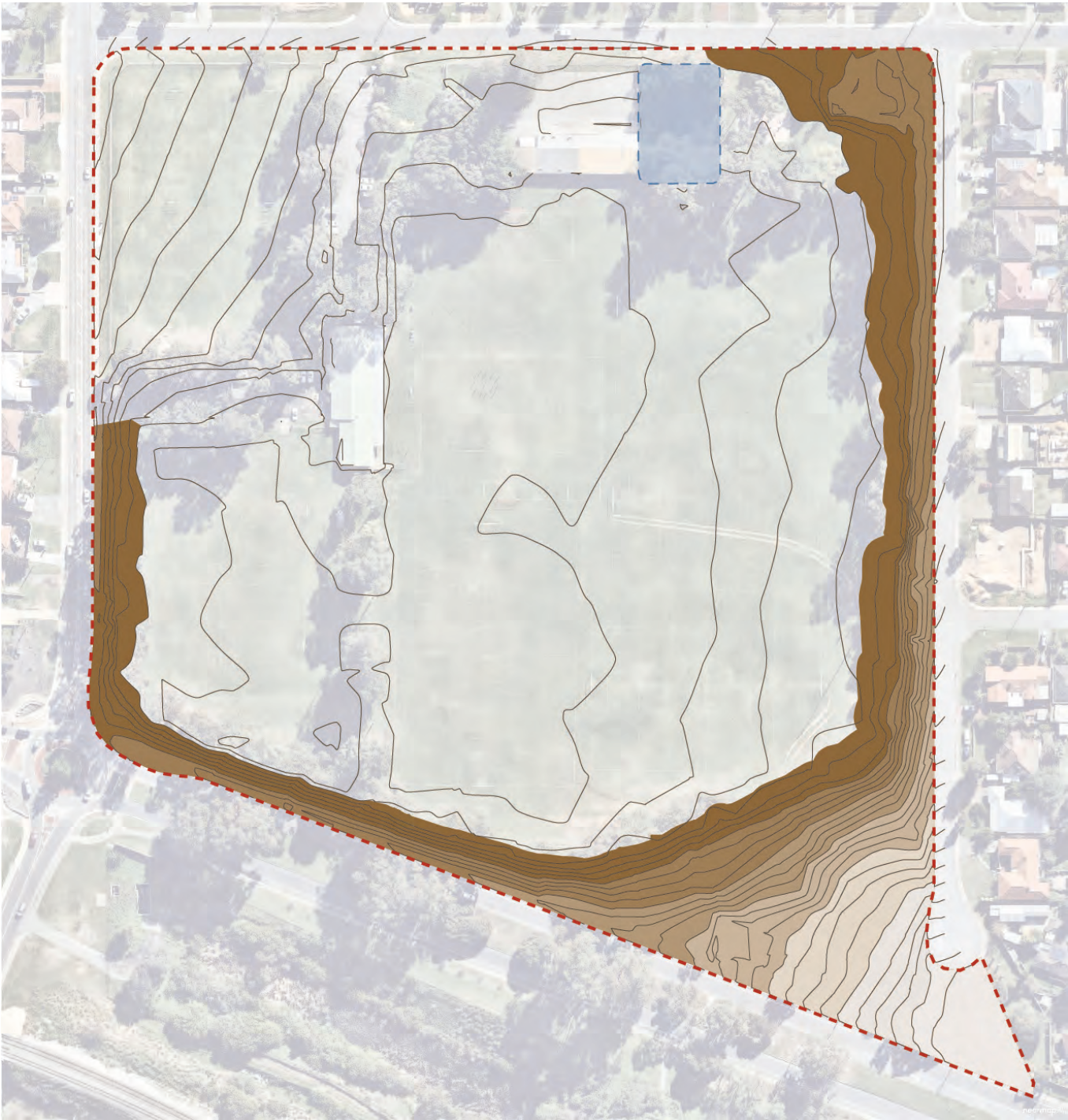
LEGEND

- SITE BOUNDARY
- ECOLOGICAL LINKS



KEY DESIGN CONSIDERATIONS

EXISTING CONTOURS



LEGEND

- | | | | |
|---|---------------|---|----------|
|  | SITE BOUNDARY |  | LANDFORM |
|  | CONTOURS |  | SUMP |

EXISTING TREES



LEGEND

-  SITE BOUNDARY
-  TREE PROTECTION ZONE (TPZ)
-  TREE CANOPY

SITE PHOTOS



EXISTING FEATURES

LEGEND

- 1 CARPARKS
 - 2 COCKBURN CITY SOCCER CLUB
 - 3 TRAINING SHIP COCKBURN BUILDING AND CARPARK
 - 4 FENCED SUMP
 - 5 PLAYGROUND
 - 6 FIELD OF POPPIES MEMORIAL
- SITE BOUNDARY
- EXISTING FIELD



POTENTIAL PLAYING FIELD
OPPORTUNITIES

LEGEND

-  SITE BOUNDARY
-  CONSTRAINT ZONE - MINIMAL DISTURBANCE
-  CONSTRAINT ZONE - STRATEGIC DISTURBANCE
-  OPEN SPACE - IDEAL FIELD AREAS



FIELD LAYOUT

EXISTING FIELD LAYOUT

LEGEND

-  SITE BOUNDARY
-  CONSTRAINT ZONE - MINIMAL DISTURBANCE
-  CONSTRAINT ZONE - STRATEGIC DISTURBANCE
-  EXISTING FIELDS



PROPOSED FIELD LAYOUT

LEGEND

-  SITE BOUNDARY
-  CONSTRAINT ZONE - MINIMAL DISTURBANCE
-  CONSTRAINT ZONE - STRATEGIC DISTURBANCE
-  PLAYING FIELD AREA
-  PROPOSED SENIOR/NPL JUNIOR FOOTBALL FIELD
-  PROPOSED FOOTBALL FIELD
-  PROPOSED MINIROOS FOOTBALL FIELD
-  PROPOSED BUILDING FOOTPRINT
-  PROPOSED VIEWING TERRACES
-  PROPOSED CARPARK FOOTPRINT
-  PROPOSED PLAYGROUND



DESIGN PRINCIPLES AND CONSIDERATIONS



ACCESS, INCLUSION AND AMENITY

- Clearly defined entry points
- Path network caters to multiple user types - walking, cycling, prams, wheelchairs, etc.
- Universal access design to be considered and provided for in all aspects of the design wherever possible
- Integrated and connected hierarchy of spaces within the site
- Retention of their 'natural feel'
- Incorporate amenities for improved site activation (toilet, shelters, picnic facilities, parking, drink fountains, etc.)
- Create a coordinated and consistent signage strategy for directional, interpretive, information



HEALTH, ACTIVITY AND SPORT

- Promotion of the precinct as a place of sport, exercise, and fitness for all ages
- Rationalise and upgrade existing playing fields improving key elements such as lighting, drainage, and irrigation which will allow these sporting amenities to serve the community into the future
- Defined trails and fitness routes with signage and line markings for walkers and runners
- Provide amenities that support the sporting programs on-site, including sheltered viewing areas, drink fountains etc.



PLAY

- The Inclusion of a high-quality play space offering a broad range of play experiences, including physical, imaginative, and sensory
- Consideration of play for all ages, from toddlers through to teenagers
- Equipment should provide a level of risk and exploration to challenge individual users
- Universal access and equipment for a range of abilities to be provided
- Combination of prefabricated and custom play equipment ensuring a wide variety of play experiences are provided
- The custom equipment will be unique to this location and reflective of the sites culture and environment
- Consideration will be given to parents and carers supervising children within the playspace



ENVIRONMENT AND ENGAGEMENT

- Revegetate understory with local endemic native species to enhance ecology
- Provide additional habitat features to improve the ecology of the site
- Celebrate landscape values by defining a clear interpretative strategy that provides clear educational information
- Discovery of the site cultural history from pre-settlement to now celebrating its rich history and diversity



SAFETY

- All designs will follow the requirements of the Occupational Safety and Health Act and CPTED (Crime prevention through environmental design) principles
- Open sight lines for passive surveillance across the site
- Assess the need for fencing in key areas
- Consider lighting, sightlines, night-time activation to enhance community safety



SUSTAINABILITY

- Efficient and sustainable use of resources in the context of the overall design, materials selection, sourcing (e.g., avoiding long haul delivery were feasible) etc.
- All finishes and furniture will be designed to be contemporary, with durability and sustainability in mind
- Apply WSUD (Water-sensitive urban design) principles to wetlands and other water retention areas on site
- A net reduction in water used for irrigation with an aspirational 25% reduction target set
- Use runoff for passive irrigation
- Localised infiltration of stormwater
- Investigation of energy-saving approaches, including solar power for facilities



PLANTING DESIGNS

- Develop the planting pallet that supports the City's biodiversity strategy outcomes
- Appropriate mixes of native endemic plantings will be used across the site
- The plant palette will be split between amenity areas and key interfaces between parkland and the carparks



COMMUNITY

- Provide a place for the local community to recreate
- Provide a diverse range of spaces and places that encourage community engagement and social opportunities
- Use the park as an opportunity to improve mental and physical health and well being of the community
- Encourage community events and activities
- Celebrate the suburbs rich history and cultural diversity
- Use the park as a place for learning and positivity

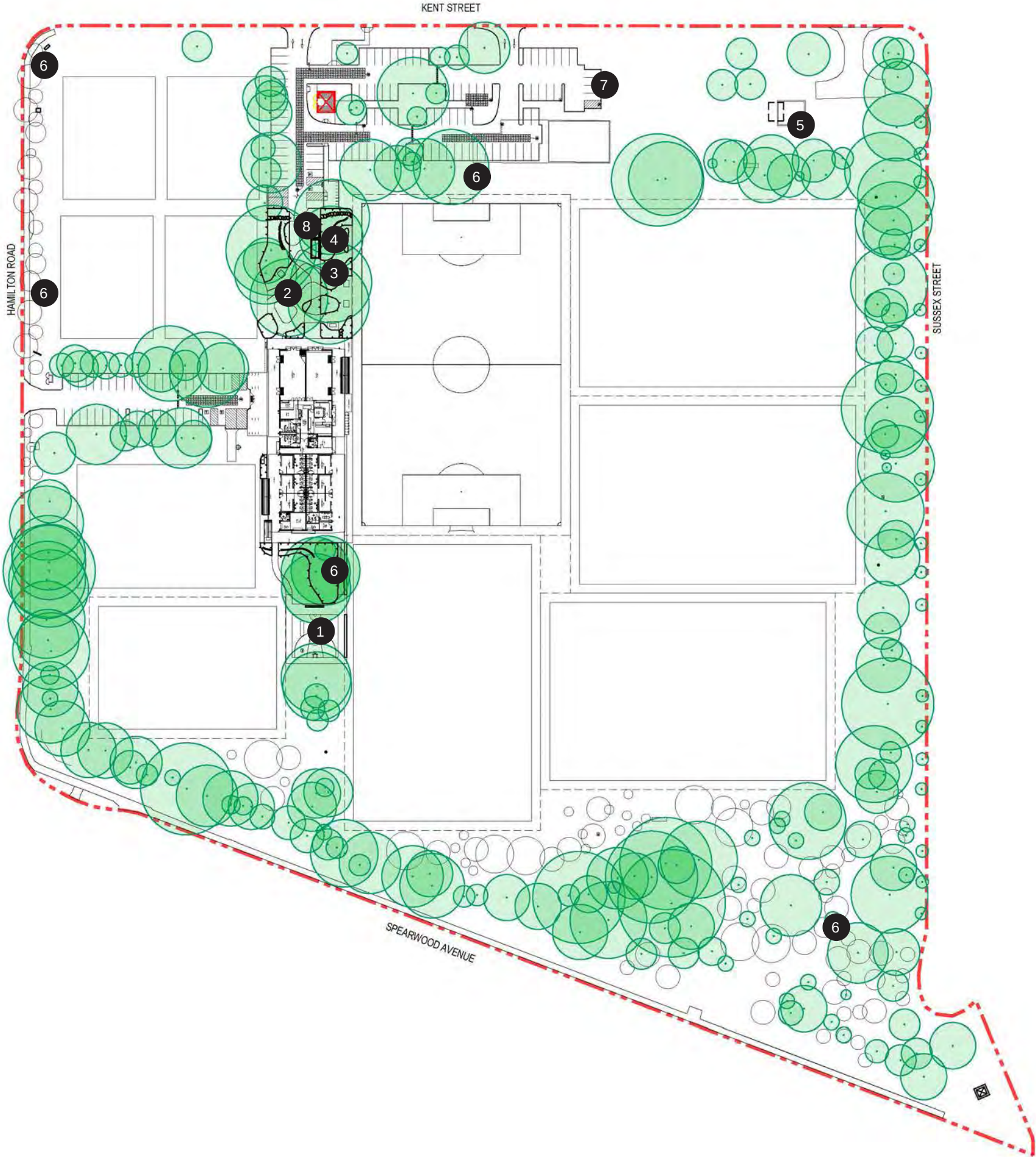
SCHEMATIC ACTIVATION LOCATIONS

LANDSCAPE LEGEND

- 1 MULTI-SPORT YOUTH SPACE WITH HALF COURT BASKETBALL RING / SOCCER GOAL AND GROUND PLANE MARKINGS
- 2 PLAY SPACE WITH SOFTFALL
- 3 AMENITY AREA - FORMAL SEATING AND BBQS
- 4 ART INSTALLATIONS WITHIN THE LANDSCAPE
- 5 OUTDOOR EXERCISE STATION
- 6 PLANTING OF SUPPLEMENTARY ENDEMIC SPECIES
- 7 CARPARK PLANTING - WATERWISE / ENDEMIC TREES AND SMALL SHRUBS
- 8 ENTRY PLAZA WITH SPACE FOR FOOD TRUCKS
-  EXISTING TREE TO BE RETAINED



Scale 1:1500 @ A3





Wheelchair Parking (Img: locallove.ca)



Interactive Signage (Img: pinterest.com)



Nature Play (Img: Rob Frith)



Bird Box (Img: Mandy Bamford)



Art installation (Img: moool.com)



Bird Watering Station (Img: City of South Perth)



DDA Drink Fountain with dog bowl (Img: Grillex)



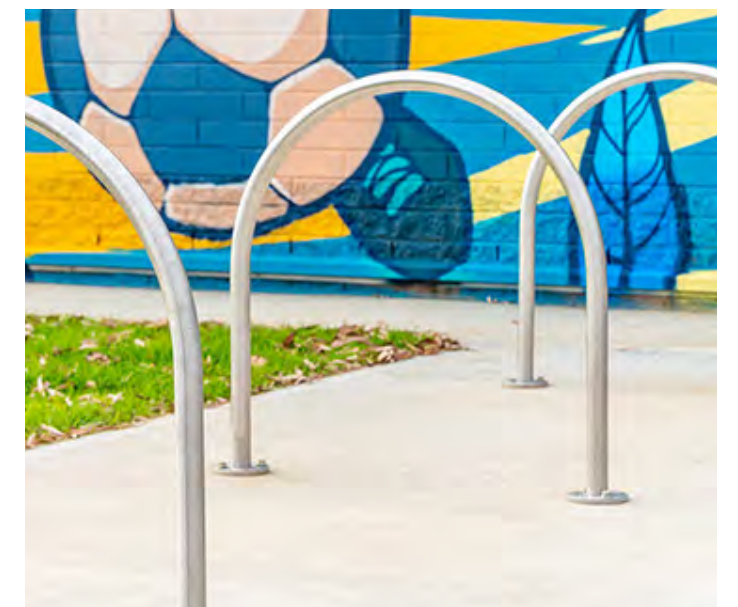
Fitness Equipment (Img: Kompan)



Logs and planting as informal barrier (Img: Morgan Gillham)

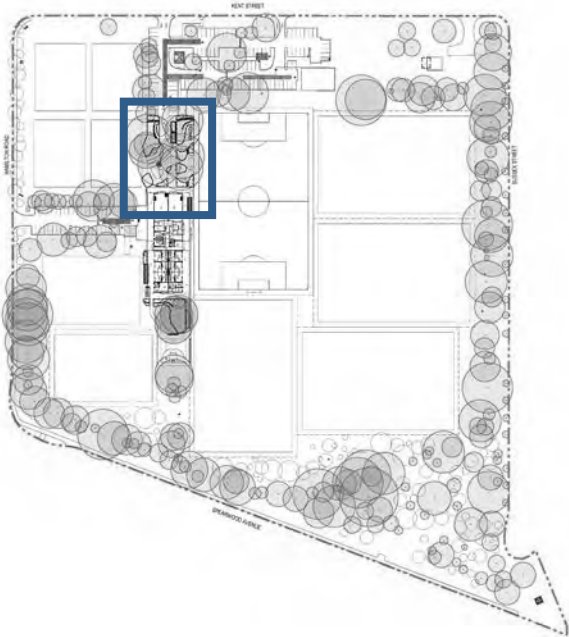


Playground (Img: Earthscape)



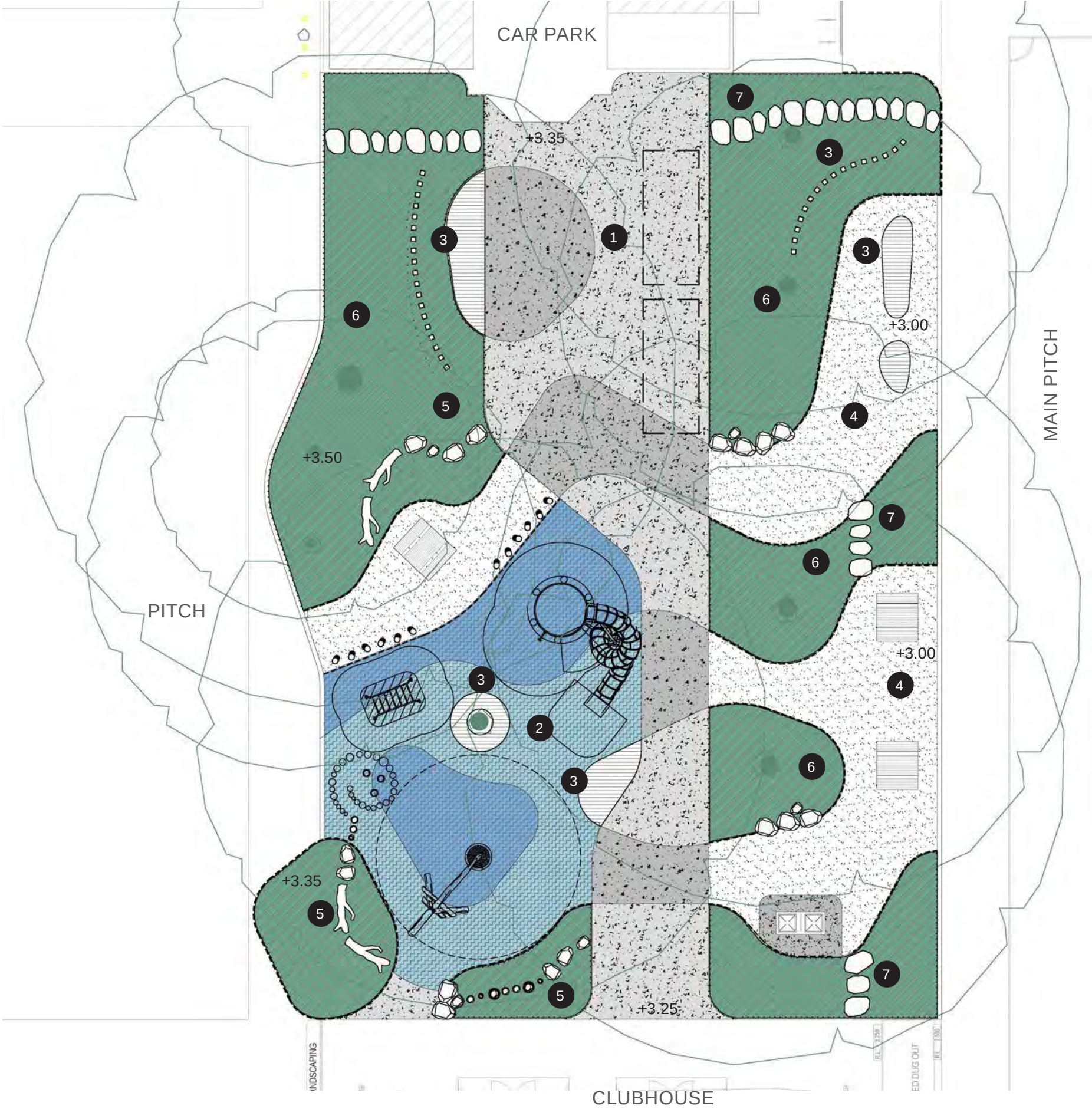
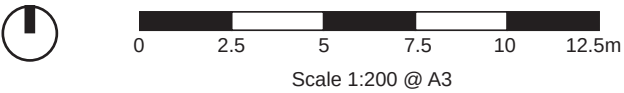
Bicycle Parking (Img: Street Furniture Australia)

NORTHERN PLAYSPACE CONCEPT

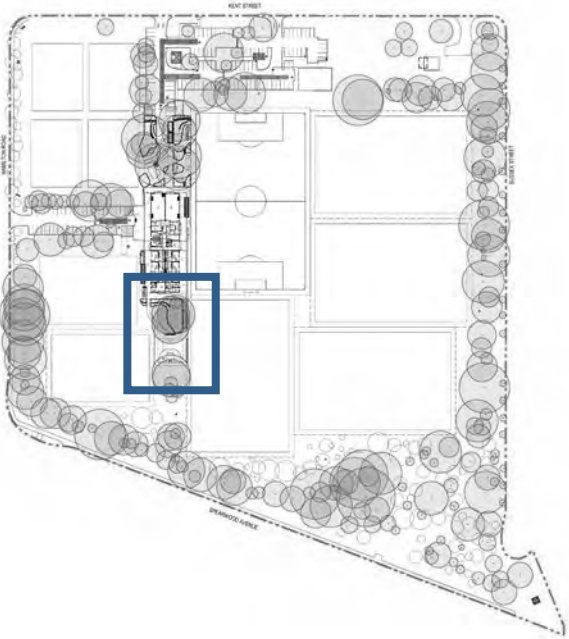


LEGEND

- 1 ENTRY PLAZA WITH SEATING AND SPACE FOR FOOD TRUCKS. INSITU CONCRETE SURFACE
- 2 PLAYSPACE AREA - A VARIETY OF PLAY ELEMENTS WITH RUBBER SOFTFALL
- 3 ART ELEMENTS - BESPOKE SEATING AND VERTICAL ELEMENTS BY ARTIST
- 4 AMENITY AREA FACING MAIN PITCH - TABLES, SEATING WITH DDA COMPLIANT BBQ WITH STABILISED GRAVEL FINES SURFACE
- 5 INFORMAL NATURE OBSTACLE COURSE
- 6 NATIVE MULCHED GARDEN BEDS AROUND EXISTING TREES
- 7 INFORMAL STEPPING STONE PATHS

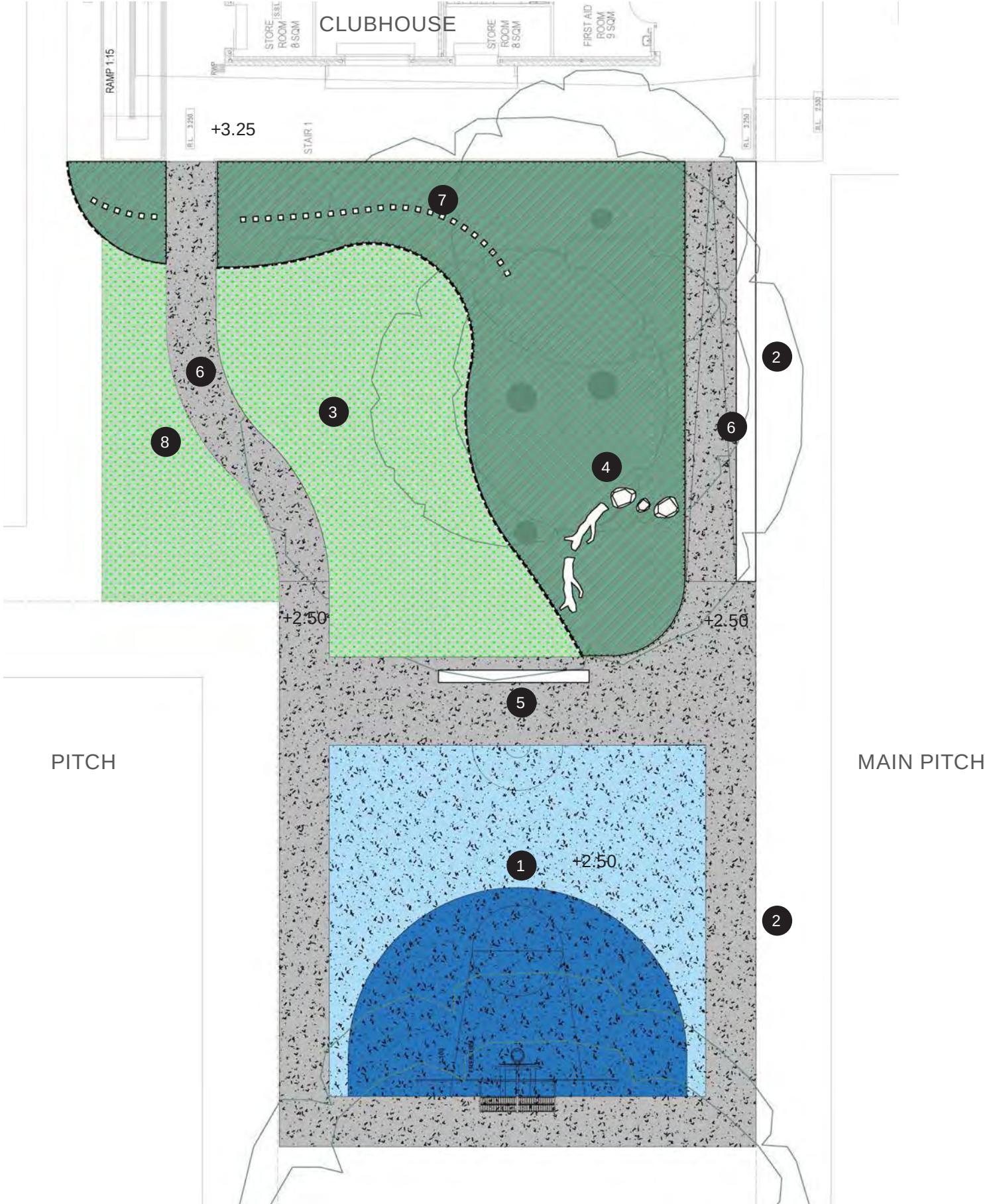
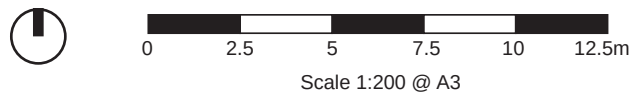


SOUTHERN COURT CONCEPT



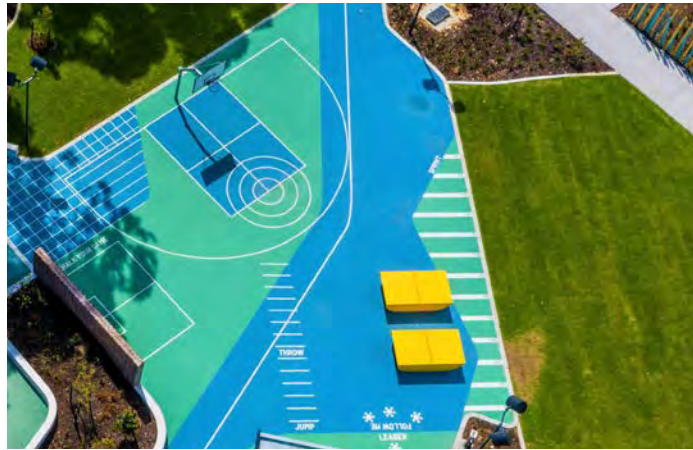
LEGEND

- 1 HALF BASKETBALL COURT WITH BASKETBALL RING AND SOCCER GOAL
- 2 SEATING WALL FACING MAIN PITCH
- 3 SLOPING LAWN
- 4 NATIVE MULCHED GARDEN BED AROUND EXISTING TREES
- 5 SEATING WALL
- 6 1:21 WALKWAY DOWN TO COURTS
- 7 VERTICAL ELEMENTS BY ARTIST
- 8 LAWN TO SLOPE UP TO WALKWAY



YOUTH SPACE

- Compact, multi-programmable hard space
- Opportunity for ground plane to incorporate public art elements
- Can thematically link to soccer



Compact hardcourt space (Img: MG Group)



Ground plane activation (Img: Andrew Lloyd)



Multisport (Img: Kompan)

NATURE PLAY

- Making use of existing trees
- Utilising cut logs from onsite felled trees
- Diversifies play space & demographics as part of pos



Nature play stepping logs (Img: JBA)



Nature play netting (Img: JBA)



Nature play timber logs (Img: JBA)

BIODIVERSITY AWARENESS

- Several habitat nodes as part of the Southern Playspace, including habitat logs, insect hotels, bird waterers and interpretive signage
- Public art & interpretive opportunities at selected trees / nodes



Insect hotel (Img: JBA)



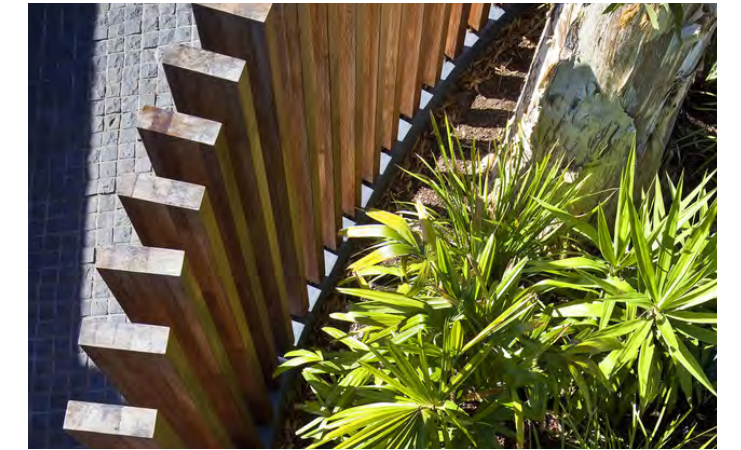
Bird waterer (Img: Town of Vic Park)



Bird Box (Img: Mandy Bamford)

HANDLES COMPETING USES

- Several edge typologies to help define the different spaces, and to help contain the potentially competing ball sports during peak usage times
- Serves multiple functions (advertising for club, habitat, informal play)



Vertical elements (Img: Karl Bleath)



BBQs (Img: Mirvac)



Painted totem poles as informal barriers (Img: World Landscape Architecture)

PLANTING

Design approach

- The plant palette selection recommends native plants to reflect the natural setting. The site sits as part of the Cottesloe vegetation complex, and the species contained on the following pages are a celebration of the diversity and colour found as part of this complex.
- Given the amount of shade afforded by the established trees onsite, a cross section of species that are shade tolerant have been included.
- As part of CPTED design considerations, the maintenance of visual sightlines in certain areas should be prioritised. As a result, in these areas a range of hardy ground covers and low lying shrubs should be chosen.
- The ground water table is close to the surface throughout the site, as evidenced by the presence of many large tree roots close to the surface. Planting within the tree protection zone (TPZ) of existing trees involves considered use of both mulch and prostrate species, in order to avoid unnecessary disturbance to existing tree roots.

Plant images sourced from JBA, friendsofqueensparkbushland.org.au & Florabase.dpaw.wa.gov.au

TREES

Banksia attenuata



Banksia grandis



Banksia menziesii



Euc decipiens



Eucalyptus marginata



Eucalyptus tottiana



SHRUBS & STRAPPY PLANTS

Acacia lasiocarpa prostrate



Adenanthos cuneatus



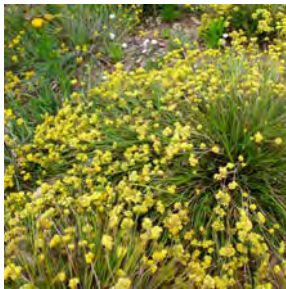
Anigozanthos humilis



Atriplex cinerea



Conostylis aculeata



Eremophila glabra



Dianella revoluta



Gastrolobium capitalum



Ficinia nodosa



Lepidosperma gladiatum



Olearia axillaris mini PBR



Templetonia retusa



GROUNDCOVERS

Acacia saligna prostrate



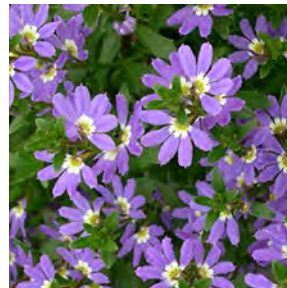
Kennedia prostrata



Grevillea obtusifolia



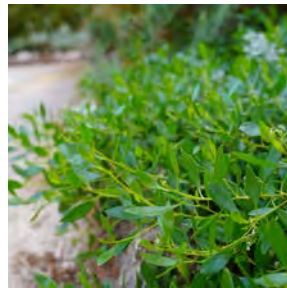
Scaevola sp.(prostrate form)



Hemiandra pungens



Myoporum insulare prostrate



PLANT SCHEDULE

Client: City of Cockburn
Project: Beale Park Redevelopment
Location: Spearwood Ave, Spearwood
Date: May-23
Rev: A
Author: TD
Reviewed by: PV



This site lies within the Cottesloe Vegetation complex.

The Beale Park Redevelopment site lies within the Cottesloe Central and South Vegetation complex (CCS) - Mosaic of woodland of Euc. Gomphocephala (Tuart) - E. marginata (Jarrah) - Corymbia calophylla (Marri), closed heath on the limestone outcrops (Heddlé et al. 1980)

					MIX DETAILS		
KEY	GENUS / SPECIES / CULTIVAR	COMMON NAME	HEIGHT (m)	WIDTH (m)	POT	PLANT IN GROUPS OF	DENSITY PER M2
PLANT MIX 1 - SOUTHERN PLAYSPACE							
SHRUBS - MIX 1							
Bni	Banksia nivea	Couch Honeypot	0.5	0.5	Tubestock	3	3
Eni	Eremophila glabra (upright)	Tar Bush	1	1	Tubestock	1	3
Pfe	Pimelea ferruginea	Pink Rice Flower	0.7	0.7	tube	1	3
Wfr	Westringia fruticosa 'grey box'	Coastal Rosemary	1	1	140mm	1	3
STRAPPY LEAVED - MIX 1							
Fno	Ficinia Nodosa	Knobby Club Rush	0.7	0.7	Tubestock	1	3
Lli	Lomandra 'Lime Tuff'	Matt Rush	0.5	0.5	140mm	5	5
Lta	Lomandra 'LM300 Tanika'	Matt Rush	0.5	0.5	140mm	5	5
GROUNDCOVERS - MIX 1							
Acu	Adenanthos cuneata 'Coral Carpet'	Basket flower	0.4	0.4	130mm	5	5
Ero	Eremophila glabra 'Roseworthy'	Emu Bush Roseworthy	0.3	1	140mm	3	3
Min	Myoporum insulare prostrate	Creeping boobialla	0.3	1.2	130mm	3	3
Wbu	Westringia 'Bulli Coastal Creep'	Coastal Rosemary	0.4	1	140mm	3	3
TOTAL							
PLANT MIX 2 -SOUTHERN PLAYSPACE (STRAPPY LEAVED AND GROUND COVERS)							
STRAPPY LEAVED - MIX 2							
Cca	Conostylis candicans	Grey Cottonhead	0.4	0.4	Tubestock	5	5
Lli	Lomandra 'Lime Tuff'	Matt Rush	0.5	0.5	140mm	5	5
Lta	Lomandra 'LM300 Tanika'	Matt Rush	0.5	0.5	140mm	3	5
GROUNDCOVERS - MIX 2							
Ebl	Eremophila glabra 'Blue Horizon'	Emu Bush Blue Horizon	0.3	1	Tubestock	3	3
Min	Myoporum insulare prostrate	Creeping boobialla	0.3	1.2	130mm	3	3
Wbu	Westringia 'Bulli Coastal Creep'	Coastal Rosemary	0.4	1	140mm	3	3

KEY	GENUS / SPECIES / CULTIVAR	COMMON NAME	HEIGHT (m)	WIDTH (m)	POT	PLANT IN GROUPS OF	DENSITY PER M2
PLANT MIX 3 - CARPARK / ROAD INTERFACE (SHRUBS AND STRAPPY LEAVED)							
SHRUBS - MIX 3							
Abu	<i>Alyxia buxifolia</i>	Dysentery Bush	1.0	1.5	tube	1	1
Aho	<i>Acacia howittii</i> 'Honey Bun'	Sticky Wattle	1	1	Tubestock	1	1
Egl	<i>Eremophila glabra</i> (upright)	Tar Bush	1	1	Tubestock	3	3
Gle	<i>Guichenotia ledifolia</i>		0.4	0.5	Tubestock	3	3
Ogh	<i>Olearia</i> 'ghost town'	Coastal Daisy	0.5	1	Tubestock	3	3
Pfe	<i>Pimelea ferruginea</i>	Pink Rice Flower	0.7	0.7	tube	3	3
Rba	<i>Rhagodia baccata</i>	Berry Saltbush	1.2	1.2	Tubestock	1	1
Tre	<i>Templetonia retusa</i>	Cockies Tongue	1.5	1	Tubestock	1	3
STRAPPY LEAVED - MIX 3							
Cca	<i>Conostylis candicans</i>	Grey Cottonhead	0.4	0.4	Tubestock	5	5
Dcl	<i>Dianella</i> 'Clarity Blue'	Blue Flax Lilly	0.6	0.5	140mm	5	3
Fno	<i>Ficinia Nodosa</i>	Knobby Club rush	0.7	0.6	Tubestock	3	3
Lka	<i>Lomandra</i> 'Katrinus Delux'	Matt Rush	0.7	0.7	140mm	3	3
Lli	<i>Lomandra</i> 'Lime Tuff'	Matt Rush	0.5	0.5	140mm	5	5
TOTAL							
PLANT MIX 4 - CARPARK / ROAD INTERFACE (LOW SHRUBS AND GROUNDCOVERS)							
SHRUBS - MIX 4							
Ogh	<i>Olearia</i> 'ghost town'	Coastal Daisy	0.5	1	Tubestock	3	3
Pfe	<i>Pimelea ferruginea</i>	Pink Rice Flower	0.7	0.7	tube	3	3
Wfr	<i>Westringia fruticosa</i> 'grey box'	Coastal Rosemary	1	1	140mm	1	3
GROUNDCOVERS - MIX 4							
Ala	<i>Acacia lasiocarpa prostrate</i>	Prickly Moses	0.5	0.7	Tubestock	3	3
Eka	<i>Eremophila glabra</i> 'Kalbarri Carpet'	Tar Bush	0.3	1	Tubestock	3	3
Hpu	<i>Hemiandra pungens</i>	Snake Bush	0.3	1	Tubestock	3	3
Kpr	<i>Kennedia prostrata</i>	Running Postman	0.1	1	Tubestock	3	3
Min	<i>Myoporum insulare prostrate</i>	Creeping Boobialla	0.3	1.2	Tubestock	3	3
Wbu	<i>Westringia</i> 'Bulli Coastal Creep'	Coastal Rosemary	0.4	1	Tubestock	3	3
TOTAL							
PLANT MIX 5 - CARPARK / ROAD INTERFACE (LOW STRAPPY LEAVED)							
STRAPPY LEAVED - MIX 5							
Cca	<i>Conostylis candicans</i>	Grey Cottonhead	0.4	0.4	Tubestock	5	3
Lli	<i>Lomandra</i> 'Lime Tuff'	Matt Rush	0.5	0.5	140mm	5	5



JOSH BYRNE & ASSOCIATES

LANDSCAPE • SUSTAINABILITY • COMMUNICATIONS

T 08 9433 3721 E jba@joshbyrne.com.au W joshbyrne.com.au

A Suite 109 Atwell Buildings 3 Cantonment Street Fremantle WA 6160

APPENDIX T

BEALE PARK

DA ACOUSTIC ASSESSMENT

NOVEMBER 2024

OUR REFERENCE: 33683-1-22048-02

DOCUMENT CONTROL PAGE

PRELIMINARY ACOUSTIC ASSESSMENT
BEALE PARK
SPEARWOOD

Job No: 22048-02

Document Reference: 33683-1-22048-02

FOR

CITY OF COCKBURN

DOCUMENT INFORMATION				
Author:	Tim Reynolds		Checked By:	George Watts
Date of Issue:	12 November 2024			
REVISION HISTORY				
Revision	Description	Date	Author	Checked
DOCUMENT DISTRIBUTION				
Copy No.	Version No.	Destination	Hard Copy	Electronic Copy
1	1	SAVILLS Project Management Attn: Ian Hart Email: ACONEX		✓

CONTENTS

1.0	INTRODUCTION	2
2.0	SUMMARY	2
3.0	CRITERIA	2
4.0	NOISE MODELLING AND RESULTS	5
4.1	Mechanical Services	5
4.2	Patrons / Functions	5
5.0	RESULTS	6
6.0	ASSESSMENT	6
6.1	L _{A10} Noise Emission – Mechanical Services	6
6.2	L _{A10} Noise Emission – Patrons and Music	7

APPENDICIES

A	Development Plans
---	-------------------

1.0 INTRODUCTION

Herring Storer Acoustics have been commissioned to carry out an acoustical assessment of noise emissions associated with the proposed redevelopment of the Beale Park community centre / club rooms in Spearwood.

This work is understood to have been requested as a precursor to the development application for the redevelopment.

2.0 SUMMARY

A preliminary assessment has been undertaken of the noise that would be received at the neighbouring residences from the redevelopment of the Beale Park Redevelopment.

We understand that the mechanical services would be located on the roof. From the drawings provided, we also believe that the mechanical services would be screened from the neighbouring residences. Based on the assessment undertaken, noise received at the neighbouring residences from the mechanical services would comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times. However, to ensure compliance, it is recommended that a review of the mechanical services design be undertaken when the design is complete.

Noise received at the neighbouring residence from patrons in the alfresco areas has also been determined to comply with the Regulatory requirements. However, for functions, where music is to be played, to comply with the Regulations, the glazing to the Function / Clubroom is to be a minimum of 10.38mm laminated glass. Additionally, the access doors to the club / function area are to be closed when music is being played and access should be via the lobby.

3.0 CRITERIA

The *Environmental Protection (Noise) Regulations 1997* stipulate the allowable noise levels at any noise sensitive premises from other premises. For noise sensitive premises, the allowable noise level is determined by the calculation of an influencing factor, which is added to the baseline criteria set out in Table 1 of the Regulations. For commercial premises, the assigned noise levels are fixed for all times. The baseline assigned noise levels are listed in Table 2.1.

TABLE 2.1 – ASSIGNED NOISE LEVELS

Premises Noise	Receiving	Time of Day	Assigned Level (dB)		
			L _A 10	L _A 1	L _A max
Noise sensitive premises within 15 metres of a dwelling		0700 - 1900 hours Monday to Saturday	45 + IF	55 + IF	65 + IF
		0900 - 1900 hours Sunday and Public Holidays	40 + IF	50 + IF	65 + IF
		1900 - 2200 hours all days	40 + IF	50 + IF	55 + IF
		2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	35 + IF	45 + IF	55 + IF

Note: The L_{A10} noise level is the noise that is exceeded for 10% of the time.
The L_{A1} noise level is the noise that is exceeded for 1% of the time.
The L_{Amax} noise level is the maximum noise level recorded.

It is a requirement that noise from the site be free of annoying characteristics (tonality, modulation and impulsiveness) at other premises, defined below as per Regulation 9.

- “impulsiveness”** means a variation in the emission of a noise where the difference between L_{Apeak} and $L_{Amax Slow}$ is more than 15dB when determined for a single representative event;
- “modulation”** means a variation in the emission of noise that –
- (a) is more than 3dB $L_{A Fast}$ or is more than 3dB $L_{A Fast}$ in any one-third octave band;
 - (b) is present for more at least 10% of the representative assessment period; and
 - (c) is regular, cyclic and audible;
- “tonality”** means the presence in the noise emission of tonal characteristics where the difference between –
- (a) the A-weighted sound pressure level in any one-third octave band; and
 - (b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,
- is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A Slow}$ levels.

Where the above characteristics are present and cannot be practicably removed, the following adjustments are made to the measured or predicted level at other premises.

TABLE 2.2 – ADJUSTMENTS FOR ANNOYING CHARACTERISTICS

Where tonality is present	Where modulation is present	Where impulsiveness is present
+ 5 dB	+ 5 dB	+ 10 dB

Where the noise emission is music, then any measured level is adjusted according to Table 2.3 below.

TABLE 2.3 – ADJUSTMENTS TO MEASURED MUSIC NOISE LEVELS

Where impulsiveness is not present	Where impulsiveness is present
+10 dB(A)	+15 dB(A)

The nearest neighbouring noise sensitive premises considered in our assessment are as shown in Figure 1 below. It is noted that in some instances the locations identified are elevated (i.e. second floor). This has been accounted for in our assessment.

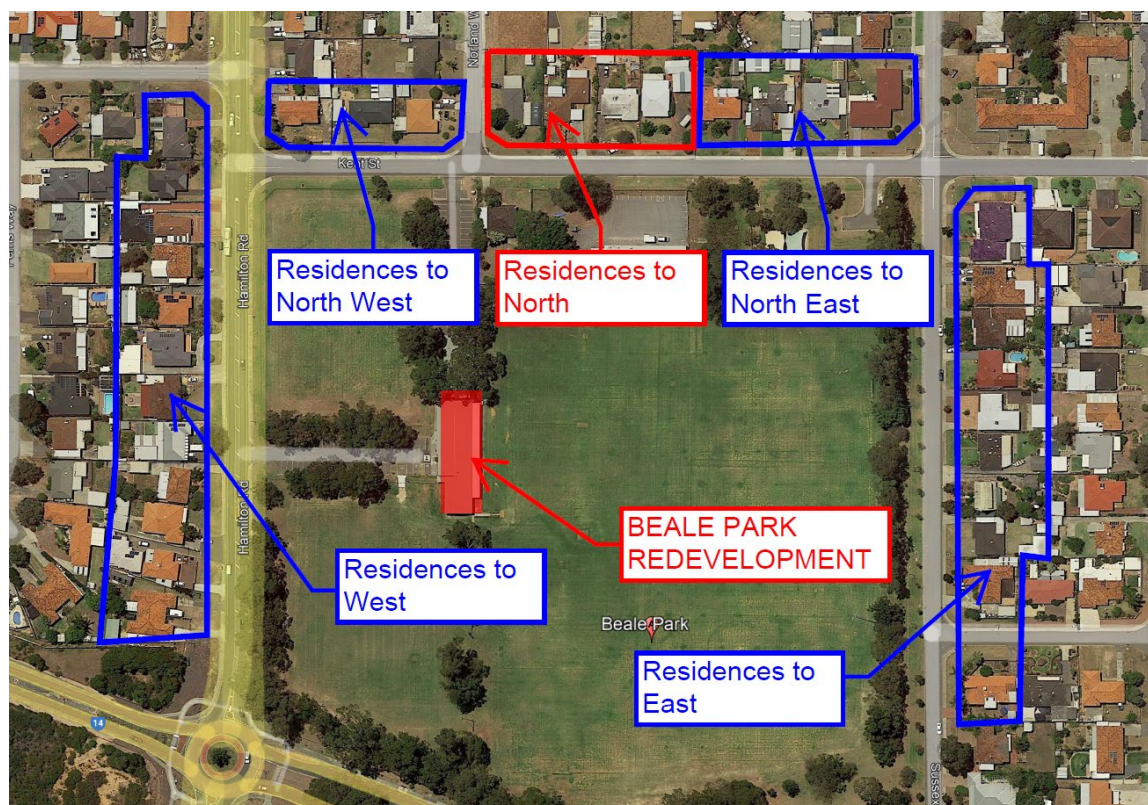


FIGURE 01 – DEVELOPMENT LOCATION AND SURROUNDS

At the neighbouring residences, with Hamilton Road being a secondary road in the inner circle; Rockingham Road being a primary road in the outer circle and the centre being a clubroom within the inner circle, the Influencing Factor for the neighbouring residences has been determined to be +4 dB for the majority of residences, however, there is a number of residences (ie designated “North” on Figure 01) that are outside 100m from Hamilton Road and 450m from Rockingham Road; and at these residences the Influencing Factor would be +2 dB. Thus, the assigned noise levels at the neighbouring residences would be as listed in Tables 3.4 and 3.5.

**TABLE 3.4 - ASSIGNED OUTDOOR NOISE LEVEL
RESIDENCES TO NORTH**

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
Noise sensitive premises: highly sensitive area	0700 - 1900 hours Monday to Saturday (Day)	49	59	69
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day)	44	54	69
	1900 - 2200 hours all days (Evening)	44	54	59
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	39	49	59

**TABLE 3.4 - ASSIGNED OUTDOOR NOISE LEVEL
OTHER RESIDENCES**

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
Noise sensitive premises: highly sensitive area	0700 - 1900 hours Monday to Saturday (Day)	49	59	69
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day)	44	54	69
	1900 - 2200 hours all days (Evening)	44	54	59
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	39	49	59

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.

4.0 NOISE MODELLING AND RESULTS

To assess the noise received at the neighbouring premises from the proposed development, noise modelling was undertaken using the noise modelling program SoundPlan.

Calculations were carried out using the DWER's weather conditions, which relate to worst case noise propagation, as stated in the Department of Environment Regulation "*Draft Guidance on Environmental Noise for Prescribed Premises*". These conditions include winds blowing from sources to the receiver(s).

4.1 MECHANICAL SERVICES

Calculations of noise emission from the Mechanical Services were based on the sound power levels used in the calculations are listed in Table 4.1.

TABLE 4.1 – SOUND POWER LEVELS

Item	Sound Power Level, dB(A)
Air conditioning condensing Unit	2 @ 78 4 @ 72
Kitchen Exhaust Fan	84
Kitchen Supply Air Fan	80
Changeroom / Toilet Exhausts	1 @ 82 2 @ 70

Notes:

- 1 With regards to the air conditioning, we note that the air conditioning has not been designed at this stage of the development. However, we believe that the mechanical service would be located on the roof, behind the parapets.
- 2 No diversity has been included in the noise modelling. Thus, the assessment would be considered conservative.

4.2 PATRONS / FUNCTIONS

From information provided, a noise model was developed of the proposed redevelopment, including the external alfresco areas.

Internal noise levels have been assumed to be music at a level of 85 dB(A) at 2 metres from the speakers. For breakout noise from the Function area / Clubroom to comply with the Regulatory requirements, the faced glazing needs to be as a minimum 10.38mm laminated glass.

Noise levels within the external areas has been assumed to be 66 dB(A)/m² sound power level. This noise level is representative of beer garden noise levels, which given the furniture and likely clientele is considered a reasonable assumption of the use of the space.

5.0 RESULTS

The results of the noise modelling for the worst case location with regards to the noise being assessed, for each of the neighbouring residences shown in Figure 01, are outlined below.

The resultant noise levels from the mechanical services at the worst case location of the neighbouring residences are listed in Table 5.1, With the noise received at the neighbouring residences from patrons and music breakout are shown in Table 5.2.

**TABLE 5.1 - ACOUSTIC MODELLING RESULTS FOR L_{A10} CRITERIA
MECHANICAL PLANT**

Neighbouring Premises	Calculated Noise Level (dB(A))
West	30
North West	29
North	29
North East	28
East	27

**TABLE 5.2 - ACOUSTIC MODELLING RESULTS FOR L_{A10} CRITERIA
PATRONS / MUSIC**

Neighbouring Premises	Calculated Noise Level (dB(A))	
	Patrons	Music
West	24	24
North West	23	24
North	23	24
North East	22	23
East	19	18

6.0 ASSESSMENT

6.1 L_{A10} NOISE EMISSION – MECHANICAL SERVICES

Noise emissions from the mechanical services would be steady state and would operate for the majority of time. Hence noise received from the mechanical services needs to comply with the assigned L_{A10} noise level.

To be conservative, a +5 dB(A) penalty has been applied to the calculated noise level associated with the combined noise from the mechanical services. Table 6.1 lists the characteristics that should be included in the assessable noise level, with Table 6.2 showing the applicable Assigned Noise Levels, and assessable noise level emissions associated for the scenarios associated with the mechanical.

TABLE 6.1 - APPLICABLE ADJUSTMENTS AND ASSESSABLE – MECHANICAL SERVICES

Location	Calculated Noise Level, dB(A)	Applicable Adjustments to Measured Noise Levels, dB(A)			Assessable Noise Level, dB(A)
		Where Noise Emission is NOT music			
		Tonality	Modulation	Impulsiveness	
West	30	+5	-	-	35
North West	29	+5	-	-	34
North	29	+5	-	-	34
North East	28	+5	-	-	33
East	27	+5	-	-	32

TABLE 6.2 – ASSESSMENT – MECHANICAL SERVICES

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable L _{A10} Assigned Level (dB)	Exceedance to Assigned Noise Level (dB)
West	35	Day	49	Complies
		Sundays	44	Complies
		Evening	44	Complies
		Night	39	Complies
North West	34	Day	49	Complies
		Sundays	44	Complies
		Evening	44	Complies
		Night	39	Complies
North	34	Day	47	Complies
		Sundays	42	Complies
		Evening	42	Complies
		Night	37	Complies
North East	33	Day	49	Complies
		Sundays	44	Complies
		Evening	44	Complies
		Night	39	Complies
East	32	Day	49	Complies
		Sundays	44	Complies
		Evening	44	Complies
		Night	39	Complies

6.2 L_{A10} NOISE EMISSION – PATRONS AND MUSIC

As voices are broadband, no adjustment to the calculated noise levels is applicable in accordance with the *Environmental Protection (Noise) Regulations 1997*.

Table 6.3 lists the characteristics that should be included in the assessable noise level for patrons.

TABLE 6.3 – ASSESSMENT – PATRONS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable L_{A10} Assigned Level (dB)	Exceedance to Assigned Noise Level (dB)
West	24	Day	49	Complies
		Sundays	44	Complies
		Evening	44	Complies
		Night	39	Complies
North West	23	Day	49	Complies
		Sundays	44	Complies
		Evening	44	Complies
		Night	39	Complies
North	23	Day	47	Complies
		Sundays	42	Complies
		Evening	42	Complies
		Night	37	Complies
North East	22	Day	49	Complies
		Sundays	44	Complies
		Evening	44	Complies
		Night	39	Complies
East	19	Day	49	Complies
		Sundays	44	Complies
		Evening	44	Complies
		Night	39	Complies

With regards to the breakout from music, given the calculated noise level, the music is unlikely to be audible. However, to be conservative the +10 dB(A) penalty for music has been applied.

Note: At the calculated noise level for music, any music received at the neighbouring residence would not be impulsive, thus, only the +10 dB penalty would be applicable, if audible.

Table 6.4 lists the characteristics that should be included in the assessable noise level associated with music, with Table 6.5 showing the applicable Assigned Noise Levels, and assessable noise level emissions associated for the scenarios associated with the music.

**TABLE 6.4 - APPLICABLE ADJUSTMENTS AND ASSESSABLE L_{A10} NOISE LEVELS, dB(A)
MUSIC**

Location	Calculated Noise Level dB(A)	Applicable Adjustments to Measured Noise Levels, dB(A)		Assessable Noise Level, dB(A)
		Where Noise Emission is music		
		Where impulsiveness is not present	Where impulsiveness is present	
West	24	+10	-	34
North West	24	+10	-	34
North	24	+10	-	34
North East	23	+10	-	33
East	18	+10	-	28

TABLE 6.5 – ASSESSMENT – MUSIC

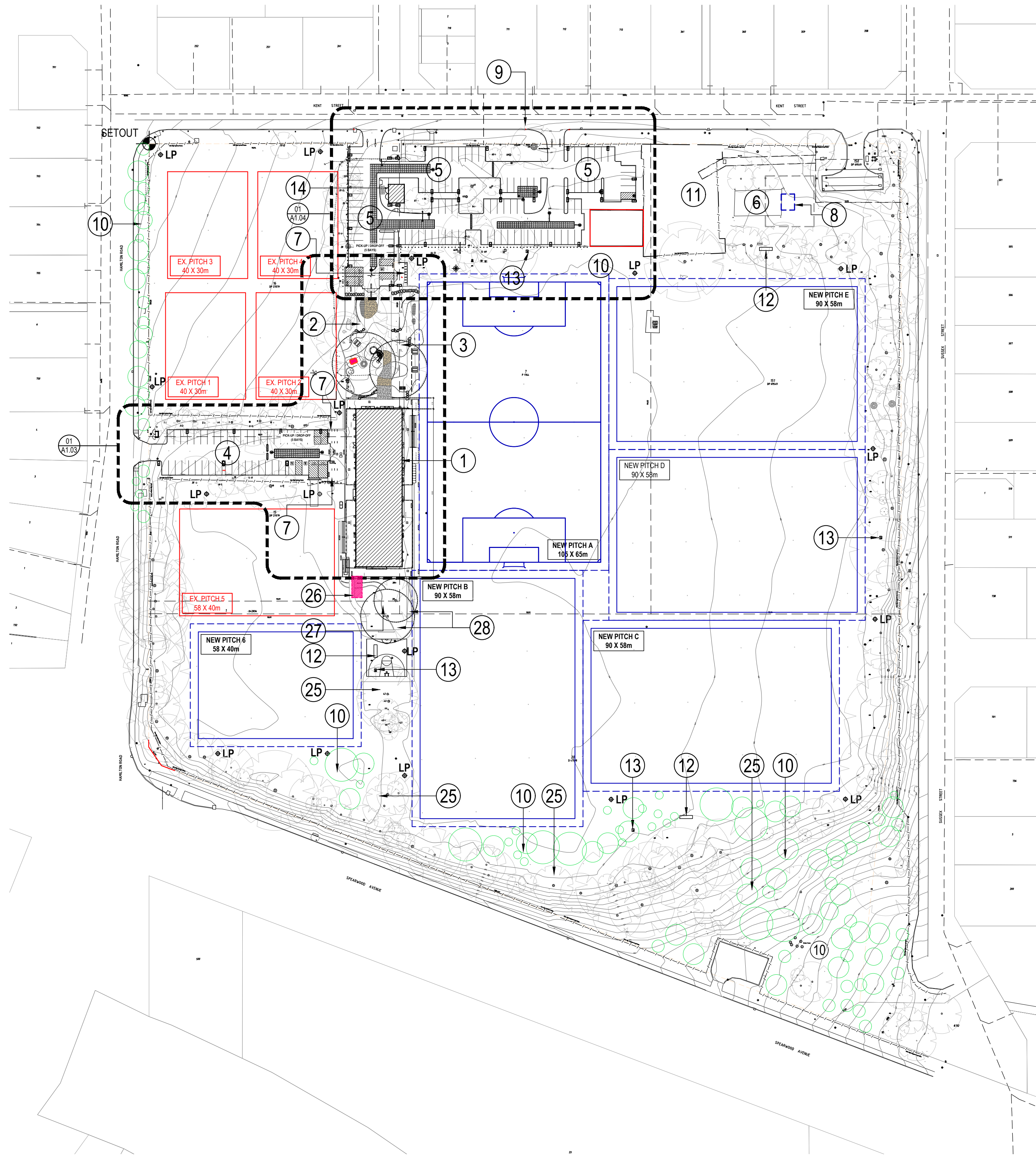
Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable L _{A10} Assigned Level (dB)	Exceedance to Assigned Noise Level (dB)
West	34	Day	49	Complies
		Sundays	44	Complies
		Evening	44	Complies
		Night	39	Complies
North West	34	Day	49	Complies
		Sundays	44	Complies
		Evening	44	Complies
		Night	39	Complies
North	34	Day	47	Complies
		Sundays	42	Complies
		Evening	42	Complies
		Night	37	Complies
North East	33	Day	49	Complies
		Sundays	44	Complies
		Evening	44	Complies
		Night	39	Complies
East	29	Day	49	Complies
		Sundays	44	Complies
		Evening	44	Complies
		Night	39	Complies

As can be seen from the above tables, noise levels associated with the external area proposed in the redevelopment complies with the applicable assigned noise levels during the night period. However, to ensure compliance, the following are recommended :

- that a review of the mechanical services design be undertaken when the design is complete.
- the glazing to the Function / Clubroom is to be a minimum of 10.38mm laminated glass. Additionally, the access doors to the club / function area are to be closed when music is being played and access should be via the lobby.

APPENDIX A

Development Plans



MASTER SITE PLAN
SCALE 1 : 1000

SK1.01
REV P

BEALE PARK REDEVELOPMENT
PROPOSED MASTER SITE PLAN

OCT. 2024 SCALE : AS SHOWN @ A1 JOB NO. BDG 2054_2

NOTES

- PROPOSED NEW CLUBHOUSE.
 - 2 HOME & AWAY UNISEX CHANGEROOMS.
 - REFEREES / OFFICIALS ROOM.
 - FUNCTION & CLUB ROOM.
 - EXTERNAL & INTERNAL STORAGE AREA.
 - PUBLIC TOILETS (INCLUDING AMBULANT TOILETS).
 - OFFICE & MEETINGS ROOM.
 - FIRST AID ROOM.
 - BAR & KIOSK.
 - NATURE / MOVEMENT / LOCAL HISTORY THEMED PUBLIC ARTWORK INCORPORATED INTO PROPOSED NEW CLUBHOUSE.
- PROPOSED AMENITY AREA - INFORMAL SEATING & SHADE STRUCTURES WITH BBQs.
- RETAIN 10 TREES NO. 32, 33, 34, 35, 49, 50, 51, 52 & 53. OUT OF THE TEN, 6 TREES (34,49,50,51,52 & 53) SUITABLE FOR ROOSTING. 2 HIGH VALUE TREES (31, 35) AND 2 LOW VALUE TREES (32,33) BASED ON THE TREE SURVEY REPORT.
- PROPOSED HAMILTON ROAD CARPARK UPGRADE.
 - 40 VISITOR CARBAYS.
 - 2 UNIVERSAL ACCESSIBLE BAYS.
 - 1 AMBULANCE BAY.
 - 1 LOADING BAY.
 - UPGRADE OF CONCRETE KERBING & CARPARK SURFACE TO BE CARRIED OUT WITH ARBORIST ADVICE.
- PROPOSED KENT ST. CARPARK UPGRADE & EXTENSION.
 - PROPOSED CAR PARK LAYOUT TO BE REVIEWED BY ARBORIST IN RELATION TO EXISTING TREE TPZs.
 - 93 VISITOR BAYS.
 - 2 UNIVERSAL ACCESSIBLE BAYS.
 - 1 AMBULANCE BAY.
 - 1 LOADING BAY.
 - UPGRADE OF CONCRETE KERBING & CARPARK SURFACE TO BE CARRIED OUT WITH ARBORIST ADVICE.
- EXISTING PLAYGROUND TO REMAIN.
- PROPOSED BIKE RACKS.
- OUTDOOR EXERCISE STATION & LANDSCAPING.
- EXISTING NORFOLK PINE TREE TO REMAIN AS ENTRY STATEMENT TO UPGRADED CARPARK.
- PROPOSED PLANTING OF SUPPLEMENTARY ENDEMIC SPECIES SHOWN IN GREEN (APPROXIMATELY 170 TREES IN TOTAL). REFER TO LANDSCAPING SCHEMATIC DESIGN FOR PLANTING SELECTION.
 - ALONG HAMILTON ROAD TO PREVENT UNAUTHORISED VERGE PARKING.
 - TO SOUTH OF END OF BEALE PARK.
- EXISTING DRAINAGE SUMP TO BE RETAINED.
- PROPOSED PARK BENCHES.
- PROPOSED BIN LOCATIONS.
- PROPOSED BIN ENCLOSURE.
 - FACE BRICK BIN ENCLOSURE WITH SEALED CONCRETE ON-GROUND FLOOR SLAB & STEEL FRAMED COLORBOND PROFILED METAL SHEET ROOFING. NO CEILINGS.
 - PAINT FINISHED CEMENT RENDERED INTERNAL WALLS.
 - LOCKABLE STEEL DOUBLE LEAF SWING GATE WITH DROP BOLT MOUNTED INTERNALLY.
 - WEATHERPROOF STEEL LOUVRES WITH STEEL MESH TO INTERNAL SIDE OF LOUVRES.
 - INDUSTRIAL FLOOR WASTE TO THE CITY'S SPECIFICATION & REQUIREMENTS.
 - POWDERCOAT FINISHED SECURITY SCREENS WITH ANTI-VANDAL FIXINGS AT HIGH LEVEL FOR VENTILATION.
- INDICATIVE ON-SITE & UNDERGROUND STORMWATER DRAINAGE CELLS. REFER TO CIVIL DRAWINGS FOR FURTHER INFORMATION.
- SURFACE TREATMENT & / LANDSCAPING OF CAR PARK TRAFFIC ISLANDS PENDING ARBORIST ADVICE.
- BIN LAY DOWN AREA.
- LOCAL AUTHORITY WASTE TRUCK (HINO 816) INDICATIVE SWEEP PATH.
- EXISTING BRICK FENCE TO BE DEMOLISH
- EXISTING CYCLONE FENCING TO ASSESSED FOR SOUNDNESS & TO BE RETAINED WHERE POSSIBLE.
- NEW CYCLONE FENCING.
- PROPOSED NEW ACCESSIBLE RAMP TO COMPLY WITH AS1428.1
- NEW LOW TIMBER LOG BOLLARD TO LOCAL AUTHORITY REQUIREMENTS.
- NEW LOW BOLLARD TO MATCH EXISTING AT CAR PARK.
- INFORMAL HABITAT TRAIL MAKING USE OF EXISTING TREES. PUBLIC ART & INTERPRETIVE OPPORTUNITIES AT SELECTED LOCATIONS.
- REMOVE EXISTING CONTAINER TO CITY'S DIRECTION
- NATIVE GARDEN BED OF SMALL SHRUBS & GROUND COVER.
- AT SOUTH END OF BUILDING, RETAIN 2 TREES (39 & 41 - SUITABLE FOR ROOSTING) & REMOVE 3 TREES (36,37,38 - LOW VALUE)
- EXISTING CVES BUILDING PARTIALLY DEMOLISHED TO STRUCTURAL RECOMMENDATION TO RETAIN ONLY GARAGE PART AS STORAGE. EXISTING REDUNDANT SERVICES CONNECTIONS TO BE DECOMMISSIONED & TERMINATED TO SERVICES CONSULTANT'S REQUIREMENTS.

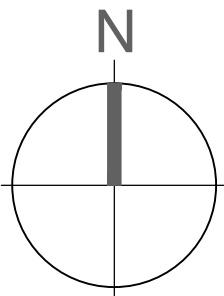
NOTE - CONTRACT TO CHECK & VERIFY ALL DIMENSIONS, LEVELS, & ANGLES ON SITE BEFORE COMMENCING. ALL CONSTRUCTION WORK TO BE IN ACCORDANCE WITH THE NATIONAL CONSTRUCTION CODE OF AUSTRALIA, APPROVED DOCUMENTS & RELEVANT AUSTRALIAN STANDARDS

GENERAL NOTES

- ALL SERVICES, LANDSCAPING & STRUCTURAL INFORMATION SHOWN ON ARCHITECTURAL DRAWINGS ARE INDICATIVE ONLY. REFER TO CONSULTANT DRAWINGS FOR SERVICES & STRUCTURAL REQUIREMENTS.
- EXISTING SITE SERVICES MAINS & ROUTES ARE CURRENTLY SHOWN WITHOUT MODIFICATIONS FOR THE PURPOSES OF DEVELOPMENT APPROVAL. SERVICES MODIFICATIONS TO BE CONFIRMED IN THE BUILDING PERMIT APPLICATION.
- PROPOSED CAR PARK UPGRADES & EXTENSIONS. INDICATIVE CAR PARK LIGHTING POLE & SPORTS LIGHTING POLE LOCATIONS ARE TO BE REVIEWED WITH FORTHCOMING ARBORIST ADVICE.
- PROPOSED INDICATIVE CAR PARK LEVELS ARE TO BE REVIEWED WITH FORTHCOMING ARBORIST ADVICE.

LEGEND

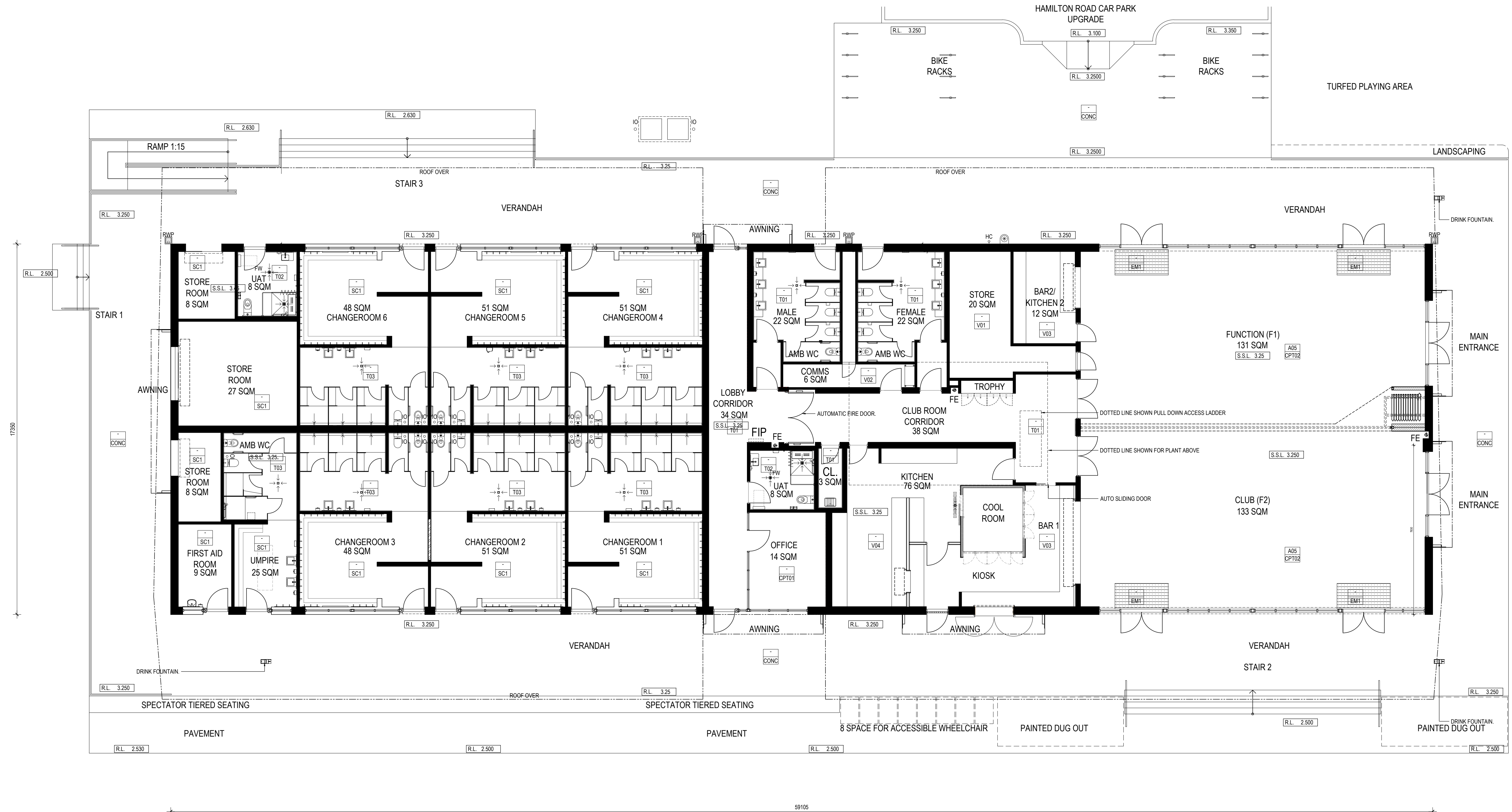
- INDICATIVE SOCCER PITCH FLOODLIGHT POLES - 100 LUX TO SERVICE ALL PITCHES. LOCATIONS TO BE REVIEWED WITH ARBORIST IN RELATION TO EXISTING TREE TPZs.
- INDICATIVE CAR PARK LIGHTING POLE. LOCATIONS TO BE REVIEWED WITH ARBORIST IN RELATION TO EXISTING TREE TPZs.
- INDICATIVE SEWER GRATE. REFER TO CIVIL DRAWINGS FOR STORMWATER DRAINAGE, STORAGE & DISPOSAL.
- INDICATIVE SEWER MANHOLE. REFER TO CIVIL DRAWINGS FOR STORMWATER DRAINAGE, STORAGE & DISPOSAL.
- SPEED HUMP TYPE 1 IN COMPLIANCE WITH AS 2890.1.



bdg
Bollig Design Group

Architecture
Urban Design
Master Planning
Interior Design
T: 61 8 9321 4402
Level 1, 1260 Hay Street, West Perth 6005
PO Box 1224, West Perth 6872
E: bdg@bollig.com.au W: bollig.com.au

PRELIMINARY

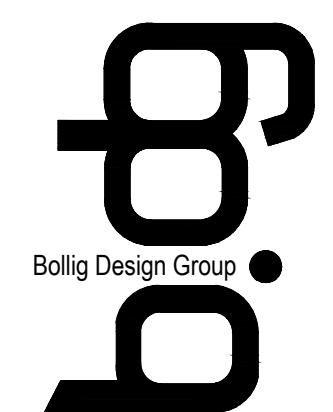


GROUND FLOOR PLAN
SCALE 1 : 100

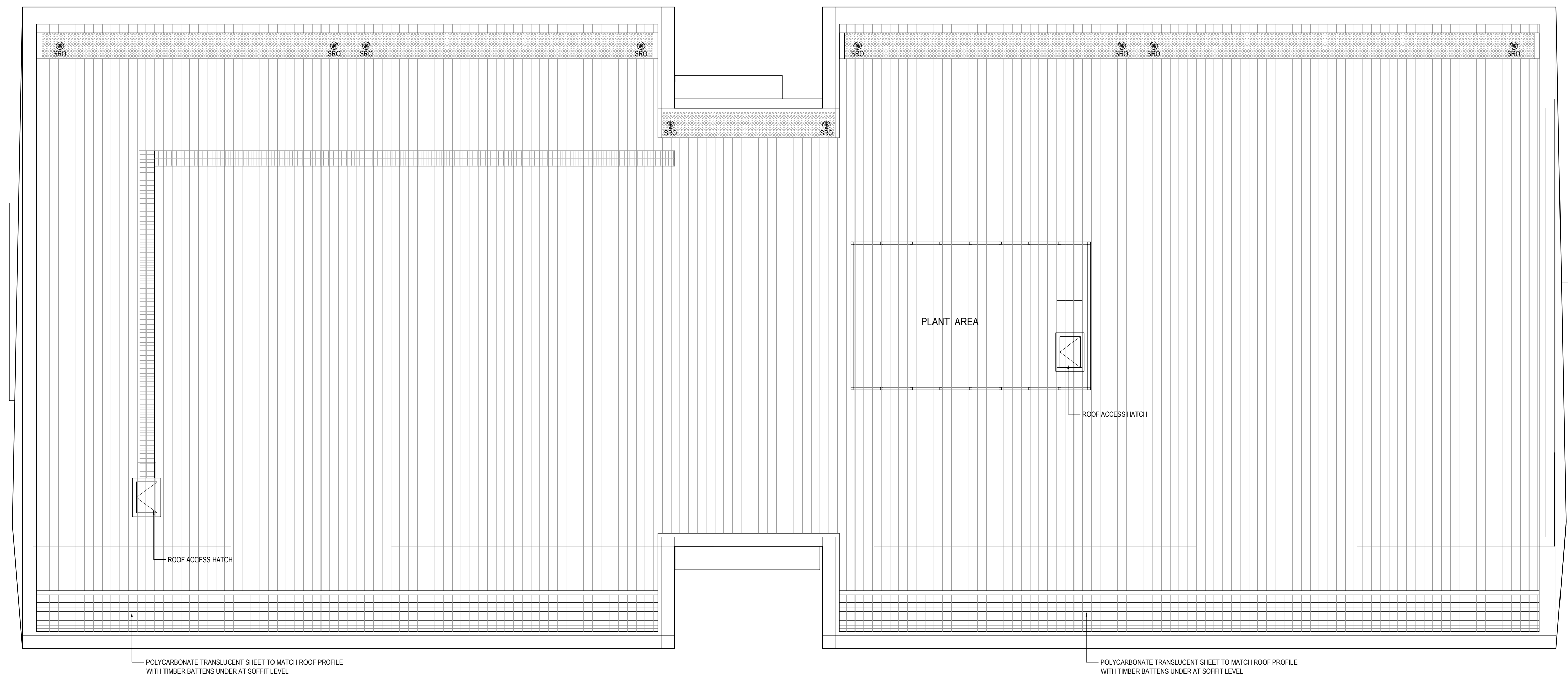
SK2.01
REV D

BEALE PARK REDEVELOPMENT
PROPOSED CLUB ROOM FACILITY FLOOR PLAN
OCT. 2024 SCALE : AS SHOWN @ A1 JOB NO. BDG 2054_2

PRELIMINARY



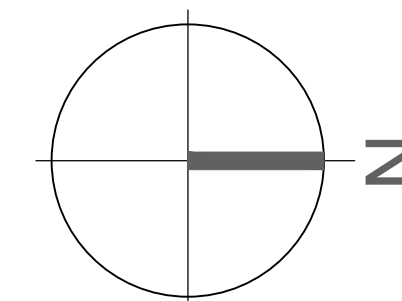
Architecture
Urban Design
Master Planning
Interior Design
T. 61 8 9321 4402
Level 1, 1260 Hay Street, West Perth 6005
PO Box 1224, West Perth 6872
E. bbg@bollig.com.au W. bollig.com.au



ROOF FLOOR PLAN
SCALE 1 : 100

SK0.R1
REV A

BEALE PARK REDEVELOPMENT
PROPOSED CLUB ROOM FACILITY ROOF PLAN
OCT. 2024 SCALE : AS SHOWN @ A1 JOB NO. BDG 2054_2



PRELIMINARY



Architecture
Urban Design
Master Planning
Interior Design
T. 61 8 9321 4402
Level 1, 1260 Hay Street, West Perth 6005
PO Box 1224, West Perth 6872
E. bdg@bollig.com.au W. bollig.com.au

APPENDIX U

Beale Park Redevelopment

Sustainability Services

NCC 2019 Section J – JV3 Performance Solution



14/11/2024

Ref: 301250819

PREPARED FOR:

City of Cockburn

PREPARED BY:

Fong H Yong

Revision Schedule

Revision	Date	Comment	Prepared By	Approved By
P01	14/11/2024	Design Development Issue	FY	AL

Qualifications to this Report

The following qualifications apply to this report:

- Information has been based on our understanding of the proposed building and documentation provided, as noted.
- This report outlines the scope of works required for NCC Section J compliance only.
- The project design team (including the Architect) will be required to review and consider the implications of these recommendations on their design for the project.
- For example:
 - Glazing selections have considered the thermal rating to the glazing and frame configurations only. The design team should also coordinate these recommendations with any specific acoustic, wind, structural, safety (during design and installation) or Architectural Design requirements for a particular project.
 - Different insulation products will have varying spatial allowances. The design team should coordinate the proposed insulation types, with specified R-values required throughout this report.
- As this project involves no detailed design or site supervision by Stantec, we advise that we will not prepare a Safety in Design report for this project. As detailed in our scope of work we will review the Safety in Design report prepared by the project designer and make comment as appropriate. We confirm that the responsibility for complying with the requirements of the state OS&H legislation remains with the project designer in conjunction with the project team and the client. We note that the OS&H legislation places particular obligations on the developers and owners of property with respect to the management of OS&H issues arising from the construction, use, maintenance and demolition of plant and buildings.

Disclaimer

This energy model provides an estimate of the base building's energy performance. This estimate is based on a necessarily simplified and idealised version of the building that does not and cannot fully represent all of the intricacies of the building and its operation. As a result, the energy model results only represent an interpretation of the potential performance of the building. No guarantee or warrantee of building performance in practice can be based on energy modelling results alone.

The results generated from this analysis are based on specific criteria outlined in the NCC Volume One and are not considered to be a true representation of the actual operation of the building. The intent of these criteria is to permit the comparison of the estimated annual energy consumption of a Proposed Building against that of a Reference Building and therefore determine if a specific building has the ability to be energy efficient.

The thermal properties described in the following report are to meet the minimum energy efficiency requirements stated by the NCC provisions only. It does not directly account for any requirements for the following aspects:

- Thermal Comfort – Thermal Comfort requirements of Section J are inherently met under the Deemed to Satisfy verification method. This does not however assure thermally comfortable conditions in reality. Mechanical engineer to confirm any specific requirements for Air-Conditioning Systems
- Vapour Barriers and Condensation – Architect to ensure appropriate details for waterproofing and condensation risk management.

- Impact and Structural – Structural engineer to confirm requirements.
- Acoustic requirements – Acoustic engineer to confirm requirements.
- Fire Requirements - Fire Engineer or Building Surveyor to confirm requirements.

File Records

All modelling completed on the basis of the following documents:

Drawing #	Drawing Name	Revision
2054_SK2.01-100	GRD FLR PLAN	D
2054_SK3.01-100	ELEVATION	D
2054_SK0.R1	ROOF LAYOUT	A

The following inputs and outputs are the basis of assessment for this report:

Record	Reference	Proposed
IES Thermal Model:	301250819_Beale Park_REF_VE19_R0	301250819_Beale Park_PRO1_VE19_R0 301250819_Beale Park_PRO2_VE19_R0
Apache Vista File:	301250819_Beale Park_REF_VE19_R0.aps	301250819_Beale Park_PRO1_VE19_R0.aps 301250819_Beale Park_PRO2_VE19_R0.aps
Energy Analysis Results	301250080_BEALE PARK VE19_NCC 2019_002.xlsm	
Reference Glazing Calculators	301250819_Calculator-facade-Volume-One-2019_R02.xlsm	

Contents

1. Executive Summary	1
1.1 Findings 1	
1.2 Conditions and Requirements	1
1.3 Building Fabric	2
2 Introduction	5
2.1 Section J Objective	5
2.2 Site Context	5
2.3 Development Overview	6
2.4 Building Function and BCA Classification	7
3 Assessment Methodology	8
3.1 Modelling Assumptions	8
4 Modelling Results	12
4.1 Greenhouse Gas Emissions	12
4.2 Conclusion	14
Appendix A Insulation Mark-ups	
Appendix B Construction Details	
Appendix C Occupancy and Operational Profiles	
Appendix D JV3 Verification Using a Reference Building	
Appendix E Section J JV3 Modelling Parameters	
Appendix F Part J1 – Building Fabric	
Appendix G Part J3 – Building Sealing	
Appendix H Performance Based Design Brief	

1. Executive Summary

This report has been prepared at the instruction of City of Cockburn for the Beale Park redevelopment located at 9 Kent Street, Spearwood WA.

The purpose of this investigation is to review the development against the NCC (2019) Section J Requirements utilising the following methodology:

- Part J1 – JV3 Performance Engineered Approach
- Part J3 – Deemed-to-Satisfy Prescriptive requirements

1.1 Findings

Subject to the conditions and requirements noted in this report, the proposed development is considered to be compliant with the NCC Volume One Section J1 and J3 requirements.

It is noted that any variation to the conditions and requirements may impact the performance outcomes and impact the level of compliance.

Table 1 Energy consumption summary and comparison.

Model	Annual GHG Production (kgCO ₂ e)	Comparison	Compliance Achieved
Reference Building	38,044	-	-
Proposed Building – Option 1: Single Glazed (without Solar PV)	38,356	100.82%	Non-Compliant
Proposed Building – Option 1: Single Glazed (with Min. 4kW Solar PV)	33,313	87.57%	Compliant
Proposed Building – Option 2: Double Glazed (without Solar PV)	37,994	99.87%	Compliant

1.2 Conditions and Requirements

1.2.1 Performance Requirements - Façade

The Façade shall comply with the performance requirements outlined within this report;

- Location of insulation and the building fabric thermal performance requirements
- Glazing thermal performance requirements

The thermal performance of all construction materials associated with this specification has been summarised in Section 1.3.1.

Reference is made to Appendix A for mark-up indicating extent of any insulation included within the construction specifications.



1.2.2 Prescriptive Requirements

In addition to the performance related compliance requirements outlined above, there are further prescriptive Section J elements which must be complied with. These are outlined below and shall be complied with during the delivery phase of the project.

- Appendix F - Part J1 – Building Fabric
- Appendix G - Part J3 – Building Sealing

1.3 Building Fabric

1.3.1 Construction Thermal Performance

Overall thermal performance of the building fabric is shown below. Refer to Appendix A for the locations of insulation.

Table 2 Building fabric thermal performance requirements.

Roof Type	Cavity Type	Total R-value (m ² K/W)	Frame Material Allowance	Frame Percentage Allowance (%)	Thermal Break Included	Thermal Break R-value (m ² K/W)	Minimum Typical Insulation (m ² K/W)	Example insulation requirement
Metal deck with ceiling	Airspace (Unventilated / Reflective)	4.64	Steel	8%	-	R0.38*	R1.3 & R2.5	60mm Foiled Faced Glasswool Blanket & 140mm Glasswool Batts

* Thermal break from the compression of glasswool blanket between metal deck and roof rafter.

External Wall Type	Cavity Type	Total R-value (m ² K/W)	Frame Material Allowance	Frame Percentage Allowance (%)	Thermal Break Included	Thermal Break R-value (m ² K/W)	Minimum Typical Insulation (m ² K/W)	Example insulation requirement
Cavity Block Wall	Airspace (Ventilated/ Reflective)	1.59	-	-	No	N/A	R0.2	6mm Bubblewrap with Foiled Face

Internal Wall Type	Cavity Type	Total R-value (m ² K/W)	Frame Material Allowance	Frame Percentage Allowance (%)	Thermal Break Included	Thermal Break R-value (m ² K/W)	Minimum Typical Insulation (m ² K/W)	Example insulation requirement
Block Walls	None	0.58	-	-	No	N/A	-	None



Floor Type	In-slab / Screed system	Total Floor R-Value (m ² K/W)	Typical Insulation R-value (m ² K/W)	Example insulation requirement
Slab on Ground	No in-slab heating or cooling	2.56	Nil additional insulation required*	N/A

* Note: No additional insulation is required to be applied to the floor as the soil in contact with the slab have an effective R value greater than R2.0 as shown in **Appendix B**.

When selecting insulation types, the fire properties of the product shall comply with the NCC Deemed-to-Satisfy Provisions for fire hazard properties and a non-combustible material, as required and as nominated by the Building Surveyor.

Building Fabric Notes:

1. Internal walls refers to walls separating conditioned and non-conditioned internal zones.
2. The Total R-value shall be calculated, including allowance for thermal bridging, in accordance with:
 - AS/NZS 4859.2 for a roof or floor;
 - AS/NZS 4859.2 for wall components or Specification J1.5b (NCC 2019 Volume One) for spandrel panels.
3. The Total R-value calculation must consider individual component layers in a composite element including any building material, insulating material, airspace and associated surface resistances.

Table 3 Minimum Total System External Glazing Thermal Performance Requirements.

Window Type	Location	U-value (W/m ² K)	SHGC
Option 1: Single Glazed Low E Neutral in an Aluminium Frame	All conditioned spaces	4.62	0.50
Option 2: Double Glazed Low E Neutral in an Aluminum Frame	All conditioned spaces	3.47	0.43

Glazing Notes:

1. Performance values states are whole-of-system, inclusive of framing and glass, and in accordance with Australian Fenestration Rating Council (AFRC) requirements.
2. Area-weighted average glazing performance must achieve the above values, allowing variation in window types and performance.



1.4 Option 1: Solar PV

1.4.1 Solar PV Performance

If Solar PV is to be implemented for the building, then compliance can be achieved with the single glazing. For glazing specification refer to Option 1 in section 1.3.1 'Construction Thermal Performance'.

Section J Clause JV3 (b) states that "*the annual greenhouse gas emissions of the proposed building may be offset by renewable energy generated and used on site*". In order to achieve compliance, a total of 37,855 kgCO₂ of related renewable energy emissions offset must be generated and used on site.

Generic solar photovoltaic design parameters have been used to simulate an indicative Solar PV array for the site. Renewable energy generation and building electricity demand profiles have been matched on an hourly basis. Energy generated and used has been offset in the proposed building.

Indicatively, the following Solar PV design parameters are required:

Table 4 Solar PV system requirements.

Input – Solar PV System	
PV Array Size	4 kWdc
Inverter Size	4 kWac
DC to AC Ratio	1.00
Inverter Efficiency (%)	98%
Solar PV System Derating Factor	0.87
Orientation	North
Tilt Angle – Fixed (°)	5°
Annual Solar PV Generation	6,799 kWh
Annual Solar PV Generation Consumed On-Site	6,767 kWh

Electrical Engineer/Solar PV Installer to confirm that generation profiles and quantities of final design are sufficient to achieve required offset amount.



2 Introduction

2.1 Section J Objective

It is understood that the objective is as follows:

- Confirm compliance with the Parts J1 to J2 of Section J of the NCC Volume One (2019) utilizing the “JV3 – Verification using a Reference Building” method for all non-Class 2 areas.
- Confirm compliance with the Parts J3 Section J of the NCC Volume One (2019)

It is noted that all modelling has been carried out in accordance with NCC Volume One Specification JV. Refer to Appendix E for Verification Using a Reference Building protocol.

This report should be read in conjunction with all relevant plans and specifications and any supplementary regulatory information.

2.2 Site Context

The performance solution applies to the development area in Figure 1.

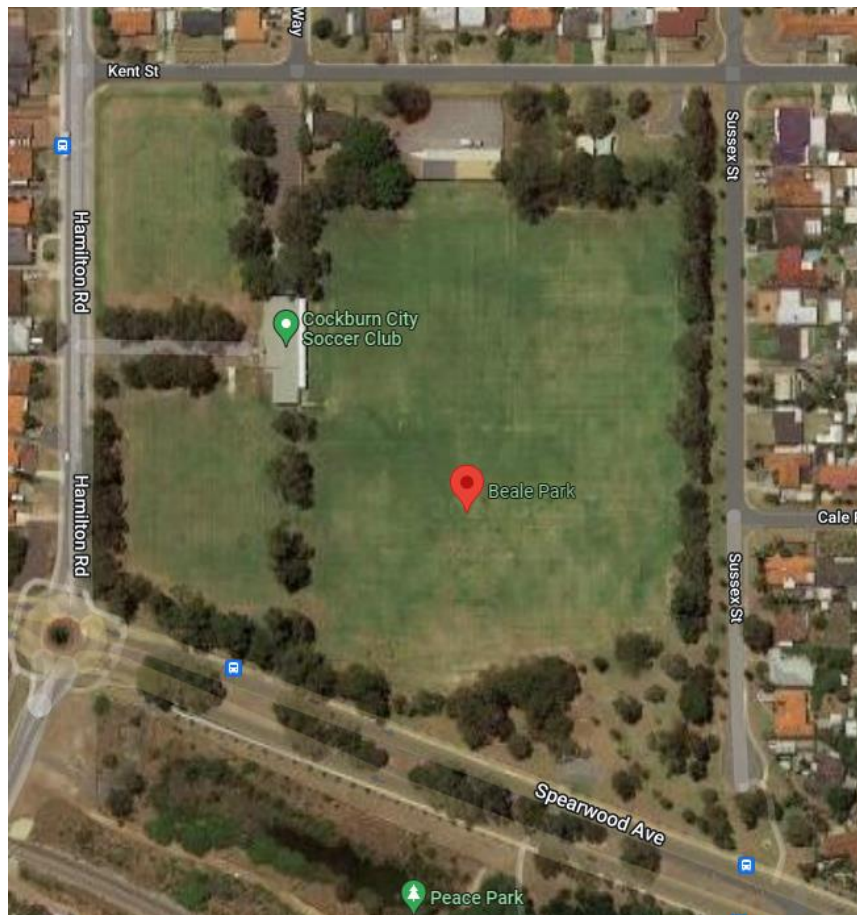


Figure 1 Applicable location of the JV3 solution.

2.3 Development Overview

Property Title	Beale Park Redevelopment
Address	9 Kent Street, Spearwood WA 6163
Number of stories	1
Building Description	Class 9b – Public Hall
NCC Volume	2019
NCC Volume One Climate Zone	5
Name and Version of the Software used in the Analysis	IES Virtual Environment, v2019

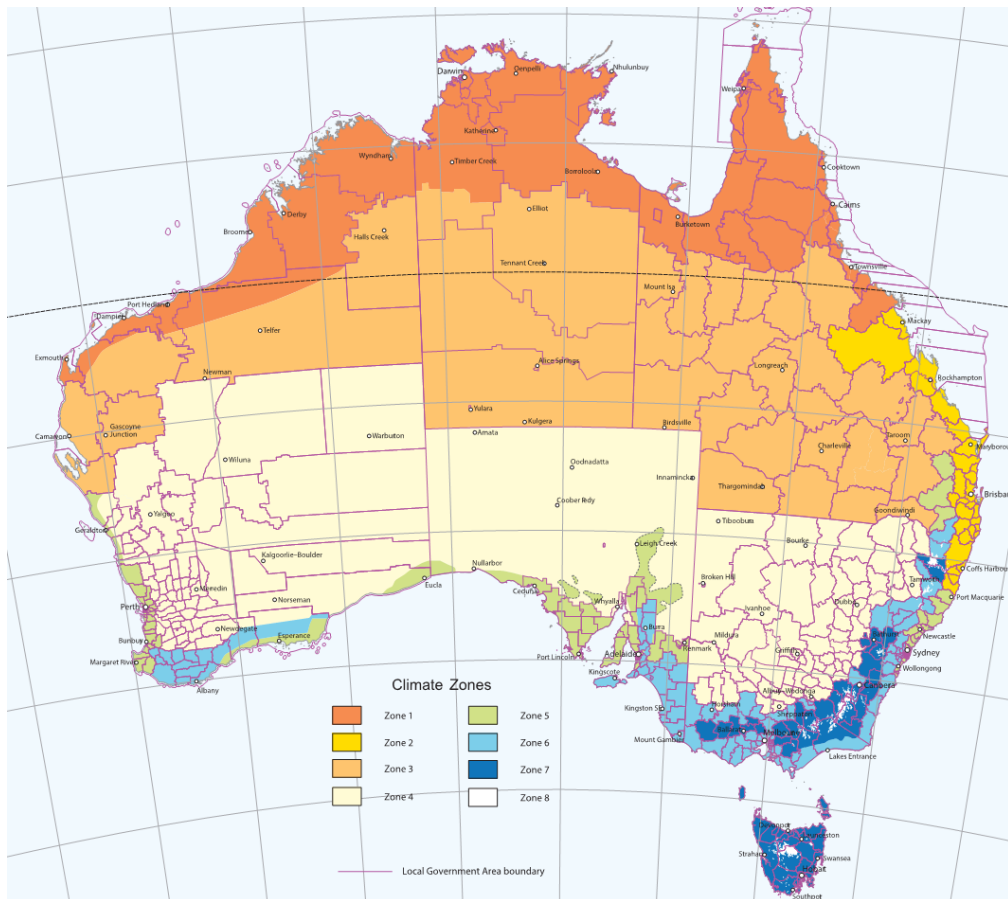


Figure 2: BCA Climate Map (abcb.gov.au)

2.4 Building Function and BCA Classification

The following Building Classifications (As defined by BCA) have been identified for this development:

Table 3: BCA Building Function and BCA Classification

BCA Class	Included/Excluded
1a	
1b	
2	
3	
4	
5	
6 (Café/Restaurant)	
6 (Shop)	
7a	
7b	
8	
8 (Laboratory)	
9a	
9a (Ward)	
9b	✓
9b (School)	
9c	
10	

3 Assessment Methodology

3.1 Modelling Assumptions

Compliance is verified when it is determined that the estimated annual energy consumption of the Proposed Building with its services is not more than the estimated annual energy consumption of a (deemed-to-satisfy compliant) Reference Building when:

- i. The Proposed Building is modelled with the proposed services; and
- ii. The Proposed Building is modelled with the same services as the Reference Building.

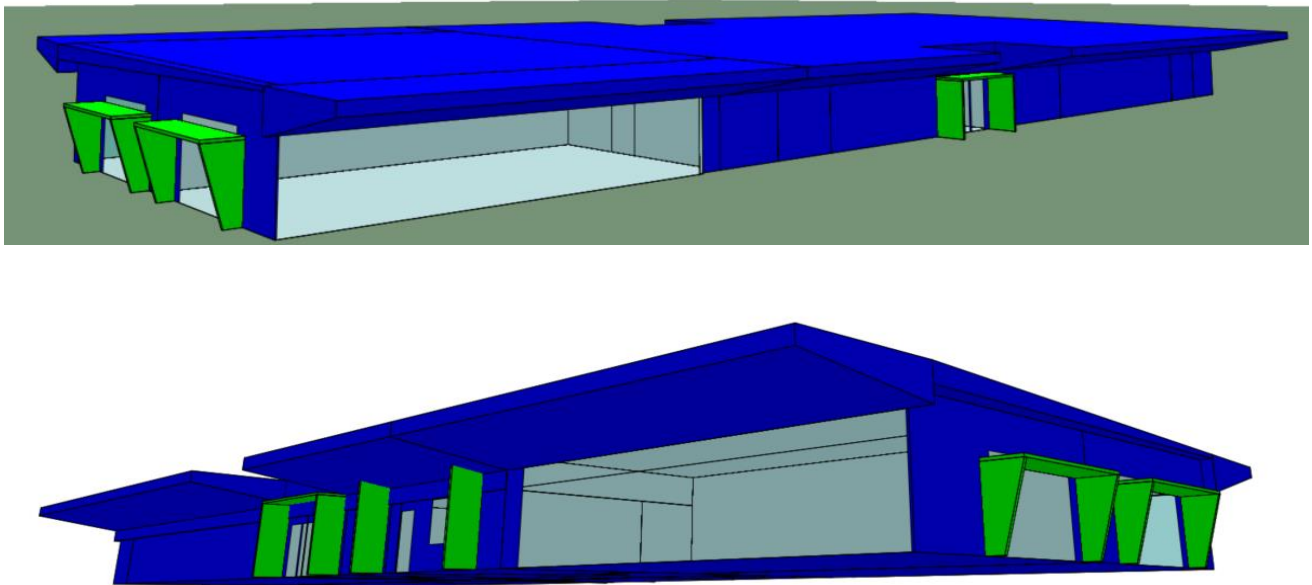


Figure 3 Images of the JV3 model.

3.1.1 Internal Loads

The internal loads for both the Proposed and Reference Buildings are as per the design requirements stipulated in the NCC Volume One Section J.

Profiles

Occupancy, lighting, equipment and HVAC plant throughout the site were estimated to operate in accordance with the NCC Volume One JV Specifications.

Refer to Appendix D - Occupancy and Operational Profiles for complete summary of modelling inputs.

Lighting Levels

The lighting load allowances incorporated into the energy model as per allowances within NCC Volume One Section J6.

Zone	Lighting Load (W/m ²)
Class 9b Theatre and public hall_NCC19	8
Class 6 Restaurant_Dining room or Café_NCC19	14

General_Toilets Uncond_NCC19	3
General_BOH Unconditioned_NCC19	1.5
Class 6 Restaurant_Kitchen_NCC19	4
Class 5_Office_NCC19	4.5

Occupant Density & Heat Gains

The occupant densities applied to the model are accordance with the requirements stipulated in the NCC Volume One Section D, Part D1, Table D1.13.

Description	Sensible Heat (W/person)	Latent Heat (W/person)
JV3 Allowance	75	55
Dining	80	80
Zone	Occupant Density (m ² per person)	
Class 9b Theatre and public hall_NCC19	1	
Class 6 Restaurant_Dining room or Café_NCC19	1	
General_Toilets Uncond_NCC19	0	
General_BOH Unconditioned_NCC19	0	
Class 6 Restaurant_Kitchen_NCC19	10	
Class 5_Office_NCC19	10	

Appliances and Equipment

The allowances for sensible and latent heat gain from equipment to all heating and cooling zones throughout the site as per the requirements stipulated in NCC Volume One Section J, Specification JV, Table 2h.

Zone	Sensible (W/m ²)	Latent (W/m ²)
Class 9b Theatre and public hall_NCC19	0	0
Class 6 Restaurant_Dining room or Café_NCC19	5	0
General_Toilets Uncond_NCC19	0	0
General_BOH Unconditioned_NCC19	0	0
Class 6 Restaurant_Kitchen_NCC19	5	0
Class 5_Office_NCC19	11	0



3.1.2 Reference Building with Reference Services

Construction Thermal Performance

Building fabric constructions are in accordance with the Deemed-to-Satisfy requirements in NCC Volume One Section J1.

Glazing Thermal Performance

The glazed areas used for the Reference Building were calculated using the NCC Volume One Section J2 Glazing Calculator (Method 2).

Building Services

Simplified Package systems have been modelled that reflect the general type and configuration of the proposed systems.

Heating and Air Conditioning

The following attributes for the HVAC system has been used to provide results:

Cooling Fuel: Grid Electricity

Heating Fuel: Grid Electricity

System Type	COP
Air Cooled <10kW	3.22
Air Cooled 10-39kW	3.1
Air Cooled >39kW	2.9

System Name	COP @ Condenser ambient Temp (°C)			
	-5 °C	0 °C	5 °C	15 °C
Air Cooled <10kW	2.40	2.57	2.88	3.68
Air Cooled 10-39kW	2.31	2.48	2.78	3.54
Air Cooled >39kW	2.16	2.32	2.60	3.31

Mechanical Ventilation Rate – Outside Air

Mechanical ventilation has been modelled at the rates of introduction of outside air as per the design requirements stipulated in AS 1668.2.

Infiltration Air Change Rate

Infiltration air change rates have been modelled in accordance with NCC Volume One Section J JV3 (d) (i) (F).

Domestic Hot Water, Lifts, and Escalators

Domestic hot water energy consumption, lifts, and escalators have been excluded from the calculation in accordance with the NCC Volume One Specification JV3 (e).



3.1.3 Proposed Building with Reference Services

Construction Thermal Performance

Refer to Section 1.3 Building Fabric for overall thermal performance of the proposed building fabric. Refer to **Appendix A** for the locations of each insulation type.

Glazing Thermal Performance

The project external glazing shall have the total thermal performance values as outlined below. These are whole of window properties and include the glass and frame combined. An indicative glass and frame type is provided for information only. Final glazing selection must comply with the performance limits set by the whole of window U-value and SHGC.

Table 6 Minimum Total System external glazing thermal performance requirements.

Window Type	Location	U-value	SHGC
Option 1: Single Glazed Low E Neutral in an Aluminum Frame	All conditioned spaces	4.62	0.50
Option 2: Double Glazed Low E Neutral in an Aluminum Frame	All conditioned spaces	3.47	0.43

Building Services

As per Reference Services

Space Temperature Range

Cooling Load Set-point: 24

Heating Load Set-point: 21

Mechanical Ventilation Rate – Outside Air

Mechanical ventilation has been modelled at the rates of introduction of outside air as per the design requirements stipulated in AS 1668.2.



4 Modelling Results

4.1 Greenhouse Gas Emissions

The following annual energy consumption has been taken from the IES Virtual Environment Vista results file for the site.

Table 7 Option 1 - Modelling Results – Building Energy Consumption Results.

Energy Consumption	Greenhouse Gas Emission (kgCO2e/annum)		Greenhouse Gas Demand Improvement on Reference
	REFERENCE PROJECT	PROPOSED PROJECT	
HVAC Greenhouse Gas Emission Total (without PV)	38,044	38,356	-0.82%
HVAC Greenhouse Gas Emission Total (with Min. 4kW PV)	38,044	33,313	12.43%
Heating	6,590	7,124	-8.1%
Cooling	17,578	17,369	1.2%
Distribution Fans	0	0	-
Heat Rejection	1,122	1,109	1.2%
Distribution Pumps	0	0	-
Lighting	11,187	11,187	0.0%
Equipment	1,567	1,567	0.0%
Solar PV	-	-5,042	-

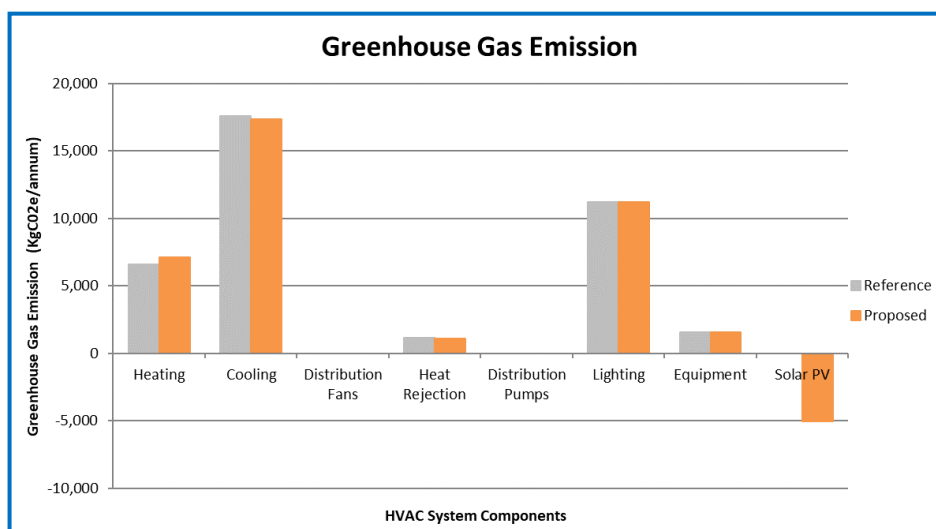


Figure 4: Greenhouse Gas Emissions

Table 7 Option 2 - Modelling Results – Building Energy Consumption Results.

Energy Consumption	Greenhouse Gas Emission (kgCO2e/annum)		Greenhouse Gas Demand Improvement on Reference
	REFERENCE PROJECT	PROPOSED PROJECT	
HVAC Greenhouse Gas Emission Total	38,044	37,994	0.13%
Heating	6,590	7,032	-6.7%
Cooling	17,578	17,116	2.6%
Distribution Fans	0	0	-
Heat Rejection	1,122	1,093	2.6%
Distribution Pumps	0	0	-
Lighting	11,187	11,187	0.0%
Equipment	1,567	1,567	0.0%

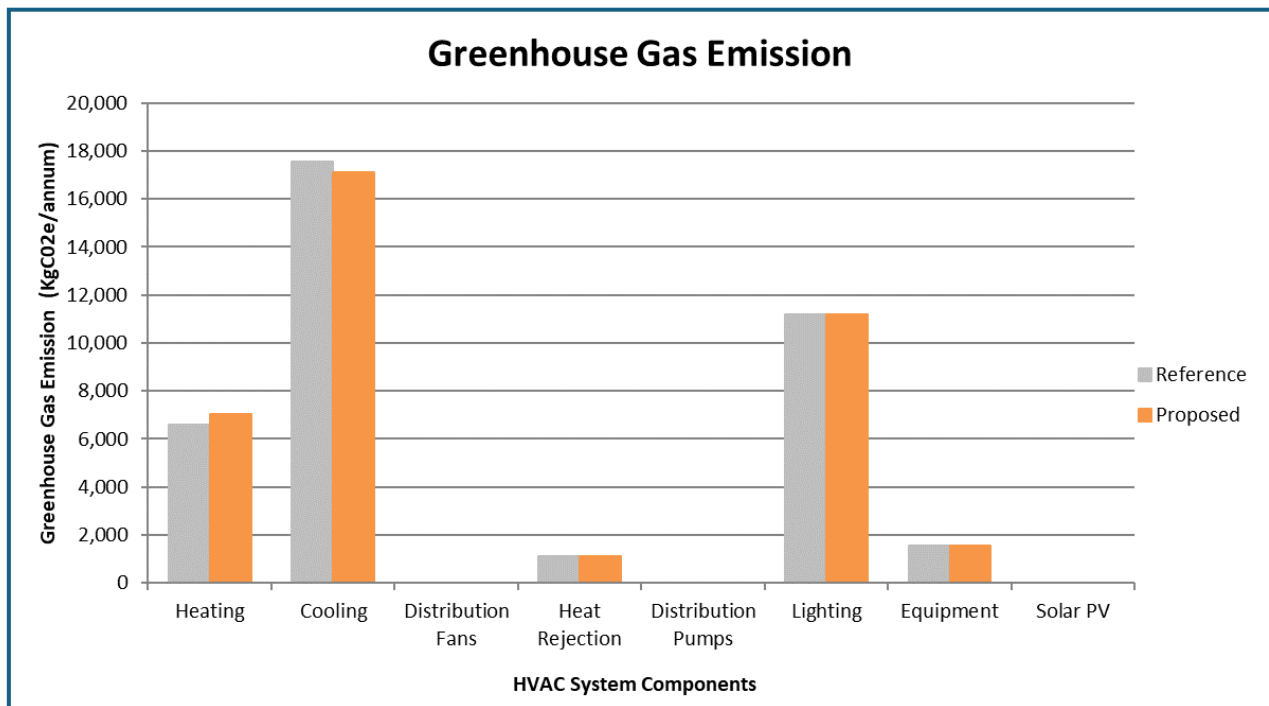


Figure 5: Greenhouse Gas Emissions

4.1.1 Thermal Comfort

In accordance with Specification JV3 (a) (ii) the proposed building must achieve a thermal comfort level of a Predicted Mean Vote between -1 to +1 across not less than 95% of the floor area of all occupied zones for not less than 98% of the annual hours of operation of the building.

In order to verify this requirement, IES Virtual Environment's Vista analysis software module is utilised to assess the results for each of the nominated heating and cooling zones. Only spaces with temperature control aiming human thermal comfort are included in the thermal comfort assessment.

Simulation has been undertaken to identify the percentage of the hours per annum that the spaces thermal comfort levels were outside the specified PMV band during the annual hours of operation (refer to Appendix B - Occupancy and Operational Profiles). The results of this are noted below.

Table 12 Modelling Results – Model Verification Results

Area	PMV range	% of Nominated floor area with a min 98% of hours within PMV range	Compliant
Proposed Project Thermal Comfort	-1 to 1	100	Yes

4.2 Conclusion

The modelling results indicate that the proposed building with the reference services will perform better than the reference (DTS) scenario.

The proposed building with the design specification outlined within this report is compliant with the requirements of the NCC Volume One Section J1 to J2 utilising the "JV3 – Verification using a Reference Building" method.

Sustainability Team Leader, Project Technical Lead / Appropriately Qualified Person



Name: Aida Leon

Date: 14/11/2024



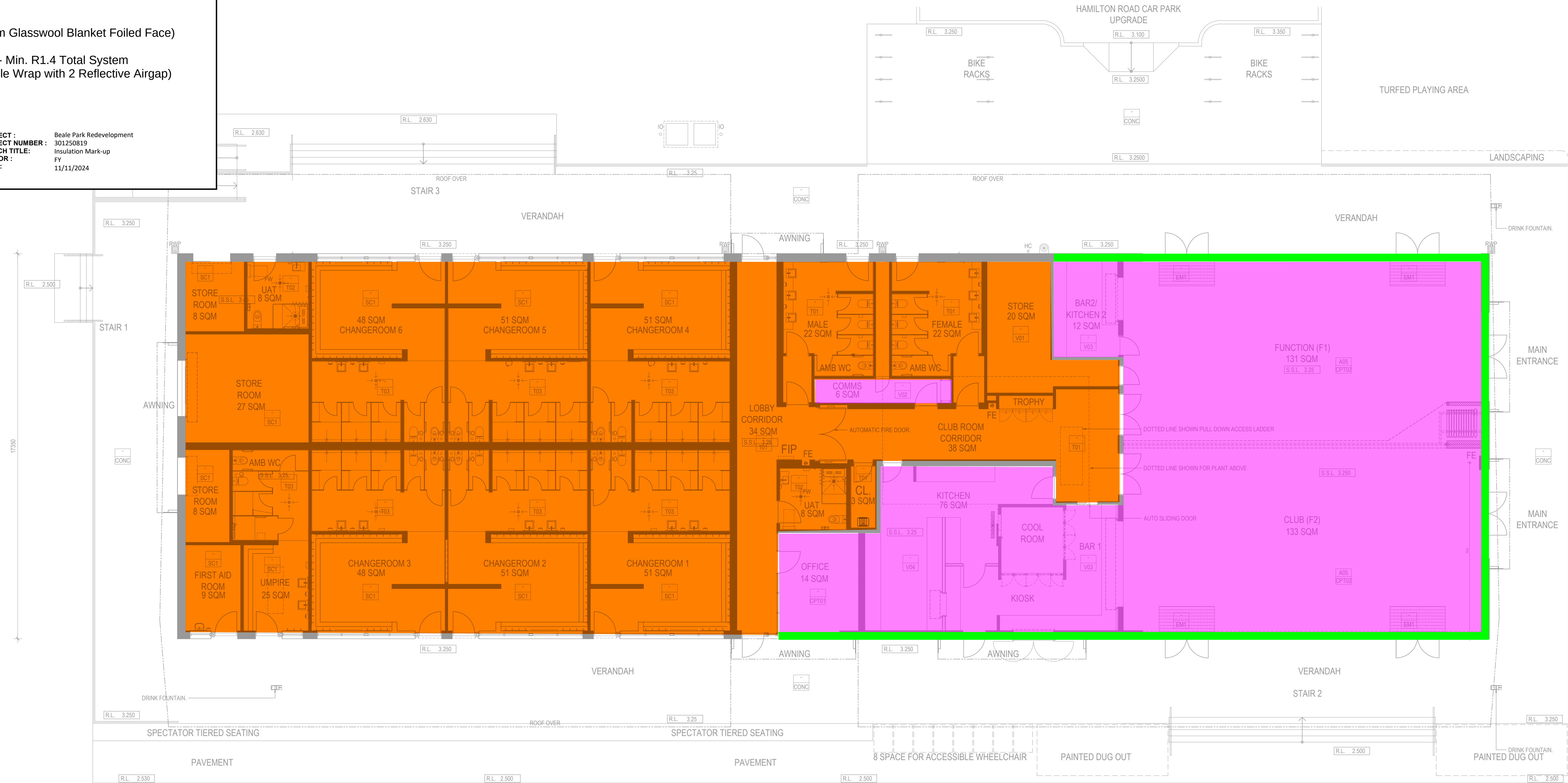
Appendix A Insulation Mark-ups

Legend

- Roof/Ceiling - Min. 3.7 Total System
(E.g R1.3 60mm Glasswool Blanket Foiled Face + R2.5 140mm Glasswool Batts)
- Roof
(E.g R1.3 60mm Glasswool Blanket Foiled Face)
- External Walls - Min. R1.4 Total System
(E.g R0.2 Bubble Wrap with 2 Reflective Airgap)



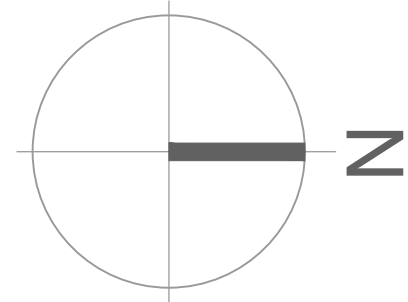
PROJECT : Beale Park Redevelopment
PROJECT NUMBER : 301250819
SKETCH TITLE: Insulation Mark-up
AUTHOR : FY
DATE : 11/11/2024



GROUND FLOOR PLAN
SCALE 1 : 100

SK2.01
REV D

BEALE PARK REDEVELOPMENT
PROPOSED CLUB ROOM FACILITY FLOOR PLAN
OCT. 2024 SCALE : AS SHOWN @ A1 JOB NO. BDG 2054_2



PRELIMINARY



Architecture
Urban Design
Master Planning
Interior Design
T. 61 8 9321 4402
Level 1, 1260 Hay Street, West Perth 6005
PO Box 1224, West Perth 6872
E. bdg@bollig.com.au W. bollig.com.au

Appendix B Construction Details

The Total R-value shall be calculated, including allowance for thermal bridging, in accordance with:

- AS/NZS 4859.2 for a roof or floor;
- AS/NZS 4859.2 for wall components or Specification J1.5b (NCC 2019 Volume One) for spandrel panels.

The Total R-value calculation must consider individual component layers in a composite element including any building material, insulating material, airspace and associated surface resistances.

Description Metal Deck Roof with Ceiling								
Item	Item Description	Construction Thickness (mm)	Installed thickness (mm)	Framing	Frame percentage	Thermal break R-value	Overlap (% of total)	Effective R-Value (m²K/W)
1	Outdoor Air Film (7m/s)	N/A						0.03
2	Metal Deck	1						0.00
3	R1.3 Glasswool Blanket with Foil Faced	60	60	Steel	8%	0.38*	-	2.54
4	Airspace (0.2 reflective/unventilated, flat roof)	20		No				
5	R2.5 Glasswool Batts	140	140	Steel	8%			1.83
6	Plasterboard Gypsum	13						0.08
7	Indoor Air Film (Still Air) - Horizontal	N/A						0.16
Total Thickness			233	Calculated Overall R-Value for Construction				4.64

* Thermal break from the compression of glasswool blanket between metal deck and roof rafter.

Description External Wall Block Cavity Wall								
Item	Item Description	Construction Thickness (mm)	Installed thickness (mm)	Framing	Frame percentage	Thermal break R-value	Overlap (% of total)	Effective R-Value (m²K/W)
1	Outdoor Air Film (7m/s)	N/A						0.03
2	Clay brick – 3.75kg	190						0.11
3	Airspace (reflective/ventilated)	25						1.11
4	R0.2 Bubble Wrap with both surface Foiled Face	5.5	5.5					
5	Airspace (reflective/unventilated)	19.5						
6	Clay brick – 3.75kg	110						0.14
7	Plasterboard Gypsum	13						0.08
8	Indoor Air Film (Still Air) - Vertical	N/A						0.12
Total Thickness			363	Calculated Overall R-Value for Construction				1.59

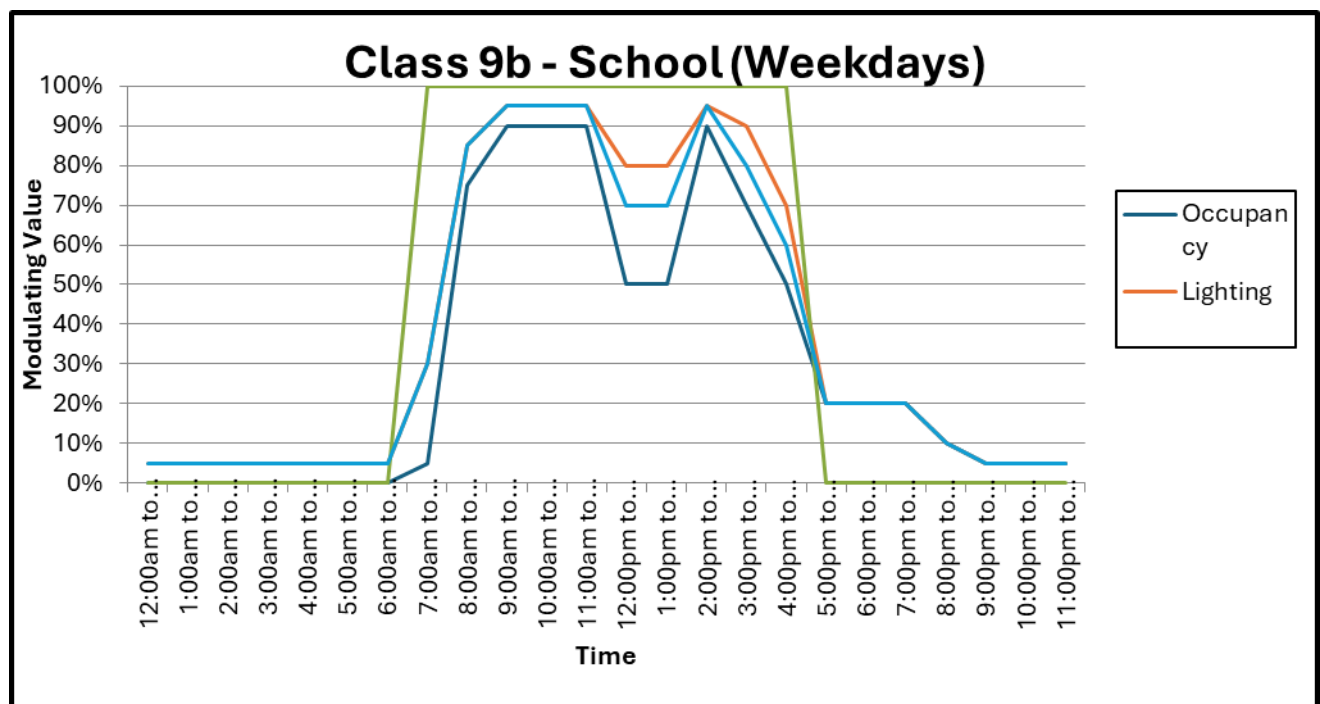
Description		Internal Wall – Block Wall						
Item	Item Description	Construction Thickness (mm)	Installed thickness (mm)	Framing	Frame percentage	Thermal break R-value	Overlap (% of total)	Effective R-Value (m²K/W)
1	Indoor Air Film (Still Air) - Vertical	N/A						0.12
2	Plasterboard Gypsum	13						0.08
3	Clay brick – 3.75kg	140						0.18
4	Plasterboard Gypsum	13						0.08
5	Indoor Air Film (Still Air) - Vertical	N/A						0.12
Total Thickness			166	Calculated Overall R-Value for Construction				0.58

Description		Concrete slab on Ground					
Item	Item Description	Construction Thickness (mm)	Installed thickness (mm)	Framing	Frame percentage	Thermal break R-value	Effective R-Value (m²K/W)
1	Indoor Air Film (Still Air) - Horizontal	N/A					0.16
2	Solid concrete	150					0.10
3	Soil in contact with floor	N/A					2.30
Total Thickness			150	Calculated Overall R-Value for Construction			2.56

Appendix C Occupancy and Operational Profiles

Class 9b Profiles

Hours of Day (Local Standard Time)	Occupancy (Monday – Friday)	Lighting (Monday – Friday)	Equipment (Monday – Friday)	HVAC (Monday – Friday)
12:00am to 1:00am	0%	5%	5%	Off
1:00am to 2:00am	0%	5%	5%	Off
2:00am to 3:00am	0%	5%	5%	Off
3:00am to 4:00am	0%	5%	5%	Off
4:00am to 5:00am	0%	5%	5%	Off
5:00am to 6:00am	0%	5%	5%	Off
6:00am to 7:00am	0%	5%	5%	Off
7:00am to 8:00am	5%	30%	30%	On
8:00am to 9:00am	75%	85%	85%	On
9:00am to 10:00am	90%	95%	95%	On
10:00am to 11:00am	90%	95%	95%	On
11:00am to 12:00am	90%	95%	95%	On
12:00pm to 1:00pm	50%	80%	70%	On
1:00pm to 2:00pm	50%	80%	70%	On
2:00pm to 3:00pm	90%	95%	95%	On
3:00pm to 4:00pm	70%	90%	80%	On
4:00pm to 5:00pm	50%	70%	60%	On
5:00pm to 6:00pm	20%	20%	20%	Off
6:00pm to 7:00pm	20%	20%	20%	Off
7:00pm to 8:00pm	20%	20%	20%	Off
8:00pm to 9:00pm	10%	10%	10%	Off
9:00pm to 10:00pm	5%	5%	5%	Off
10:00pm to 11:00pm	5%	5%	5%	Off
11:00pm to 12:00pm	5%	5%	5%	Off
Equivalent Peak Hours	7.5	9.4	9.0	10.0



Appendix D JV3 Verification Using a Reference Building

- (a) For a Class 3, 5, 6, 7, 8 or 9 building or common area of a Class 2 building, compliance with JP1 is verified when—
 - (i) it is determined that the annual greenhouse gas emissions of the proposed building are not more than the annual greenhouse gas emissions of a reference building when—
 - (A) the proposed building is modelled with the proposed services; and
 - (B) the proposed building is modelled with the same services as the reference building; and
 - (ii) in the proposed building, a thermal comfort level of between a Predicted Mean Vote of -1 to +1 is achieved across not less than 95% of the floor area of all occupied zones for not less than 98% of the annual hours of operation of the building; and
 - (iii) the building complies with the additional requirements in Specification JVa.
- (b) The annual greenhouse gas emissions of the proposed building may be offset by—
 - (i) renewable energy generated and used on site; and
 - (ii) another process such as reclaimed energy, used on site.
- (c) The calculation method used for (a) and (b) must comply with—
 - (i) ANSI/ASHRAE Standard 140; and
 - (ii) Specification JVb.

Specification JVb

Reference building

The annual greenhouse gas emissions must be calculated for the reference building in accordance with the following:

- (a) The reference building must—
 - (i) comply with Deemed-to-Satisfy Provisions in Parts J1 to J7; and
 - (ii) have the minimum amount of mechanical ventilation required by Part F4.
- (b) The external walls must have a solar absorptance of 0.6.
- (c) The air-conditioning must—
 - (i) for 98% of the annual hours of operation, achieve temperatures between—
 - (A) 18°CDB to 25°CDB for conditioned spaces with transitory occupancy; and
 - (B) subject to (ii), 21°CDB to 24°CDB in all other conditioned spaces; and
 - (ii) if the proposed building has no mechanically provided cooling or has mixed mode cooling, have the same method of control and control set points for non-mechanical cooling as the proposed building.

- (d) The infiltration rate in each zone must be—
 - (i) 0.7 air changes per hour throughout all zones when there is no mechanically supplied outdoor air; and
 - (ii) 0.35 air changes per hour at all other times.
- (e) The artificial lighting must achieve the required maximum Illumination power density in Part J6 without applying the control device adjustment factors.
- (f) Minimum Energy Performance Standards must be applied to services not covered by Parts J5 to J7.

Proposed building and reference building

The annual greenhouse gas emissions must be calculated for the proposed building and the reference building using the same:

- (a) General—
 - (i) annual greenhouse gas emissions calculation method; and
 - (ii) greenhouse gas emissions factors based on either—
 - (A) the factors in Table 3a; or
 - (B) the current full fuel cycle emissions factors published by the Australian Government, except, where the greenhouse gas intensity of electricity is less than half the greenhouse gas intensity of natural gas—
 - (aa) electricity is to be weighted as 1; and
 - (bb) natural gas is to be weighted as 2; and
 - (iii) location, being either—
 - (A) the location where the building is to be constructed if appropriate climatic data is available; or
 - (B) the nearest location with similar climatic conditions, for which climatic data is available; and
 - (iv) adjacent structures and features; and
 - (v) orientation; and
 - (vi) building form, including—
 - (A) the roof geometry; and
 - (B) the floor plan; and
 - (C) the number of storeys; and
 - (D) the ground to lowest floor arrangements; and
 - (E) the size and location of glazing; and
 - (F) external doors; and
 - (vii) testing standards including for insulation, glazing, water heater and unitary air-conditioning equipment; and

- (b) Fabric and glazing—
 - (i) quality of insulation installation; and
 - (ii) thermal resistance of air films including any adjustment factors, moisture content of materials and the like; and
 - (iii) dimensions of external, internal and separating walls; and
 - (iv) internal shading devices, their colour and their criteria for operation; and
- (c) Services—
 - (i) range and type of services and energy sources, other than renewable energy generated on site; and
 - (ii) assumptions and means of calculating the temperature difference across air-conditioning zone boundaries; and
 - (iii) floor coverings and furniture and fittings density; and
 - (iv) internal artificial lighting illumination levels; and
 - (v) internal heat gains including people, lighting, appliances, meals and other electric power loads; and
 - (vi) air-conditioning system configuration and zones; and
 - (vii) profiles for occupancy, air-conditioning, lighting and internal heat gains from people, hot meals, appliances, equipment and heated water supply systems based on—
 - (A) Specification JVC; or
 - (B) NABERS Energy for Offices simulation requirements; or
 - (C) Green Star simulation requirements; or
 - (D) the actual building if—
 - (aa) the operating hours per year are not less than 2 500; or
 - (bb) the daily operating profiles are not listed in Specification JVC; and
 - (viii) supply heated water temperature and rate of use; and
 - (ix) infiltration values, unless the following have been specified—
 - (A) additional sealing provisions to those required by Part J3; and
 - (B) an intended building leakage of less than 10 m³/hr.m² at 50Pa; and
 - (C) pressure testing to verify achievement of the intended building leakage, in which case the intended building leakage at 50Pa may be converted into a whole building infiltration value for the proposed building infiltration using Tables 4.16 to 4.24 of CIBSE Guide A; and
 - (x) sequencing for water heaters, refrigeration chillers and heat rejection equipment such as cooling towers; and
 - (xi) representation of clothing and metabolic rate of the occupants; and

- (xii) control of air-conditioning except—
 - (A) the reference building must have variable temperature control for chilled and heated water that modulates the chilled water and heated water temperatures as required to maximise the efficiency of the chiller or boiler operation during periods of low load; and
 - (B) if the controls for the proposed building are not adequately specified or cannot be simulated, the sample control specifications in Appendix B of AIRAH-DA28 must be used; and
- (xiii) environmental conditions such as ground reflectivity, sky and ground form factors, temperature of external bounding surfaces, air velocities across external surfaces and the like; and
- (xiv) number, sizes, floors and traffic served by lifts and escalators.

Services — proposed and reference building

For the modelling of services for the purposes of calculating annual greenhouse gas emissions—

- (a) system demand and response for all items of plant must be calculated on a not less frequent than hourly basis; and
- (b) energy usage of all items of plant must be calculated with allowances for—
 - (i) part load performance; and
 - (ii) staging to meet system demand; and
- (c) energy usage of cooling plant must be calculated with allowances for—
 - (i) the impact of chilled water temperature on chiller efficiency; and
 - (ii) the impact of condenser water temperature on water-cooled plant efficiency; and
 - (iii) the impact of ambient temperature on air-cooled plant efficiency; and
 - (iv) the energy use of primary pumps serving individual chillers; and
 - (v) the energy use of auxiliary equipment, including controls and oil heating for chillers; and
 - (vi) thermal losses in the chilled water system; and
 - (vii) the impact of chilled water temperature on thermal losses in the chilled water system; and
- (d) energy usage of water heating systems for space heating must be calculated with allowances for—
 - (i) the impact of water temperature on water heater efficiency; and
 - (ii) the energy use of primary or feedwater pumps serving individual water heaters; and
 - (iii) thermal losses in water heating systems; and
 - (iv) the thermal mass of water heating systems, accounting for thermal losses during periods when the system is not operating; and
- (e) energy usage of fan and pump systems must be calculated with allowances for—
 - (i) the method of capacity regulation; and
 - (ii) the use of either fixed or variable pressure control; and

(f) energy usage of pump systems must be calculated with allowances for the system fixed static pressure head;

and

(g) energy usage of auxiliary equipment associated with co-generation and tri-generation systems, including pumps, cooling towers and jacket heaters, must be calculated; and

(h) where the energy usage of the heated water supply for food preparation and sanitary purposes or the energy usage of lifts and escalators is the same in the proposed building and the reference building, they may be omitted from the calculation of both the proposed building and the reference building; and energy use of a lift in a building with more than one classification may be apportioned according to the number of storeys of the part for which the annual greenhouse gas emissions and thermal comfort level are being calculated.

Appendix E Section J JV3 Modelling Parameters

Parameter	Verification Reference	Value	Comment
Thermostat Set point	JVb (c)(i)(A)	21°C to 24°C (98% of time)	Confirmed. See Section 0: Model Verification
Daily Occupancy	JVc (a)(i)	Profiles per BCA	As per BCA Class specification
Operating Profiles	JVc (a)(i)	Profiles per BCA	As per BCA Class specification
Illumination power density	Table J6.2a	As per BCA provisions	See Section 2: Modelling Inputs
Ventilation	JVb (2)(a)(ii)	As per BCA provisions	NCC BCA Part F4, and AS1668.2
Internal Heat Gains	JVb (2)(a)(i)(ii)-A,B,C	As per BCA provisions	See Section 2: Modelling Inputs
Infiltration (perimeter)	JVd (d)(i)(ii)	0.35 Air Changes per Hour (ACH)	Plant on
		0.7 ACH	Plant off
Operation of blinds		Excluded from assessment	Reference and Proposed Models
Furniture and fittings		Excluded from assessment	Reference and Proposed Models
R-Value of air films		As per J1.2	As per Calculation methodology
Heat Migration		Migration across HVAC zones - On.	As per Calculation methodology
Artificial Lighting		As per BCA provisions	See Section 3: Modelling Inputs
Lifts		Excluded from assessment	Reference and Proposed Models
Hot Water		Excluded from assessment	Reference and Proposed Models
Non-Greenhouse Gas emitting energy sources		Excluded from assessment	Reference and Proposed Models
Thermal Calculation Method	JVb	IES-VE, ASHRAE Perth TRY	As per BCA provisions

Appendix F Part J1 – Building Fabric

The following prescriptive performance requirements for the façade must be adhered to, as per the NCC 2019 – Volume One:

J1.2 – Thermal Construction General

Insulation must comply with AS/NZS 4859.1 and be installed so that it:

- Abuts or overlaps adjoining insulation other than at supporting members such as studs, noggings, joists, furring channels and the like where the insulation must butt against the member; and
- Forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
- Does not affect the safe or effective operation of a service or fitting.
- Reflective insulation must be installed with:
 - The necessary airspace to achieve the required R-value between a reflective side of the reflective insulation and a building lining or cladding; and
 - The reflective insulation closely fitted against any penetration, door or window opening; and
 - The reflective insulation adequately supported by framing members; and
 - Each adjoining sheet of roll membrane being:
 - i. Overlapped not less than 50mm; or
 - ii. Taped together

Bulk insulation must be installed so that:

- It maintains its position and thickness, other than where it crosses roof battens, water pipes, electrical cabling or the like; and
- In a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50mm

The required Total R-Value and Total System U-Value, including allowance for thermal bridging, must be:

- Calculated in accordance with AS/NZS 4859.2 for a roof or floor; or
- Determined in accordance with Specification J1.5a for wall-glazing construction; or
- Determined in accordance with Specification J1.6 or Section 3.5 of CIBSE Guide A for soil or sub-floor spaces.

Specification J1.5a – Walls

The Total system U-Value of the wall component of a wall-glazing construction must be calculated as the inverse of the Total R-Value, including allowance for thermal bridging, in accordance with—

- AS/NZS 4859.2; or
- Specification J1.5b for spandrel panels.

Appendix G Part J3 – Building Sealing

The following prescriptive performance requirements for the façade must be adhered to, as per the NCC:

J3.4 - Windows and doors

- (a) A door, openable window or the like must be sealed—
 - (i) when forming part of the envelope; or
 - (ii) in climate zones 4, 5, 6, 7 or 8.
- (b) The requirements of (a) do not apply to—
 - (i) a window complying with AS 2047; or
 - (ii) a fire door or smoke door; or
 - (iii) a roller shutter door, roller shutter grille or other security door or device installed only for out-of-hours security.
- (c) A seal to restrict air infiltration—
 - (i) for the bottom edge of a door, must be a draft protection device; and
 - (ii) for the other edges of a door or the edges of an openable window or other such opening, may be a foam or rubber compression strip, fibrous seal or the like.
- (d) An entrance to a building, if leading to a conditioned space must have an airlock, self-closing door, rapid roller door, revolving door or the like, other than—
 - (i) where the conditioned space has a floor area of not more than 50 m²; or
 - (ii) where a café, restaurant, open front shop or the like has—
 - (A) a 3 m deep un-conditioned zone between the main entrance, including an open front, and the conditioned space; and
 - (B) at all other entrances to the café, restaurant, open front shop or the like, self-closing doors.
- (e) A loading dock entrance, if leading to a conditioned space, must be fitted with a rapid roller door or the like.

J3.5 - Exhaust fans

- (a) An exhaust fan must be fitted with a sealing device such as a self-closing damper or the like when serving—
 - (i) a conditioned space; or
 - (ii) a habitable room in climate zones 4, 5, 6, 7 or 8.

J3.6 - Construction of ceilings, walls and floors

- (a) Ceilings, walls, floors and any opening such as a window frame, door frame, roof light frame or the like must be constructed to minimise air leakage in accordance with (b) when forming part of—
 - (i) the envelope; or
 - (ii) in climate zones 4, 5, 6, 7 or 8.
- (b) Construction required by (a) must be—
 - (i) enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions; or
 - (ii) sealed at junctions and penetrations with—
 - (A) close fitting architrave, skirting or cornice; or
 - (B) expanding foam, rubber compressible strip, caulking or the like.
- (c) The requirements of (a) do not apply to openings, grilles or the like required for smoke hazard management.

Appendix H Performance Based Design Brief

Overview

The National Construction Code 2019 Amendment One requires all performance based solutions to be accompanied by a Performance Based Design Brief (PBDB). This appendix serves as the PBDB for the Performance Solution proposed for this project.

Section A2.2 of NCC 2019 Amendment One outlines the requirements for Performance Solutions. The performance solution presented in this report adheres to the requirements of Section J “JV3 Verification using a reference building” and as such satisfies the requirement of A2.2 (2)(b)(i) being a “Verification Method provided in the NCC”. The overall complexity and risks associated with this performance solution is hence considered low.

In order to manage these risks, the following methodology is proposed

1. Prepare a PBDB
2. Carry out Analysis
3. Evaluate Results
4. Prepare a final report (this document)

The key stakeholders for this process are considered to be:

- Building Owner or Owners Representative
- Builder or Project Manager
- Architect
- Mechanical Engineer
- Structural Engineer and
- Building Surveyor/Certifier

The above stakeholders have been made aware of this PDBD via distribution of this report.

The proposed performance solution uses the thermal simulation software IES VE which complies with ANSI/ASHRAE Standard 140 to simulate a “reference building” outcome that complies with all relevant aspects of the Deemed-to-Satisfy approach. This is compared against a “proposed building” that only modifies building fabric in accordance with prescribed parameters in the JV3 Verification Method. All other inputs remain constant and as per the JV3 verification method requirements. Calculated carbon emissions allow comparison of the effectiveness of the proposed fabric modifications. Additional requirements for the above stakeholders are outlined in Appendix F and G.

The performance solution is deemed to be acceptable when the following criteria are achieved and as per JV3(a)(i) and JV3(a)(ii)

- It is determined that the annual greenhouse gas emissions of the proposed building are not more than the annual greenhouse gas emissions of the reference building when
 - The proposed building is modelled with the proposed services
 - The proposed building is modelled with the same services as the reference building
- In the proposed building, a thermal comfort level of between a predicted Mean Vote of -1 to +1 is achieved across not less than 95% of the floor area of all occupied zones for not less than 98% of the annual hours of operation of the building

The following assumptions are made in regard to the above criteria:

- Thermal comfort in the proposed building is taken to be the proposed fabric and reference services
- Thermal comfort between -1 and +1 is achieved in all regularly conditioned spaces, as opposed to all occupied zones. In many instances, occupancy of these zones may be highly intermittent, thermal comfort requirements may be minimal and as a result air conditioning would not be provided (ie storage rooms). In these instances, the Predicted Mean Vote metric will not remain within +1 and -1 for a large period of the year but should not indicate poor performance overall.
- An average calculation of predicted mean vote is not acceptable. Simulated areas must satisfy the PMV requirements for 98% of the year in order to contribute to the 95% area threshold. This ensures that poor performing (thermally uncomfortable) areas within zones are not hidden or obscured by better performing areas elsewhere.

Due to the low degree of risk or impact to life safety, a safety factor of 0.0% is proposed as suitable.

Overview and outline of the analysis

Refer to Sections 3. Assessment Methodology, 4. Modelling Results and 4.2 Conclusion of this report for an overview of the analysis, including:

- Method of analysis used
- Calculations and outcomes
- The results obtained and relevance to the PDBD

Evaluation of Results

Refer to Sections 1.1 Findings, 4. Modelling Results and 4.2 Conclusion for an evaluation of the results, including a comparison of results with the acceptance criteria

Conclusion

A performance solution has been undertaken to meet the performance requirement of Section J of the NCC 2019 Amendment One. This performance solution is in all instances in accordance with the prescribed parameters as outlined in Section J “JV3 Verification Using a Reference Building”. This performance based design brief has outlined the overall process, associated risks, evaluation methods and acceptance criteria to relevant stakeholders. The performance solution undertaken has met all acceptance criteria and specification of this proposed solution are found as Section 1.2 Conditions and Requirements and Section 1.3 Building Fabric in the body of this report.

Conditions related to the use of this performance solution are outlined in the Disclaimer and Qualifications to this Report sections, as well as Section 1.2 Conditions and Requirements.

Stantec Australia Pty Ltd
Level 2,
88 William Street
Perth WA 6000
Tel +61 8 6460 0300



Connect with us



stantec.com/au