

Attachments

Ordinary Council Meeting

Monday 15 April 2019

9.1.1 27 Barcelona Street, BOX HILL (CP 105138 25B): Development of the land for eight (8) dwellings, including associated tree removal.

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9.1.2 Development Plan for 16-18 Spring Street, Box Hill

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9.1.3 Implementation of Sustainability Strategy 2016-2022: Energy Efficiency Capital Works Proposal

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9.2.1 Living Melbourne: Our Metropolitan Urban Forest

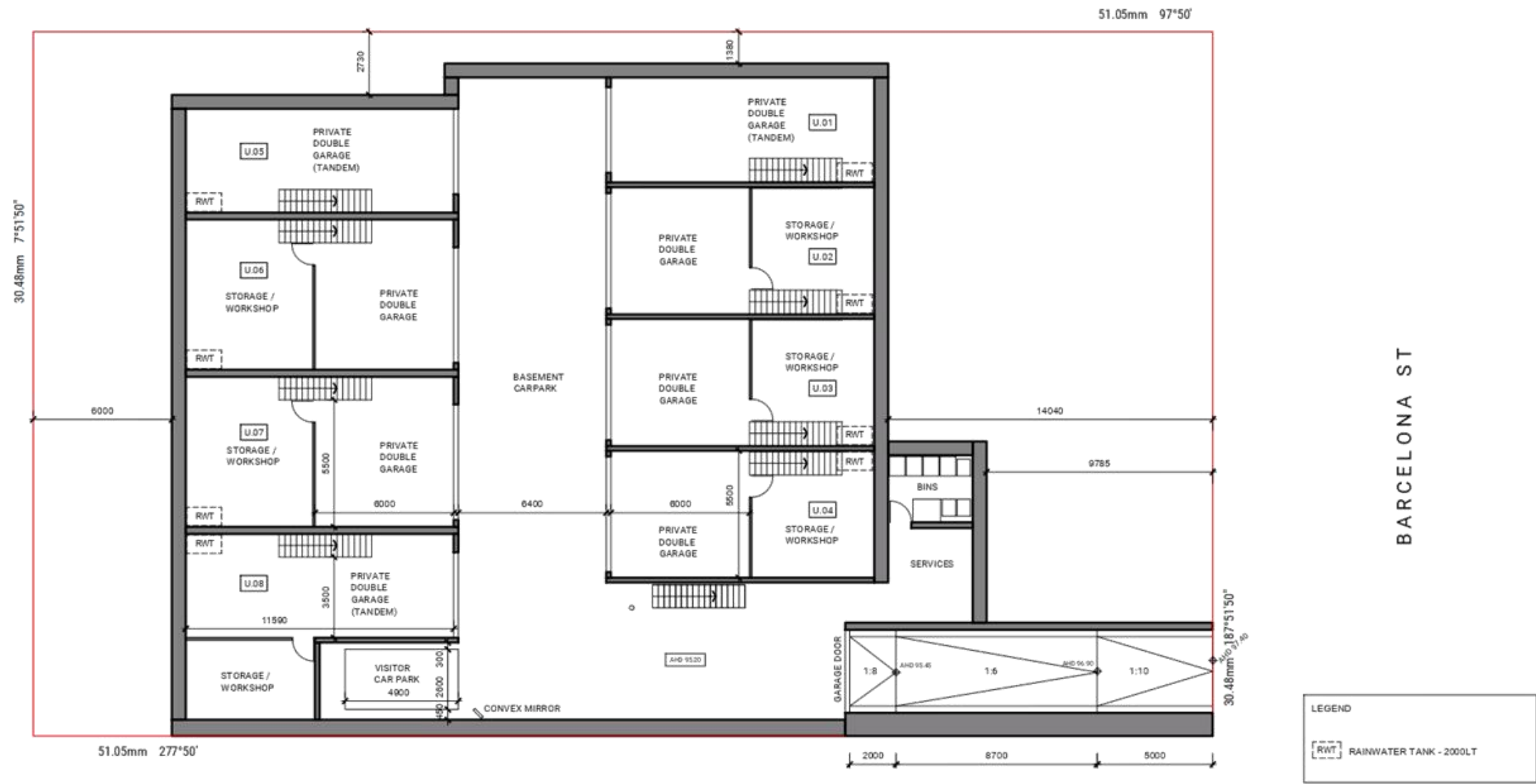
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9.1.1 27 Barcelona Street, BOX HILL
(CP 105138 25B): Development
of the land for eight (8) dwellings,
including associated tree
removal.

Attachment 1 Plans

Attachment 2 Landscaping plan

9.1.1 – ATTACHMENT 1. Plans



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CLIENT
CANTERBURY PROPERTY DEVELOPMENTS

PROJECT
Multi Residential.
27 Barcelona St. Boxhill. 3128

DWG TITLE
BASEMENT FLOOR



DWG NUMBER
TP01 (C)

SCALE
1:100 @ A1
1:200 @ A3

DATE
2018-10-21

STATUS
TOWN PLANNING

9.1.1 – ATTACHMENT 1. Plans



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PROJECT
Multi Residential.
27 Barcelona St. Boxhill. 3128

DWG TITLE
GROUND FLOOR



DWG NUMBER
TP02 (C)

SCALE
1:100 @ A1
1:200 @ A3

DATE
2018-10-21

STATUS
TOWN PLANNING

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PROJECT
Multi Residential.
27 Barcelona St. Boxhill. 3128

DWG TITLE
FIRST FLOOR



DWG NUMBER
TP03 (C)
SCALE
1:100 @ A1
1:200 @ A3

DATE
2018-10-21
STATUS
TOWN PLANNING

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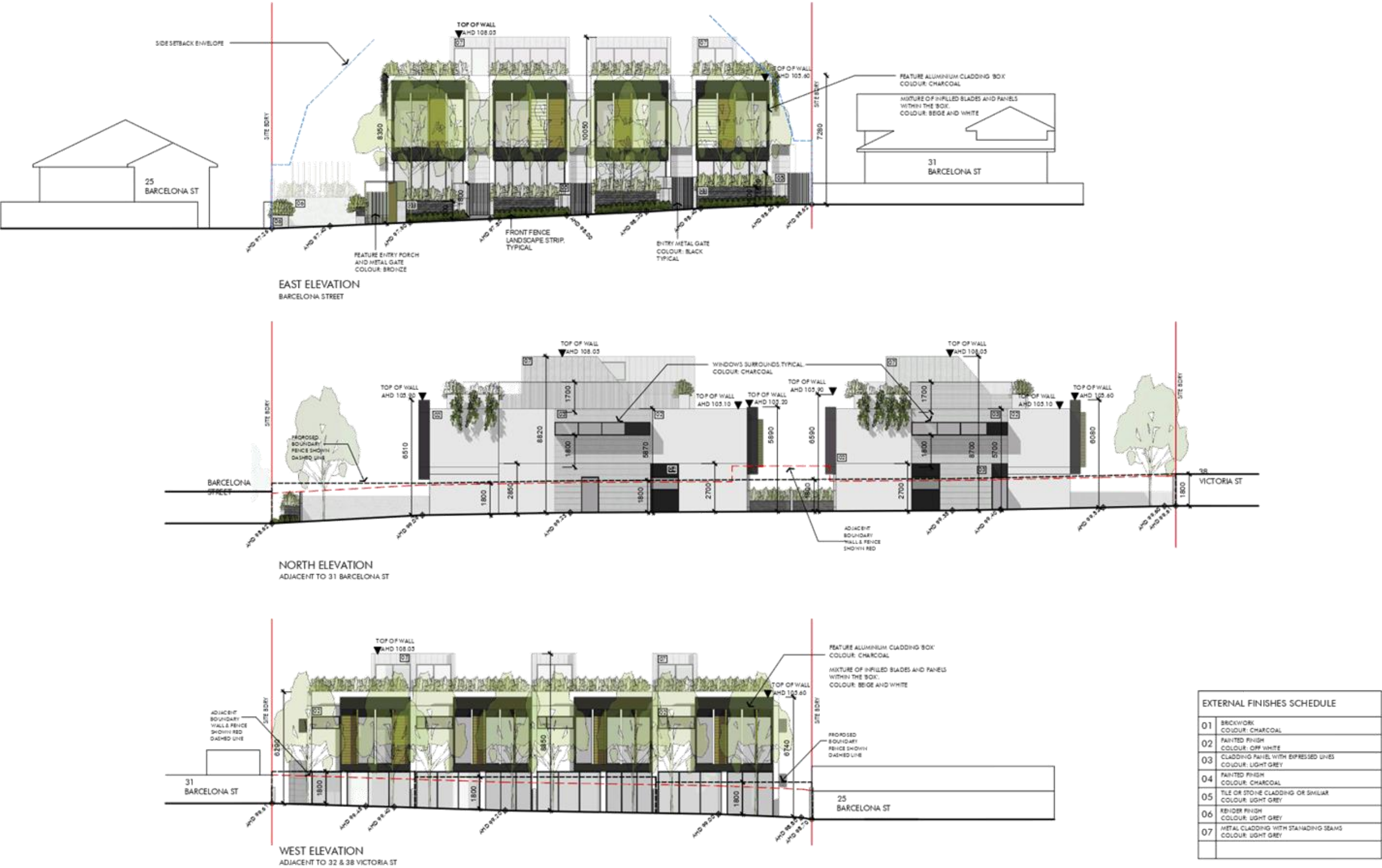
DWG TITLE
SECOND FLOOR



DWG NUMBER
TP04 (C)
SCALE
1:100 @ A1
1:200 @ A3

DATE
2018-10-21
STATUS
TOWN PLANNING

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PROJECT
Multi Residential.
27 Barcelona St. Boxhill. 3128

DWG TITLE
EAST, NORTH, WEST ELEVATIONS

DWG NUMBER
TP06 (C)

DATE
2018-10-21

SCALE
1:100 @ A1
1:200 @ A3

STATUS
TOWN PLANNING

9.1.1 – ATTACHMENT 1. Plans



EXTERNAL FINISHES SCHEDULE	
01	BRICKWORK COLOUR: CHARCOAL
02	PAINTED FINISH COLOUR: OFF WHITE
03	CLADDING PANEL WITH EXPRESSED LINES COLOUR: LIGHT GREY
04	PAINTED FINISH COLOUR: CHARCOAL
05	TILE OR STONE CLADDING OR SIMILAR COLOUR: LIGHT GREY
06	RENDER FINISH COLOUR: LIGHT GREY
07	METAL CLADDING WITH STANDING SEAMS COLOUR: LIGHT GREY



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CLIENT
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PROJECT
Multi Residential,
27 Barcelona St. Boxhill. 3128

DWG TITLE
SOUTH ELEVATION
INTERNAL WEST, EAST ELEVATIONS

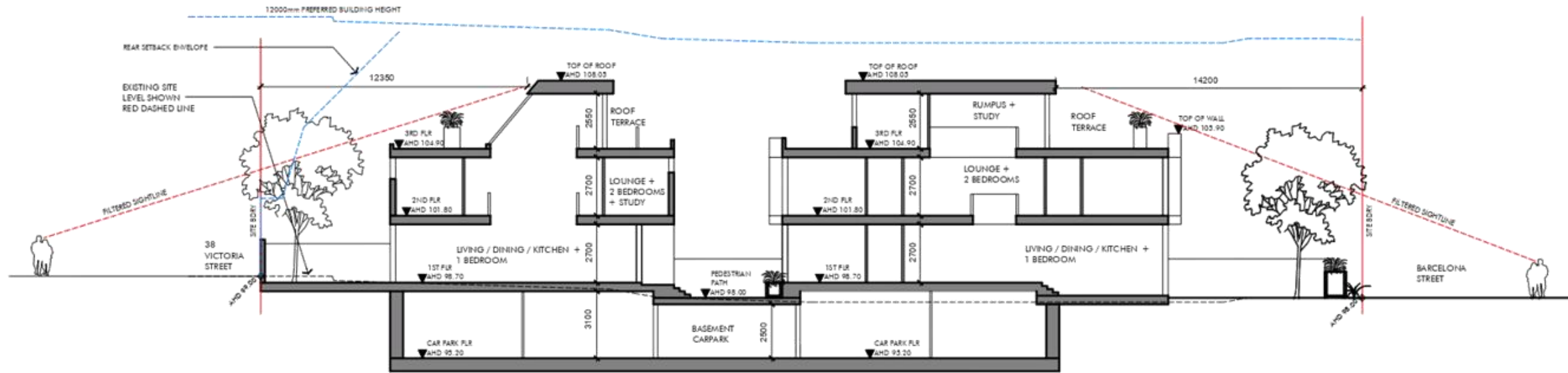
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1:200 @ A3

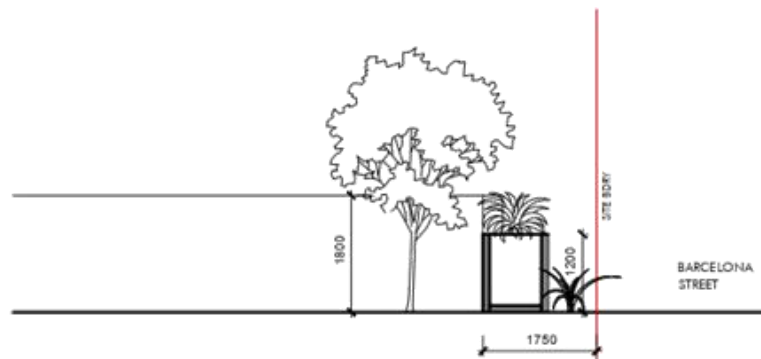
DATE
2018-10-21

STATUS
TOWN PLANNING

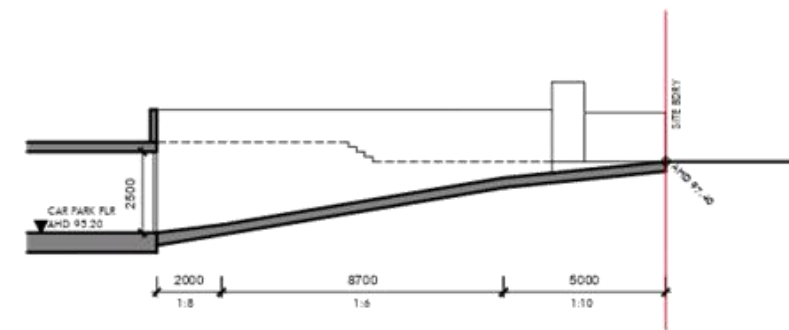
9.1.1 – ATTACHMENT 1. Plans



SITE SECTION DIAGRAM A-A



PART SECTION - FRONT FENCE
SCALE 1:50 @ A1; 1:100 @ A3



PART SECTION - CAR RAMP



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CLIENT
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PROJECT
Multi Residential,
27 Barcelona St. Boxhill. 3128

DWG TITLE
SECTION AA
CAR RAMP SECTION

DWG NUMBER
TP08 (C)
SCALE
1:100 @ A1
1:200 @ A3

DATE
2018-10-21
STATUS
TOWN PLANNING

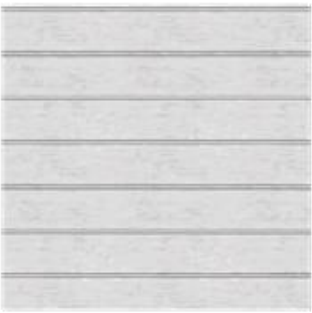
9.1.1 – ATTACHMENT 1. Plans



BRICKWORK
COLOUR: CHARCOAL



PAINTED FINISH
COLOUR: OFF WHITE



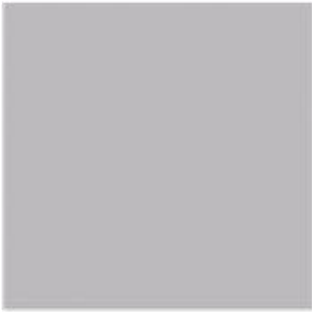
CLADDING PANEL WITH EXPRESSED LINE
COLOUR: LIGHT GREY



METAL CLADDING WITH STANDING SEAMS
COLOUR: LIGHT GREY



RENDER FINISH
COLOUR: LIGHT GREY



PAINTED FINISH & METAL CLADDING
COLOUR: LIGHT GREY



TILE OR STONE CLADDING
COLOUR: LIGHT GREY



ENTRY METAL GATE
COLOUR: BLACK



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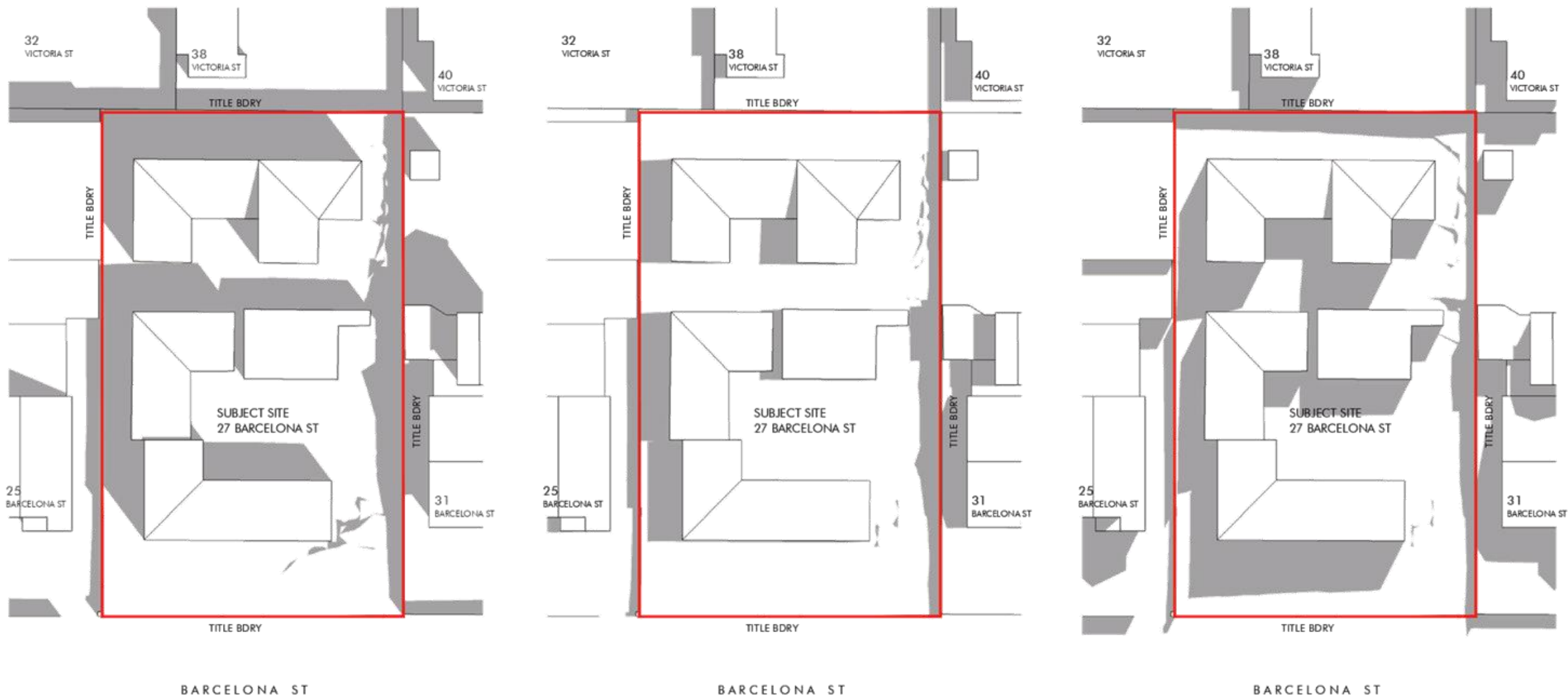
CLIENT
CANTERBURY PROPERTY DEVELOPMENTS

PROJECT
Multi Residential,
27 Barcelona St. Boxhill. 3128

DWG TITLE
EXTERNAL MATERIAL & FINISHES
SCHEDULE

DWG NUMBER
TP09 (C)
SCALE
N.T.S.
DATE
2018-1021
STATUS
TOWN PLANNING

9.1.1 – ATTACHMENT 1. Plans

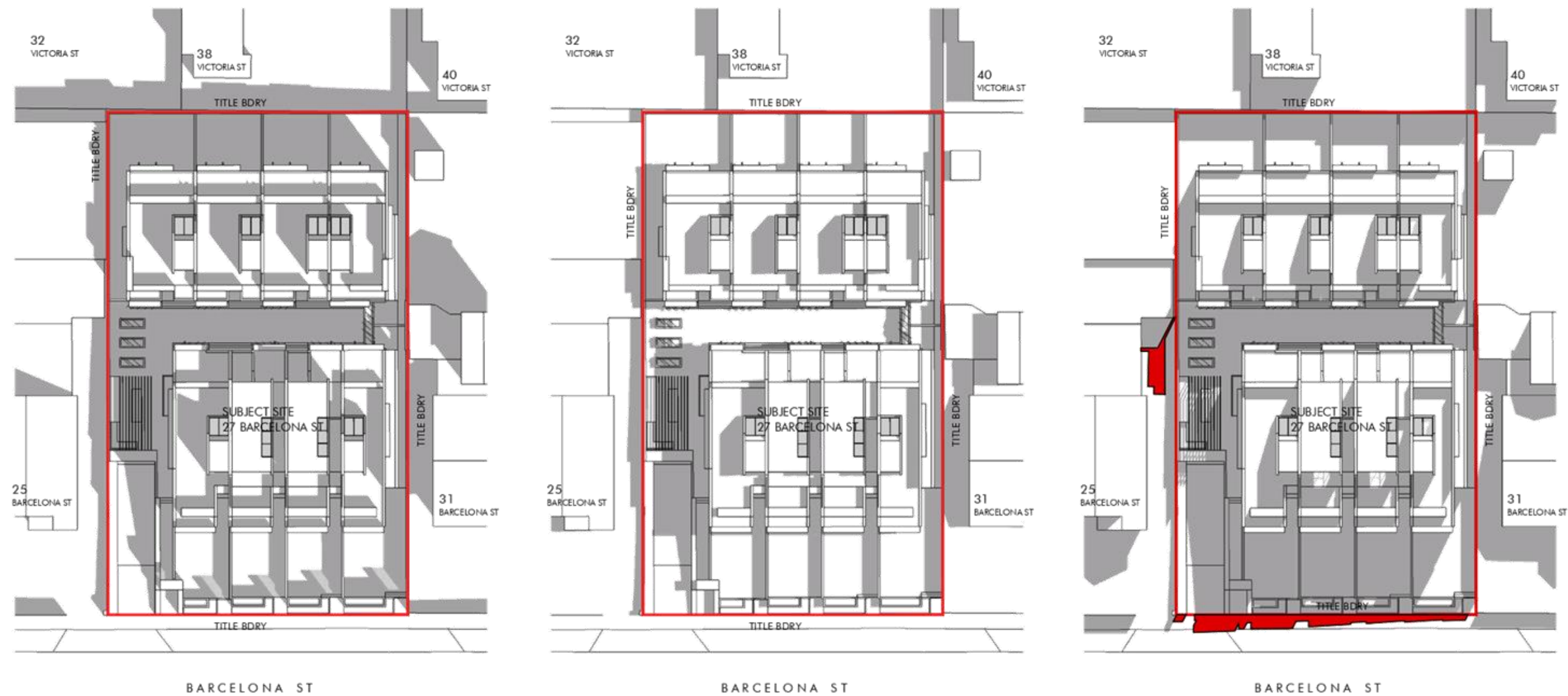


PROPOSED SHADOW DIAGRAMS
9AM - 22nd SEPTEMBER

PROPOSED SHADOW DIAGRAMS
12PM - 22nd SEPTEMBER

PROPOSED SHADOW DIAGRAMS
3PM - 22nd SEPTEMBER

9.1.1 – ATTACHMENT 1. Plans



PROPOSED SHADOW DIAGRAMS
9AM - 22nd SEPTEMBER

PROPOSED SHADOW DIAGRAMS
12PM - 22nd SEPTEMBER

PROPOSED SHADOW DIAGRAMS
3PM - 22nd SEPTEMBER

LEGEND

 ADDITIONAL OFFSITE SHADOW CAST BY PROPOSED SCHEME.



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CLIENT
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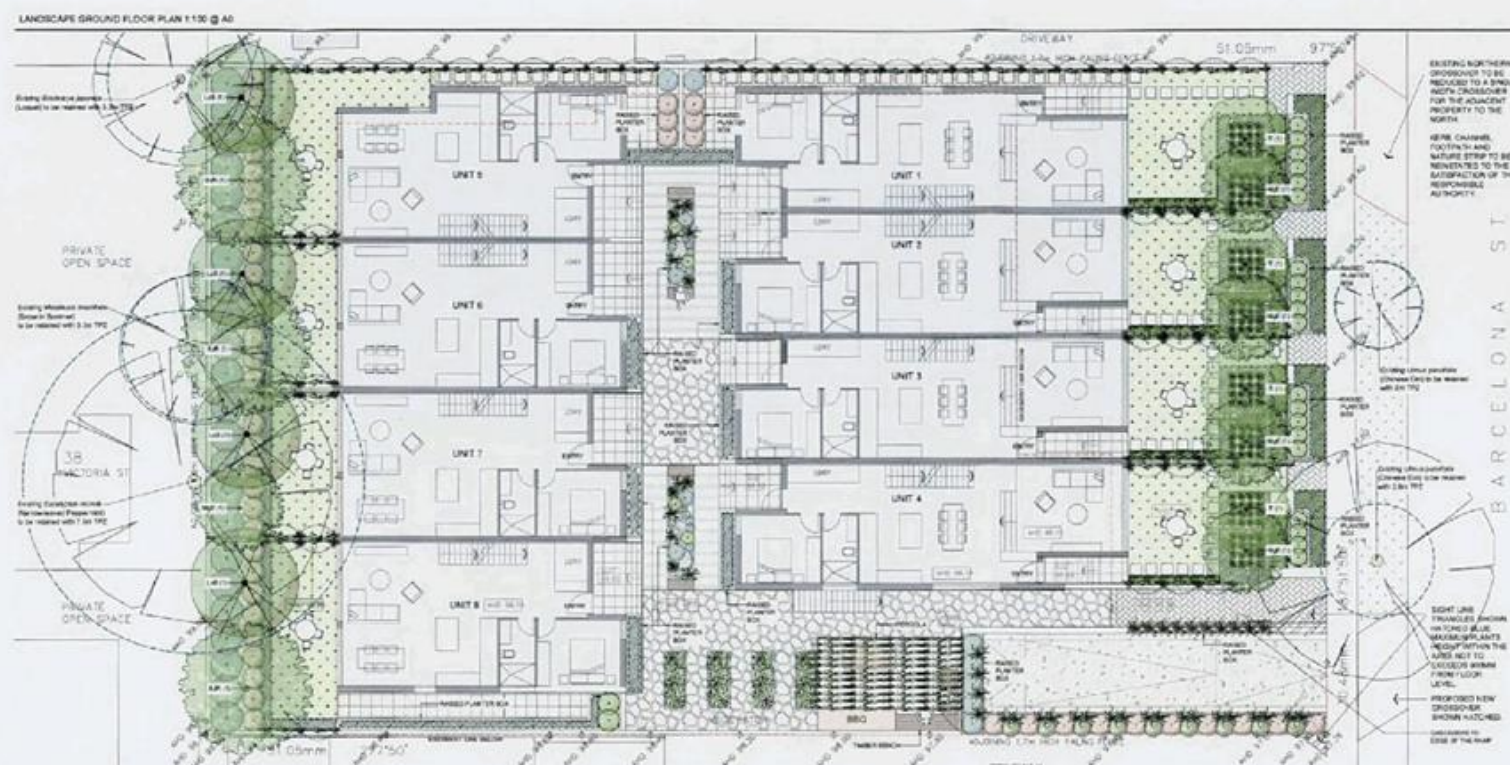
PROJECT
Multi Residential,
27 Barcelona St. Boxhill. 3128

DWG TITLE
PROPOSED SHADOW DIAGRAMS



DWG NUMBER
TP11 (C)
SCALE
1:200 @ A1
1:400 @ A3

DATE
2018-10-21
STATUS
TOWN PLANNING

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9.1.2 Development Plan for 16-18 Spring Street, Box Hill

- Attachment 1 Urban Context Report & Development
Plan:Elenberg Fraser Architects
- Attachment 2 Transport Impact Assessment: One Mile
Grid Traffic Engineering
- Attachment 3 Sustainability Management Plan: Wood
and Grieve Engineers
- Attachment 4 Landscape & Public Realm Concept Plan:
Tract Consultants
- Attachment 5 Community Infrastructure Assessment:
ASR Research

Note: That in the interest of sustainability, 1 copy of the following Attachments will be provided at each of Councils Service Centres, Council Libraries and an additional 2 copies made available at the meeting, due to the size and volume of documents

9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects



CITY OF WHITEHORSE

Date: 29/1/2019

RECEIVED

16 SPRING ST PROPOSAL

PREPARED BY

ELENBERG FRASER

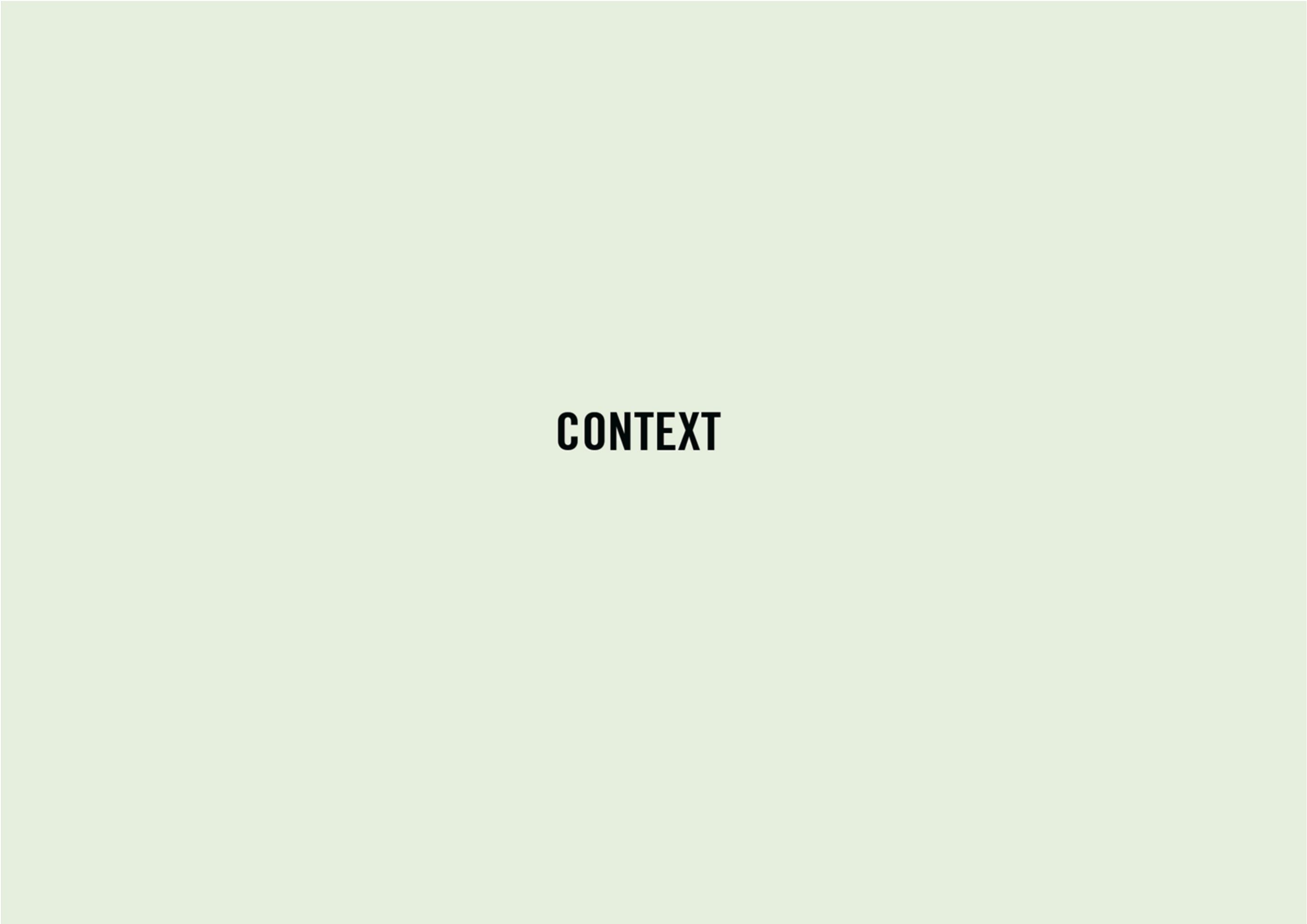
×

ORION

PROJECT TEAM

CLIENT	ORION EAST	TRAFFIC ENGINEER	ONE MILE GRID
CLIENT	BOXHILL INSTITUTE	TOWN PLANNER	BMDA DEVELOPMENT ADVISORY
PROJECT MANAGEMENT	RCP	FIRE ENGINEER	WOOD & GRIEVE ENGINEERS
LEAD ARCHITECT	ELENBERG FRASER	BUILDING SURVEYOR	CHECK POINT
INTERIOR DESIGNER	ELENBERG FRASER	URBAN DESIGNER	DLA ASSOCIATES
NURSING FACILITY ARCHITECT	SILVER THOMAS HANLEY	LANDSCAPE ARCHITECT	TRACT
QUANTITY SURVEYOR	WT PARTNERSHIP	WASTE ENGINEER	LEIGH DESIGN
SERVICES ENGINEER	WOOD & GRIEVE ENGINEERS	ACOUSTIC ENGINEER	MARSHALL DAY
STRUCTURAL & CIVIL ENGINEER	WSP AUSTRALIA	WIND ENGINEER	MEL CONSULTANTS

9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects



01.1_SITE LOCATION



16 SPRING STREET, BOX HILL
SITE AREA: 2,626 SQM (APPROX.)
FRONTAGE: SPRING STREET
EXISTING: AT GRADE CAR PARK (PRIVATE), OPEN TO AIR

THE SUBJECT SITE 16 SPRING STREET IS LOCATED WITHIN THE HOSPITAL & EASTERN TAFE PRECINT WITHIN THE BOX HILL METROPOLITAN ACTIVITY CENTRE. THE SITE IS IDEALLY LOCATED IN CLOSE PROXIMITY TO PUBLIC TRANSPORT NETWORKS, RETAIL, RECREATION, EDUCATION AND EMPLOYMENT OPPORTUNITIES.



01.2_SITE PLAN

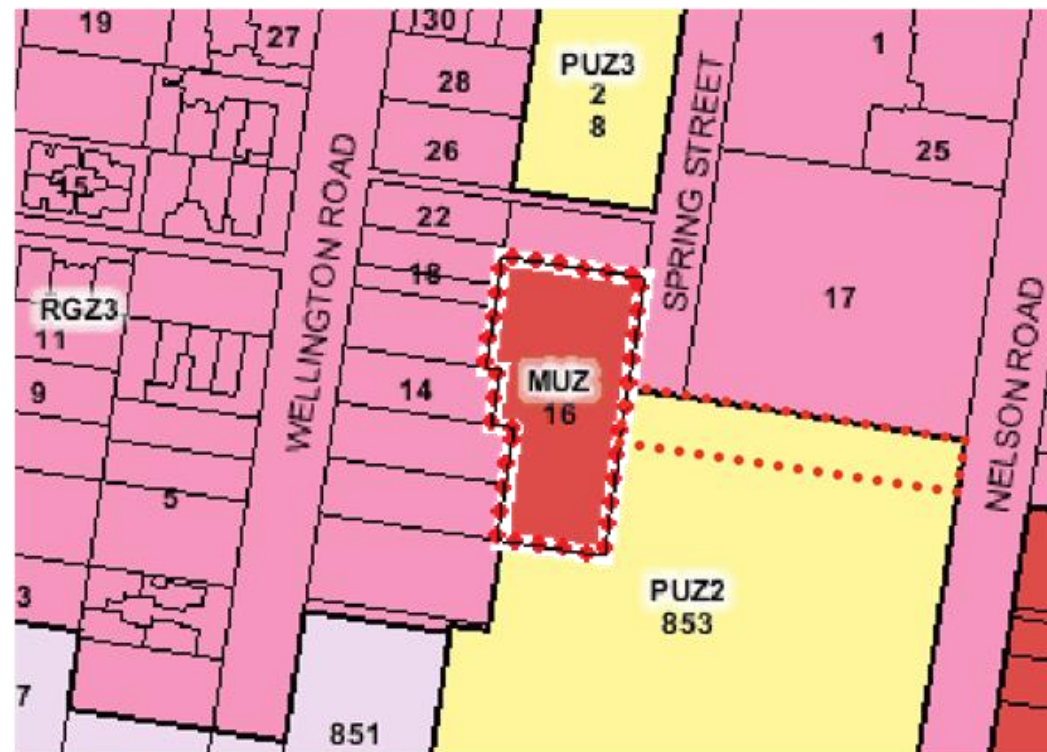


URBAN CONTEXT REPORT_RFI RESPONSE _ 16 SPRING STREET, BOXHILL

ELENBERG FRASER

9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects

01.3_TOWN PLANNING CONTROLS: WHITEHORSE PLANNING SCHEME



ZONE LEGEND

ACZ - Activity Centre	IN1Z - Industrial 1	R1Z - General Residential
B1Z - Commercial 1	IN2Z - Industrial 2	R2Z - General Residential
B2Z - Commercial 1	IN3Z - Industrial 3	R3Z - General Residential
B3Z - Commercial 2	LDRZ - Low Density Residential	RAZ - Rural Activity
B4Z - Commercial 2	MUZ - Mixed Use	RCZ - Rural Conservation
B5Z - Commercial 1	NRZ - Neighbourhood Residential	RDZ1 - Road - Category 1
C1Z - Commercial 1	PCRZ - Public Conservation & Resource	RDZ2 - Road - Category 2
C2Z - Commercial 2	PDZ - Priority Development	RGZ - Residential Growth
CA - Commonwealth Land	PPRZ - Public Park & Recreation	RLZ - Rural Living
CCZ - Capital City	PUZ1 - Public Use - Service & Utility	RUZ - Rural
CDZ - Comprehensive Development	PUZ2 - Public Use - Education	SUZ - Special Use
DZ - Dockland	PUZ3 - Public Use - Health Community	TZ - Township
ERZ - Environmental Rural	PUZ4 - Public Use - Transport	UFZ - Urban Floodway
FZ - Farming	PUZ5 - Public Use - Cemetery/Crematorium	UGZ - Urban Growth
GRZ - General Residential	PUZ6 - Public Use - Local Government	
GWAZ - Green Wedge A	PUZ7 - Public Use - Other Public Use	
GWZ - Green Wedge	PZ - Port	-- Urban Growth Boundary

MIXED USE ZONE

Shown on the planning scheme map as MUZ

MUZ PURPOSE:

- To implement the State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.
- To provide for a range of residential, commercial, industrial and other uses which complement the mixed-use function of the locality.
- To provide for housing at higher densities. To encourage development that responds to the existing or preferred neighbourhood character of the area.
- To facilitate the use, development and redevelopment of land in accordance with the objectives specified in a schedule to this zone.

PUBLIC USE ZONE- EDUCATION

Shown on the planning scheme map as PUZ2

PUZ PURPOSE:

To recognise public land use for public utility and community services and facilities, to provide for associated uses that are consistent with the intent of the public land reservation or purpose.

01.4_TOWN PLANNING CONTROLS: WHITEHORSE PARKING OVERLAY

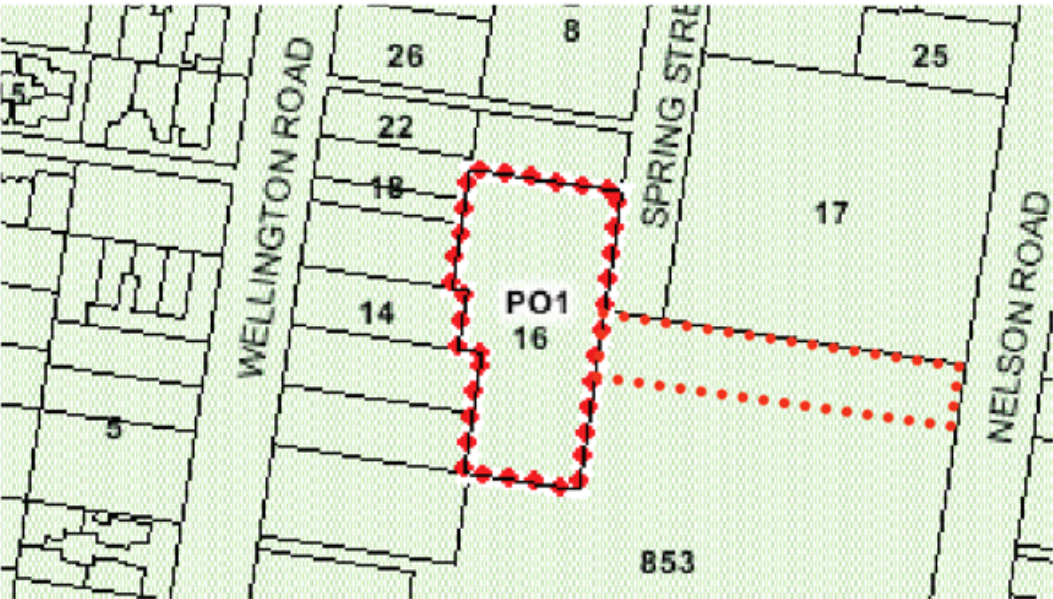


Table 1: Car parking spaces

Use	Rate	Measure
Dwelling	0.5	Resident spaces to each one bedroom dwelling, plus
	0.75	Resident spaces to each two bedroom dwelling, plus
	1.0	Resident spaces to each three or more bedroom dwelling (with studies or studios that are separate rooms counted as a bedroom), plus
	0.2	Visitor spaces to each dwelling for the first five dwellings, plus
	0.1	Visitor spaces to each dwelling for any subsequent dwellings
Office	2.0	To each 100 square metres of net floor area

For all other uses listed in Table 1 of Clause 52.06-5, the number of car parking spaces required for a use shall be calculated by using the *Rate* in Column B of that Table (representing a minimum rate).

PARKING OVERLAY
Shown on the planning scheme map as PO1

PO1 PURPOSE:
To facilitate an appropriate provision of car parking spaces, to identify areas and uses where local car parking rates apply, to identify areas where financial contributions are to be made for the provision of shared car parking.

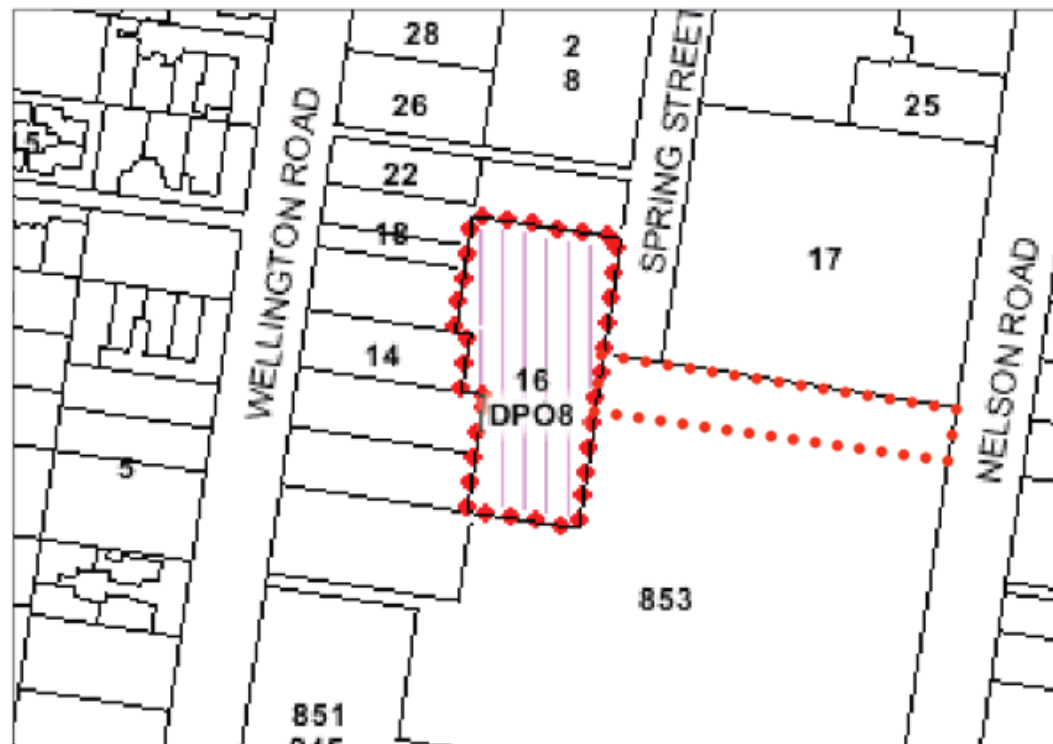
- 1.0 CAR PARKING OBJECTIVES TO BE ACHIEVED**
- Manage car parking demand and supply to satisfy user needs (with a focus on maintaining/increasing the viability of Box Hill).
 - Locate and manage car parking so as to minimise traffic generated by the search for a parking space.
 - Reduce vehicle trips through minimising parking provision where appropriate.
 - Encourage the use of active and sustainable travel modes rather than increased private vehicle travel.
 - Improve general amenity for pedestrians within Box Hill to increase the willingness for visitors and staff to walk to and within the Centre to their destination.

2.0 NUMBER OF CAR PARKING SPACES TO BE PROVIDED
If a use is specified in the Table below, the minimum number of car parking spaces required for the use is calculated by multiplying the Rate specified for the use by the accompanying Measure. (Table 1)

3.0 PERMIT REQUIREMENT
To recognise public land use for public utility and community services and facilities, to provide for associated uses that are consistent with the intent of the public land reservation or purpose.

9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects

01.5 DEVELOPMENT PLAN OVERLAY SCHEDULE 8



DEVELOPMENT PLAN OVERLAY - SCHEDULE 8

Shown on the planning scheme map as DPO8

DPO PURPOSE:

- To implement the State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.
- To identify areas which require the form and conditions of future use and development to be shown on a development plan before a permit can be granted to use or develop the land.
- To exempt an application from notice and review if it is generally in accordance with a development plan.

Overlays Legend

AEO - Airport Environs	IPO - Incorporated Plan
BMO - Bushfire Management	LSIO - Land Subject to Inundation
CLPO - City Link Project	MAEO1 - Melbourne Airport Environs 1
DCPO - Development Contributions Plan	MAEO2 - Melbourne Airport Environs 2
DDO - Design & Development	NCO - Neighbourhood Character
DDOPT - Design & Development Part	PO - Parking
DPO - Development Plan	PAO - Public Acquisition
EAO - Environmental Audit	RO - Restructure
EMO - Erosion Management	RCO - Road Closure
ESO - Environmental Significance	SBO - Special Building
FO - Floodway	SLO - Significant Landscape
HO - Heritage	SMO - Salinity Management
ICPO - Infrastructure Contributions Plan	SRD - State Resource
	VPD - Vegetation Protection

9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects

01.6 DEVELOPMENT PLAN OVERLAY SCHEDULE 8

1.0 REQUIREMENT BEFORE A PERMIT IS GRANTED

A permit may be granted before a development plan has been approved for the following:

- Subdivision
- Minor buildings and works
- Removal or creation of easements or restrictions.

Before granting a permit, the responsible authority must be satisfied that the permit will not prejudice the preparation of a Development Plan and the future use and development of the land in an integrated manner.

2.0 CONDITIONS AND REQUIREMENTS FOR PERMITS

None specified.

3.0 REQUIREMENTS FOR DEVELOPMENT PLAN

The development plan must include the following:

A site analysis that identifies existing conditions plan, showing surrounding land uses and development, adjoining roads and pedestrian links, public transport routes and social infrastructure.

- Concept plans for the layout and development of the site, which show:
- The siting and orientation of built form.
- The proposed uses of each building.
- Three dimensional building envelopes for new buildings, including indicative building heights, the separation distances between buildings and the setback from street frontages and adjoining properties.
- Shadow diagrams for the equinox (22 September / 22 March) based on the building envelopes and arrangements.

Design Guidelines for the site, which reflect the following requirements:

- The building heights should not exceed 29 storeys in height and provide an appropriate graduation in height.
- A street wall of 4 storeys should be established with upper levels setback a minimum of 3 metres from Spring Street.
- A setback of at least 6 metres from the northern boundary should be provided to incorporate vehicle access to the site off Spring Street.
- The development should include a mixed use podium of 4 storeys, incorporating commercial and retail and other active uses at ground floor level and three levels of education facilities.
- All levels above the podium should provide for residential development.
- Car parking should be obscured from the public realm.
- Building services, including roof top services/elements should be screened or relocated away from the public realm.
- Sustainable design principles should be applied to address water management, solar access and energy conservation.

An indicative development schedule including the number, type and density of dwellings and the floor area of any proposed non-residential uses.

A transport plan and car parking plan, which provides:

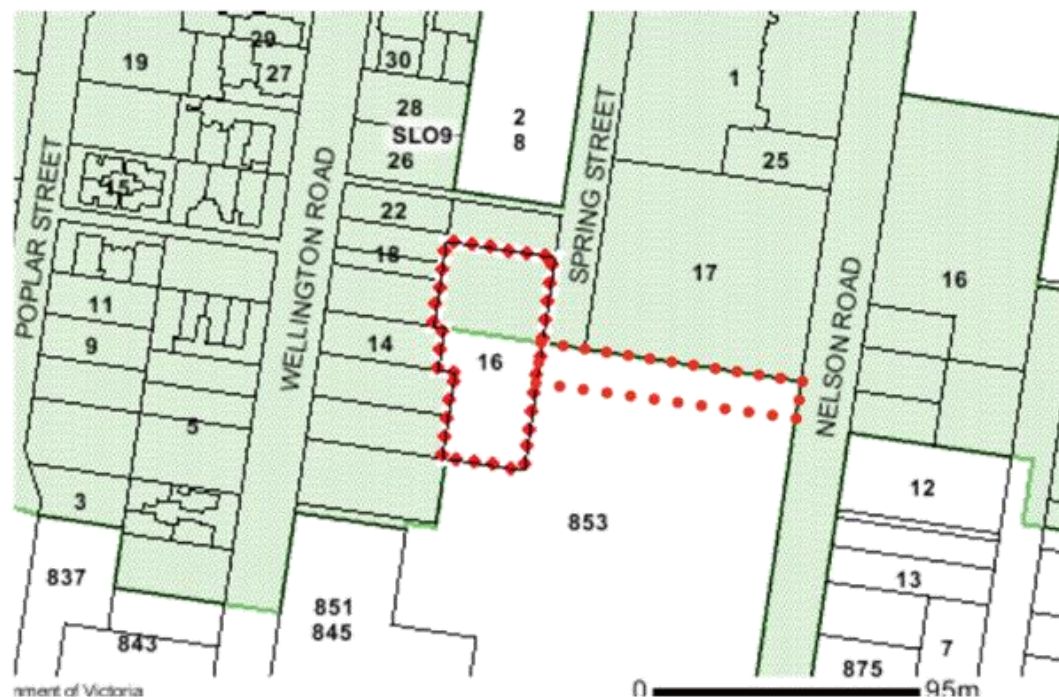
- The existing capacity of the surrounding road network.
- An indication of roads, pedestrian, cyclist and vehicle access locations, including parking areas both internal and external to the site.
- An assessment of the impact of traffic and car parking generated by the use and development upon the surround road network.
- Car parking rates for all uses, including visitor car parking.
- The layout of accessways, car parking and loading areas.
- Separated areas for pedestrian movement throughout the site and linkages to the pedestrian network.
- The provision of convenient bicycle storage facilities.
- For the creation of a new road along the northern boundary of 853 Whitehorse Road, connecting Spring Street (as extended) to Nelson Road.

A landscape and public realm concept plan for the site.

A community infrastructure assessment to determine the impact of development on the demand for such facilities

9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects

01.7_SIGNIFICANT LANDSCAPE OVERLAY - SCHEDULE 9



Overlays Legend

- AEO - Airport Environs
- BMO - Bushfire Management
- CLPO - City Link Project
- DCPD - Development Contributions Plan
- DDO - Design & Development
- DDOPT - Design & Development Part
- DPO - Development Plan
- EAO - Environmental Audit
- EMO - Erosion Management
- ESO - Environmental Significance
- FO - Floodway
- HO - Heritage
- ICPO - Infrastructure Contributions Plan

- IPO - Incorporated Plan
- LSIO - Land Subject to Inundation
- MAEO1 - Melbourne Airport Environs 1
- MAEO2 - Melbourne Airport Environs 2
- NCO - Neighbourhood Character
- PO - Parking
- PAO - Public Acquisition
- RO - Restructure
- RCO - Road Closure
- SBO - Special Building
- SLO - Significant Landscape
- SMO - Salinity Management
- SRO - State Resource
- VPO - Vegetation Protection

SIGNIFICANT LANDSCAPE OVERLAY - SCHEDULE 9

Shown on the planning scheme map as DP08

DPO PURPOSE:

- To implement the State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.
- To identify significant landscapes.
- To conserve and enhance the character of significant landscapes.

1.0 LANDSCAPE CHARACTER OBJECTIVE TO BE ACHIEVED

To encourage the retention of established and mature trees and to provide for the planting of new canopy trees.

2.0 PERMIT REQUIREMENT

Buildings and works

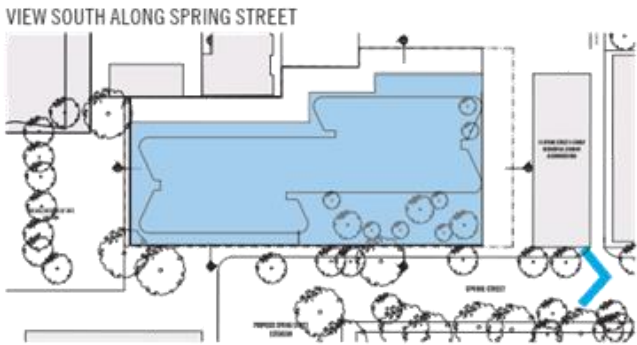
- A permit is required to construct a front fence that is within 4 metres of any vegetation that requires a permit to remove, destroy or lop under the provisions of this schedule. This does not apply to the like-for-like replacement of a front fence to the satisfaction of the responsible authority.
- A permit is not required to construct a building or carry out works provided the building or works are set back at least 4 metres from the base of any tree protected under the provisions of this schedule.

Vegetation removal

- A permit is required to remove, destroy or lop a tree. This does not apply to:
- A tree less than 5m in height and having a single trunk circumference of 1.0 metre or less at a height of one metre above ground level; or
- The pruning of a tree for regeneration or ornamental shaping; or
- A tree which is dead or dying or has become dangerous to the satisfaction of the responsible authority; or
- A tree outside the Minimum Street Setback in the Residential Growth Zone

The overlay affects the northern half of the site. The vegetation on this part of the site have been removed at sometimes in previous years. This means that this control will not impact on design options.

01.8_EXISTING CONDITIONS - SITE PHOTOS

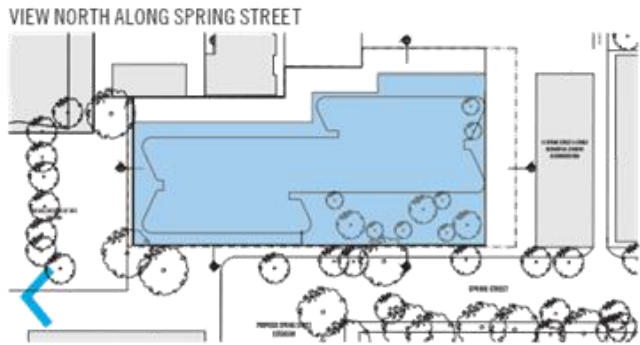


URBAN CONTEXT REPORT_RFI RESPONSE _ 16 SPRING STREET, BOXHILL

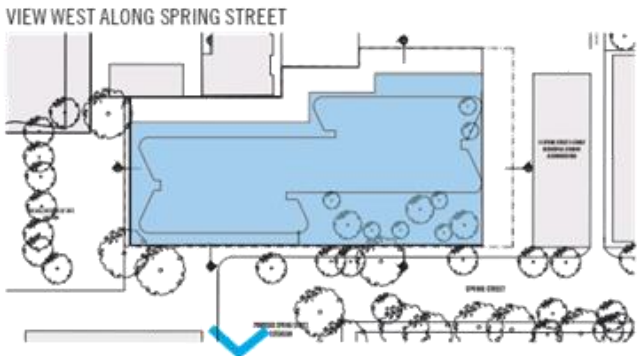
ELENBERG FRASER



01.8_EXISTING CONDITIONS - SITE PHOTOS



01.8_EXISTING CONDITIONS - SITE PHOTOS



URBAN CONTEXT REPORT_RFI RESPONSE _ 16 SPRING STREET, BOXHILL

ELENBERG FRASER



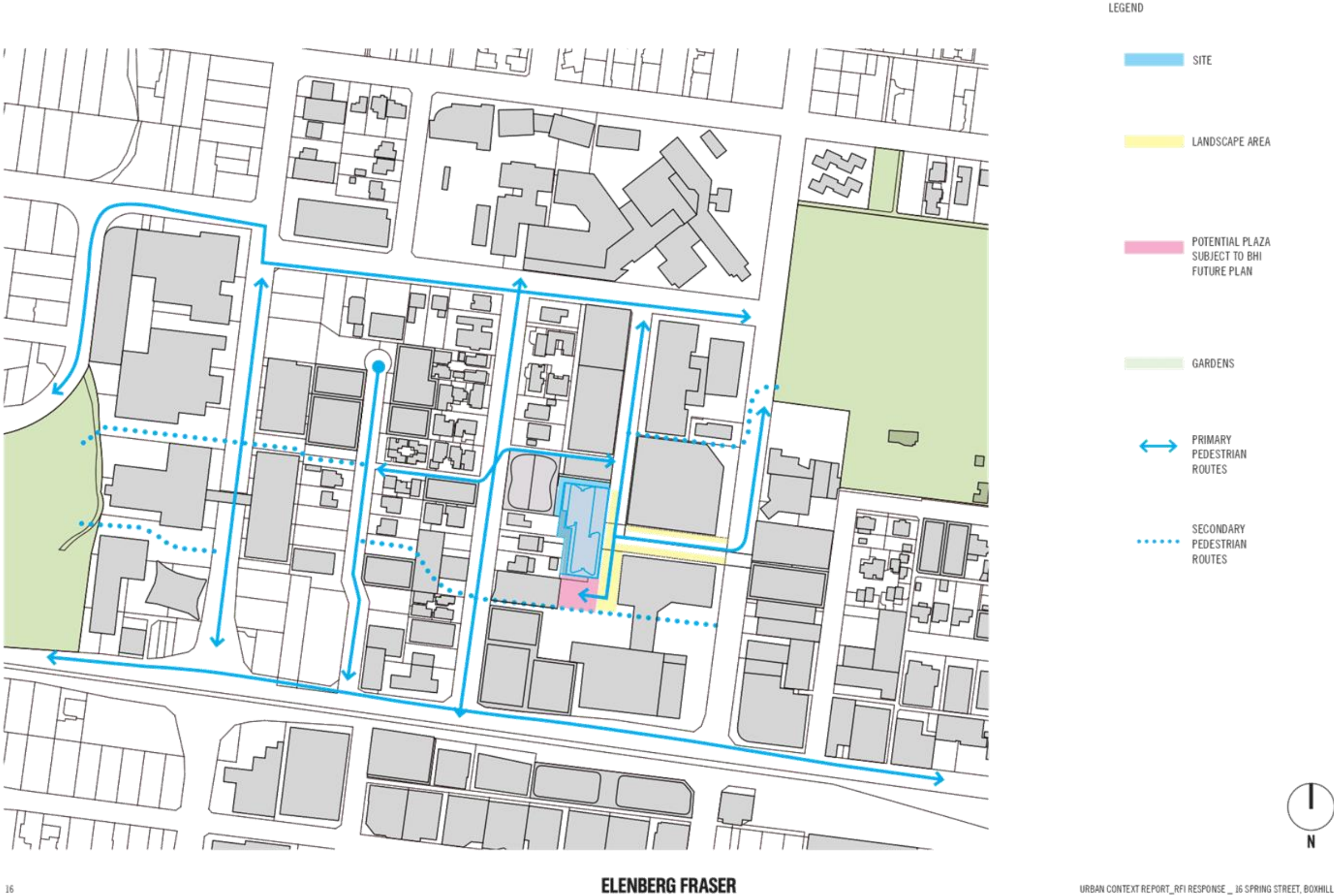
01.9_DEVELOPMENT CONTEXT



01.10_LAND USE - BHI AND HOSPITAL



01.11_PEDESTRIAN CONNECTIVITY



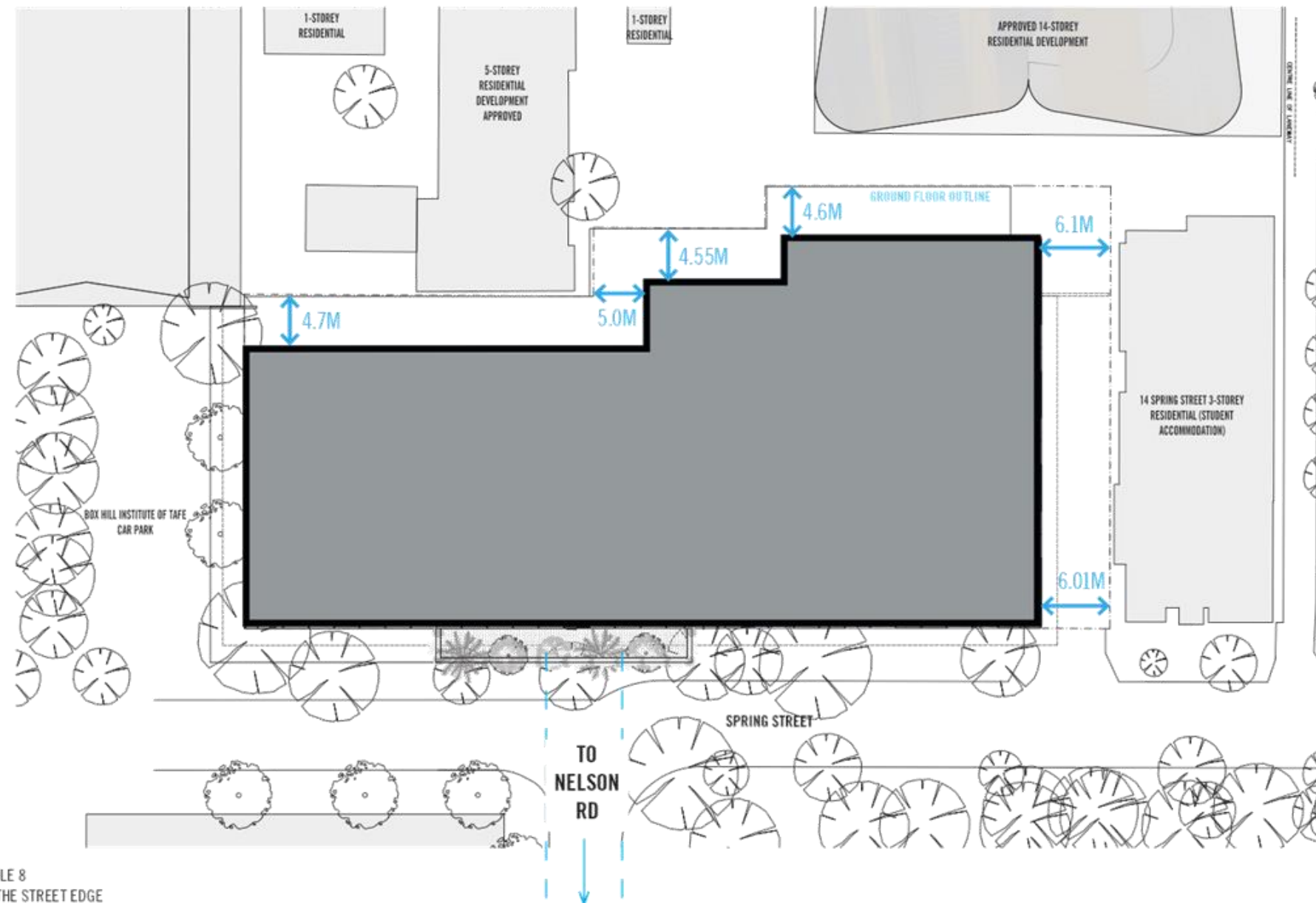
1.12_VIEWS



9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects

PLANNING CONTEXT

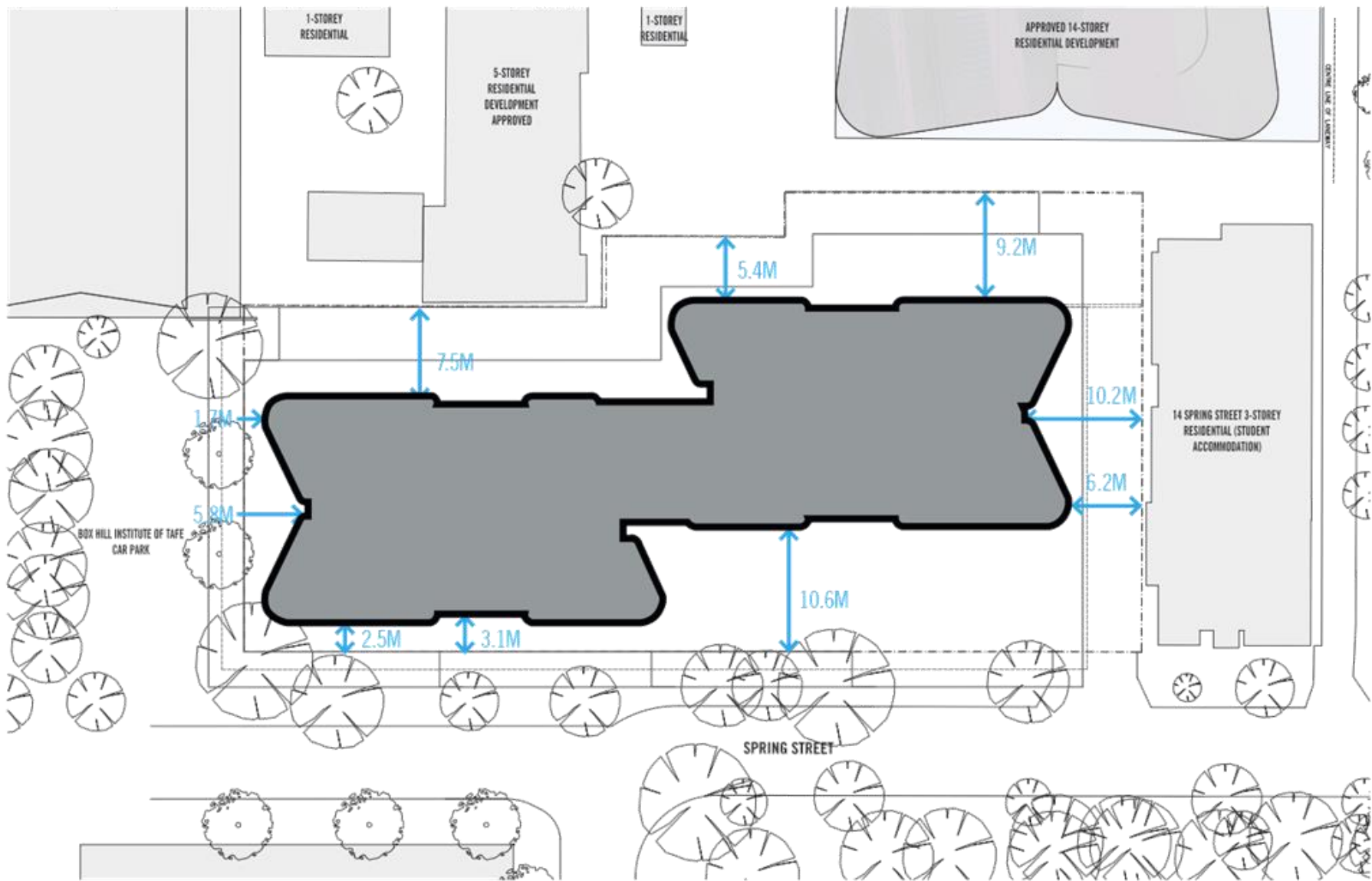
02.1 DEVELOPMENT PLAN OVERLAY SCHEDULE 8: BUILT FORM DIRECTIONS: PODIUM AND CONNECTIVITY



DEVELOPMENT PLAN OVERLAY SCHEDULE 8

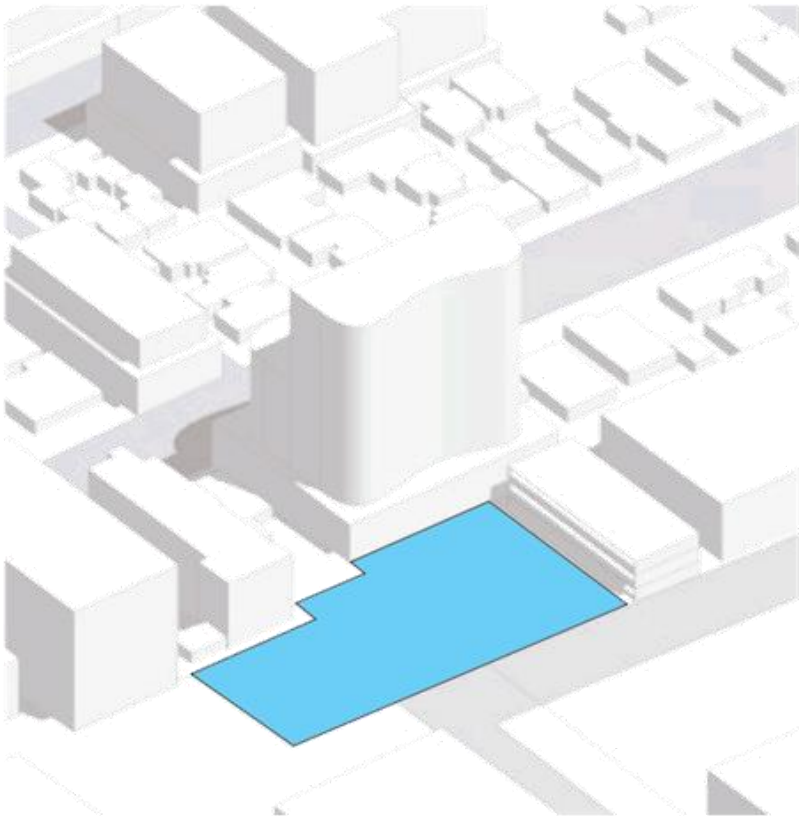
- FOUR STOREY PODIUM DEFINING THE STREET EDGE
- STEPPED TOWER FORM
- VEHICULAR LANEWAY ACCESS ALONG NORTHERN EDGE OF SITE
- CREATION OF NEW ROAD ALONG THE NORTHERN BOUNDARY OF 853 WHITEHORSE RD CONNECTING SPRING ST (AS EXTENDED) TO NELSON RD
- 6M SETBACK TO NORTH
- MIN 4.5M SETBACK TO WESTERN BOUNDARIES

02.2_DEVELOPMENT PLAN OVERLAY SCHEDULE 8: BUILT FORM DIRECTIONS: TOWER



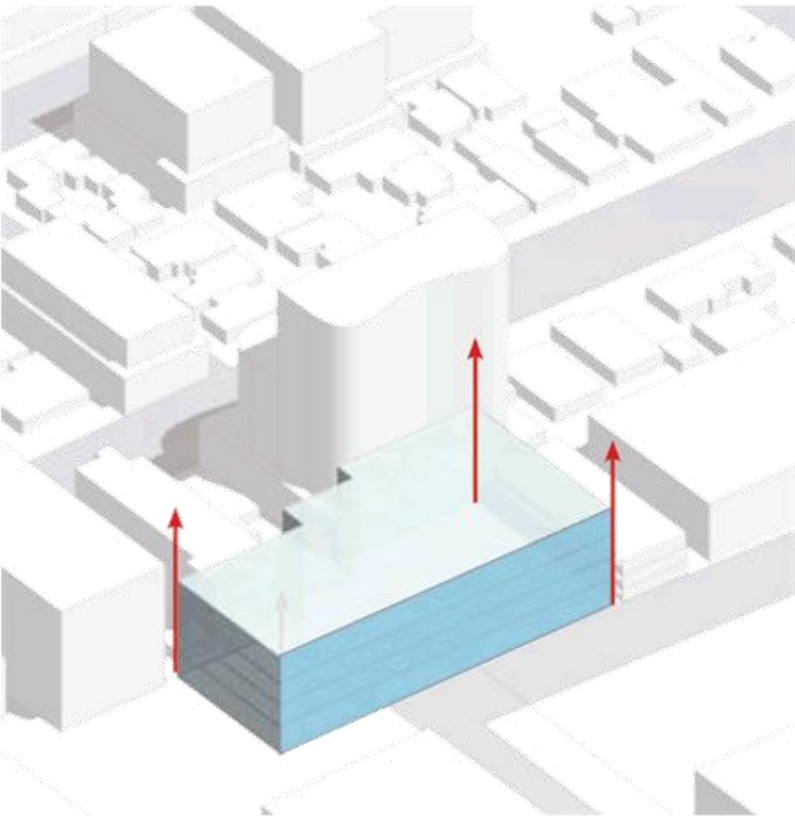
02.3_PLANNING FRAMEWORK ENVELOPE

SITE



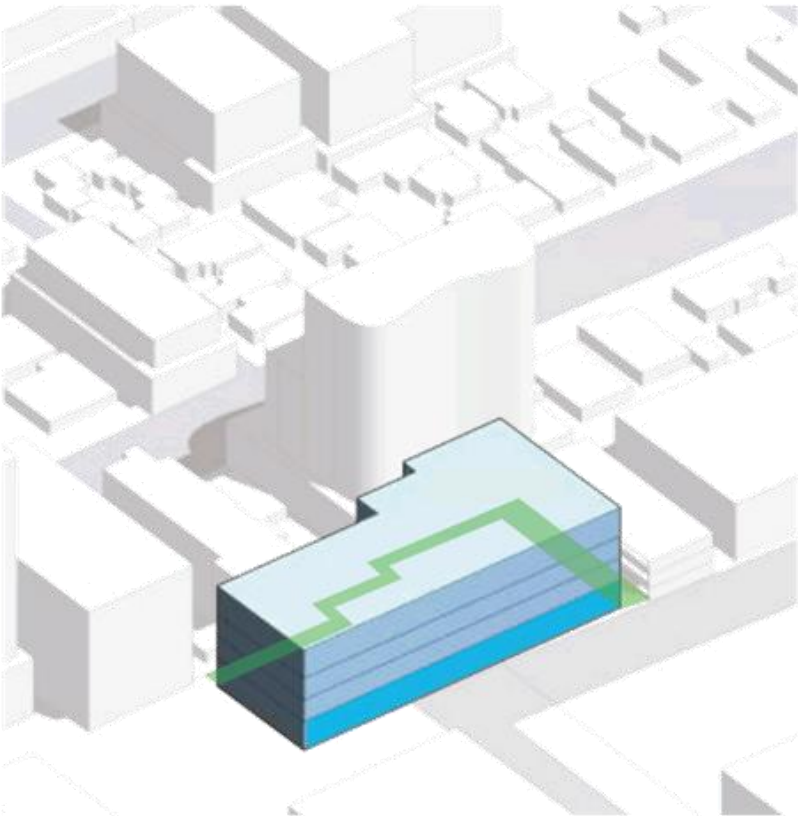
AN OPEN AIR CARPARK CURRENTLY OCCUPIES THE SUBJECT SITE.

PODIUM



THE ESTABLISHMENT OF A 4-STOREY PODIUM IN LINE WITH THE DEVELOPMENT PLAN OVERLAY SCHEDULE 8.

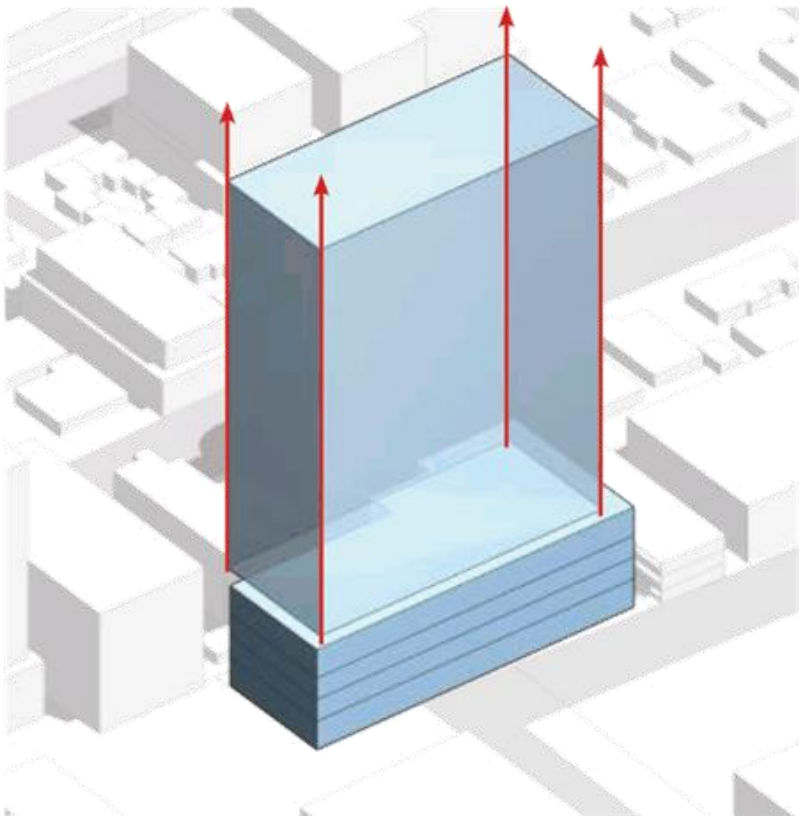
PODIUM SETBACKS



SETTING BACK THE NORTHERN END OF THE PODIUM AWAY FROM THE NEIGHBOURING SITE AND CREATING VEHICLE ACCESS TO BOH ZONES IN LINE WITH THE DEVELOPMENT PLAN OVERLAY SCHEDULE 8. A MINIMUM 4.5M SETBACK HAS BEEN APPLIED ALONG THE WESTERN BOUNDARY TO ALLOW FOR EQUITABLE DEVELOPMENT

02.3_PLANNING FRAMEWORK ENVELOPE

TOWER EXTRUSION



TOWER UP TO 29-LEVELS AS DESCRIBED IN THE DEVELOPMENT PLAN OVERLAY SCHEDULE 8.

TOWER SHIFT/ FORM/SETBACKS



SEPARATING THE TOWER FORM TO REDUCE VISUAL BULK AND MOULDING THE FORM TO CREATE MORE ORGANIC GEOMETRY TO FURTHER BREAK DOWN THE MASS

GRADATION IN HEIGHT



APPROPRIATE GRADATION IN HEIGHT AS REQUIRED BY THE DESIGN GUIDELINES NOMINATED IN THE DEVELOPMENT PLAN OVERLAY – SCHEDULE 8. THE BUILDING HAS BEEN DESIGN TO STEP FROM THE ROOF PLANT SCREEN DOWN TO 29 STOREYS AT THE SOUTHERN END, THEN STEP DOWN TO 27 STOREYS AND 25 STOREYS TO THE NORTHERN PORTION OF THE TOWER.

9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects

MASTER PLANNING RESPONSE

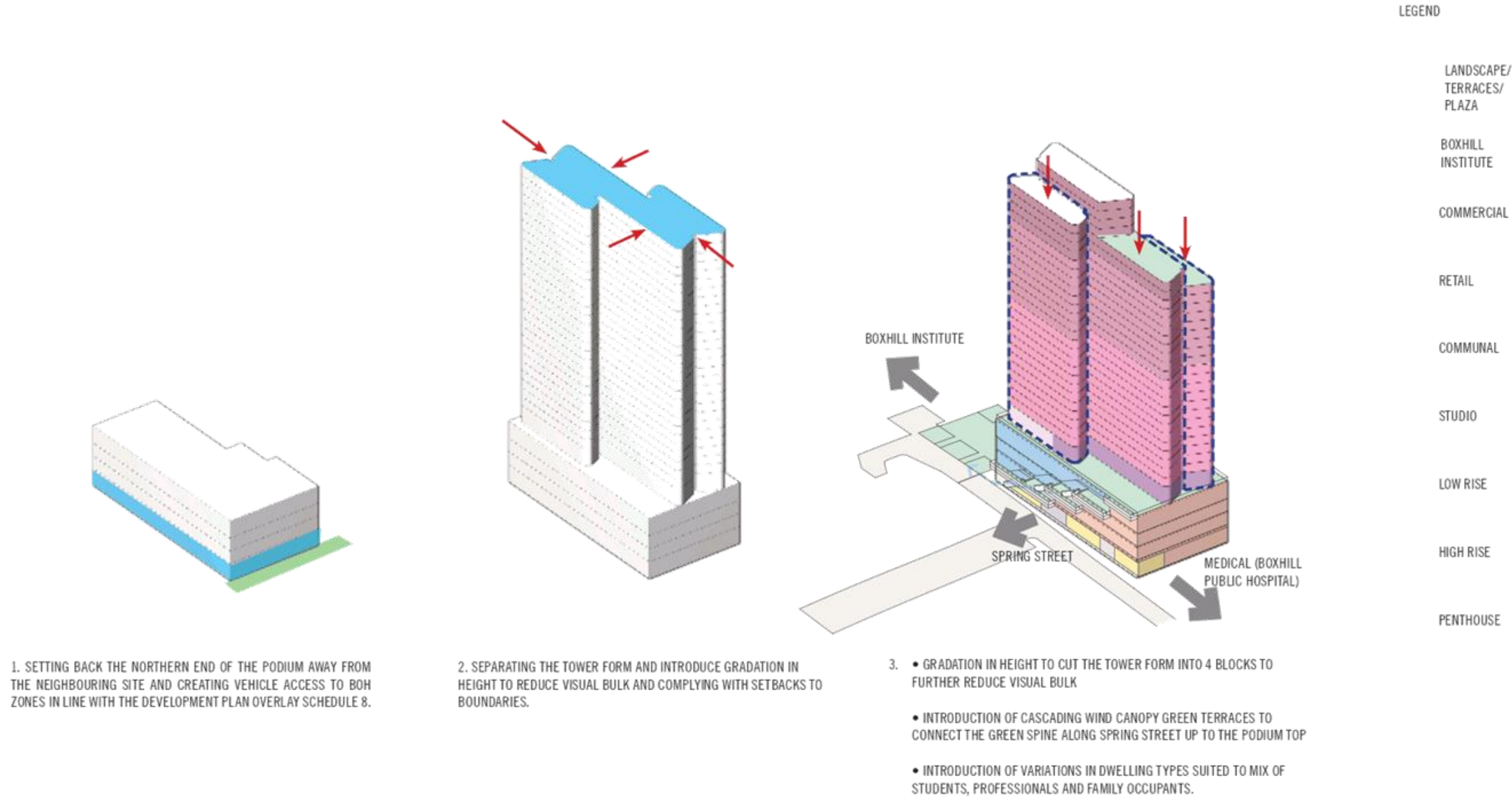
9.1.2 – ATTACHMENT 1.

Urban Context Report & Development Plan:Elenberg Fraser Architects

03.1_NEW CAMPUS CENTRE



03.2_MASSING AND PROGRAMME



03.3 DESIGN PILLARS



03.4_SITE OPPORTUNITIES_GROUND FLOOR SPRING STREET ACTIVATION



03.5_SITE OPPORTUNITIES_GROUND FLOOR ACTIVATION

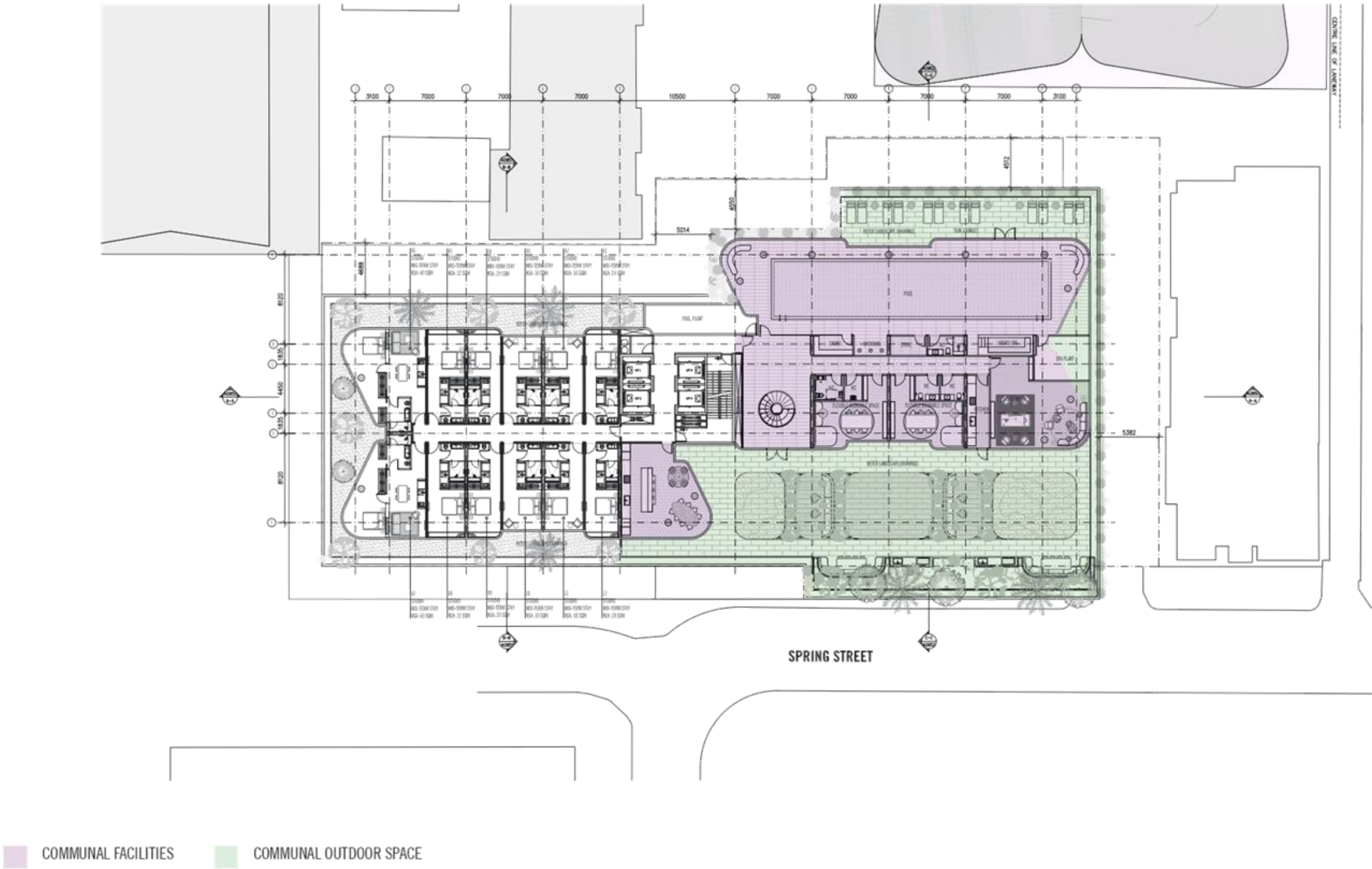


- OPEN AND TRANSPARENT GROUND FLOOR PRESENCE THAT WELCOMES STUDENTS & STAFF
- OPPORTUNITIES TO PRESENT BACK TO THE BROADER COMMUNITY THE ACTIVITIES WITHIN THE BHI
- PRESENT ACTIVE FRONTAGES THAT CONTRIBUTE TO THE STREETScape & PUBLIC REALM

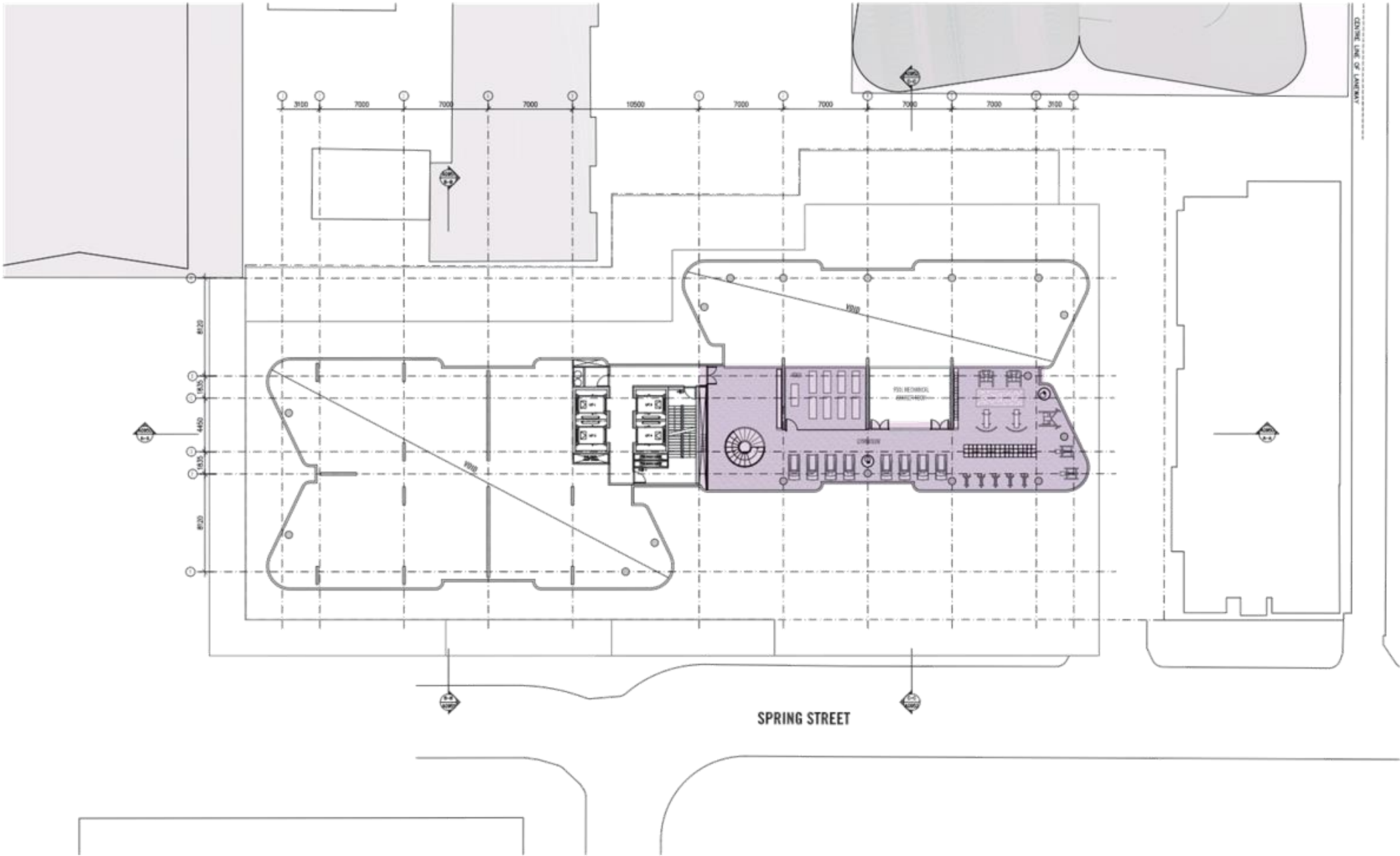
URBAN CONTEXT REPORT_RFI RESPONSE _ 16 SPRING STREET, BOXHILL

ELENBERG FRASER

03.6_SITE OPPORTUNITIES_PODIUM TOP COMMUNAL FACILITIES



03.7_SITE OPPORTUNITIES_L04 MEZZANINE COMMUNAL FACILITIES



03.8_SITE OPPORTUNITIES_L27 HIGH RISE EXCLUSIVE OUTDOOR COMMUNAL FACILITIES



COMMUNAL OUTDOOR SPACE

EXISTING EXAMPLES
EQ TOWER

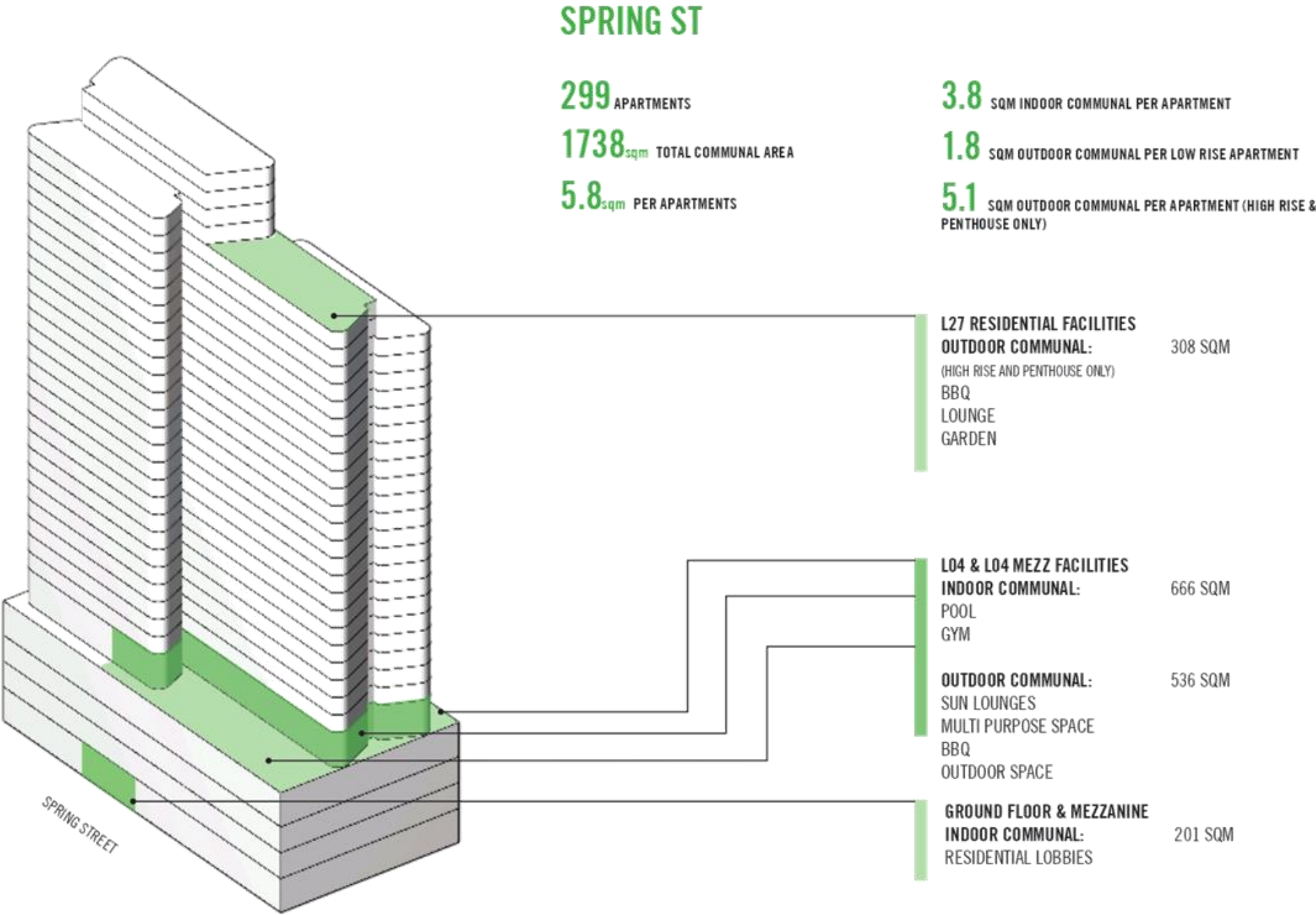
2.2M2 PER APARTMENT

APARTMENTS:	632
LOBBY	140M²
PODIUM TOP L07	1044M²
LEVEL 33	188M²
TOTAL COMMUNAL AREA:	1372M2

PREMIER TOWER

2.8M2 PER APARTMENT

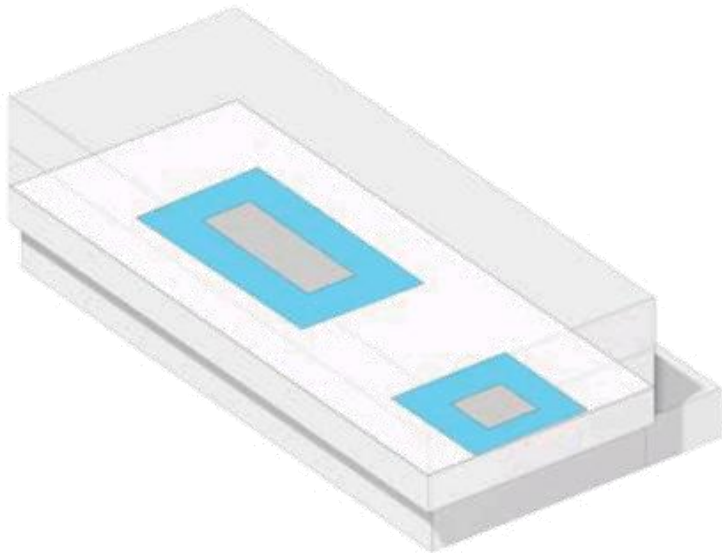
APARTMENTS:	780
HOTEL ROOMS	186
LOBBY	
PODIUM TOP L07 + L07M	
LEVEL 46	
PENTHOUSE CLUB L76	
TOTAL COMMUNAL AREA:	2740M2



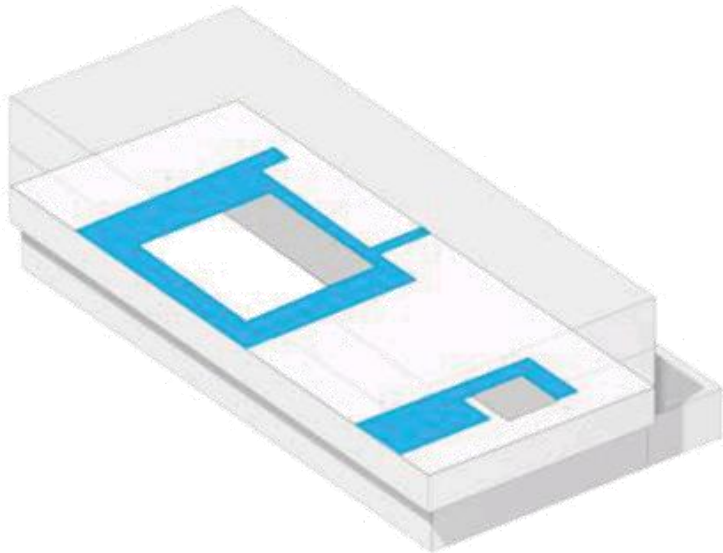
9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects

DESIGN RESPONSE

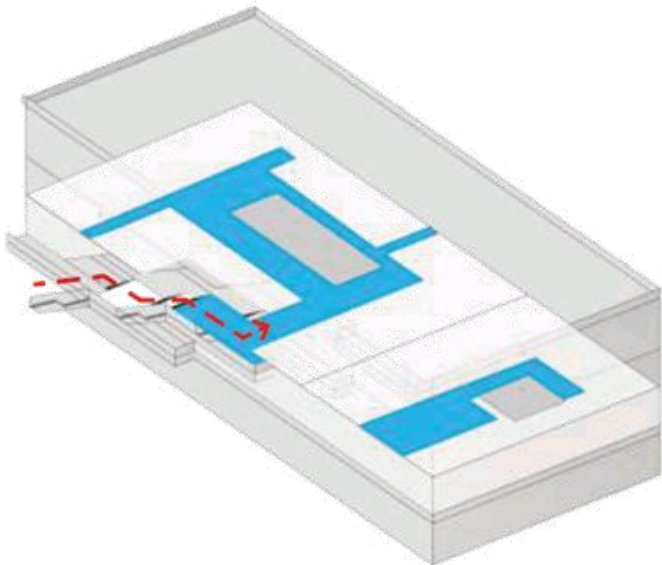
04.1_PODIUM CONCEPT - INSIDE OUT LEARNING



INBOARD CIRCULATION (STANDARD APPROACH)

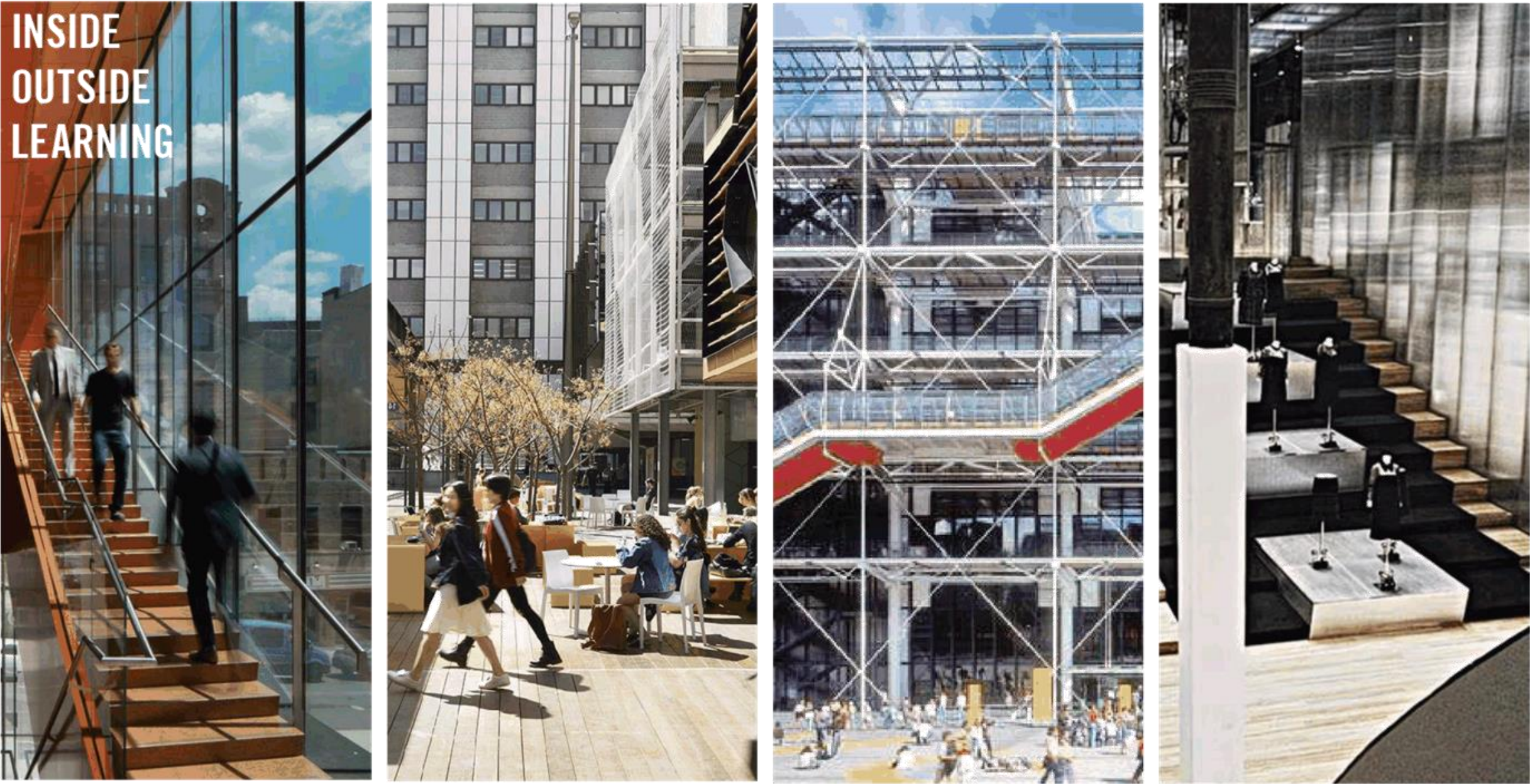


CIRCULATION PULLED ONTO FACADE
FOR BETTER AMENITY AND EFFICIENCY

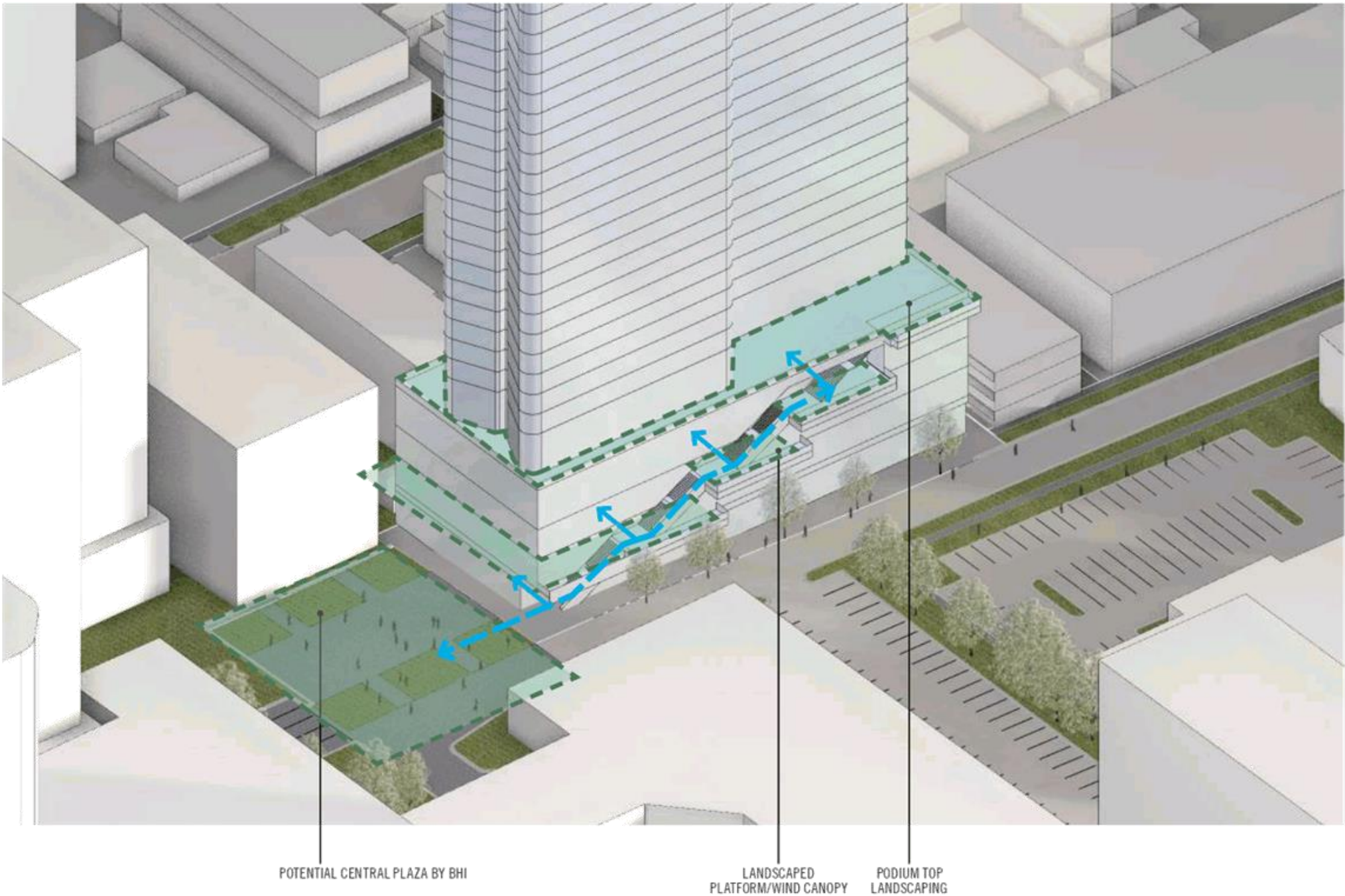


INTRODUCTION OF STAIR ON EASTERN
SIDE FOR BETTER CONNECTIVITY AND
CIRCULATION EXPERIENCE

04.1_PODIUM CONCEPT - INSIDE OUTSIDE LEARNING



04.2_PODIUM CONCEPT - CONNECTING TO THE LANDSCAPE



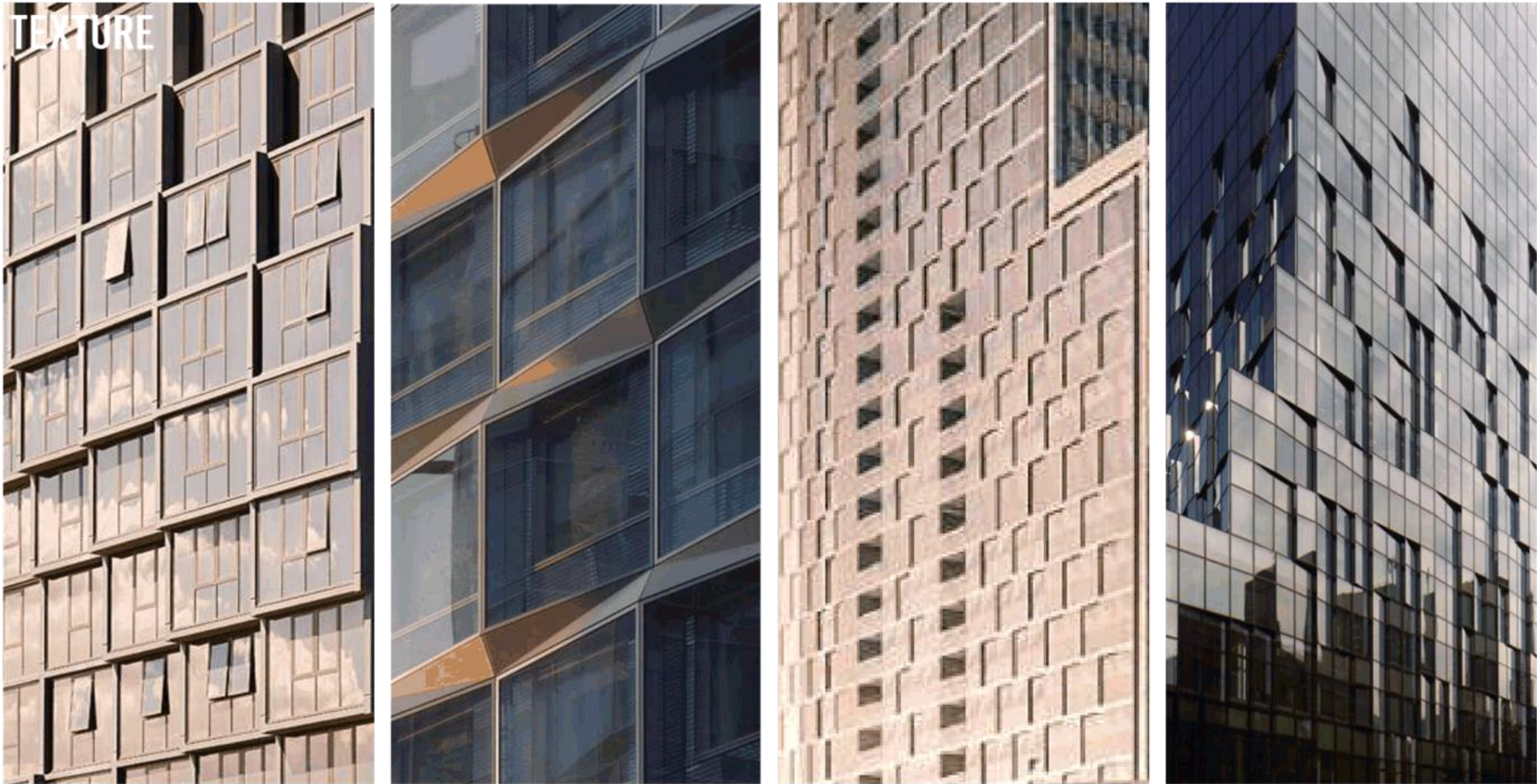
04.2_PODIUM CONCEPT - CONNECTING TO LANDSCAPE



04.3_PODIUM ARCHITECTURE - MATERIAL RICHNESS



04.3_PODIUM ARCHITECTURE - MATERIAL RICHNESS



URBAN CONTEXT REPORT_RFI RESPONSE _ 16 SPRING STREET, BOXHILL

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04.4_A NEW LANDSCAPED THOROUGHFARE



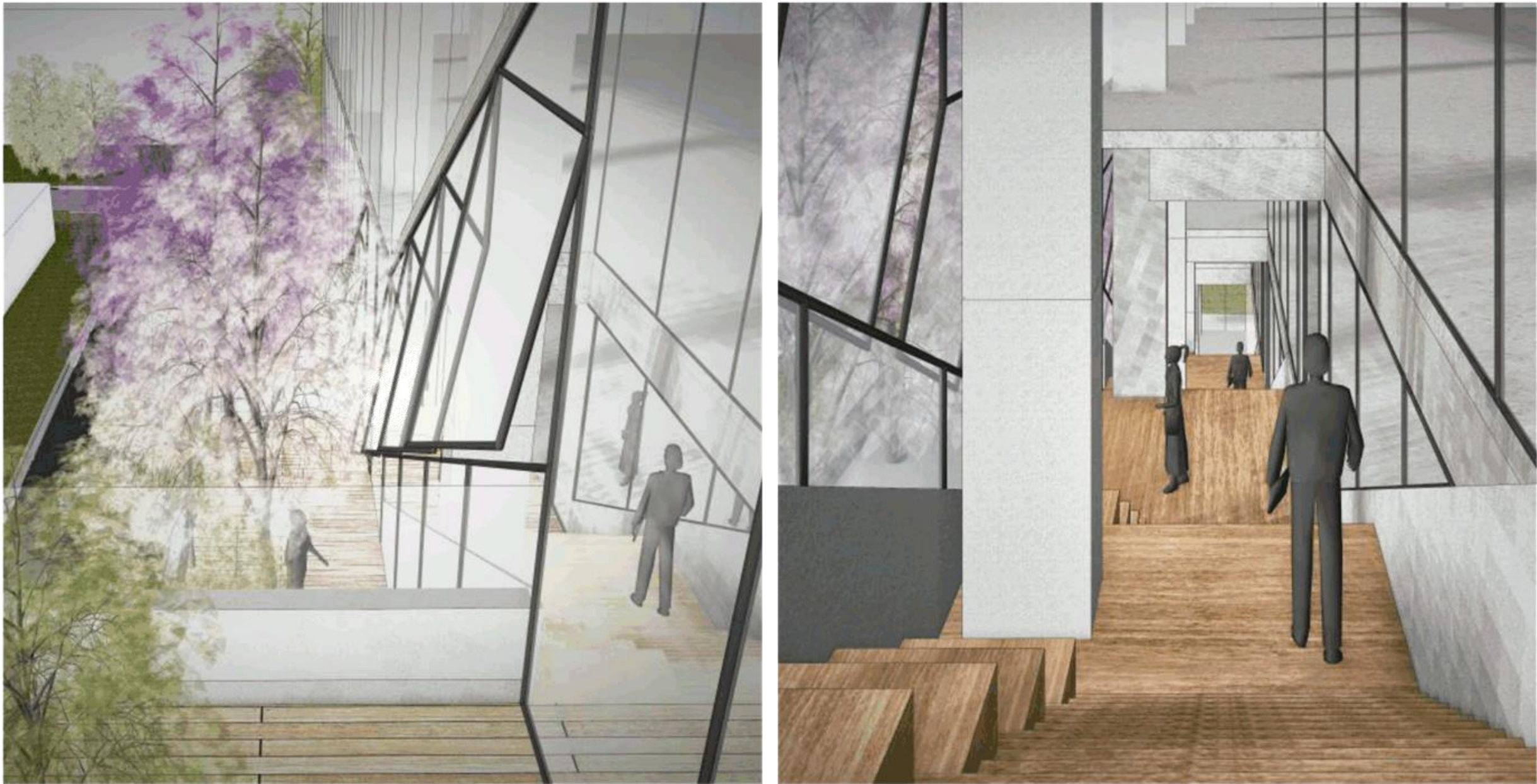
04.4_A NEW LANDSCAPED THOROUGHFARE



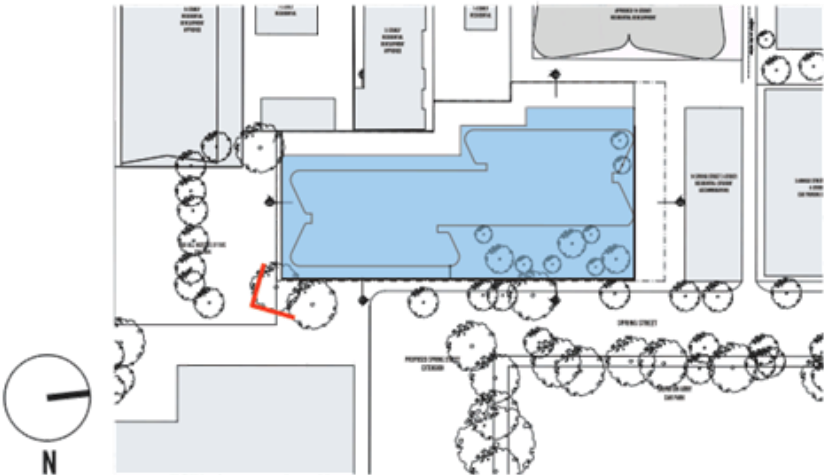
04.4_A NEW LANDSCAPED THROUGHFARE



04.4_A NEW LANDSCAPED THROUGHFARE



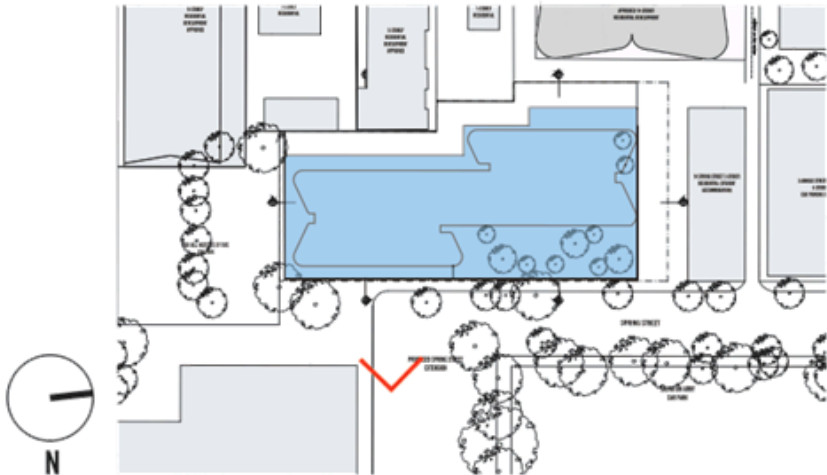
04.5_ARTIST’S IMPRESSION - PODIUM



9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects



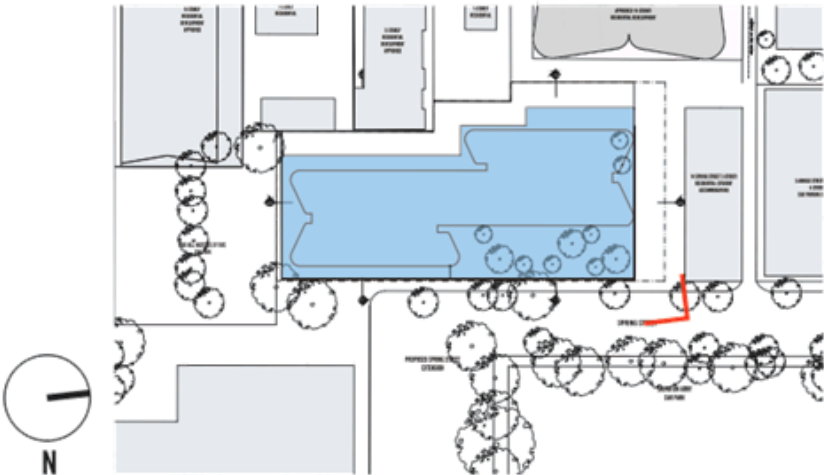
04.6_ARTIST’S IMPRESSION - PODIUM



9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects



04.7_ARTIST'S IMPRESSION - PODIUM



9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects





04.8_TOWER CONCEPT

*Shanshui
Waterfall*

04.8_TOWER CONCEPT

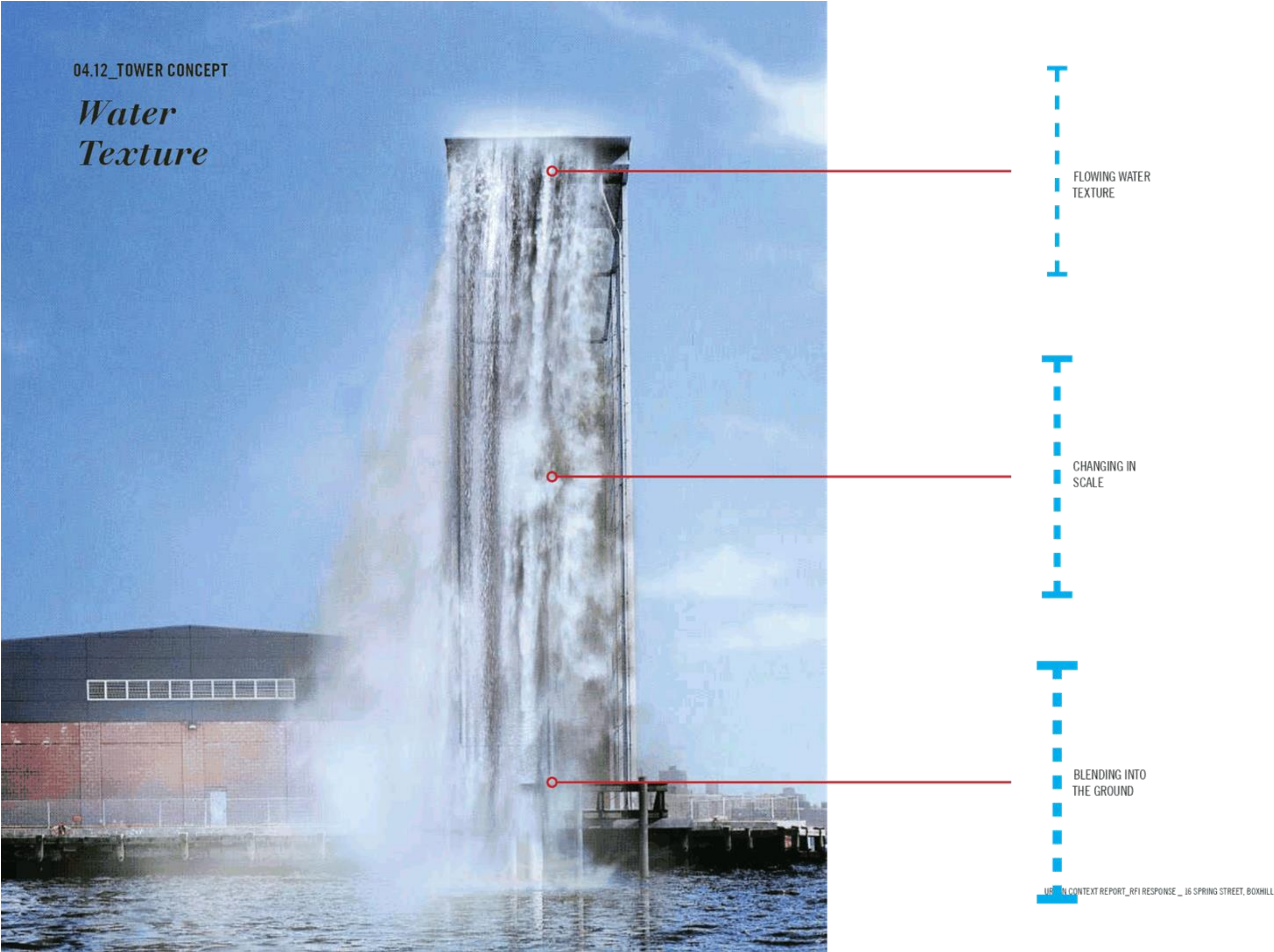


9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects



04.11_TOWER CONCEPT





04.13_TOWER CONCEPT

Changing of
the Seasons



WINTER



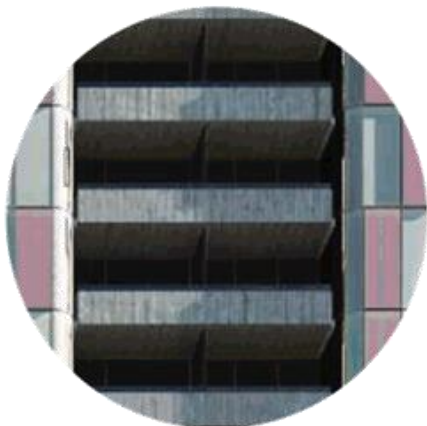
SPRING



SUMMER

04.14_TOWER CONCEPT

- BLUSH/SILVER DICHROIC GLASS REPRESENTING THE COLOURS OF SPRING
 - SILVER/CHAMPAGNE DICHROIC GLASS REPRESENTING THE SPRINGTIME SHOULDER SEASONS OF SUMMER AND WINTER
- THE BLUSH PANELS HAVE BEEN OUTLINED IN A THIN BLACK FRAME TO ACCENTUATE THEM AND ARRANGED IN THE PATTERN OF A CASCADING WATERFALL



- PRECAST TEXTURED BALUSTRADE TO HELP BREAK UP THE TOWER MASS AND REPRESENT THE ROCK FACES OF THE WATERFALL



LEGEND

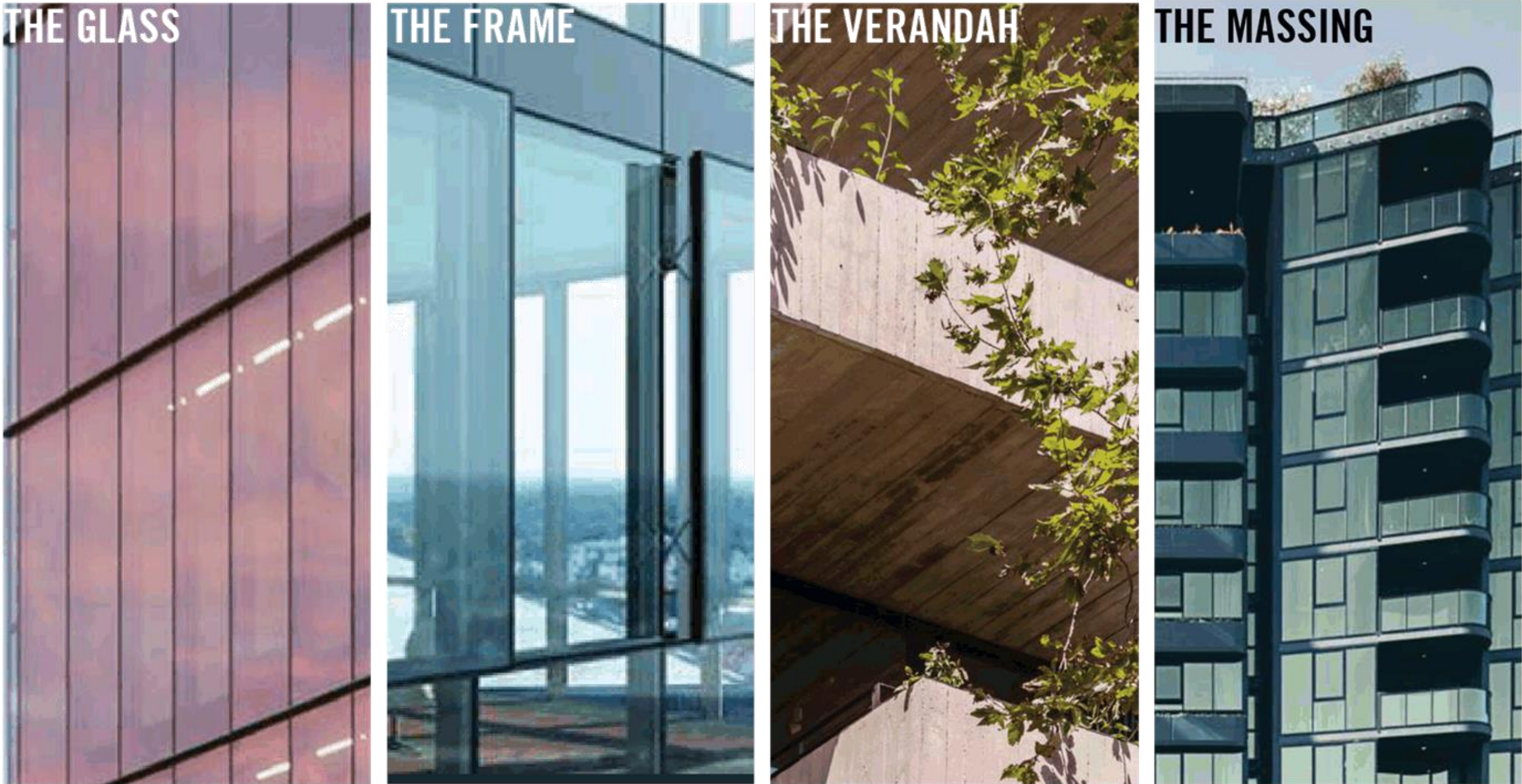
TERRACES

FACADE TYPE 1

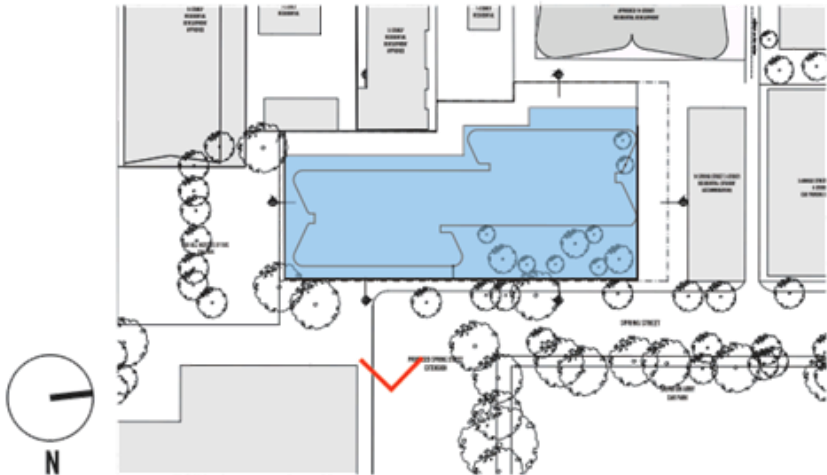
FACADE TYPE 2

UNIQUE FACADE TYPES ACCENTUATING THE EXPRESSION OF EACH TOWER MASSING INCORPORATING A GRADUATION IN TOWER HEIGHT.

04.15_TOWER CONCEPT



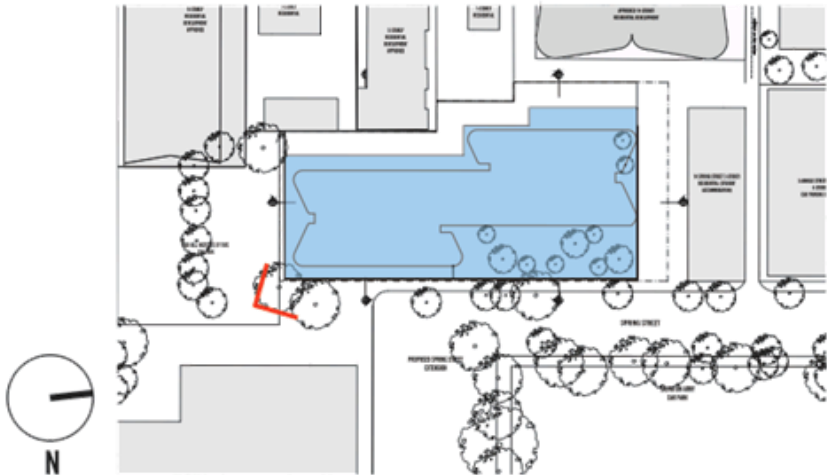
04.16_ARTIST'S IMPRESSION - TOWER



9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects



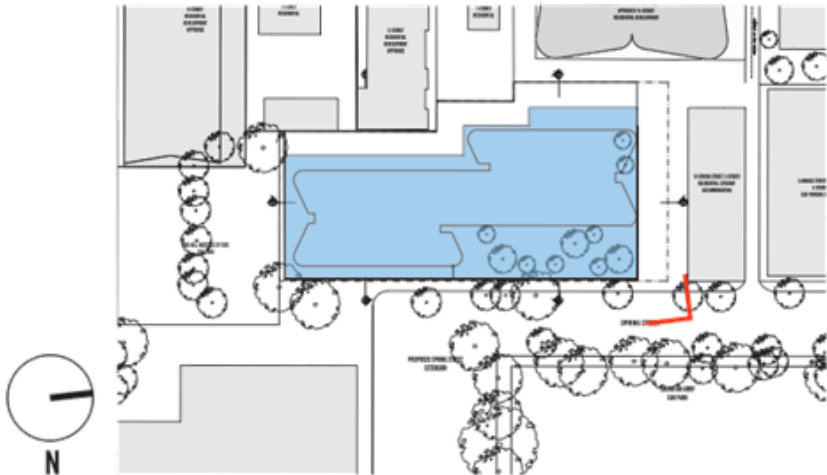
04.17_ARTIST'S IMPRESSION - TOWER



9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects



04.18_ARTIST'S IMPRESSION - TOWER



9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects



URBAN CONTEXT REPORT_RFI RESPONSE _ 16 SPRING STREET, BOXHILL

04.19_MATERIALS_PODIUM



CONC-01 - OFF FORM
TEXTURED PRECAST
CONCRETE



GL-04 - SILVER DOUBLE
GLAZING



GL01 - CLEAR VISION
GLAZING



04.20_MATERIALS_TOWER



CONC-01 - OFF FORM
TEXTURED PRECAST
CONCRETE



GL-01 - BLUSH GLASS



GL-02 - SILVER/
CHAMPAGNE DICHROIC
DOUBLE GLAZING



GL-03 - SMOKE GREY
DOUBLE GLAZING



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9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects

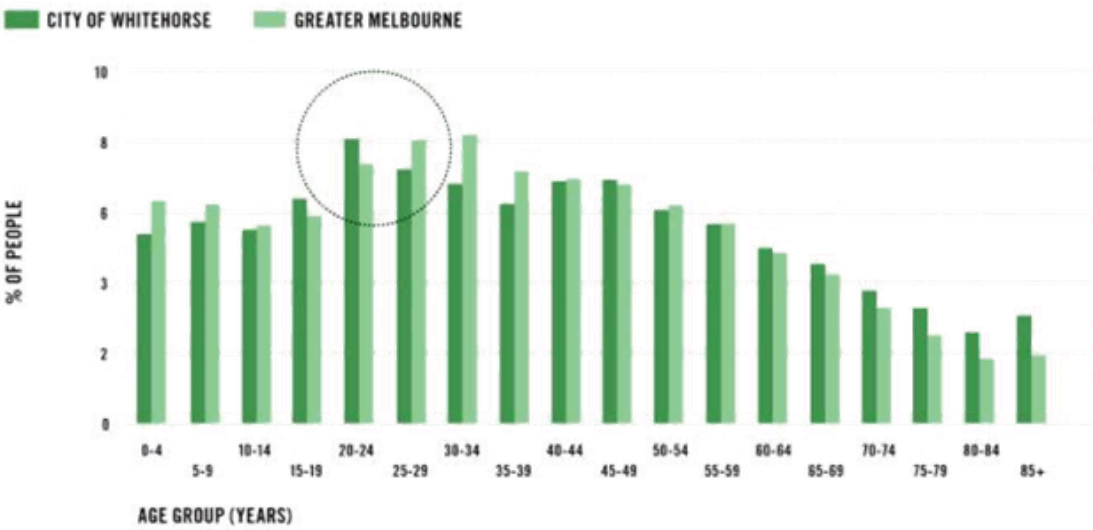
APPENDIX

9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects

DEMOGRAPHICS

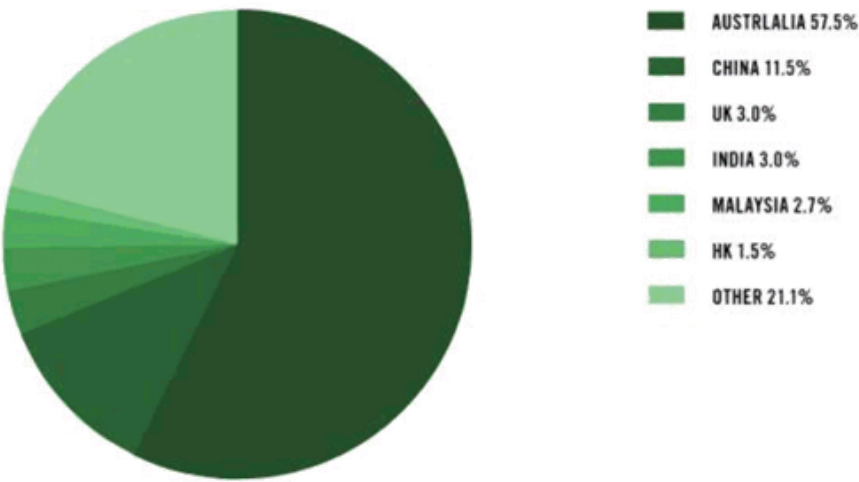
05.1_CITY OF WHITEHORSE DEMOGRAPHICS

WHITEHORSE AGE STRUCTURE (TOTAL PERSONS)



20-29
WHITEHORSE RESIDENTS PRIMARILY MILLENIALS

BIRTHPLACE RANKED BY SIZE 2016



57.5%
THE LARGEST BIRTHPLACE DEMOGRAPHIC IN WHITEHORSE ARE AUSTRALIANS

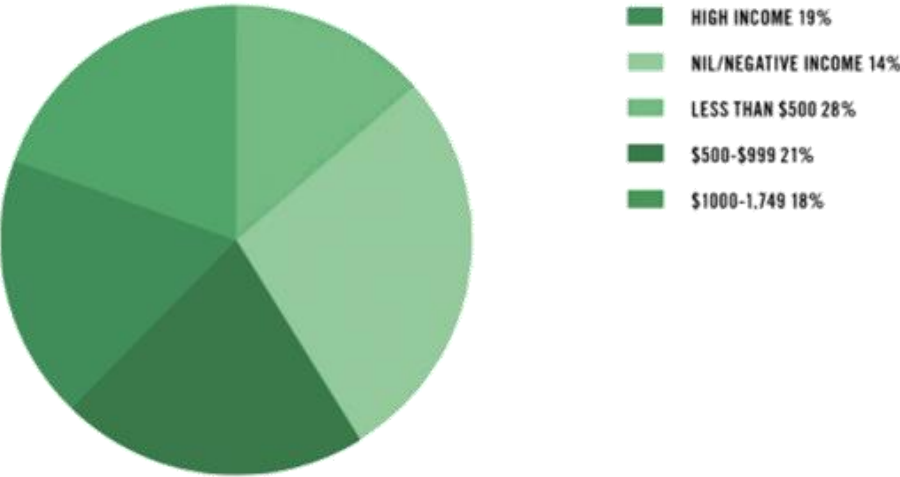
Source: Australian Bureau of Statistics, Regional Population Growth, Australia

05.1_CITY OF WHITEHORSE DEMOGRAPHICS

WHITEHORSE EMPLOYMENT



WEEKLY INDIVIDUAL INCOME 2016



UNDERSTANDING THE WHITEHORSE POPULATION



05.1_CITY OF WHITEHORSE DEMOGRAPHICS

POPULATION FLOWS 2011-2016

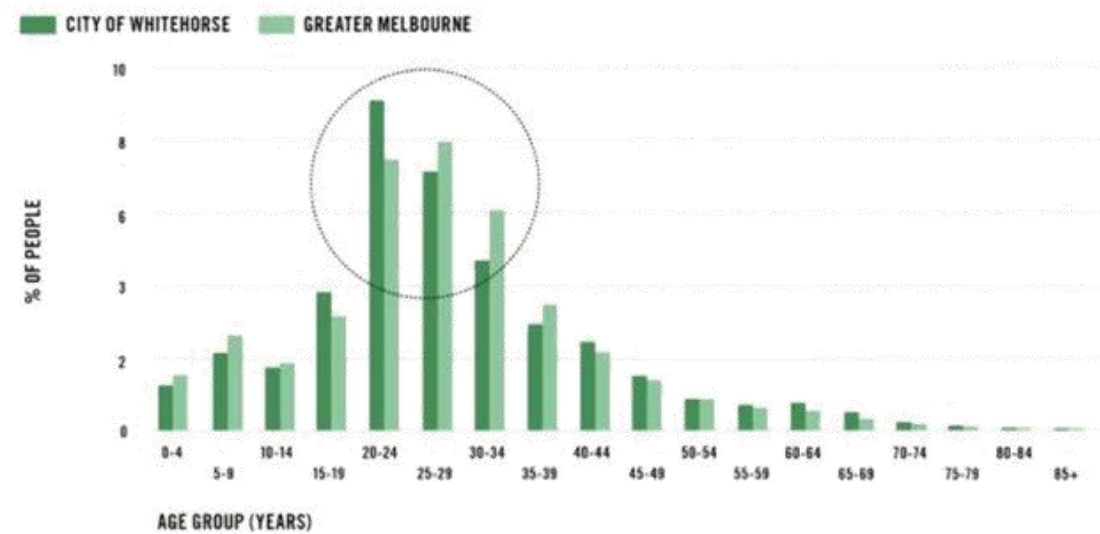


ARRIVALS BY BIRTHPLACE 2016

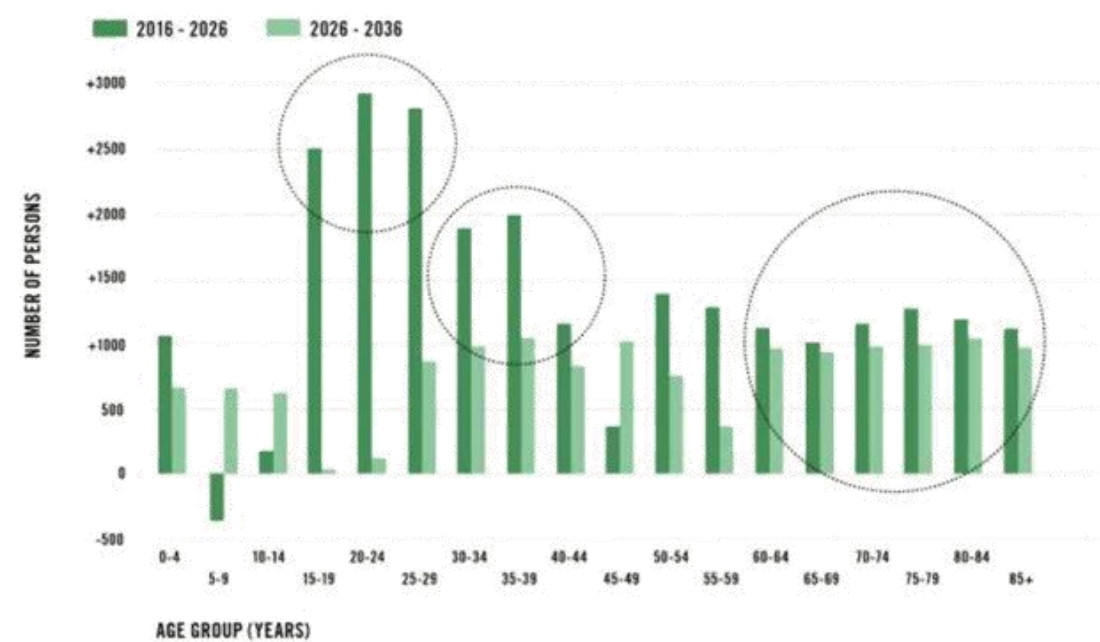


05.1_CITY OF WHITEHORSE DEMOGRAPHICS

WHITEHORSE AGE STRUCTURE (RECENT ARRIVALS)



WHITEHORSE FORECAST CHANGE IN AGE STRUCTURE



URBAN CONTEXT REPORT_RFI RESPONSE _ 16 SPRING STREET, BOXHILL

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UNDERSTANDING DEMOGRAPHIC CHANGE

20-29

MILLENNIALS WITH A DEMAND FOR A PLACE TO WORK

PRIMARILY
YOUNG OVERSEAS
ARRIVALS

29-44

YOUNG PROFESSIONALS, IMMIGRATED, TERTIARY EDUCATED
DEMAND FOR ASSET ACQUISITION

MAJOR IMMIGRATION
FROM CHINA
28.9% INDIA 11.0%
MALAYSIA 7.0%

60-85+

AGING IN PLACE, EMPTY NESTER

FAST GROWTH IN
MILLENNIAL, GLOBAL
CITIZEN & RETIREE
DEMOGRAPHICS

9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects

SITE SERVICES

9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects



06.1_SERVICES



9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects

SUSTAINABILITY

9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects



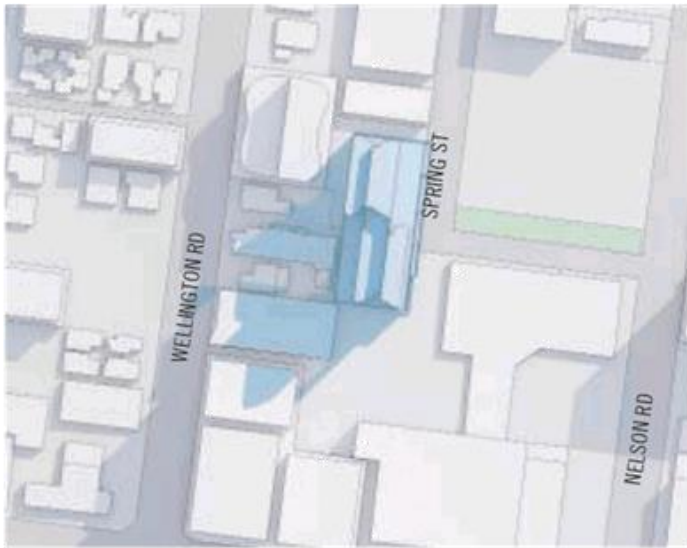
07.1_SUSTAINABILITY



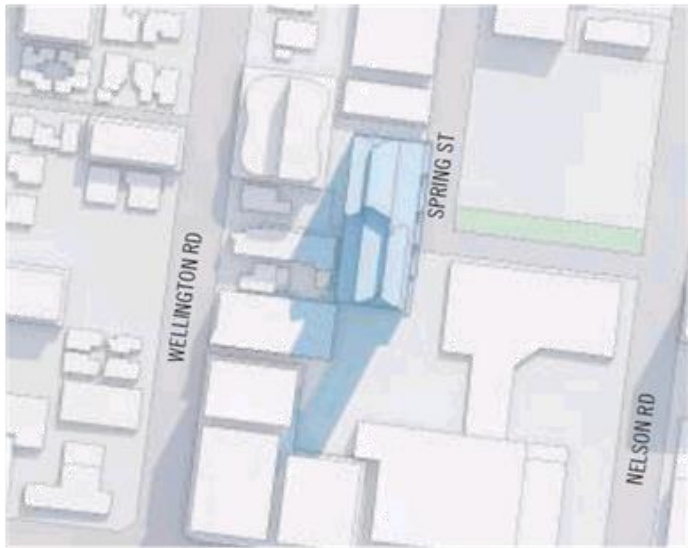
9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects

SHADOW STUDIES

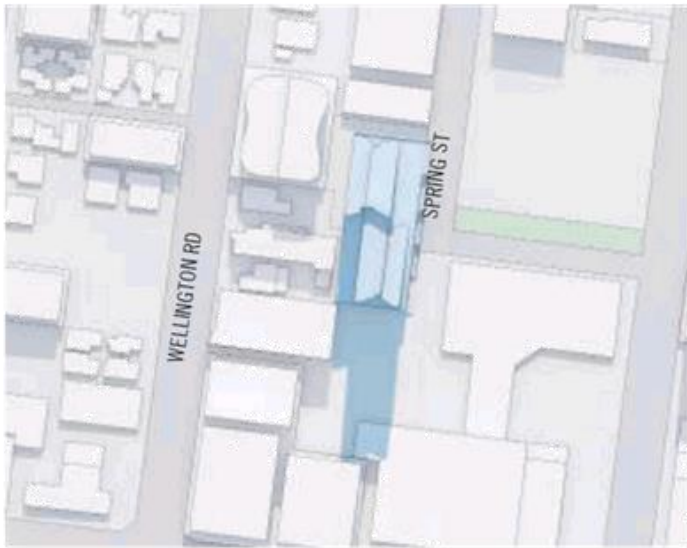
08.1_SHADOW STUDIES



22 SEPTEMBER 10 AM

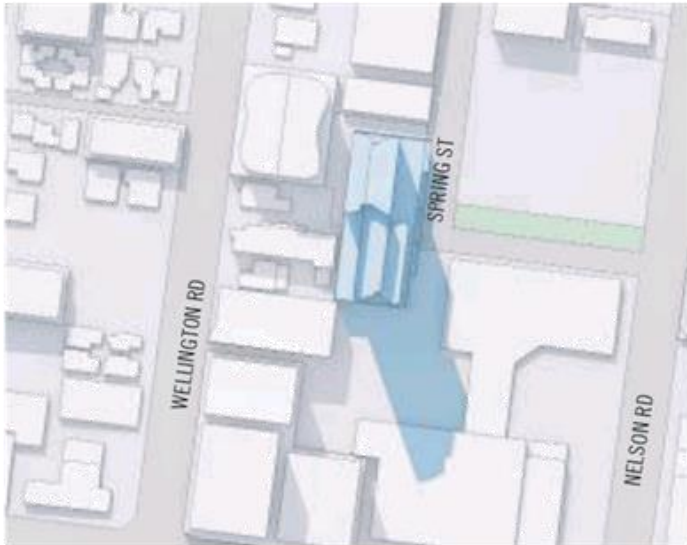


22 SEPTEMBER 11 AM

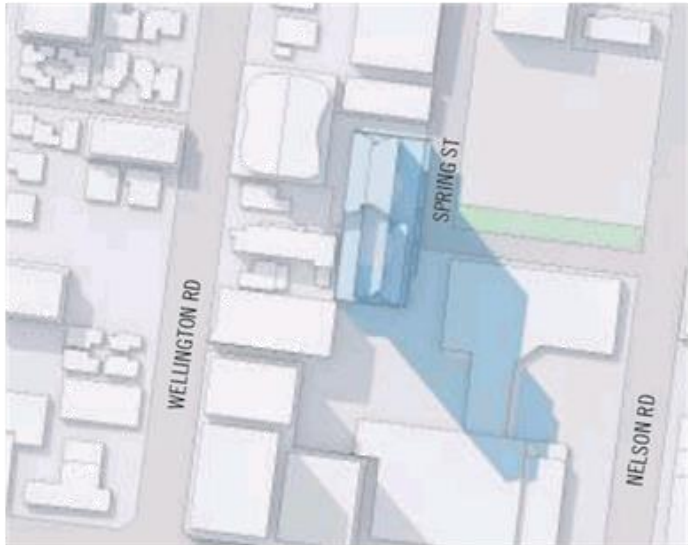


22 SEPTEMBER 12 PM

08.1_SHADOW STUDIES



22 SEPTEMBER 1 PM



22 SEPTEMBER 2 PM



22 SEPTEMBER 3 PM

9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects

DEVELOPMENT SUMMARY

9.1.2 – ATTACHMENT 1.

Urban Context Report & Development Plan:Elenberg Fraser Architects

9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects

10.1 DEVELOPMENT SUMMARY

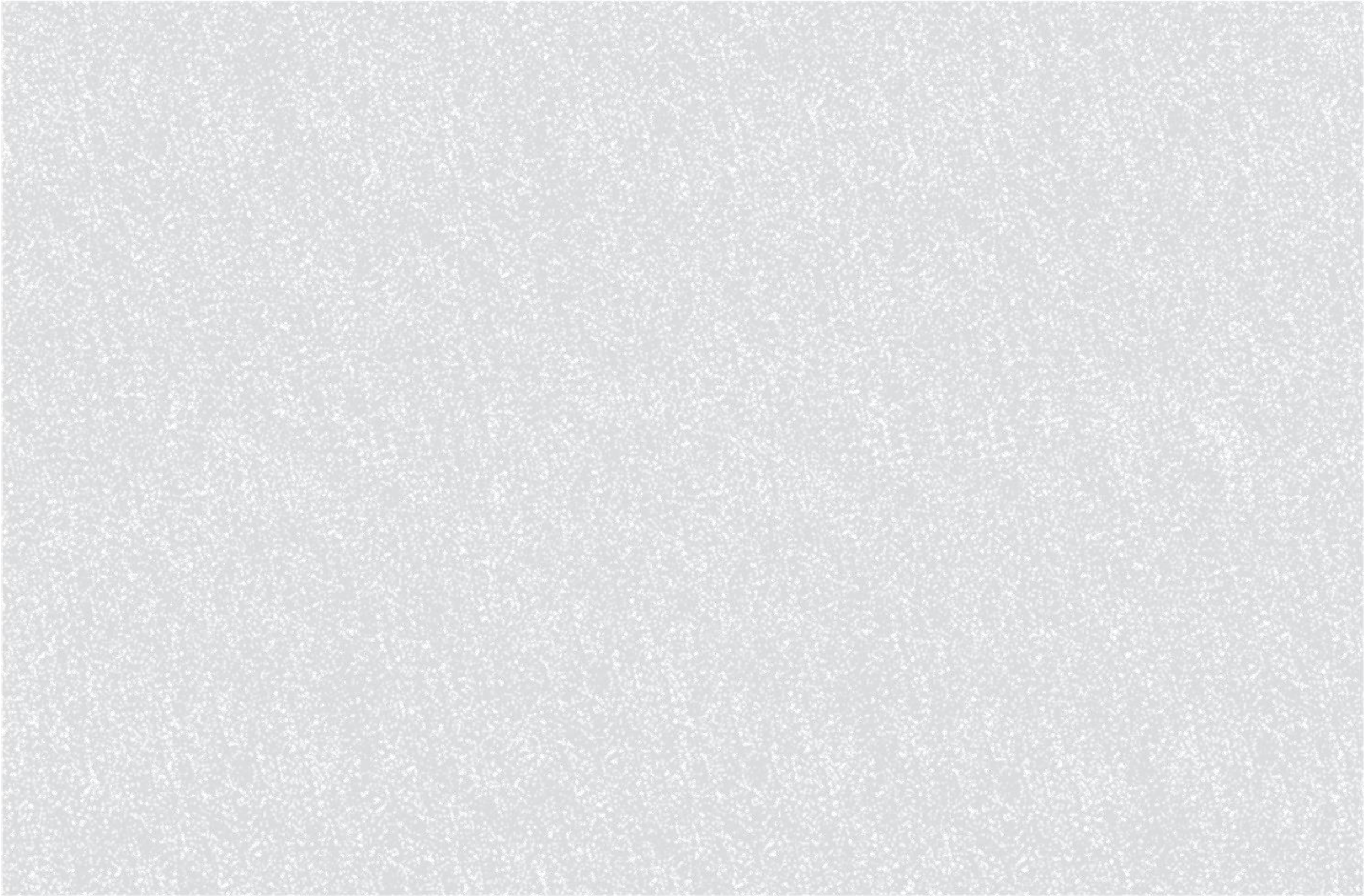
17106 16 Spring Street, Box Hill

DATE 14/02/2018
STAGE TP
REV B

Notes to Client:
1. This summary is for information only and is not intended to be used as a basis for any decision making or for any other purpose.
2. This summary is based on the information provided by the client and is not intended to be used as a basis for any decision making or for any other purpose.
3. The information in this summary is not intended to be used as a basis for any decision making or for any other purpose.
4. The information in this summary is not intended to be used as a basis for any decision making or for any other purpose.
5. The information in this summary is not intended to be used as a basis for any decision making or for any other purpose.

DEVELOPMENT SUMMARY																																		
DEVELOPMENT SUMMARY_16 SPRING STREET, BOX HILL																																		
No	LEVELS	APARTMENTS/ FLOOR	APARTMENTS/ TOTAL	GFA BHI /FLOOR	TERRACE/ CANOPY BHI /FLOOR	TOTAL BHI GFA	GFA RETAIL /FLOOR	GFA CONSULTING/F LOOR	GFA RESIDENTIAL /FLOOR	GFA SERVICES/BHI /FLOOR	TOTAL GFA	NLA RETAIL /FLOOR	NLA CONSULTING/F LOOR	NSA RESIDENTIAL /FLOOR	TOTAL NLA/NSA	EFFICIENCY /FLOOR	TERRACE AREA	TERRACE AREA / TOTAL	GFA CARPARK /FLOOR	TOTAL GFA CARPARK	TOTAL BIKES	BHI CAR SPACES /FLOOR	VISITOR CAR SPACES /FLOOR	COMMERCIAL STAFF CAR SPACES / FLOOR	RETAIL STAFF CAR SPACES/ FLOOR	RESIDENTIAL CAR SPACES /FLOOR	TOTAL CAR SPACES	STUDIO	1 BED	2 BED + 1 BATH	2 BED + 2 BATH	3 BED		
3	B5-B8																		2575	7725						79	237							
1	B2																		2575	2575						31	77							
1	B1																		2575	2575	120	34	46	16	5		93							
1	L00			661		661	422	112	272	677	1483	386			386				64	64														
	L00 MEZZ			23		23				696																								
1	L1			1196	162	1358		760	67		827		670		670																			
1	L2			1104	68	1172		760	67		827		670		670																			
1	L3			1104	68	1172		760	67		827		670		670																			
1	L4	12	12						1106		1106			417	417														12					
	L4 MEZZ								418		418																							
8	L5-L12	15	120						1089		1089			908	7264	83%	120	960												7		8		
5	L13-L17	15	75						1089		1089			904	4520	83%	120	600												7		8		
7	L18-L24	11	77						1122		1122			7854	6392	83%	88	636												2			6	3
1	L25	4	4						876		876			749	749	85%	332	332														1	3	
1	L26	5	5						876		876			724	724	82%	64	64														2	3	
1	L27	3	3						593		593			432	432	76%	40	40														1	2	
1	L28	3	3						609		609			432	432	74%	40	40														1	2	
29																																		
	TOTALS		299	4718	298	4586	422	2392	27594	1375	31307	390	2010	21130	23518		2652		12909		120	34	46	16	5	108	369	12	165	104	47	31		
																													4%	35%	35%	16%	10%	

9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects



9.1.2 – ATTACHMENT 1. Urban Context Report & Development Plan:Elenberg Fraser Architects

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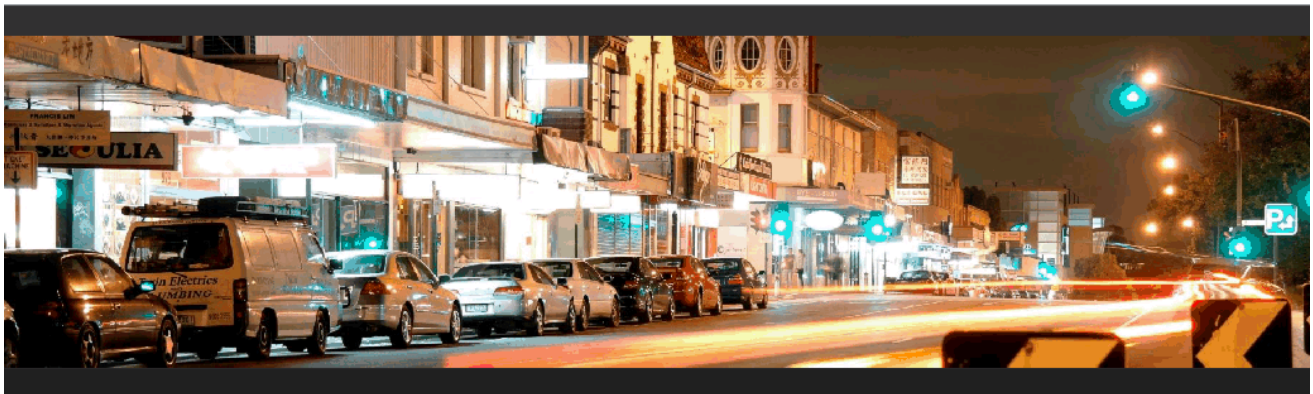
CITY OF WHITEHORSE

Date: 29/1/2019

RECEIVED

16 – 18 Spring Street, Box Hill

Transport Impact Assessment



180430TIA001K-F

23 January 2019

9.1.2 – ATTACHMENT 2. Transport Impact Assessment: One Mile Grid Traffic Engineering



onemilegrid

ABN: 79 168 115 679

(03) 9939 8250
56 Down Street

COLLINGWOOD, VIC 3066
www.onemilegrid.com.au

DOCUMENT INFORMATION

Prepared for	RCP Project & Development Management		
File Name	180430TIA001K-F	Report Date	23 January 2019
Prepared by	Joshua Haigh	Reviewed by	Jamie Spratt
Signature		Signature	

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9.1.2 – ATTACHMENT 2. Transport Impact Assessment: One Mile Grid Traffic Engineering



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1 INTRODUCTION

onemilegrid has been requested by RCP Project & Development Management to undertake a Transport Impact Assessment of the proposed mixed-use development at 16-18 Spring Street in Box Hill.

This assessment has been prepared to inform both the development plan and town planning applications for the site, noting the proposed development scheme is not proposed to materially change between the two applications. The site also includes an existing accessway which will be upgraded to a private roadway providing access to the site. This land extends from Spring Street to Nelson Road. These works are a requirement of the Development Plan Overlay but are exempt from a requirement for a Planning Permit under the Public Use Zone.

As part of this assessment the subject site has been inspected with due consideration of the development proposal, traffic data has been sourced and relevant background reports have been reviewed.

Finally, the following report has also been amended to respond to Whitehorse City Council's Request for Further Information(RFI) (dated Thursday 18 October 2018), with **onemilegrid's** response to these items contained within the report and summarised in Section 9.

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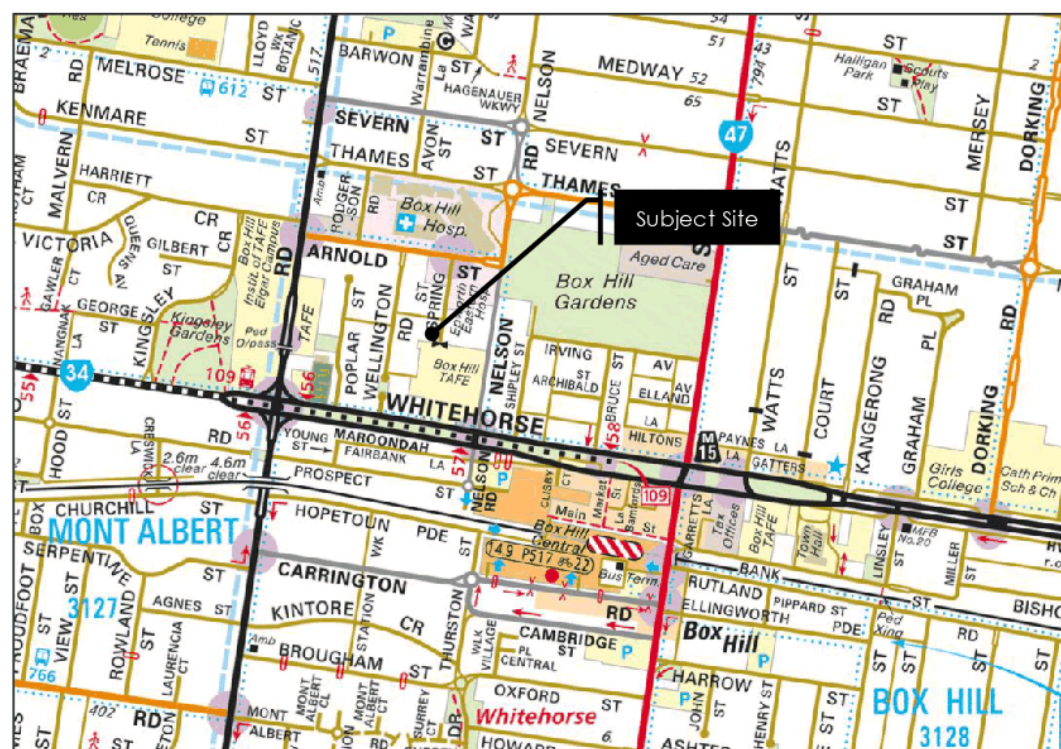


2 EXISTING CONDITIONS

2.1 Site Location

The subject site is located on the western side of Spring Street between Box Hill TAFE and Arnold Street, as shown in Figure 1. The site is currently occupied by off-street car parking, with land uses surrounding the site being varied in nature, including Hospitals, education facilities, commercial uses and residential dwellings.

Figure 1 Site Location



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Figure 2 Aerial View of Site



As shown in Figure 2 the site is currently occupied by a number of car parks, including a gravel car park on the northern portion of the site and car parking associated with the Box Hill Institute in the southern portion of the site. Access to the northern car park is currently provided from Spring Street. The southern car park is accessed via Nelson Road to the east. Access to the Box Hill car park from Spring Street is currently closed.

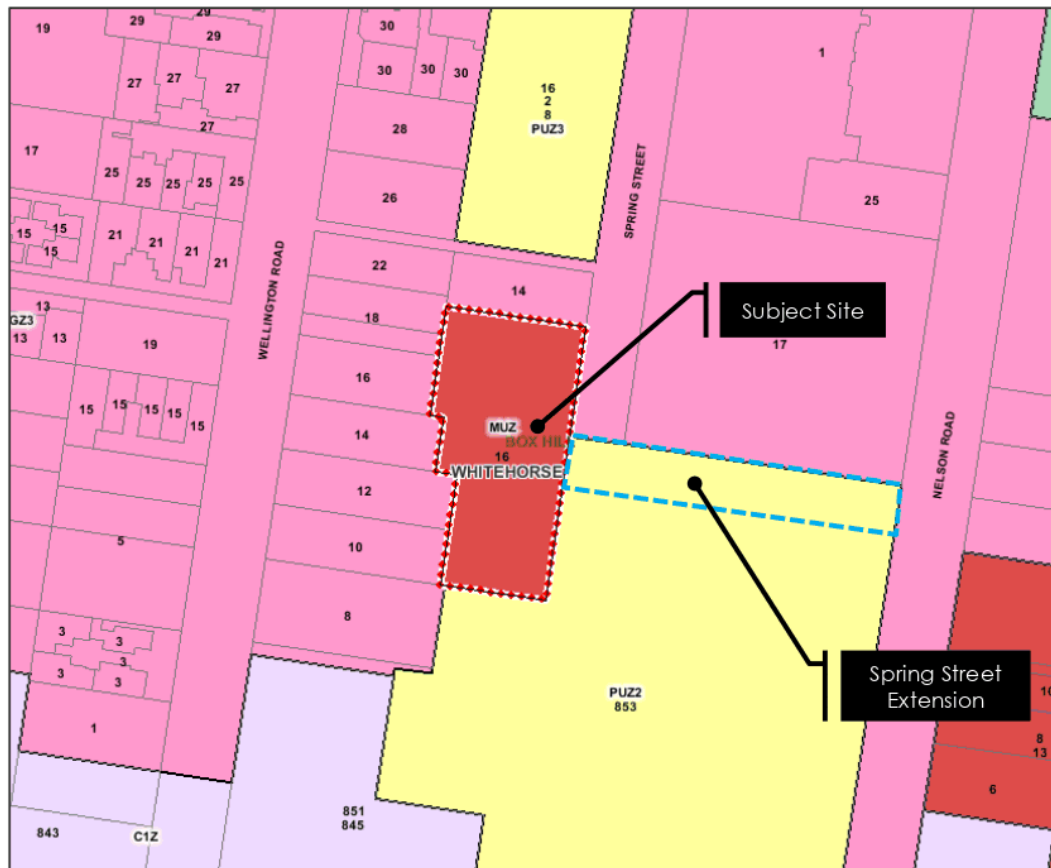
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2.2 Planning Zones

It is shown in Figure 3 that the site is located within a Mixed Use Zone (MUZ), for which the permitted uses are listed in Clause 32.04 of the Whitehorse Planning Scheme. In addition, both a development plan overlay (DPO8) and parking overlay (PO1) are applicable to the subject site.

Figure 3 Planning Scheme Zones



2.3 Background

It is understood that the developer has entered into a development deed with the Box Hill Institute to provide additional educational facilities for the Box Hill Institute, a total of 34 car parking spaces and to construct a roadway connection between Spring Street and Nelson Road.

For the roadway connection to Nelson Road, the agreement between the Box Hill Institute and the developer is to provide 90 degree car parking on the north side of the roadway and parallel car parking on the southern side.

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2.4 Road Network

A summary of the configuration of key roads in the vicinity of the site is provided in Table 1. The cross-sections of each road are shown in Figure 4 to Figure 6.

Table 1 Key Road Configurations

Road	Alignment	Vehicle Lanes	Bike Lanes	Car Parking	Speed Limit
Spring Street	North-South	One lane in each direction	None	Kerbside, time restricted and ticketed parking. East side of the road only.	50 km/hr
Private Road (Spring Street to Nelson Road)	East-West	One-lane in each direction (Private Road)	None	Kerbside parking, permit and ticketed.	-
Nelson Road	North-South	One lane in each direction	None	Kerbside, time restricted and ticketed parking.	50 km/hr

Figure 4 Spring Street North-South, looking South



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Figure 5 Private Road (Spring Street to Nelson Road), looking West



Figure 6 Nelson Road



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2.5 Traffic Volumes

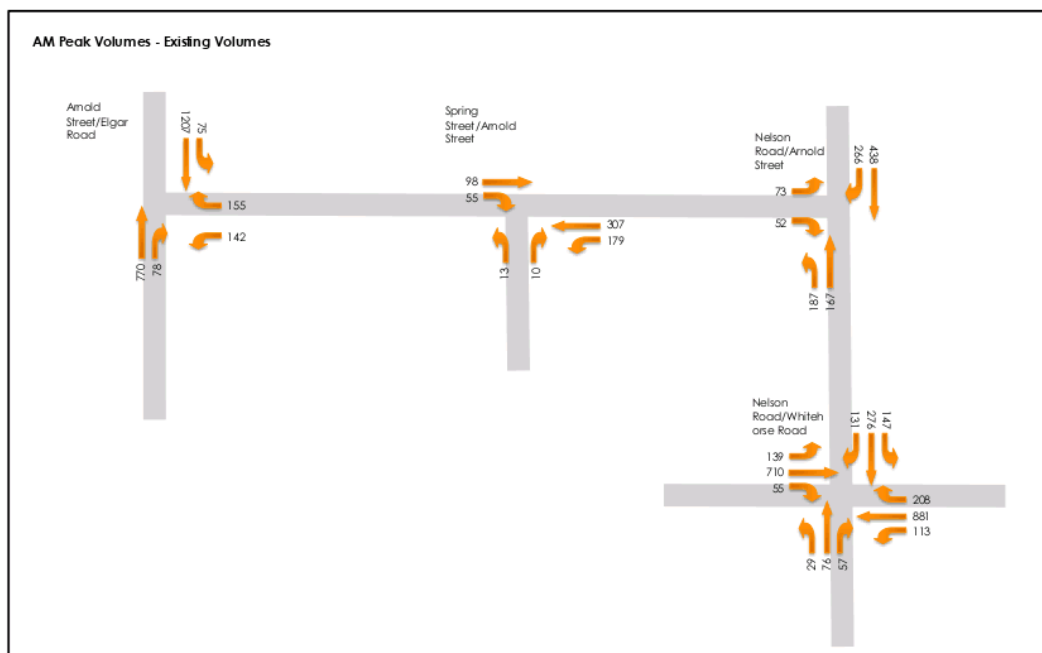
2.5.1 2015 Survey Volumes

Traffic volumes were sourced from surveys commissioned by **onemilegrid** on Wednesday 15th April 2015 at the following intersections:

- Arnold Street / Elgar Road;
- Spring Street / Arnold Street;
- Nelson Road / Arnold Street; and
- Nelson Road / Whitehorse Road.

The peak hour results of the surveys are shown in Figure 7.

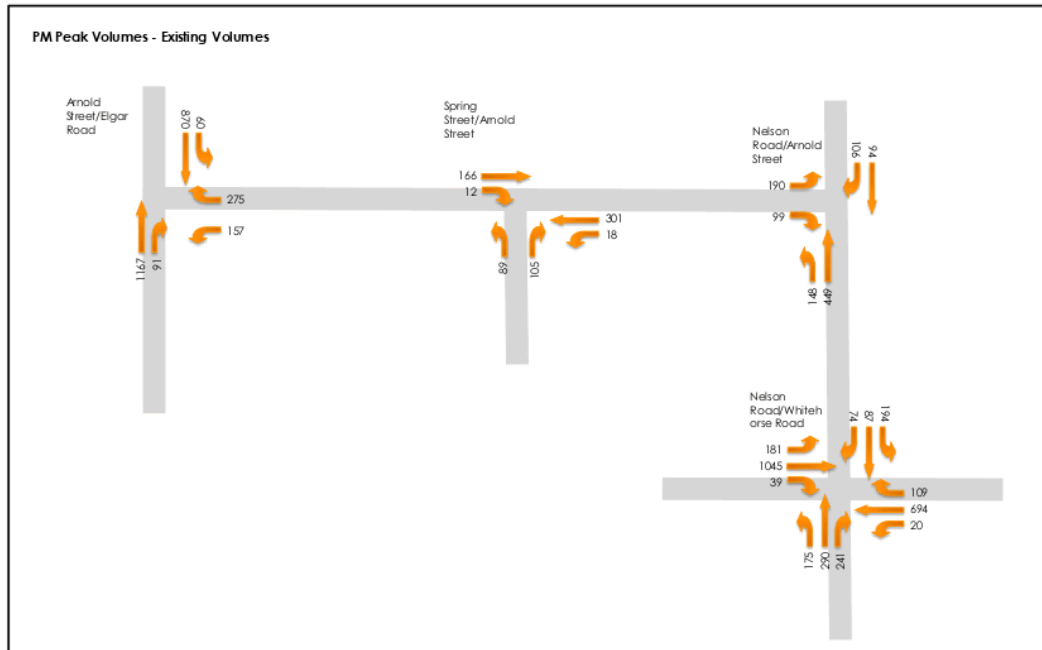
Figure 7 AM Peak Hour - Existing Traffic Volumes – April 2015



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Figure 8 PM Peak Hour - Existing Traffic Volumes – April 2015



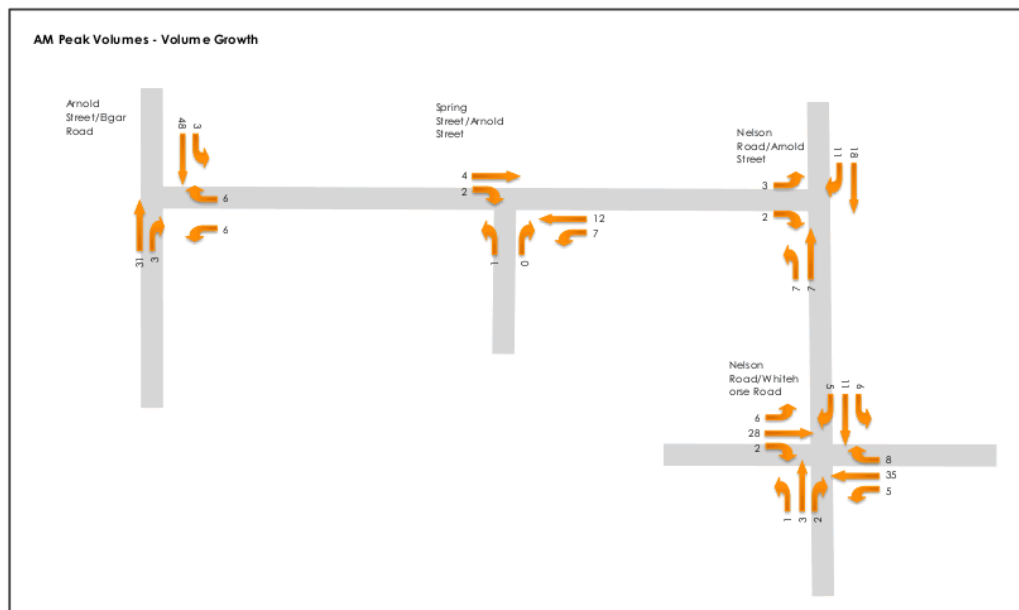
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2.5.2 Traffic Growth 2015 - 2018

To assess the level of traffic growth between the 2015 and 2018 data, VicRoads' SCATS volume data was sourced for Wednesday 18th of April at the intersection of Nelson Road/Whitehorse Road, this data indicated 4% traffic volume growth between the dates. On this basis, Figure 9 and Figure 10 outline the traffic volume growth expected at each intersection.

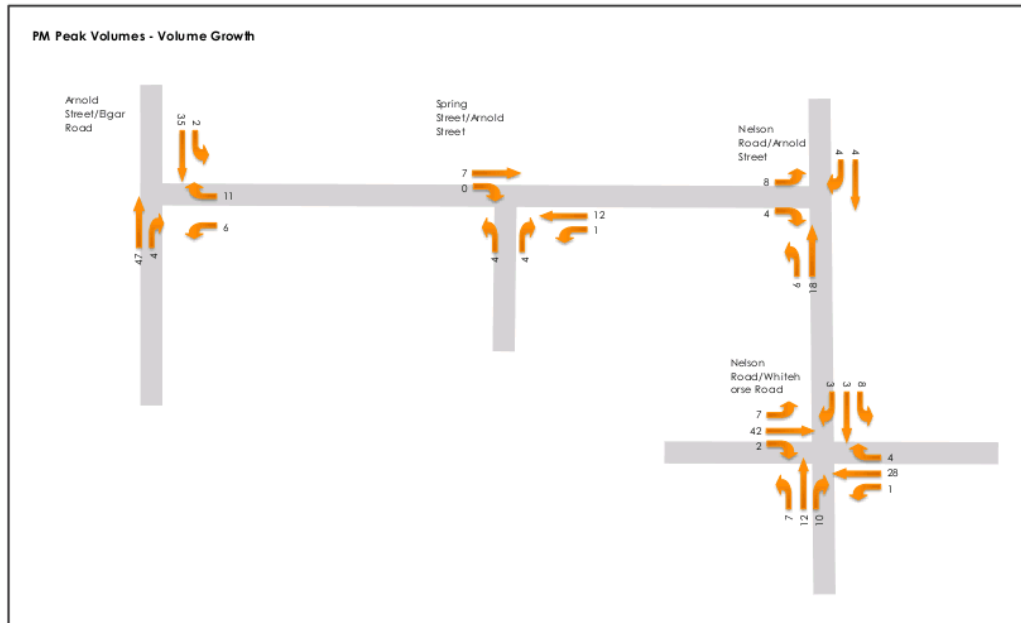
Figure 9 AM Peak Hour Traffic – 4% Volume Growth



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Figure 10 P M Peak Hour Traffic – 4% Volume Growth



2.5.3 Whitehorse Road / Nelson Road Intersection

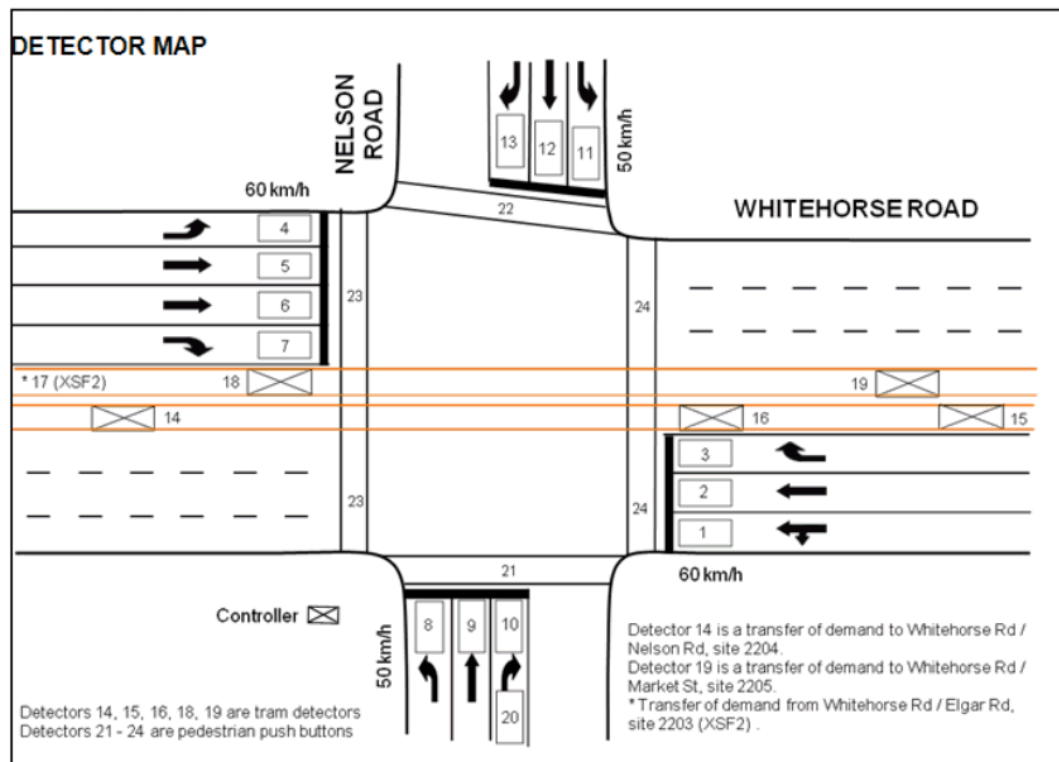
As outlined above, the original assessment relied on utilising SCATS data to apply a growth factor to the 2015 surveyed volumes.

Further interrogation of the SCATS data and detector configuration at the intersection indicates that all but one movement (Detector Loop 1) at the intersection have a dedicated loop counting traffic volumes, as shown in Figure 11.

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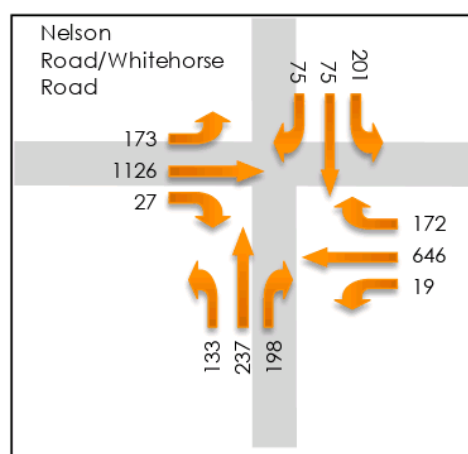


Figure 11 Whitehorse Road / Nelson Road detector layout



On this basis, to provide a more accurate representation of current traffic volumes at the intersection of Nelson Road/Whitehorse Road the SCATS volumes for Wednesday 18 April 2018 were utilised, with turn volume splits at Detector Loop 1 based on existing splits recorded in 2015. These revised volumes are shown in Figure 12, for the PM peak only, noting that this peak represents the critical peak hour in the previously undertaken assessment.

Figure 12 PM Peak Hour Existing Traffic Volumes – 18 April 2018



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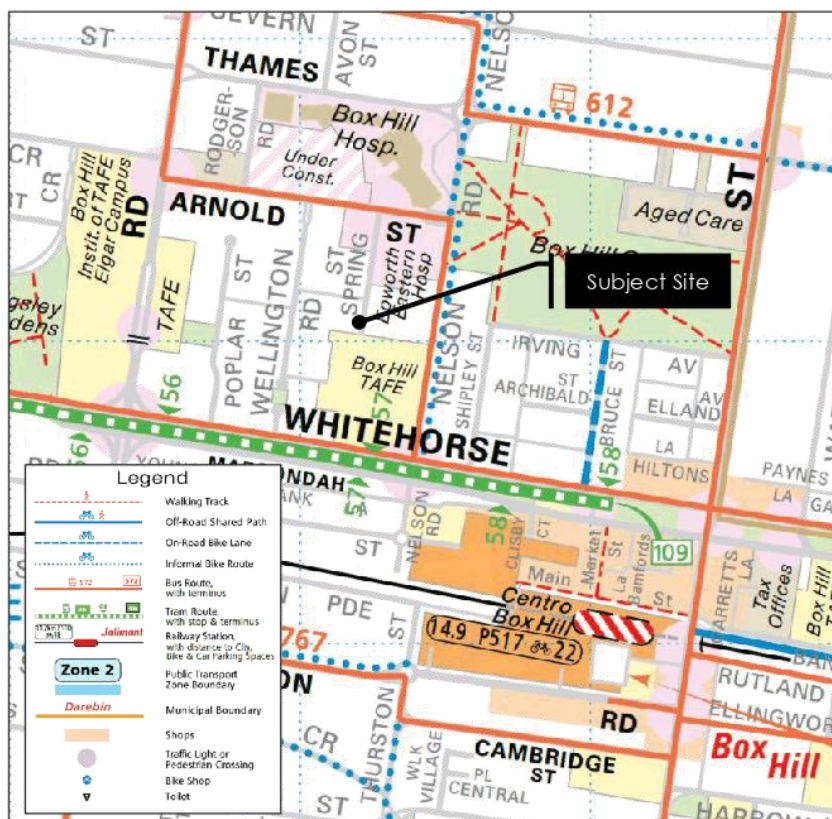


2.6 Sustainable Transport

2.6.1 General

An extract of the TravelSmart Map for the City of Whitehorse is shown in Figure 13, highlighting the public transport, bicycle and pedestrian facilities in the area.

Figure 13 TravelSmart Map



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2.6.2 Public Transport

The full public transport provision in the vicinity of the site is shown in Figure 14 and detailed in Table 2.

Figure 14 Public Transport Provision

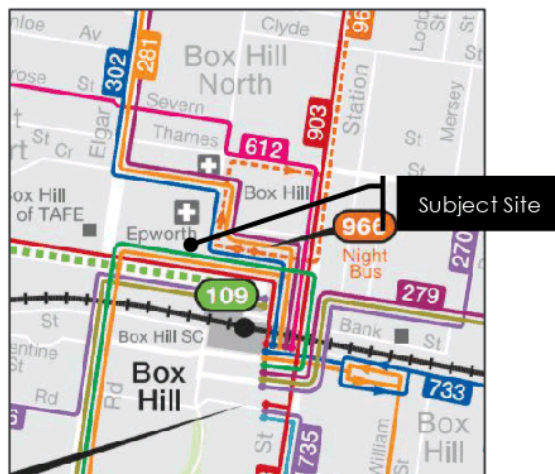


Table 2 Public Transport Provision

Mode	Route No	Route Description	Nearest Stop/Station
Train		Belgrave Line	Box Hill Central
		Lilydale Line	Box Hill Central
Tram	109	Box Hill - Port Melbourne	Nelson Road/Whitehorse Road
Bus	201	Box Hill Station - Deakin University	Box Hill Central
	270	Box Hill - Mitcham via Blackburn North	Box Hill Central
	271	Box Hill - Ringwood via Park Orchards	Box Hill Central
	279	Box Hill - Doncaster SC via Middleborough Rd	Box Hill Central
	281	Templestowe - Deakin University	Nelson Road/Whitehorse Road
	284	Doncaster Park & Ride - Box Hill via Union Road	Box Hill Central
	293	Box Hill - Greensborough via Doncaster SC	Nelson Road/Whitehorse Road
	302	City - Box Hill via Belmore Rd and Eastern Fwy	Nelson Road/Whitehorse Road
	612	Box Hill - Chadstone via Surrey Hills, Camberwell, Glen Iris	Box Hill Central
	732	Box Hill - Upper Ferntree Gully via Vermont South, Knox City, Mountain Gate	Box Hill Central
	733	Oakleigh - Box Hill via Clayton, Monash University, Mt Waverley	Box Hill Central

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735	Box Hill to Nunawading	Box Hill Central
765	Mitcham - Box Hill via Brentford Square, Forest Hill, Blackburn	Box Hill Central
766	Box Hill - Burwood via Surrey Hills	Box Hill Central
767	Southland - Box Hill via Chadstone, Jordanville, Deakin University	Box Hill Central
903	Altona - Mordialloc (SMARTBUS Service)	Box Hill Central
966	Night Bus - City - Kew - Doncaster Rd - Box Hill	Box Hill Central

The site has excellent public transport accessibility, with a wide variety of transport modes and services servicing the immediate vicinity of the site.

In addition, it is noted that the site is located within 400m of the Principal Public Transport Network (PPTN). The PPTN reflects public transport routes that provide high-quality public transport services supporting integrated transport and land use.

2.6.3 Bicycle Facilities

Limited dedicated bicycle facilities exist in the vicinity of the subject site.

2.7 Walkability

Walkability is a measure of how friendly an area is to walking. Walkability has many health, environmental, and economic benefits. Factors influencing walkability include the presence or absence and quality of footpaths or other pedestrian rights-of-way, traffic and road conditions, land use patterns, building accessibility, and safety.

The website www.walkscore.com offers an online tool to assess the walkability of an address. Based on the tool, the subject site has a Walk Score rating of 82/100 and is classified as a 'Very Walkable', with most errands able to be accomplished by foot.

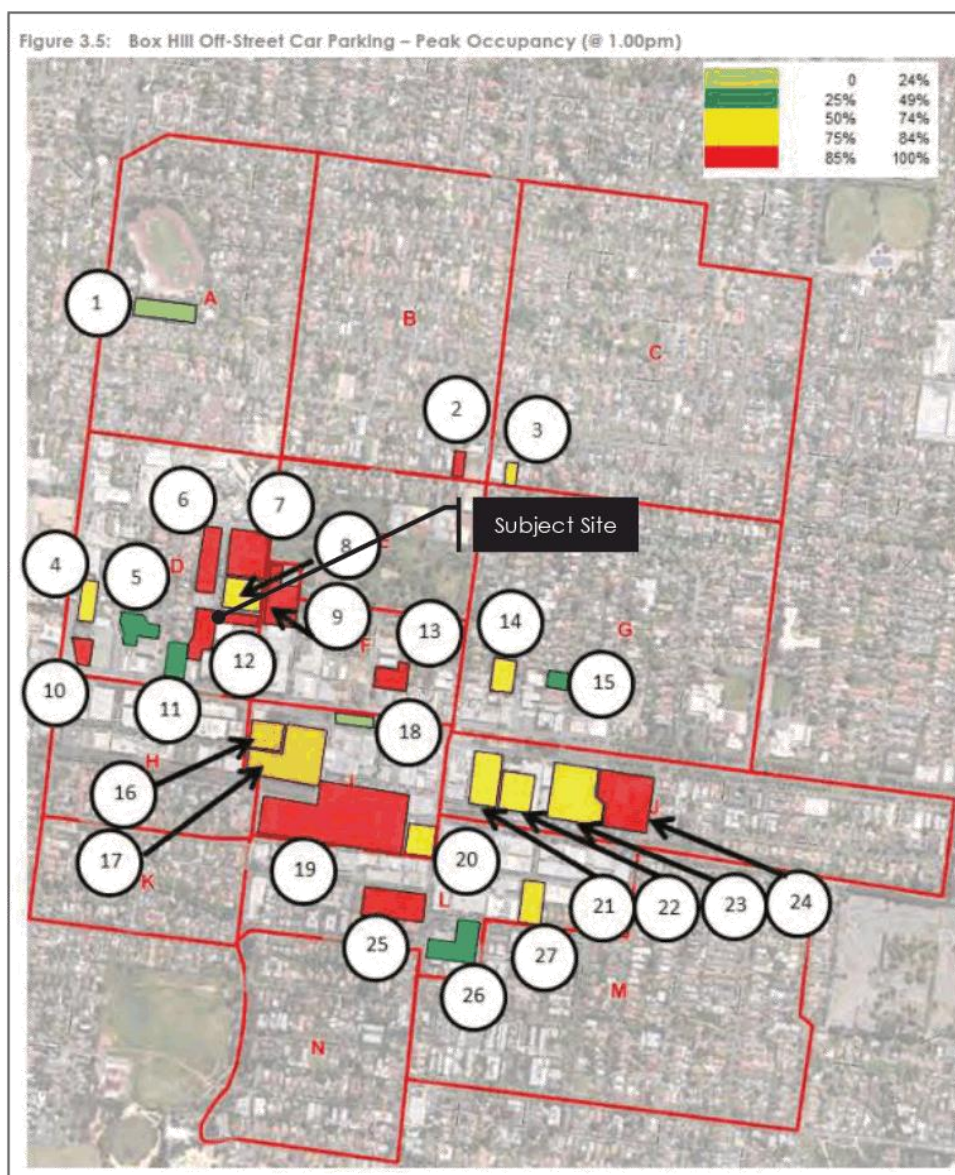
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2.8 Car Parking

Several off-street car parks exist near the site within the Box Hill Activity Centre. In this respect, reference is made to the Box Hill Central Activities Area Car Parking Strategy prepared by GTA Consultants for Whitehorse City Council. The strategy identified a total of 27 off-street car parks within the study area. An extract of the map identifying these car parks and their occupancy has been reproduced below for reference.

Figure 15 Off-Street Car Parking Areas – Box Hill Central Activities Area



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3 DEVELOPMENT PROPOSAL

3.1 General

It is proposed to develop the subject site for the purposes of a mixed-use development, containing a number of uses, as shown in Table 3.

Table 3 Proposed Development

Component	No/Area
Studio/1-Bedroom Apartment	117
2-Bedroom Apartment	151
3-Bedroom Apartment	31
Total Apartments	299
Food & Drink	398sqm / 5 tenancies
Medical Centre	2,010sqm / 13 practitioners
Education Centre (Box Hill Institute)	4,288sqm / 360 students

3.2 Car Parking

A total of 369 car spaces are proposed across five basement levels, including 36 tandem bays (72 spaces).

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3.3 Vehicle Access

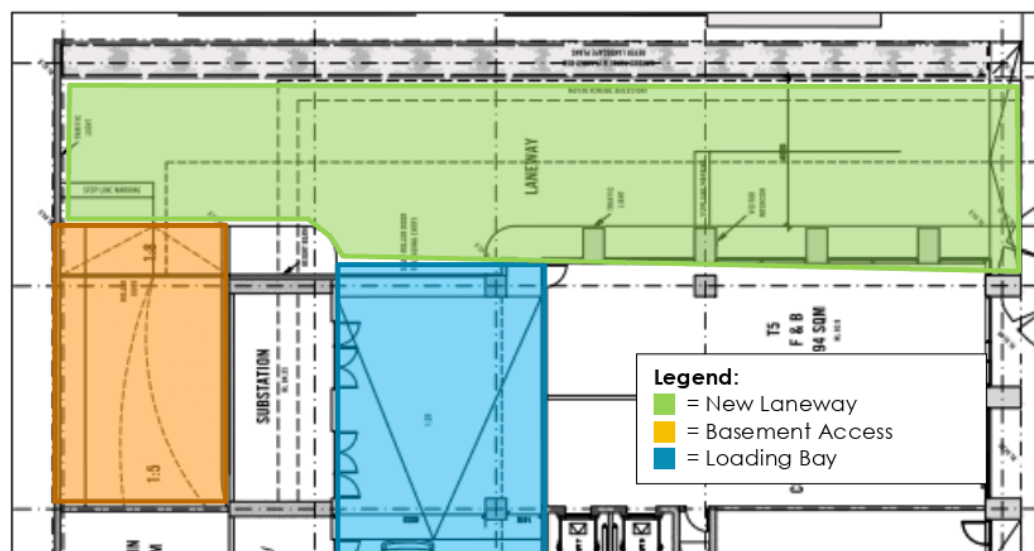
Vehicle access to the basement car park is proposed via the creation of a laneway on the sites northern boundary accessed via Spring Street to the east.

To facilitate access to the proposed loading area a traffic signalling system is proposed. The system will detect vehicles greater than 2.4m height as they pass the loading area. When a loading vehicle is detected a red light will hold vehicles at the top of the basement ramp as well as within the laneway, whilst the loading vehicle undertakes its reverse manoeuvre into the shared loading area. The location of the proposed traffic signals, hold line marking and height detection are shown in Figure 16.

In addition, access to both the loading area and basement will be controlled via roller doors. The roller door providing access to the basement car parking level will remain open during typical medical centre operating hours. An intercom will be provided along the laneway (as shown) to facilitate after hours access, with residents capable of buzzing in guests.

At basement level 2, a second roller door is proposed to limit access to the lower basement levels to residents. This arrangement is shown in Figure 17.

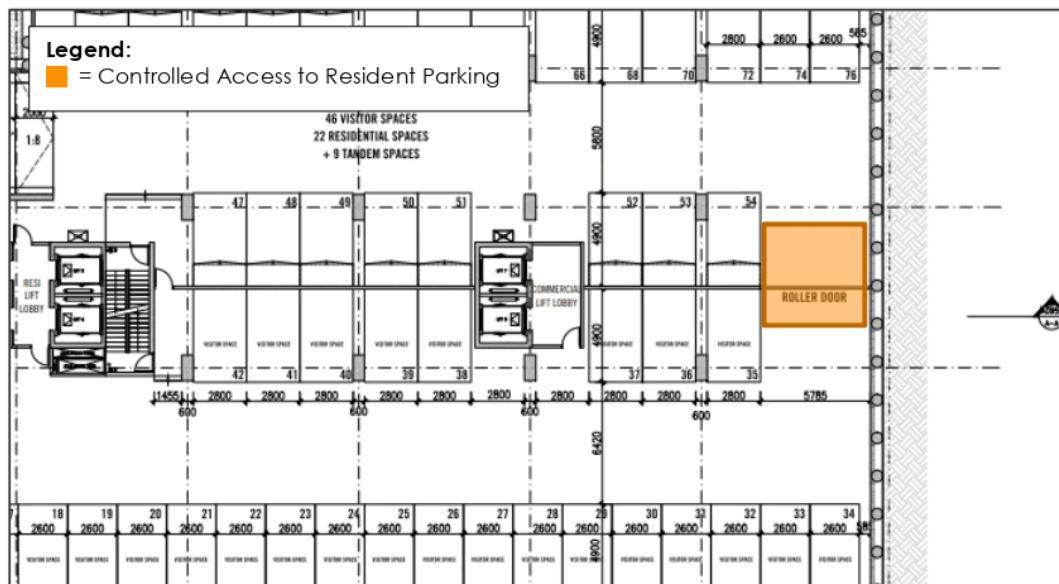
Figure 16 Ground Floor Vehicle Access Arrangements



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Figure 17 Basement Level 1 – Vehicle Access Arrangements



3.4 Bicycle Parking

A total of 120 bicycle parking spaces are proposed within secure compounds on basement level 1.

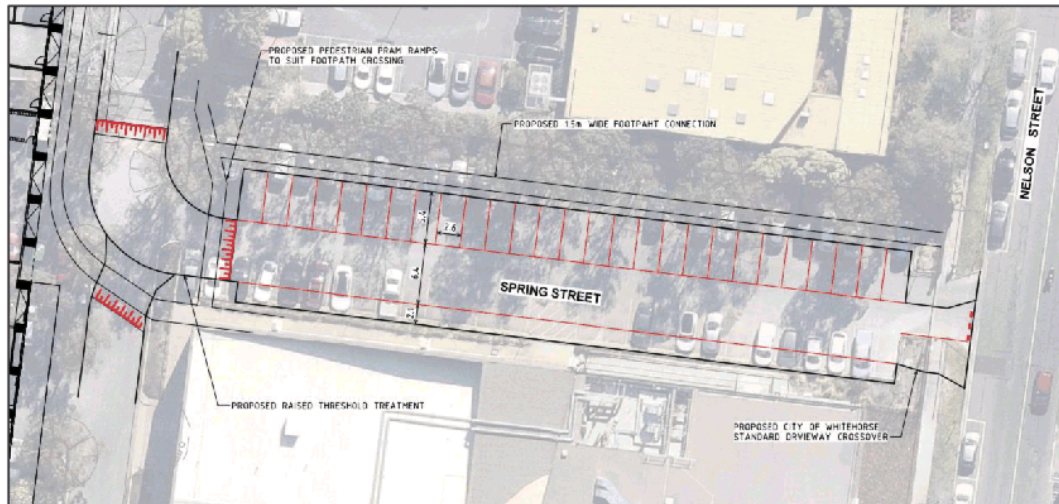
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3.5 Spring Street Extension & Intersection with Nelson Road

As part of the proposed development, it is understood that Spring Street will be extended to connect through to Nelson Road, as shown in Figure 18.

Figure 18 Spring Street Extension Concept Layout



A concept layout plan has been prepared for this extension and is attached in Appendix B. The proposed layout of Spring Street will provide for the following:

- 6.4m two-way road;
- A maximum of 27, 90-degree car parking spaces along the northern boundary (dependent on DDA parking provision);
- A 2.1m Parallel car parking lane which will be capable of accommodating 11 car spaces on the southern boundary;
- A pedestrian path along the southern boundary;
- A 1.5m pedestrian path on the northern boundary;
- A raised threshold treatment at the intersection of the new road and the existing North-South portion of Spring Street; and
- A threshold treatment/crossover to Nelson Road, subject to Council approval;

It is understood that following meetings with Whitehorse City Council that the road will be maintained as a private access road by the Box Hill Institute.

Notwithstanding, the on-street car parking and road width has been designed in accordance with AS2890-5 On-street Parking and the road width is consistent with the existing cross-section of Spring Street. A standard crossover or threshold treatment is proposed to Nelson Road.

In addition, it is anticipated that the road will operate with characteristics similar to that of a pedestrian shared area with alternate roadway treatments and a speed limit of 10km/hr. The specific function of the road and relevant treatments will be incorporated in the detailed design of the road.

The suitability of the proposed connection to Nelson Road with regards to traffic impacts is assessed in Section 8.6.3.5 of this report.

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In addition, swept paths have been undertaken to demonstrate the ability for vehicles to satisfactorily access the proposed Spring Street extension, including the an 8.8m service vehicle. These swept paths are provided in Appendix B of this report.

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4 DESIGN CONSIDERATIONS

4.1 General

onemilegrid has undertaken an assessment of the car parking layout and access for the proposed development with due consideration of the Design Standards detailed within Clause 52.06-9 of the Planning Scheme. A review of those relevant Design Standards is provided in the following section.

4.1.1 Design Standard 1 – Accessways

A summary of the assessment for Design Standard 1 is provided in Table 4.

Table 4 Clause 52.06-9 Design Assessment – Design Standard 1

Requirement	Comments
Be at least 3 metres wide	Satisfied – minimum ramp width of 5.5 metres
Have an internal radius of at least 4 metres at changes of direction or intersection or be at least 4.2 metres wide	Satisfied
Allow vehicles parked in the last space of a dead-end accessway in public car parks to exit in a forward direction with one manoeuvre	Satisfied – no publicly available car parking is located at the end of a dead-end aisle
Provide at least 2.1 metres headroom beneath overhead obstructions, calculated for a vehicle with a wheelbase of 2.8 metres	Satisfied – a minimum height clearance of 2.1 metres is achieved
If the accessway serves four or more car spaces or connects to a road in a Road Zone, the accessway must be designed so that cars can exit the site in a forward direction	Satisfied
Provide a passing area at the entrance at least 6.1 metres wide and 7 metres long if the accessway serves ten or more car parking spaces and is either more than 50 metres long or connects to a road in a Road Zone	N/a – does not connect to a road zone. Notwithstanding, the accessway has been designed to accommodate two-way vehicle flows.
Have a corner splay or area at least 50 per cent clear of visual obstructions extending at least 2 metres along the frontage road from the edge of an exit lane and 2.5 metres along the exit lane from the frontage, to provide a clear view of pedestrians on the footpath of the frontage road. The area clear of visual obstructions may include an adjacent entry or exit lane where more than one lane is provided, or adjacent landscaped areas, provided the landscaping in those areas is less than 900mm in height.	Satisfied
If an accessway to four or more car parking spaces is from land in a Road Zone, the access to the car spaces must be at least 6 metres from the road carriageway.	N/a – does not connect to a road zone.

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4.1.2 Design Standard 2 – Car Parking Spaces

Car parking spaces are proposed to be provided as a mixture of Planning Scheme compliant dimensions and will include:

- 2.6m wide by 4.9m long spaces accessed via a 6.4m wide aisle;
- 2.8m wide by 4.9m long spaces accessed via a 5.8m wide aisle; and
- 2.8m wide by 4.9m long spaces accessed via a 6.4m wide aisle.

Spaces adjacent to walls have been suitably widened in accordance with Design Standard 2 of the Planning Scheme.

In addition, a number of tandem bay are proposed, these bays are generally dimensioned between 2.8m and 2.6m wide with the rear space provided as 5.4m long (total tandem bay length 10.3m) according with Planning Scheme requirements.

No disabled car parking has been provided on-site, it is recommended that any disabled parking is designed in accordance with the Australian Standards and Planning Scheme requirements. Specifically, accessible bays should be provided with an adjacent shared area, in accordance with the with the Australian Standard for Off-Street Parking for People with Disabilities AS2890.6.

4.1.3 Design Standard 3 – Gradients

The laneway entrance to the site will be at-grade complying with Planning Scheme requirements. Following this the proposed ramping into the basement car park is proposed to be provided at a grade of no more than 1:5 in accordance with the requirements of Design Standard 3. Transitions are provided where changes of grade exceed 12.5%, and transition lengths have been designed to prevent potential scraping.

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4.2 Waste Collection

Refer to the Waste Management Plan for further information.

4.3 Bicycle Parking

A total of 120 bicycle parking spaces are proposed, including 20 'Ned Kelly' style vertical hanging bikes and 100 spaces provided within a Josta Two-Tier System.

The design of the parking area is generally in accordance with Australian Standard requirements and manufacturer specifications and is considered appropriate.

4.4 Loading and Garbage

A dedicated loading bay has been provided for the development. Swept path assessments have been undertaken to demonstrate the ability for the loading bay to be accessed by vehicles up to and including 10.7m Compactor Truck. These swept paths are attached as Appendix A.

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5 LOADING CONSIDERATIONS

Clause 65 (Decision Guidelines) of the Whitehorse Planning Scheme identifies that “Before deciding on an application or approval of a plan, the responsible authority must consider, as appropriate: The adequacy of loading and unloading facilities and any associated amenity, traffic flow and road safety impacts.”

A dedicated loading area is proposed on ground level to service the retail and commercial uses on the site. As outlined in Section 4.4, swept paths have been undertaken demonstrating the loading bay is able to be accessed by vehicles up to and including an 10.7m Compactor Truck. This level of loading provision is considered appropriate for the proposed development.

6 BICYCLE PARKING CONSIDERATIONS

The bicycle parking requirements for the subject site are identified in Clause 52.34 of the Whitehorse Planning Scheme, which specifies the following requirements for the different components of the proposed development.

Table 5 Clause 52.34 – Bicycle Parking Requirements

Component	No/Area	Requirement	Total
Dwelling (four or more storeys)	299 dwellings	1 space per 5 dwellings for residents	60
		1 space per 10 dwellings for visitors	30
Education Facility	9 staff ¹	1 space per 20 employees	0
	360 students	1 space per 20 full-time students	18
Medical Centre	13 practitioners	1 space per 8 practitioners for employees	2
		1 space per 4 practitioners for visitors	3
Retail	398m ²	1 space per 300m ² for employees	1
		1 space per 500m ² for visitors	1
Total	Residents		60
	Students		18
	Employees		3
	Visitors		34
	Total		115

¹ Estimate based on 1 staff member per 40 students

Furthermore, where 5 or more employee bicycle spaces are provided, employee facilities are required in accordance with Clause 52.34 of the Whitehorse Planning Scheme. As only 3 staff spaces are required, additional facilities are not required.

A total of 120 bicycle parking spaces are proposed, satisfying the bicycle parking requirements for the site.

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7 CAR PARKING CONSIDERATIONS

7.1 Statutory Car Parking Requirements

The subject site is affected by a parking overlay (Clause 45.09 of the Whitehorse Planning Scheme). Schedule 1 to the parking overlay sets out the minimum number of car spaces to be provided for a number of uses within the overlay area, with a permit required to reduce the required parking. Where a use is not listed, the 'Column B' rates of Clause 52.06-5 apply as a minimum.

On this basis, the car parking requirements for those uses listed in the Whitehorse Planning Scheme are outlined below.

Table 6 Statutory Car Parking Requirements

Use	No/Area	Min Rate	Car Parking Measure	Total
Dwelling	117 dwellings	0.5	to each one bedroom dwelling	58
	151 dwellings	0.75	to each two-bedroom dwelling	113
	31 dwellings	1.0	to each three or more bedroom dwelling	31
	Dwelling Residents Sub-Total			202
	5 dwellings	0.2	for visitors to every dwelling for the first five dwellings; plus	1
	294 dwellings	0.1	for visitors to every dwelling for subsequent dwellings	29
	Dwelling Visitors Sub-total			30
Medical Centre	2,010sqm / 13 practitioners	3.5	to each 100sqm of leasable floor area	70
Education Centre	4,288sqm / 360 students	0.3	to each student that is part of the maximum number of students on the site at any time	108
Retail (Food & Drink or Shop)	398sqm	3.5	to each 100sqm of leasable floor area	13
Total				423

Based on the above assessment, the development generates a statutory requirement to provide a minimum of 423 spaces.

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7.1.1 Proposed Car Parking Provision

It is proposed to provide 369 car parking spaces on-site allocated as follows:

- Dwelling Residents: 268 spaces, including 36 tandem bays (72 spaces);
- Education Centre: 34 spaces;
- Medical Centre: 16 staff spaces
- Retail Staff: 5 spaces;
- Shared Visitors: 46 spaces.

On the above basis, the proposed development has a shortfall of car parking associated with the education centre, retail, dwelling visitor and medical centre uses.

Clause 52.06-7 of the Whitehorse Planning Scheme indicates that an application to reduce (including reducing to zero) the requirement for car spaces must be accompanied by a Car Parking Demand Assessment. The Assessment must assess the car parking demand likely to be generated by the proposed development, having consideration to:

- The likelihood of multi-purpose trips within the locality which are likely to be combined with a trip to the land in connection with the proposed use.
- The variation of car parking demand likely to be generated by the proposed use over time.
- The short-stay and long-stay car parking demand likely to be generated by the proposed use.
- The availability of public transport in the locality of the land.
- The convenience of pedestrian and cyclist access to the land.
- The provision of bicycle parking and end of trip facilities for cyclists in the locality of the land.
- The anticipated car ownership rates of likely or proposed visitors to or occupants (residents or employees) of the land.
- Any empirical assessment or case study.

An assessment of the likely parking demands and the appropriateness of reducing the car parking provision below them is set out below.

7.2 Car Parking Demand Assessment

7.2.1 VC148 Planning Provision Updates

On 31 July 2018, amendment VC148 to the Victorian Planning Scheme was gazetted. This amendment contained a number of revisions, including revisions to the car parking requirements for land within walking distance of the Principal Public Transport Network (PPTN). Specifically, the amendment allows for the use of Column B parking rates for development sites identified as being within the PPTN area.

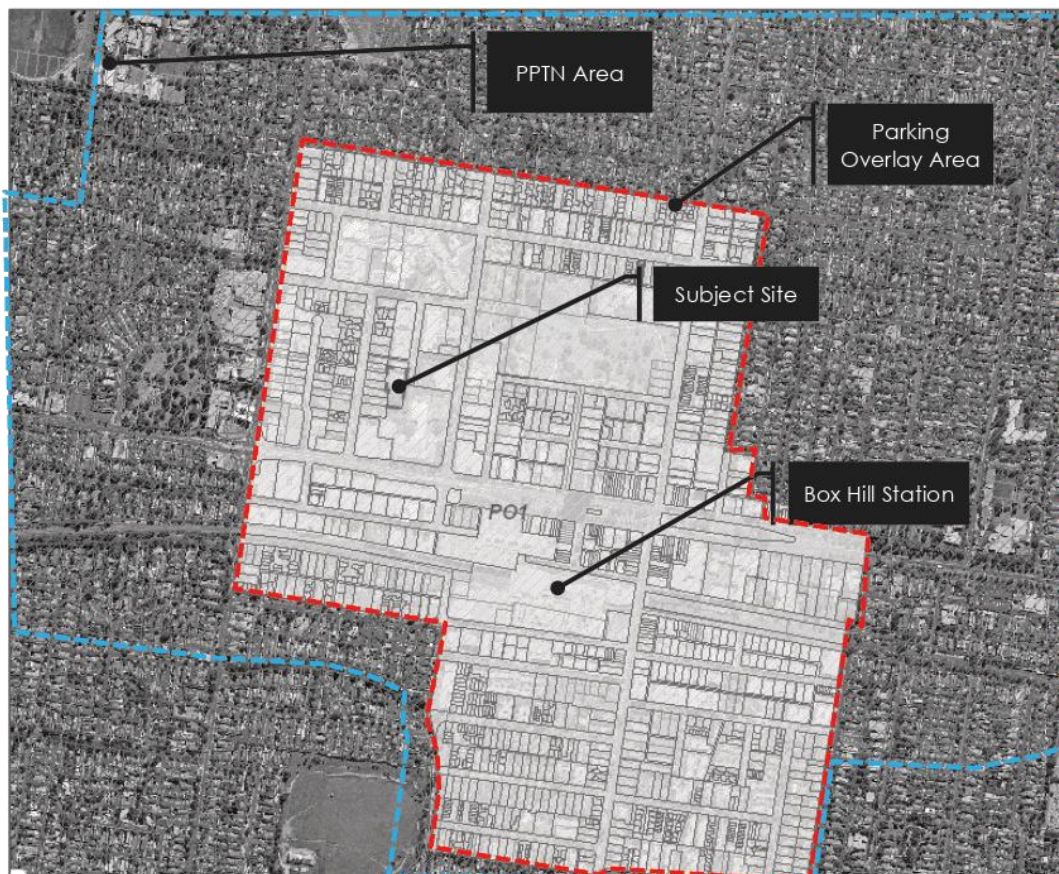
Although this requirement does not apply to the site as it sits within a Parking Overlay, it is considered appropriate to consider the reduced parking requirements allowed for under Column B rates, when assessing the car parking demands of the development. Specifically, consideration is given to the residential visitor requirement with Column B rates of Clause 52.06-5 of the Whitehorse Planning Scheme specifying no requirement for residential visitor parking.

As shown in the figure below, there are a number of locations in the vicinity of the site that are not affected by the Parking Overlay that are capable of adopting the reduced Column B rates for dwelling visitors. These sites, are located further away from the key public transport infrastructure in the area (Box Hill Station).

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Figure 19 PPTN and Parking Overlay Area Maps



The adoption of Column B rates for the residential visitor portion of the development should be considered in this instance, noting that this provision will result in better design outcomes for the building, noting that on-site residential visitor parking is typically poorly managed, underutilised or used by residents for long-term car parking.

7.2.2 Resident Car Parking Demands

The resident car parking requirements set out Clause 45.09 of the Whitehorse Planning Scheme are considered appropriate to adopt as a minimum for the site, noting that the rates are consistent with ABS Census 2016 data.

7.2.3 Medical Centre

With regards to the Medical Centre use, reference is made to the Box Hill Central Activities Area Car Parking Strategy ('the Strategy') prepared by GTA Consultants for Whitehorse City Council. The Strategy nominates a car parking rate of 2.0 spaces per 100sqm of net floor area for Medical Centre type uses.

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Application of this equates to a car parking demand of 41 car parking spaces for the medical centre. Of this demand, it is expected that 16 spaces will be for staff and 24 spaces will be for visitors.

By way of comparison, adopting Column A rates from Table 1 of Clause 52.06 for Medical Centre uses (13 practitioners), also equates to a car parking demand of 41 spaces.

It is noted that, Column B rates are typically adopted in areas to assist in reducing car parking demands, and in this instance the application of the Column B rate results in a significant increase in the car parking demand when compare to both the Column A rate and empirical evidence.

7.2.4 Education Centre

The education centre car parking requirements set out Clause 45.09 of the Whitehorse Planning Scheme are considered appropriate for a site in an unconstrained location.

With respect to the location of the subject site it is noted that it is located within the Box Hill Activity Centre and is proximate to a number of nearby public transport services (as outlined in Section 2.6).

The location is a constrained in terms of access with moderately to heavily trafficked road space, in part caused by Council's planning policy to encourage and concentrate high density residential development in this area. A statutory planning measure that provides an alignment with the 'CBD' location is provided in the Parking Overlay 1 which sets lower parking rates for dwellings and offices.

In the assessment of the car parking supplied for the Proposal, the land use which is under provided for is 'Education', being the BHI use. Education is not a specified use under PO1. For unspecified uses, the PO1 requirement reverts to Column B of CI 52.06-05. Column B is a lower rate to Column A, reflecting a preference for reduced car parking provision in more intensively developed locations. Under Column B, car parking for educational uses is required at 0,3 car space per student, unless a permit is granted to reduce or waive car parking.

Given this explanation, the Proposal meets the car parking requirements of PO1 for the land uses for which it was designed. That is, the nomination of the education parking rate is an unplanned consequence of adopting a Parking Overlay control.

In the case of BHI parking we note that there are two campuses and in the order of 700 car spaces accessible by students. Some of these car spaces are situated immediately south of the Proposal. And, where tertiary campuses are in commercial locations, the provision of car parking is generally very limited.

Additionally, the site is readily accessible by both pedestrians and cyclists with adequate bicycle parking proposed to be provided on-site.

The combination of these factors is likely to result in car parking associated with the institute being generated at rates lower than those outlined within the Planning Scheme.

Notwithstanding, for the purpose of assessment a demand of 108 has been conservatively assumed. As 34 spaces are proposed for staff on-site, the education component results in a shortfall of 74 spaces, likely to be associated with students.

7.2.5 Retail

The proposed retail uses are anticipated to operate in an ancillary manner to the proposed uses within the building, with the majority of the trade generated by these uses coming from existing residents and visitors to the proposed uses at the site. In this respect, the provision of no visitor car parking for the retail uses is considered acceptable.

With regards to staff demands a single car space is provided for each tenancy (5 total spaces). This equates to a car parking provision of approximately 1 space per 100m².

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7.2.6 Temporal Variation of Car Parking Demands

7.2.6.1 Residential Visitors

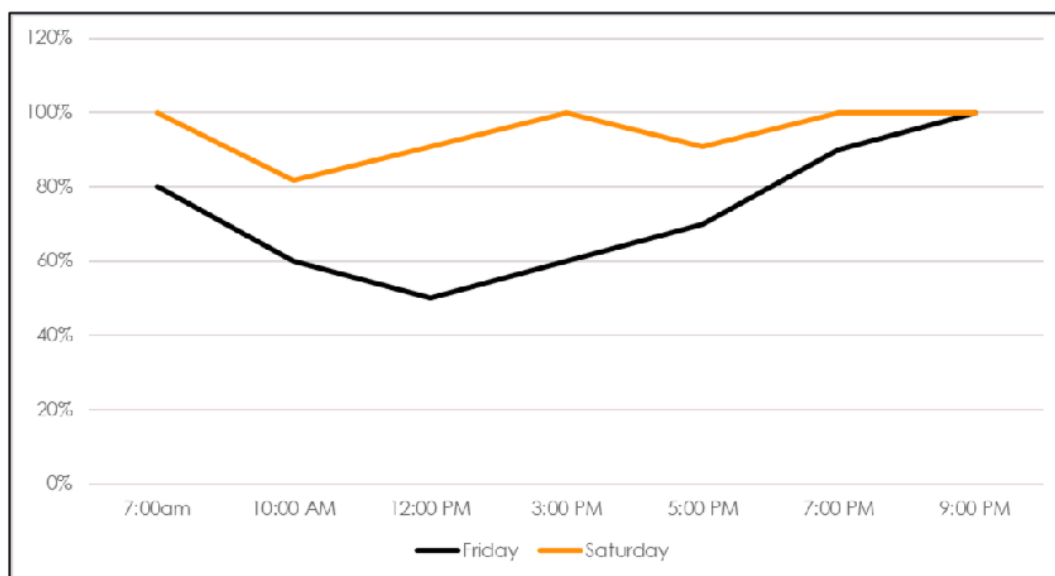
As discussed in Section 7.2.1, it is considered that Column B rates should be applied to the residential visitor component of the development. Notwithstanding, the parking overlay rate has been adopted for the purposes of the temporal demand assessment.

In order to estimate the temporal variation of visitor car parking demands associated with the residential use on-site, reference is made to a visitor parking study undertaken by **onemilegrid** at the 'Scala' apartment complex, located at 1 Roy Street, South Melbourne.

Parking surveys were undertaken on Friday 23rd and Saturday 24th of October 2015 between 7:00 AM and 9:00 PM with a view to establishing a profile of parking demands across a weekday and weekend.

A view of the parking demand profile for both days is provided in Figure 20 below.

Figure 20 Visitor Parking Demand Profile



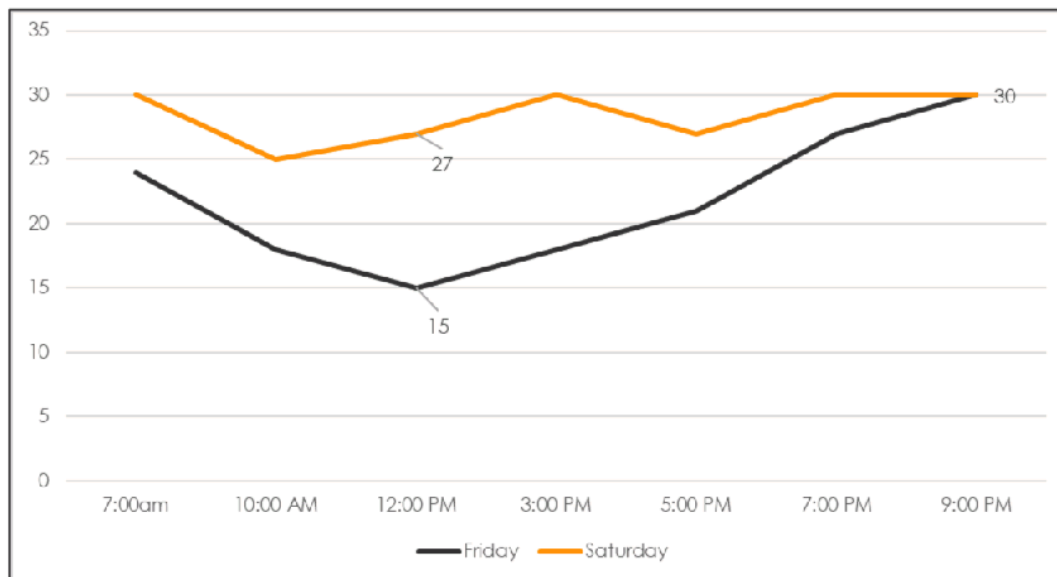
As outlined in Figure 20 residential visitor car parking demands vary significantly on the Friday with demands during the day representing approximately 50% of the peak evening demand at 9:00 PM. With regards to Saturday parking demands the profile is relatively linear.

Application of the above car parking demand profile to the statutory residential visitor car parking requirement of 30 spaces equates to the following anticipated residential visitor car parking demands across the course of the day.

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Figure 21 Anticipated Visitor Car Parking Demand



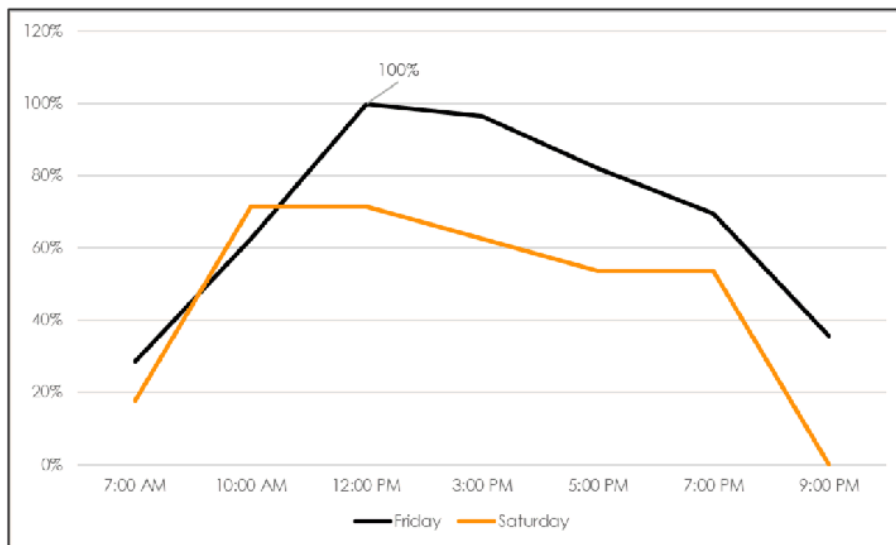
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7.2.6.2 Medical Centre Visitors

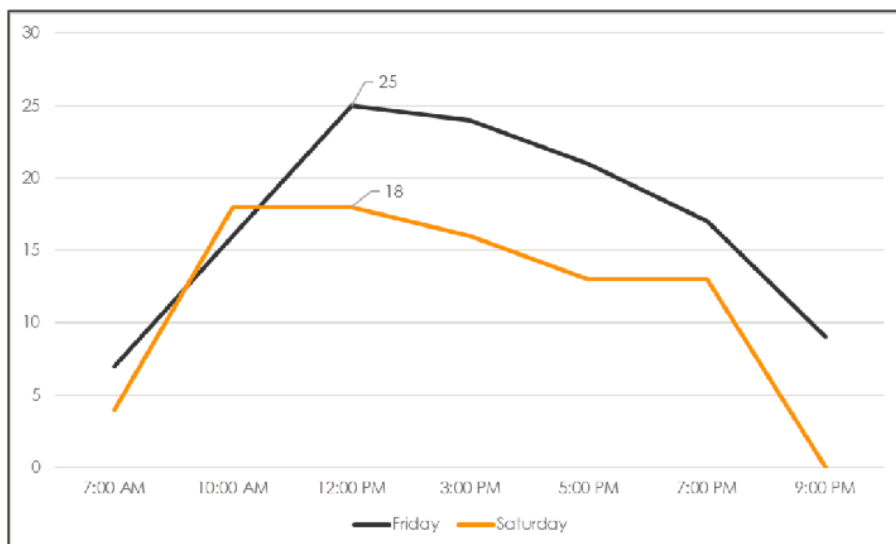
Guidance on the temporal demand variation for the medical centre use has been sought from Google, which provides charts indicating popular times for businesses (read more at <https://support.google.com/business/answer/6263531?hl=en>). 'Popular Times' data was sourced for a number of existing medical centres in close proximity of the site, based on this data, Figure 22 has been produced outlining the demand profile for the medical centre use.

Figure 22 Medical Centre Visitor Demand Profile



Application of the above demand profile to the anticipated peak demand of 18 spaces equates to the following car parking demand profile.

Figure 23 Anticipated Medical Centre Parking Demand



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7.2.6.3 Education Centre

For the purpose of assessment, it has been assumed that the education centre use will have 100% demand during the weekday periods with demands reducing to 20% over the weekend.

7.2.7 Anticipated Car Parking Demand

Based on the above, it is anticipated the development will generate the following car parking demands:

Table 7 Anticipated Car Parking Demand

Use	Anticipated Demand			
	Weekday Midday	Weekday Evening	Weekend Midday	Weekend Evening
Long Term Demand				
Resident	205	205	205	205
Education Centre Staff	34	34	7	7
Retail Staff	5	5	5	5
Medical Centre Staff	16	16	16	16
Total Long Term Demand	260	260	233	233
Total Long Term Supply	323	323	323	323
Visitor Demand				
Residential Visitor	15	30	27	30
Medical Centre Visitor	25	9	18	0
Total Visitor Demand	40	39	45	30
Visitor Parking Supply	46	46	46	46
Visitor Surplus/Shortfall	6+	7+	1+	+16
Student Demand				
Students	74	74	15	15

Based on the above, all long-term car parking demands associated with the development will be able to be accommodated on-site. Further, short-term car parking demands associated with residential and medical centre visitors are also anticipated to be able to be fully accommodated on-site, with surplus visitor parking.

Finally, a shortfall of up to 74 spaces associated with the student component of the education centre is anticipated, noting that this level of demand is considered conservative on the high side, when having consideration to the location of the site. A review of the proposed shortfall follows acknowledging that the Planning Scheme allows for a reduction in car parking including to zero subject to a number of decision guidelines.

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7.3 Review of Car Parking Provision

7.3.1 Alternative Modes of Transport

As indicated in Section 2.6, the site has excellent access to Public Transport, with numerous train, tram and bus services in the immediate vicinity. The provision of excellent public transport ensures that visitors to the development will have access to a variety of options for site access.

In addition, with respect to the education use there is an abundance of student accommodation proximate to the site, with students housed in this accommodation likely to ride or walk to the site in-lieu of private motor vehicle.

7.3.2 Opportunities for Off-Site Car Parking

Several car parking options exist for those visitors to the development that cannot be accommodated on-site. On-street car parking is available on the majority of streets immediately surrounding the development providing a mixture of ticketed and time restricted parking.

Additionally, as identified in Section 2.8, numerous off-street car parking also exists within the vicinity of the site providing further parking opportunities for visitors to the site.

With respect to the proposed education use, it is noted that similar uses located within proximity to high quality public transport services, typically offer discounted student car parking in nearby paid car parks, with these car parks typically also accessible by the general public. Examples of this include Australian Catholic University on Victoria Street in Fitzroy, Melbourne University in Carlton and RMIT Melbourne Campus. Students of these universities are typically encouraged to utilise public transport services where possible, with students that elect to drive directed to off-street car parking within the area.

Given the abundance of public off-street car parking in the vicinity of the site as well as the existing car parking provided by the BHI at nearby campuses, it is considered that there is ample opportunity within the surrounding area for students to park when required.

7.3.3 Box Hill Central Activity Area Car Parking Strategy

The subject site is located within the Box Hill Central Activities Area, in this regard reference is made to the Box Hill Central Activities Area Car Parking Strategy ('the Strategy') prepared by GTA Consultants for Whitehorse City Council.

The study outlines a number of considerations with regards to visitor parking demands including, "...short-term car parking (i.e. hospital patient visitors and TAFE students) is recommended to be provided along street frontages." and, "The use of nearby car parking vacancies where available should, however, be considered on a case-by-case basis as a means to satisfy residential visitor parking demands."

The strategy clearly outlines the suitability of providing visitor parking on-street for a number of uses, including specifically outlining the suitability of accommodating demands for students and patients on-street.

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7.3.4 Adequacy of Proposed Car Parking Provision

It is expected that the proposed supply of car parking is appropriate for the proposed development, considering the following:

- The parking provision is generally in accordance with the Parking Overlay rates applicable to the site;
- The peak visitor carparking demands associated with the Medical Centre and residential uses are anticipated to be capable of being accommodated within the on-site visitor car parking supply;
- The shortfall of Education Centre car parking is expected to be readily accommodated within available off-street parking within the broader Box Hill Activity Centre;
- Car parking demands associated with the education centre use are anticipated to be less than those outlined within the Planning Scheme noting the sites high level of accessibility;
- Based on the recent VC148 amendment residential visitor car parking is no longer required to be provided on site where a site is within 400m of the PPTN;
- A number of off-site car parking opportunities exist in the vicinity of the site including on-street car parking and numerous off-street car parks;
- The proposed development provides bicycle parking in excess of the statutory requirements, therefore providing an alternate means of transportation;
- The development is within an easy walking distance of amenities, including shops, education, entertainment and recreational facilities;
- The site has excellent access to public transport, with numerous train, tram and bus services in the immediate vicinity, providing access options for residents and employees with no on-site parking space;
- Reduced car parking provision assists with the desired reduction in private vehicle usage, therefore minimising traffic impacts in the vicinity.

7.4 Accessible Car Parking

The Building Code of Australia (BCA) specifies the minimum requirements for the provision of accessible car parking.

The proposed retail, medical and education uses within the development, generate requirements to provide DDA parking, with a minimum of 1 space per use required. On this basis, the development generates a requirement to provide three disable parking spaces.

It is recommended that three DDA car parking spaces be provided on-site and designed in accordance with Australian Standard requirements.

As less than 6 (i.e. no more than 5) car spaces are provided for the proposed retail use (which requires the provision of accessible parking), the accessible bay does not need to be designated, so as to restrict the use of the car parking space only for people with a disability, also noting that the proposed retail parking will be for staff only.

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8 TRAFFIC CONSIDERATIONS

8.1 Traffic Generation

8.1.1 Residential

Surveys undertaken by other traffic engineering firms at residential dwellings have shown that the daily traffic generation rates vary depending on the size, location and type of the dwelling, the parking provision and proximity to local facilities and public transport. These surveys indicate a daily traffic generation rate of 2 vehicle movements per day per dwelling would be appropriate for a development if this scale. Application of this rate equates to 598 vehicle movements per day or 60 vehicle movements in a peak hour (adopting a peak-to-daily ratio of 10%).

In addition, the distribution of inbound and outbound traffic during the AM and PM peak hours has been assumed as follows:

- AM Peak Hour:
 - + Inbound: 20%
 - + Outbound: 80%
- PM Peak Hour:
 - + Inbound: 60%
 - + Outbound: 40%

8.1.2 Retail Tenancies

With regard to the Retail tenancies, it is anticipated that each allocated parking space may generate one inbound trip during the AM peak period, and one outbound trip during the PM peak period, equivalent to 5 vehicle trips per hour.

8.1.3 Medical Centre

To assess the level of traffic generated by the proposed Medical Centre a first principals-based assessment has been undertaken. It has been assumed that each doctor on the site will see a patient for an average of 10-15 minutes, with approximately 5 minutes between patients. This equates to each doctor seeing 3 patients over an hour, or 6 vehicle movements per practitioner per hour.

It is noted that medical centres are not typically fully staffed throughout the entire day, in this respect it has been assumed approximately 50% of staff will be on-site seeing patients in a peak hour (8 staff on-site).

Adopting this rate equates to 48 vehicle movements in a peak hour, including 24 inbound and 24 outbound trips.

8.1.4 Education Centre

As on-site parking for the centre will be limited to staff only, it has been conservatively assumed that each car space will generate one vehicle movement in a peak hour representing a staff member arriving to site in the AM peak hour and departing in the PM peak hour.

Adoption of this rate equates to 34 vehicle movements generated by the Education Centre use in a peak hour.

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8.1.5 Anticipated Traffic Generation

Based on the above survey results, the anticipated traffic generated by the proposed development is shown in Table 8.

Table 8 Anticipated Traffic Generation

Use	AM Peak Hour			PM Peak Hour		
	Inbound	Outbound	Total	Inbound	Outbound	Total
Resident	12	48	60	36	24	60
Medical Centre	24	24	48	24	24	48
Education Centre	34	0	34	0	34	34
Retail	6	0	6	0	6	6
Total	76	72	148	60	88	148

8.2 Traffic Distribution

8.2.1 General

Considering the location of the site in relation to the arterial road network, public transport facilities, schools, recreation and retail and employment precincts, the directional distribution of traffic has been assumed as follows:

- 50% to/from the north; and
- 50% to/from the south;

Traffic has been further distributed between the key intersections surrounding the site to generally align with existing traffic distributions.

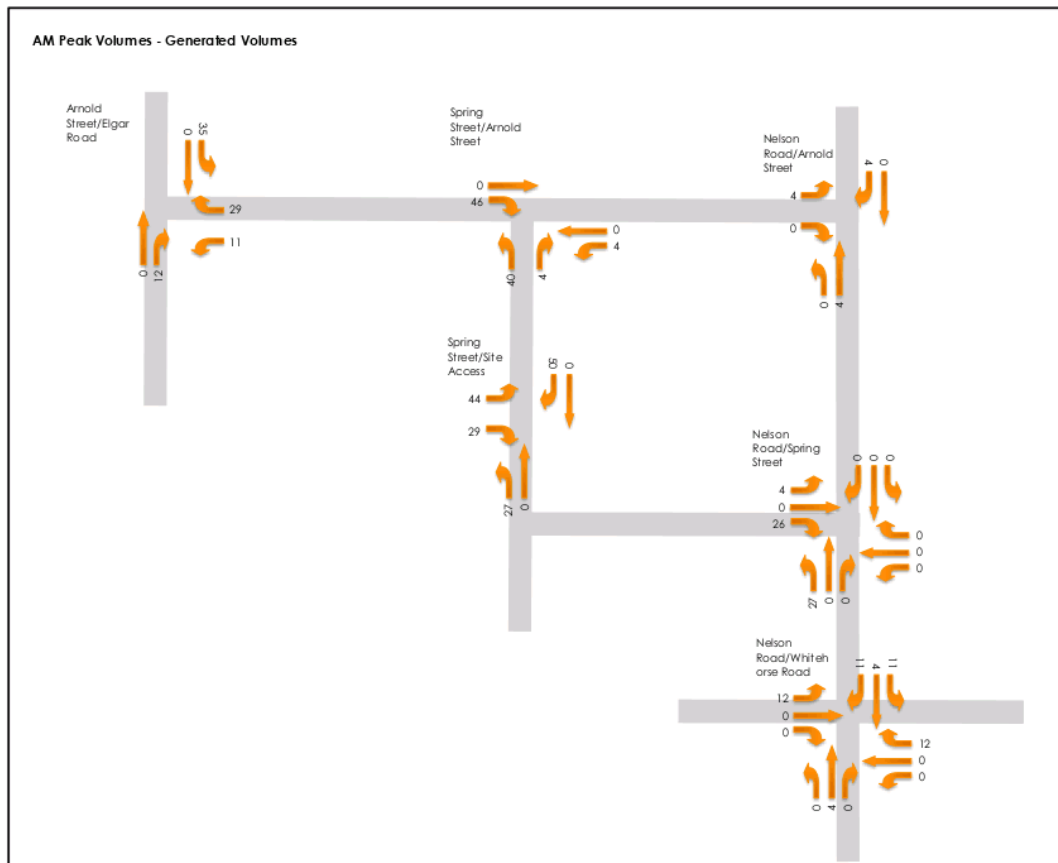
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8.3 Generated Traffic Volumes

Based on the above, the following traffic volumes are expected to be generated by the proposed development.

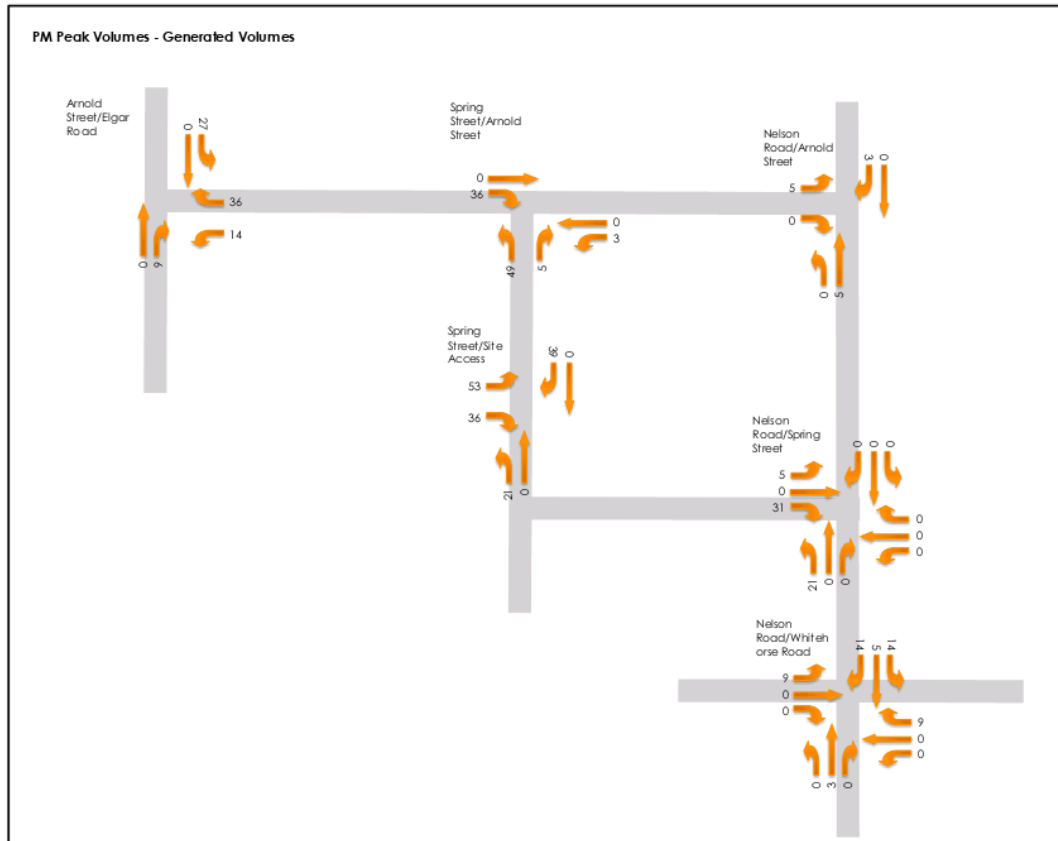
Figure 24 AM Peak Hour - Generated Traffic Volumes



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Figure 25 PM Peak Hour – Generated Traffic Volumes



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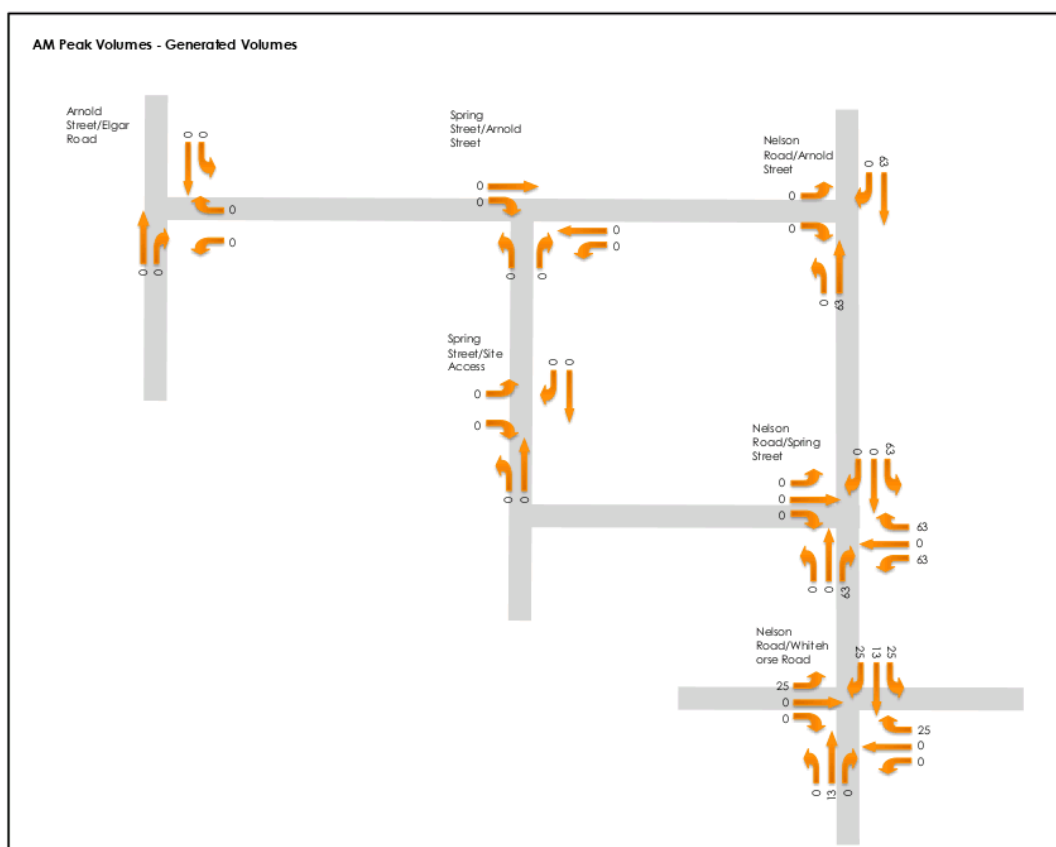
8.4 Adjacent Development Traffic

It is noted that a number of developments are either under construction or proposed in the vicinity of the site, with the most critical of these being the development of a 500 space car park at the RSL adjacent the proposed Spring Street East-West extension.

In this respect, to account for a level of this growth, it has been assumed that the 500 space RSL car park will turnover at 50% of the number of spaces during a peak hour, with movements split evenly between inbound and outbound. This equates to 125 inbound and 125 outbound vehicle movements in a peak hour. This level of traffic generation is considered to be conservative on the high side.

The distribution of the RSL traffic on the adjacent road network is shown in Figure 26.

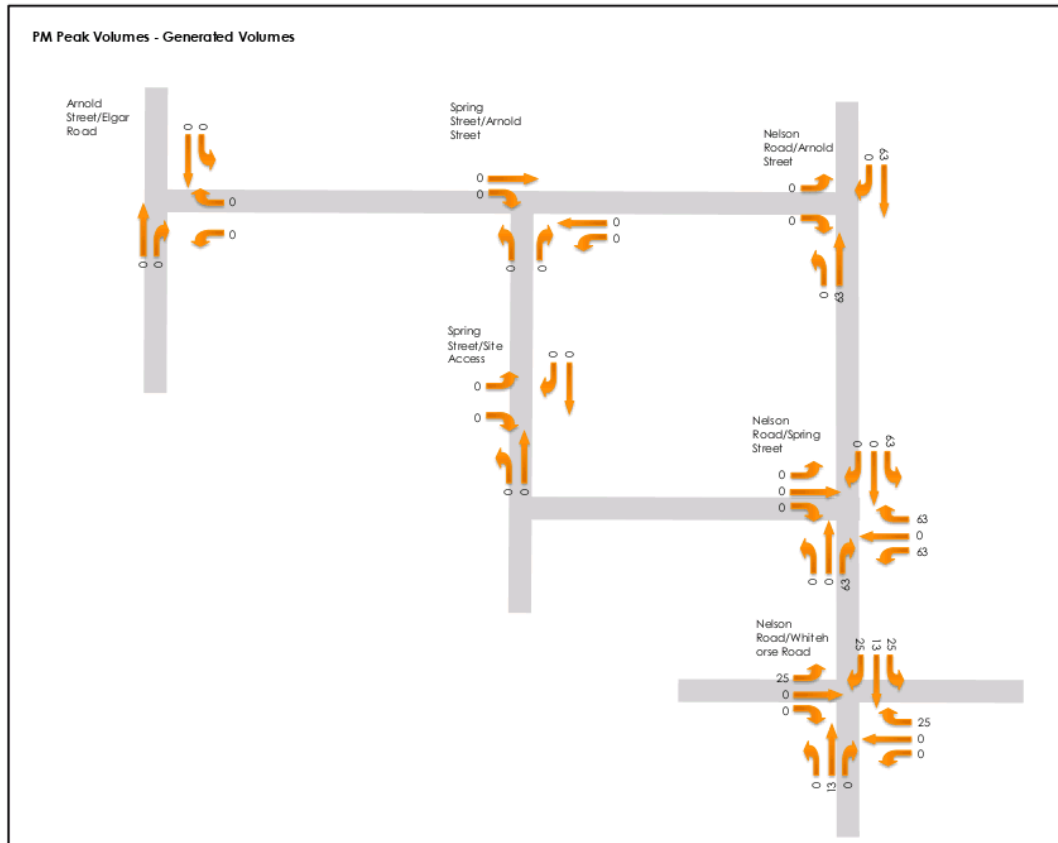
Figure 26 RSL – AM Peak Hour Traffic Generation



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Figure 27 RSL – PM Peak Hour Traffic Generation



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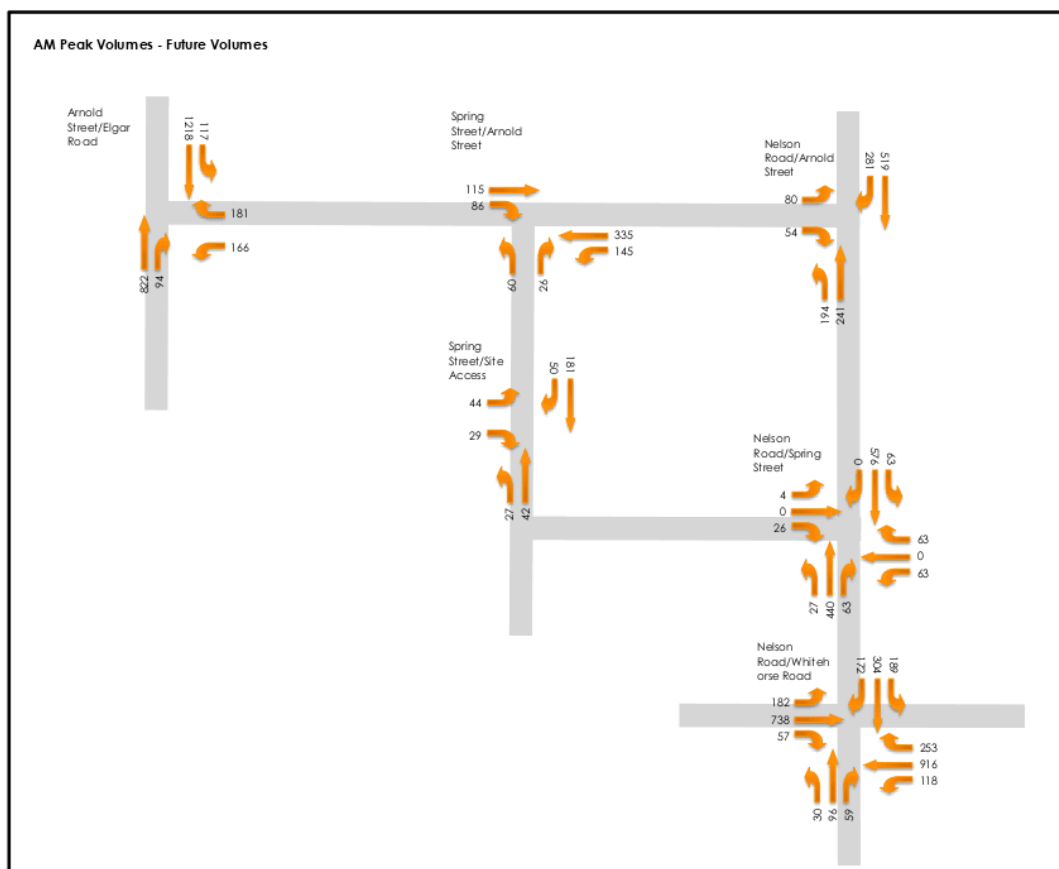


8.5 Resultant Future Traffic Volumes

Based on the above, the future intersection volumes can be calculated by combining the existing volumes with the expected traffic volume growth and superimposing the traffic anticipated to be generated by the proposed development and adjacent RSL. It is noted that, as discussed in Section 2.5.3, traffic volumes in the PM peak hour have been adjusted based on SCATS data at the intersection of Whitehorse Road/Nelson Road.

The resultant peak hour traffic volumes are shown in Figure 28.

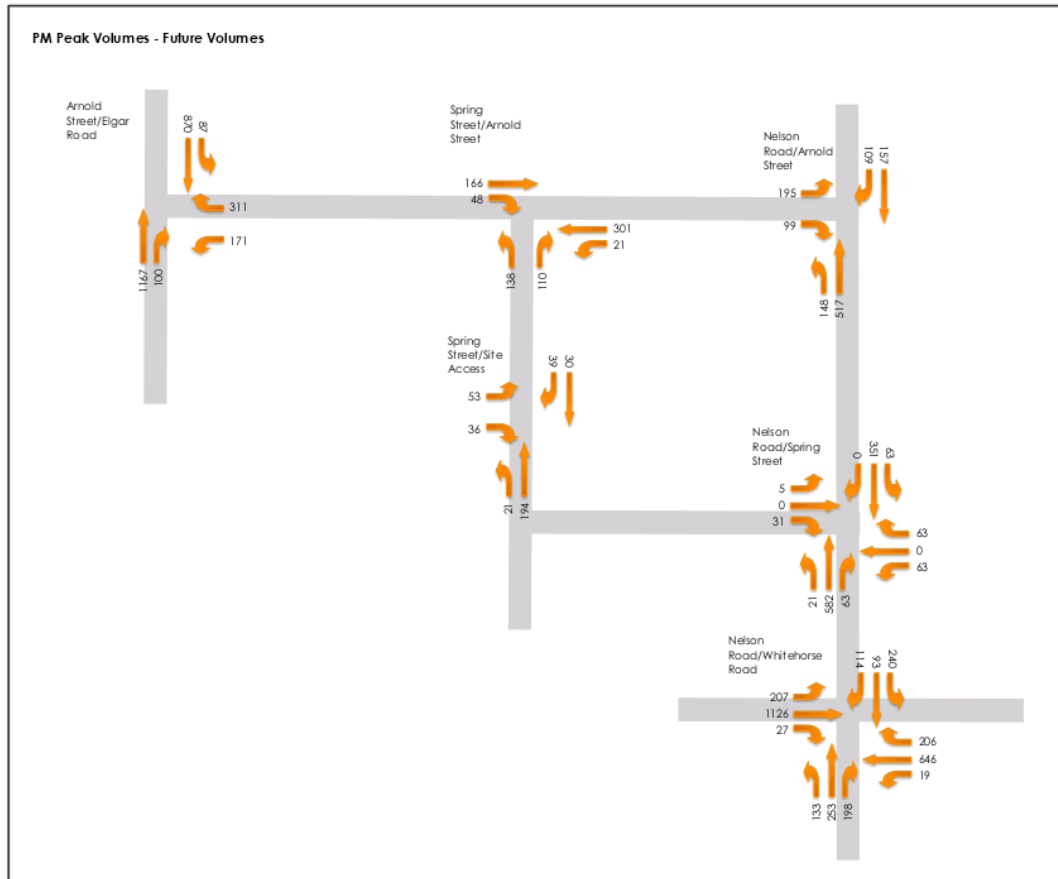
Figure 28 AM Peak Hour - Resultant Future Traffic Volumes



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Figure 29 PM Peak Hour - Resultant Future Traffic Volumes



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8.6 Traffic Impact

8.6.1 Modifications to SIDRA Phasing

In addition to a review of input traffic volumes, changes to the phasing of traffic signals at the intersection has also been reviewed and updated.

Specifically, phasing at the intersection was updated to reflect the phasing provided within the SCATS site Ops Sheet.

Additionally, a cycle time of 120 seconds was adopted for the intersection.

8.6.2 Intersection Capacity Assessment

To assess the operation of the intersection the traffic volumes have been input into SIDRA Intersection, a traffic modelling software package.

The SIDRA Intersection software package has been developed to provide information on the capacity of an intersection with regard to a number of parameters. Those parameters considered relevant are, Degree of Saturation (DoS), 95th Percentile Queue, and Average Delay as described below.

Table 9 SIDRA Intersection Parameters

Parameter	Description														
Degree of Saturation (DoS)	The DoS represents the ratio of the traffic volume making a particular movement compared to the maximum capacity for that particular movement. The value of the DoS has a corresponding rating depending on the ratio as shown below.														
	<table><tr><th>Degree of Saturation</th><th>Rating</th></tr><tr><td>Up to 0.60</td><td>Excellent</td></tr><tr><td>0.61 – 0.70</td><td>Very Good</td></tr><tr><td>0.71 – 0.80</td><td>Good</td></tr><tr><td>0.81 – 0.90</td><td>Fair</td></tr><tr><td>0.91 – 1.00</td><td>Poor</td></tr><tr><td>Above 1.00</td><td>Very Poor</td></tr></table>	Degree of Saturation	Rating	Up to 0.60	Excellent	0.61 – 0.70	Very Good	0.71 – 0.80	Good	0.81 – 0.90	Fair	0.91 – 1.00	Poor	Above 1.00	Very Poor
	Degree of Saturation	Rating													
	Up to 0.60	Excellent													
	0.61 – 0.70	Very Good													
	0.71 – 0.80	Good													
	0.81 – 0.90	Fair													
	0.91 – 1.00	Poor													
Above 1.00	Very Poor														
It is noted that whilst the range of 0.91 – 1.00 is rated as 'poor', it is acceptable for critical movements at an intersection to be operating within this range during high peak periods, reflecting actual conditions in a significant number of suburban signalised intersections.															
Average Delay (seconds)	Average delay is the time delay that can be expected for all vehicles undertaking a particular movement in seconds.														
95th Percentile (95%ile) Queue	95%ile queue represents the maximum queue length in metres that can be expected in 95% of observed queue lengths in the peak hour														

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The results of the analysis are provided in Table 10 and Table 11.

Table 10 AM Peak Hour - Existing/Future Conditions

Intersection	Approach	DoS		Avg. Delay (sec)		Queue (m)	
		Existing	Future	Existing	Future	Existing	Future
AM Peak							
Arnold Street / Elgar Road	Elgar Rd – South	0.468	0.561	7.7	8.8	58.9	59.1
	Arnold St – East	0.495	0.567	46.2	41.0	52.3	57.0
	Elgar Rd – North	0.519	0.560	7.8	9.0	113.2	119.1
Spring Street / Arnold Street	Spring St – South	0.063	0.193	16.7	17.1	2.1	6.6
	Arnold St – East	0.463	0.464	8.9	8.9	28.4	28.4
	Arnold St – West	0.157	0.213	8.7	10.1	8.4	9.0
Nelson Road / Arnold Street	Nelson Rd – South	0.209	0.243	3.0	2.5	0.0	0.0
	Nelson Rd – North	0.498	0.553	4.6	5.3	31.5	39.5
	Arnold St – West	0.222	0.297	9.9	12.2	5.4	8.0
Nelson Road / Whitehorse Road	Nelson Rd – South	0.678	0.678	41.1	39.0	27.8	27.8
	Whitehorse Rd – East	0.807	0.878	43.4	52.6	216.0	250.8
	Nelson Rd – North	0.827	0.889	40.7	43.2	125.6	144.7
	Whitehorse Rd – West	0.792	0.852	45.4	50.9	160.3	177.7
Spring Street Extension / Nelson Road	Nelson Rd – South	-	0.339	-	2.8	-	10.5
	RSL Access – East	-	0.475	-	24.6	-	14.0
	Nelson Rd – North	-	0.358	-	0.6	-	0.2
	Spring St Extension – West	-	0.174	-	26.3	-	3.7

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Table 11 PM Peak Hour - Existing/Future Conditions

Intersection	Approach	DoS		Avg. Delay (sec)		Queue (m)	
		Existing	Future	Existing	Future	Existing	Future
PM Peak							
Arnold Street / Elgar Road	Elgar Rd – South	0.664	0.712	13.4	15.3	140.3	154.2
	Arnold St – East	0.665	0.716	31.7	31.0	73.6	84.6
	Elgar Rd – North	0.480	0.521	11.6	13.3	86.8	96.5
Spring Street / Arnold Street	Spring St – South	0.313	0.411	17.5	17.8	11.1	15.0
	Arnold St – East	0.428	0.428	7.6	7.7	26.2	26.2
	Arnold St – West	0.237	0.246	7.2	8.3	13.1	13.7
Nelson Road / Arnold Street	Nelson Rd – South	0.349	0.383	1.4	1.3	0.0	0.0
	Nelson Rd – North	0.192	0.243	6.2	6.3	7.5	10.4
	Arnold St – West	0.417	0.498	10.2	12.1	15.4	19.4
Nelson Road / Whitehorse Road	Nelson Rd – South	0.637	0.864	38.7	43.1	83.5	94.9
	Whitehorse Rd – East	0.808	0.854	43.8	44.3	119.9	118.4
	Nelson Rd – North	0.770	0.866	56.4	53.7	78.4	88.1
	Whitehorse Rd – West	0.802	0.866	32.9	41.0	234.5	273.6
Spring Street Extension / Nelson Road	Nelson Rd – South	-	0.407	-	1.5	-	8.9
	RSL Access – East	-	0.432	-	22.2	-	12.7
	Nelson Rd – North	-	0.243	-	0.9	-	0.2
	Spring St Extension – West	-	0.183	-	26.3	-	4.0

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8.6.3 Intersection Operation

8.6.3.1 Arnold Street / Elgar Road

As outlined above the intersection of Arnold Street/Elgar Road is anticipated to go from a 'Very Good' level of service to a 'Good' level of service during the PM peak hour following the development of the site, with minimal increases to queues and delays on all approaches.

8.6.3.2 Spring Street / Arnold Street

The intersection of Spring Street/Arnold Street is anticipated to continue to operate with an 'Excellent' level of service following the development of the site.

8.6.3.3 Nelson Road / Arnold Street

As outlined above, the intersection of Nelson Road/Arnold Street is anticipated to continue to operate with an 'Excellent' level of service following the development of the site.

8.6.3.4 Nelson Road/Whitehorse Road

As outlined in Table 10, the intersection of Nelson Road/Whitehorse Road is anticipated to continue to operate at a 'Fair' level of service during the AM and PM peak hours following the development of the site.

In the PM peak hour, the operation of the intersection will go from 'Fair' to 'Poor' with DoS values of between 0.910 and 0.940 following the development of the site.

8.6.3.5 Spring Street Extension/Nelson Road

The new intersection of Spring Street/Nelson Road is anticipated to operate with an 'Excellent' level of service following the development of the site. In this respect, it is not considered necessary to implement signalisation at this intersection.

Further, supplementary gap acceptance surveys have been undertaken at the existing intersection. These surveys indicate the following existing gap capacity at the intersection:

- AM Peak Hour:
 - + Left Out: 669 vehicles
 - + Right Out: 471 vehicles
 - + Right In: 1,092 vehicles
- PM Peak Hour:
 - + Left Out: 859 vehicles
 - + Right Out: 525 vehicles
 - + Right In: 1,360 vehicles

As indicated above, there are enough gaps along Nelson Road to accommodate additional traffic in and out of the proposed extension.

8.7 Traffic Review

As shown above, all intersections are expected to operate satisfactorily following the development of the site, with limited impact on existing levels of service.

8.8 Daily Traffic Volumes – Spring Street Private Road

Finally, based on the anticipated traffic generated by the development it is anticipated that the Spring Street extension will carry in the order of 555 vehicle movements a day. The proposed extension is considered to have characteristics suitably similar to an 'Access Place' which has an indicative daily traffic threshold of between 300 and 1,000 vehicles per day.

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On this basis, the proposed Spring Street road is anticipated to operate satisfactorily following its development.

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9 SUMMARY OF RFI RESPONSE

A summary of the response to the traffic and transport related RFI items is provided in Table 12.

Table 12 RFI Response Table

<i>RFI Item</i>	<i>Section of Report Responding to Item</i>	<i>Notes</i>
Preparation of a Green Travel Plan	N/A	A separate green travel plan has been prepared (refer to 180430GTP001A-F)
4a. A lack of parking provision for the proposed use	Section 7	As outlined in Section 7, the development is no longer anticipated to have a shortfall of parking.
4b. The impact upon the intersection of Nelson Road and Whitehorse Road which should be referred to VicRoads for comment	Section 8.6	As outlined in Section 8.6, a more thorough assessment of the traffic impacts at the intersection indicate the proposed development is not anticipated to materially impact on the operation of the intersection with a 'Fair' level of service anticipated to be maintained post development.
4c. A queue length analysis for the entry into the proposed development.	N/A	The boom gates originally proposed have now been removed. Further, the roller doors providing access to the visitor and staff parking will be maintained in an open position during typical operating hours.
4d. Alteration of the proposed east-west spring street road layout is required.	Section 3.5	The cross-section has been altered to accommodate a 1.5m pedestrian path along the northern boundary of the road.
Other Items Raised		
Gap acceptance survey at the intersection of Nelson Road and the existing BHI car park access.	Section 8.6.3.5.	Adequate gaps have been identified on Nelson Road adjacent the existing intersection.

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10 CONCLUSIONS

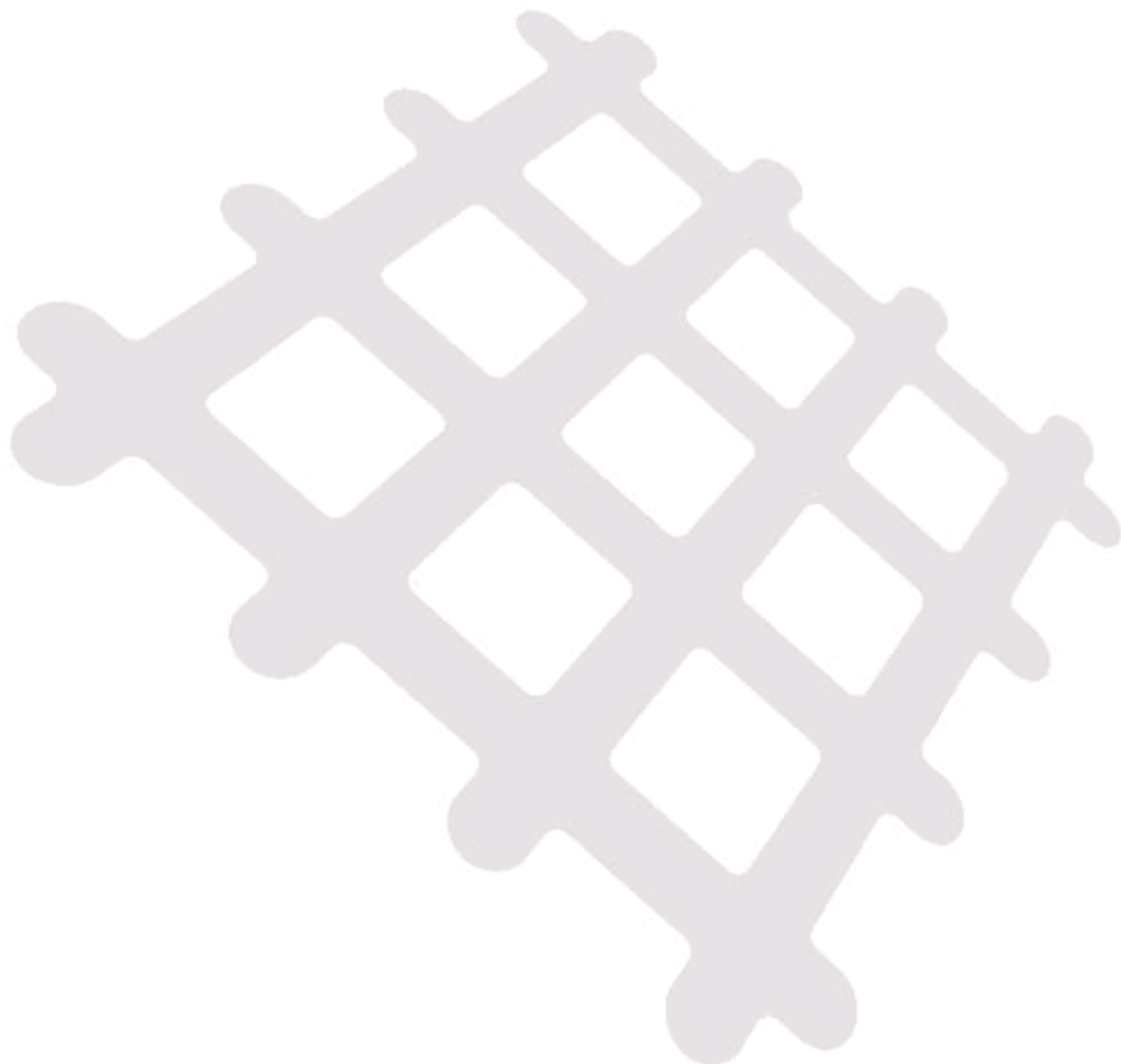
It is proposed to develop the subject site for the purposes of mixed-use development consisting of residential, medical, education and retail uses.

Considering the analysis presented above, it is concluded that:

- The proposed car parking and access design is considered appropriate;
- The proposed Spring Street extension has been designed to meet the relevant design requirements and is considered appropriate;
- The proposed bicycle parking provision and design is considered appropriate;
- The proposed supply of car parking is appropriate for the proposed development;
- The proposed development is expected to have a negligible impact on the surrounding road network when compared to the existing operation.
- There are no traffic engineering reasons which would preclude a permit from being issued for this proposal.



Appendix A Swept Path Assessments



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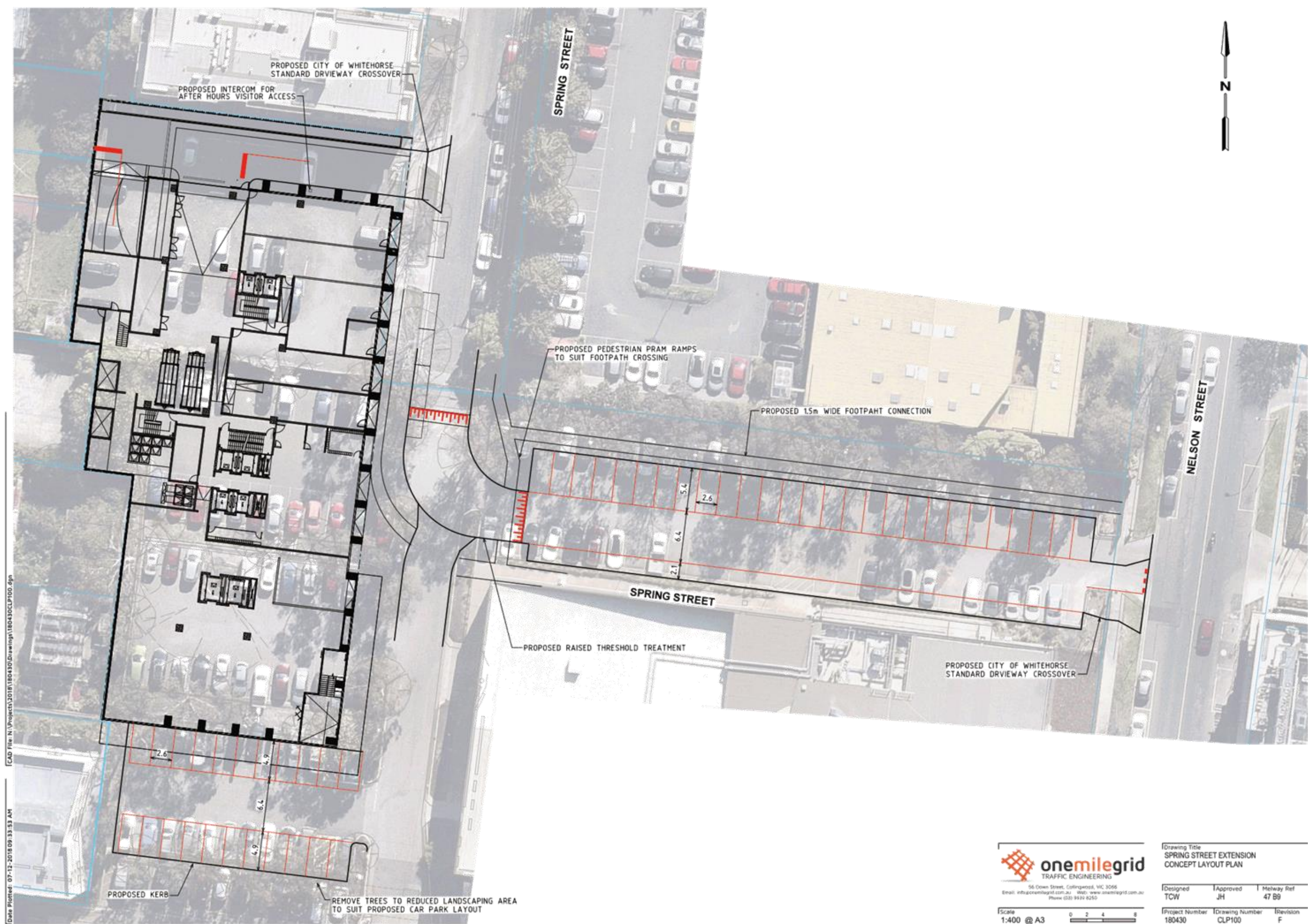




Appendix B Spring Street Concept Layout Plan



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9.1.2 – ATTACHMENT 3.

Sustainability Management Plan: Wood and Grieve Engineers



16-18 Spring Street, Box Hill

Sustainability Management Plan

Prepared for:

RCP
c/o Orion Group

Date:
18/01/19

Prepared by:

Nick Sneddon/Kenneth Yuen
Project No. 35628

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Revision

REVISION	DATE	COMMENT	APPROVED BY
DRAFT	10/08/2018	DRAFT FOR REVIEW	KKHY
2	17/08/2018	FOR TP SUBMISSION	KKHY
3	31/08/2018	FOR TP SUBMISSION	KKHY
4	06/09/2018	FOR TP SUBMISSION	KKHY
5	16/11/2018	For Client Review	KKHY
6	19/12/2018	For TP Submission	KKHY
7	18/01/2019	For TP Submission	KKHY

Disclaimer

This is a working document and therefore may be subject to change or modification through the course of the design phase of this project. It is expected that any change or modification will not impact on the overall aim of this document. That is, to provide a strategy for the project which ensures it meets Whitehorse City Council's planning guidelines on environmentally sustainable design.

Energy modelling provides an estimate of a 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, energy modelling results only represent an interpretation of the potential performance of a building. No guarantee or warranty of building performance in practice can be based on energy modelling results alone.

The results generated from any modelling analysis within this report are based on specific criteria outlined in the National Construction Code (NCC) and Built Environment Sustainability Scorecard (BESS), along with best practice guidelines 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 project team to estimate the expected annual energy consumption of the proposed building and therefore determine if the building has the ability to be energy efficient.

REVISION

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1. Executive Summary

This report has been prepared at the request of RCP c/o Orion Group and is intended to provide an overview of the Environmentally Sustainable Design (ESD) Initiatives in support of the development application for a proposed mixed use development at 16-18 Spring Street, Box Hill, Victoria.

This Sustainability Management Plan (SMP) has been prepared to inform Whitehorse City Council of the proposed development's commitment to sustainability, measured against the documented performance guidelines in accordance with Whitehorse City Council's Planning Scheme. The project design team has used the proposed Whitehorse City Council planning scheme guidelines and has applied Sustainable Design Assessment in the Planning Process (SDAPP). The Built Environment Sustainability Scorecard (BESS) has been utilised as the sustainability tool to demonstrate compliance with SDAPP requirements.

This document may be subject to change or modification through the course of the project. However, any change or modification will not be permitted to impact on the overall aim of this document. That is, to provide a strategy for the project which ensures it achieves Best Practice as quantified within the BESS rating tool. Should the contractor provide an alternative design option which affects the overall outcome of the rating then the contractor shall ensure that said alternative will provide an equivalent or greater outcome to ensure the Best Practice rating is maintained.

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1.1 The Proposed Development

The proposed development is situated on Spring Street in Box Hill. This is depicted in the below image:



The development comprises of the following:

- 29 stories comprised of 299 residential apartments and commercial spaces such as retail and consulting rooms
- 5 basement levels comprising of 369 car parking spaces
- Ground floor common areas, waste and bicycle storage rooms
- Communal spaces on level 4 & mezzanine level which include areas such as an indoor pool, large gym, sauna, games room, dining rooms and Yoga / meditation rooms.

This assessment is based on the following main sources of information.

- Architectural drawings of various revisions received to date from Ellenberg Fraser dated 13th December 2018.
- Project Meetings held to date with the project design team.

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1.2 Summary of Scope

To demonstrate compliance with this policy, the proposed project aims to incorporate the following Environmentally Sustainable Design (ESD) initiatives:

1.2.1 Building Compliance: BCA 2016 - Section J - Energy Efficiency

In accordance with the current energy efficiency standards outlined within the BCA 2016, the development shall demonstrate compliance with the following code requirements:

- The proposed development will demonstrate that all new apartments achieve an average Nationwide House Energy Rating Scheme (NatHERS) rating of not less than 6 Stars.
- In addition, no individual apartment shall achieve an energy star rating of not less than 5 stars

1.2.2 Indoor Environmental Quality

- Low VOC paints, sealants and adhesives throughout
- Operable facades to assist with natural ventilation to all dwellings
- Building façade design and glazing selection to assist with natural daylight and effective shading of occupied spaces
- Thermal comfort addressed by building fabric specification and façade design

1.2.3 Energy Efficiency

- High efficiency air conditioning system selections (VRV)
- Effective building envelope design – Target of 6.5 Star average NatHERS rating
- Sub-metering base building uses to assist with energy management
- Gas fired central hot water service
- Motion/ daylight/ time clock control for all common area lighting
- LED or compact fluorescent lighting to all building zones
- CO monitors will be installed to control the operation and speed of ventilation fans
- Provision for 5 star clothes dryers as a purchase upgrade item for perspective buyers

1.2.4 Water Efficiency and Stormwater Management

- On-site rainwater capture and reuse for landscape irrigation on the podium level, and toilet flushing for the communal gym / pool area toilets on the podium level. Landscape irrigation tank is a minimum 30 kL. Toilet flushing tank is a minimum 15 kL.
- Drought tolerant landscape design
- Water Sensitive Urban Design (WSUD) strategy delivering best practice outcomes.
- Water sub-metering

1.2.5 Transport

- Electrical vehicle infrastructure is a design opportunity under consideration by the development team to provide a number of car charging stations.

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1.2.6 Waste Management

- Building Waste Management Plan - incorporating general and recycled waste storage & commercial kitchen waste management plan
- Construction Waste Management Plan – targeting 60% construction and demolition waste to be recycled

1.2.7 Urban Ecology

- Re-use of previously developed urban site
- All landscaping to use predominantly indigenous or drought tolerant plant species

1.2.8 Materials

- Low VOC paints, sealants and adhesives
- PVC selections in line with Best Practice guidelines
- All timber to be FSC or PEFC certified
- Low formaldehyde composite wood products will be selected for the project
- All refrigerants selected for the site will have zero ozone depletion (ODP) rating

1.2.9 Ongoing Building and Site Management

- Construction/environmental plan to be implemented during the construction phase of the project
- Operational recycling and waste management
- Facility management to ensure upkeep and maintenance of the building to maintain the sustainability related design initiatives

1.2.10 Built Environment Sustainability Scorecard (BESS)

A BESS assessment has been completed for the project based on its current form. The proposed residential development will achieve a score of 55% which is considered “**Best Practice**”, as summarised in the table below.

BESS Category	Minimum Target	Project Score
Management	-	56%
Water	50%	62%
Energy	50%	50%
Stormwater	100%	100%
IEQ	50%	77%
Transport	-	22%
Waste	-	33%
Urban Ecology	-	54%
Innovation	-	0%
Result	50%	55%

BESS requires a project to achieve minimum targets within 4 categories (Energy, Water, Stormwater and IEQ).

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1.2.11 Best Practice Sustainable Design

In summary, the project aims to:

- Embrace, meet and/or exceed the current mandatory ESD and NCC benchmarks.
- Identify practical and robust ESD design initiatives, that can be embraced by the future building occupants and provide operational energy, water and waste savings for the life of the building.
- Incorporate a broad range of initiatives throughout the building, to ensure a sustainable design outcome is achieved.

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2. Introduction

2.1 General Information

Wood and Grieve Engineers have been engaged by RCP c/o Orion Group to provide Environmentally Sustainable Design (ESD) consulting services for a proposed mixed use development 16 - 18 Spring Street, Box Hill, Victoria.

This report is intended to provide an overview of the proposed Environmentally Sustainable Design (ESD) Initiatives in support of the development application for 16 - 18 Spring Street, Box Hill, Victoria.

2.2 Project Description

The proposed building is to be constructed over 29 stories, plus 5 basement levels and will consist of the following:

Floor Level	Description
Basements 1 - 5	A total of 369 car parking spaces will be provided throughout 5 levels of basement
Ground & Mezzanine	Box Hill Institute entry, cafe, retail spaces, food & beverage tenancy, medical consulting rooms & lobby, waste room, loading zone and shared BOH loading area; services on mezzanine level
Level 1 - 2	Box Hill Institute and commercial spaces
Level 3	Box Hill Institute and commercial spaces
Level 4 & Mezzanine	Mid-term stay studio apartments, communal pool, sauna, outdoor spaces, kitchen, theatre lounge, gym, yoga and flexible booking spaces
Level 5 – 26	Residential dwellings
Level 27	Residential dwellings and communal outdoor space
Level 28	Residential dwellings

2.3 Report Structure

This report is intended to discuss the initiatives currently proposed by the project design team. It is envisaged that the project will incorporate the consideration of the following sustainable design elements within the project design:

- Indoor Environmental Quality (IEQ)
- Energy Efficiency
- Water Resources
- Stormwater Management
- Building Materials
- Transport
- Waste Management
- Urban Ecology
- Innovation
- Ongoing building and site management

2.4 Built Environment Sustainability Scorecard (BESS)

In addition to the sustainable design elements nominated above, the development has completed a Built Environment Sustainability Scorecard (BESS) assessment.

BESS assesses energy and water efficiency, thermal comfort, and overall environmental sustainability performance of a new building or alteration. It was created to assist builders and developers to demonstrate that a project meets sustainability information requirements as part of a planning permit application and is considered an acceptable tool for ESD benchmarking.

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3. BESS Assessment

3.1 Indoor Environment Quality

Indoor Environment Quality (IEQ) has been defined as a key sustainable building category in order to improve indoor environments for building occupants which in turns improves overall wellbeing.

The preliminary design response for the proposed mixed use development has been to create a healthy building which benefits all building user groups. In order to provide Council with examples of the design commitment, the proposed development seeks to improve the overall Indoor Environmental Quality (IEQ) for building occupants by addressing the following elements:-

Thermal Comfort	<p>The building fabric and mechanical design will target a development that aims to achieve a high level of thermal comfort. Building fabric types and the zoning of mechanical plant (for both heating and cooling) will be selected to ensure the building targets an improved level of occupant amenity.</p> <p>The dwellings aim to exceed the statutory 6 star average rating under the Nationwide House Energy Rating Scheme (NatHERS) as per preliminary assessment results.</p> <p>Furthermore, no dwelling will exceed 21 MJ/m2 in cooling load for the year. Refer to the NCC Section J NatHERS report for more detail.</p>
Natural Ventilation	<p>All apartments are provided with adequate natural ventilation via operable windows and doors, with the aim of maximising fresh air intake and reducing the need for mechanical ventilation, thus lowering overall energy use and improving internal air quality. Natural ventilation shall be in accordance with Part F4.6 of the BCA.</p> <p>Cross ventilation is provided to all residential units to assist with the successful distribution of outside air.</p> <p>All kitchen range hoods shall be ducted to outside to assist in the removal of any unpleasant odours resulting from cooking activities.</p>
Daylight	<p>Building envelope and facade design, glazing and material selection have all been designed with the intent to improve and achieve high levels of natural daylight within the building.</p> <p>All bedrooms and living rooms within the design are afforded direct access to natural light.</p> <p>There are no borrowed light spaces within the development.</p> <p>The total area of nominated spaces within the project is measured at approximately 6,661 m². Of this area, approximately 3,276 m² achieves the required daylight factor of 2.0. Therefore, this equates to ~50% of nominated area compliance.</p> <p>Daylight hand calculations can be found in Appendix C to substantiate calculations entered to the BESS assessment.</p>
External Views	<p>100% of the liveable apartment areas are within 8m of unobstructed glazing.</p> <p>100% of bedrooms are within 5m of unobstructed glazing.</p>
Hazardous Materials and VOCs	<p>All interior paints, adhesives, sealants, carpets and wall coverings will all be selected to minimise Volatile Organic Compounds (VOCs) off-gassing to improve the indoor environment quality of the facility.</p> <p>It is recommended that as a minimum the following limits are targeted; interior paints – 20g/l, timber varnishes and woodstains – 80g/l, multipurpose construction and carpet adhesives – 70 g/l, carpets – 0.75 mg/m²/hr.</p>

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Formaldehyde Minimisation	Selection of low formaldehyde composite wood products to further improve the indoor environment quality. It is recommended that as a minimum all wood products have a formaldehyde emission rating of E0.
Private External Space	The inclusion of balconies throughout the development presents the residents with the opportunity to access the outdoors without having to exit the building.

3.2 Energy Efficiency

Energy and more specifically, energy efficiency and reductions in Greenhouse Gas Emissions, remains a key driver for sustainability within the project. The built environment within Australia contributes over 40% of our total greenhouse gas emissions annually which is among the highest per capita in the world. Operational energy use within buildings represents approximately 23% all energy related greenhouse gas emissions in Australia (ABSEC, 2007). By planning for greater energy efficiency within new developments, we can set about lowering these annual greenhouse emissions.

This development has sought to include several sustainable initiatives designed in order to maximise the energy efficiency of the development.

Energy Efficiency initiatives proposed for inclusion within the development will include:-

Building Envelope Performance	<p>In accordance with the current version of the National Construction Code (NCC 2016), the project is required to achieve the following minimum thermal performance benchmarks:</p> <ul style="list-style-type: none"> - Development to achieve an average NatHERS rating of 6 Stars with no individual dwelling achieving a star rating of less than 5 Stars. - All conditioned common areas to achieve compliance with the energy efficiency requirements of Section J of the BCA. <p>Preliminary NatHERS ratings have been carried out on a typical floor plate for the development. Based on these sample NatHERS energy ratings, the project has the potential to achieve at least 6.5 Star average rating. Refer to Appendix B for results.</p> <p>For the commercial portion of the development, the project team has committed to a 20% improvement above BCA requirements using JV3 compliance with proposed services at the building permit stage of the project. A preliminary JV3 report has been prepared by Wood & Grieve Engineers under separate cover.</p> <p>The methodology to meet this target will be for the architect and the ESD Consultant to carry out design reviews throughout the design phase of the project via energy modelling analysis.</p> <p>Final review and certification will then be provided to the relevant Building Surveyor.</p>
Building Fabric	<p>Reductions in heating and cooling demands through an energy efficient building fabric design.</p> <p>This will incorporate wall insulation, suspended soffit insulation, roof insulation, shading elements and thermally efficient glass selections (where applicable).</p>
Energy Sub-Metering	<p>Individual energy, potable water and domestic hot water meters shall be provided to each apartment. Smart meters will allow occupants to effectively monitor and manage their energy bills.</p> <p>Body corporate common services shall be sub-metered to allow for ongoing building tuning works. All tenancies will also be independently sub-metered.</p>
Lighting	<p>The lighting design will incorporate energy efficient lighting fixtures (typically compact fluorescent, T5 and LED types) along with energy efficient lighting controls.</p> <p>Dimming controls to common areas, motion sensors to transient zones and</p>

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	night-setback modes of operation will all be utilised to minimise the sites lighting energy consumption.
Air Leakage Minimised	Air leakage to be minimised through best practice building fabric design to ensure that air infiltration does not have a significant impact on the building. All mechanical exhaust points shall be self-closing when not in use.
Lighting Power Density	Lighting power density shall be as follows: <ul style="list-style-type: none"> ■ Dwellings: No greater than average 4W/m² ■ Foyers, lobbies, hallways/corridors: No greater than average 8W/m² ■ Amenities: No greater than average 8W/m² ■ Back of house and indoor car parks: No greater than average 5W/m²
Air Leakage Minimised	Air leakage to be minimised through best practice building fabric design to ensure that air infiltration does not have a significant impact on the building. All mechanical exhaust points shall be self-closing when not in use.
Efficient HVAC System	When outdoor conditions are not conducive to natural ventilation, air conditioning will be used. Inverter split system units are to be installed and sized to maintain conditions of the living space and main bedroom of each dwelling. Common areas which are not in use are to have their air-conditioning levels either reduced (in order to maintain a background level of comfort) or completely turned off.
Efficient Fans and Pumps	All centralized systems are to be supplied with variable speed drives (VSD) to lower energy use when demand is low.
Domestic Hot Water	Gas fired central hot water system(s) will be installed to minimise greenhouse gas emissions from the domestic hot water demand from the development.
Peak Electricity Demand Reduction	It is anticipated that all air conditioning systems installed in the project will either be within 1 star of or in the top 25 percentile of the best available on the market under MEPS energy efficiency measurement standard.
Car Park Ventilation	CO sensors will be installed to control the operation and speed of ventilation fans.

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3.3 Water Efficiency and Stormwater Management

Water saving measures such as water efficient fittings and fixtures (taps, shower heads etc.) and rainwater tanks are included within the project design.

Overall the development will seek to address water efficiency and reduce the potable water demand for the building through the following initiatives:-

Minimising Amenity Water Demand	<p>Potable water demand reductions within the development are to be achieved by using water efficient fixtures and fittings. The architectural specification shall nominate Water Efficient Labelling Scheme (WELS) rated fittings with the following star ratings, as a minimum:</p> <ul style="list-style-type: none"> - Flow restricting devices on all fixtures - 3 Star WELS rated showerheads (>6.0, but <7.5L minute) - 4 Star WELS rated cisterns (4.5/3L flush) - 4 Star WELS urinals - 5 Star WELS rated tap-ware - 5 Star WELS dishwashers - 4 Star WELS washing machines (if applicable)
Rainwater Harvesting	<p>A rainwater harvesting system with a tank capacity of at least 45 kL (total) is proposed for the site to offset potable water demand for the development and assist in managing stormwater flows to ensure that stormwater levels do not exceed pre-development levels. The rainwater tanks will be located within the basement level of the development.</p>
Landscape Irrigation	<p>Vegetation selection within the project landscape design will focus on a reduced potable water demand. Development irrigation demand shall be primarily sourced from on-site rainwater storage tank.</p>
Rainwater Re-use	<p>Rainwater reuse is proposed for landscape irrigation on Level 4, bin wash down and also toilet flushing for the communal bathrooms for the gym.</p>
Stormwater	<p>The project acknowledges that Council's guidelines recommend a project achieve Best Practice (which is equivalent to a 100% result within the BESS rating tool), through the use of either Melbourne Water's STORM online calculator or a MUSIC model.</p> <p>To that end the project team have developed a Water Sensitive Urban Design (WSUD) strategy, inclusive of a MUSIC calculator assessment, incorporating the initiatives outlined above and achieving a Best Practice outcome. Refer to Stormwater Management Plan produced by Wood & Grieve Engineers under different cover.</p> <p>WSUD is a framework for managing urban stormwater both as a resource, and in a way that protects receiving aquatic ecosystems (CSIRO, 2005). The main objectives of WSUD include; protecting existing natural features and ecological processes; maintaining the natural hydrologic behaviour of catchments; protecting water quality of surface and ground waters; minimising demand on the reticulated water supply system; minimising sewage discharges to the natural environment; and integrating water into the landscape to enhance visual, social, cultural and ecological values (eWater, 2010).</p> <p>The WSUD assessment is contained within the Stormwater Management Plan under separate cover. Note that the current strategy is to provide 2 tanks of 15 kL and 30 kL with separate catchment areas for reuse for toilet flushing and landscape irrigation to meet the WSUD requirements.</p>

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3.4 Transport

The adoption of sustainable transport methods are encouraged by building designs which provide appropriate facilities for residents and visitors. Site proximity to major transport infrastructure also lends itself to building residents adopting and utilising sustainable methods of transport:-

Provision of Car Parks	A total of 369 car parking spaces will be provided throughout 5 levels of basement
Providing Bike Storage	The development has complied with Clause 52.18 requirements for both commercial and residential bicycle parking.
Electrical Vehicle Infrastructure	Electrical vehicle infrastructure is under consideration to be provided to a number of car parking space(s) for charging

3.5 Waste Management

In order to ensure effective waste management at the operational stage of the development, the following initiatives with respect to waste management have been proposed for inclusion within the development:-

Operational Waste Management Plan	<p>With regards to the reduction of operational building waste, a site specific Waste Management Plan will be prepared and submitted as part of the planning application. The design of the facility has incorporated an allowance for recycling throughout the waste collection facilities. Please refer to this document for further clarification in this regard.</p> <p>Provision for effective recycling waste storage – dedicated recycling and waste storage facilities have been included within the design to enable greater recycling rates from operational waste streams. Medical waste will be treated to relevant OH&S and legislative requirements for its storage and disposal.</p> <p>Waste collection systems which provide equal ease for the disposal of both garbage and recyclables generate considerably higher recycling volumes than systems which employ waste separation off site. This project aims to reduce the overall total waste that would be delivered to landfill during typically operation through the introduction of dedicated recycling waste facilities and systems which will give the users the ability to subdivide their waste at source.</p>
Construction Waste Management Plan	<p>The head contractor will be required to prepare a site specific Construction Waste Management Plan (CWMP). This will require the contractor to retain waste records and provide quarterly reports to the building owner during the construction period.</p> <p>It is proposed that the head contractor shall reuse or recycle a minimum of 60% of construction and demolition waste (by weight) to minimise the volume of waste to landfill. Material waste sorting shall include, but not be limited to:</p> <ul style="list-style-type: none"> - Concrete, bricks, asphalt - Timber - Soil - Steel and other metals - Paper, glass, plastics, cardboard packaging - Carpet, ceiling tiles, plumbing fixtures and equipment - Mechanical equipment, lighting fixtures and electrical components

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

3.6 Urban Ecology

In order to protect and enhance the local biodiversity and urban ecology, the development seeks to address this ESD category through the following on-site initiatives:-

Reuse of Land	The proposed site is the location of an existing ground level car park Redeveloping the urban site will both reduce the burden on previously undeveloped and greenfield spaces, while also providing regeneration to the local precinct.
Reclaimed Contaminated Land	As there is currently an existing car park on the site, it cannot be determined if the land is contaminated. However, as underground areas are to be developed as part of this project, should any contamination be discovered, all appropriate procedures will be undertaken to safely remove it from the land.
Ecological Value	The ecological value of the site will not be any further diminished than current. Improved ecological value of the surrounding environment through on-site stormwater management. Rainwater collection and reuse on-site has been designed in order to manage peak stormwater flows and ensure discharges remain within healthy ecological levels
Light Pollution	Outdoor lighting is often poorly designed, with an estimated 30% of light being wasted because it is directed into the night sky. This waste of lighting is a form of pollution and can cause glow, glare and light flickering that can be intrusive and detrimental to human sleep patterns, general health, astronomical research, nocturnal animals and migratory birds. All external electrical lighting luminaires to have an upward light output ratio of less than 5% and the external lighting design to comply with AS 4282 – ‘Control of the obtrusive effects of outdoor lighting’.
Light Spill	There will be minimal light spill beyond the site boundaries via suitable external lighting design.

3.7 Materials

A significant amount of material is expected to be used within the development. Embodied energy is often a key consideration overlooked in material selection. The proposed development seeks to address and manage the selection and specification of sustainable building materials through: -

Sustainable Timber	Where timber is to be incorporated into the development, Forest Stewardship Council (FSC) Certified / Plantation Timbers are to be used. FSC Certification is an internationally recognised scheme ensuring that timber is sourced from sustainable sources.
Paints, Adhesives and Sealants	All interior paints, adhesives and sealant specifications will limit Volatile Organic Compounds (VOC's). All interior paints will limit VOC's to 20g/l, while all multipurpose construction and carpet adhesives will limit VOC's to 70g/l.
PVC	Use of low PVC content or PVC free material where possible. Where PVC content is present in materials, the project shall look to source materials from suppliers who manufacture products in accordance with Best Practice Guidelines for PVC in the built environment.
Ozone Depletion Potential	Refrigerant selections for the site will have a zero ozone depletion potential (ODP) rating. Thermal insulation (building fabric and HVAC) selections for the site will have a zero ozone depletion potential (ODP) rating.

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

3.8 Innovation

These are strategies which encourage innovative technology, design and processes in all aspects of the development, which positively influence the sustainability of the building.

Innovation	This project has not targeted any innovation points.
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9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

3.9 Ongoing Building and Site Management

In order to create an integrated design and construction process which in turn leads to effective operational and on-going building performance, the development seeks to address this category through the following on-site initiatives:-

Contractor Responsibilities	Comprehensive construction/environmental management plan to be implemented by the head-contractor during the construction phase of the project.
Building Management Responsibilities	<p>Building management to ensure the upkeep and maintenance of the building in order to maintain the following design initiatives:</p> <ul style="list-style-type: none"> - Building fabric maintained in order to preserve the thermal efficiency of the building – i.e. glazing and façade maintenance. - Hot water systems to be maintained as per design specification. - Common area air conditioning to be serviced and maintained as per design specification. - Common area lighting to be LED or low-voltage with replacement fixtures adhering to the relevant design documentation. - Lighting control systems to be maintained as specified. - Bicycle store to remain clean, accessible and secure for all users. - Rainwater infrastructure including pumps, pipes to be maintained in order to secure estimated potable water savings. - Operational recycling and waste management to be enforced. - Common area spares (tiles, lights, etc) to be keep on site or readily accessible.
Building User's Guide	A Building User's Guide outlining sustainability initiatives will be provided to each apartment.

APPENDIX A BESS ASSESSMENT

BESS ASSESSMENT

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

12/19/2018

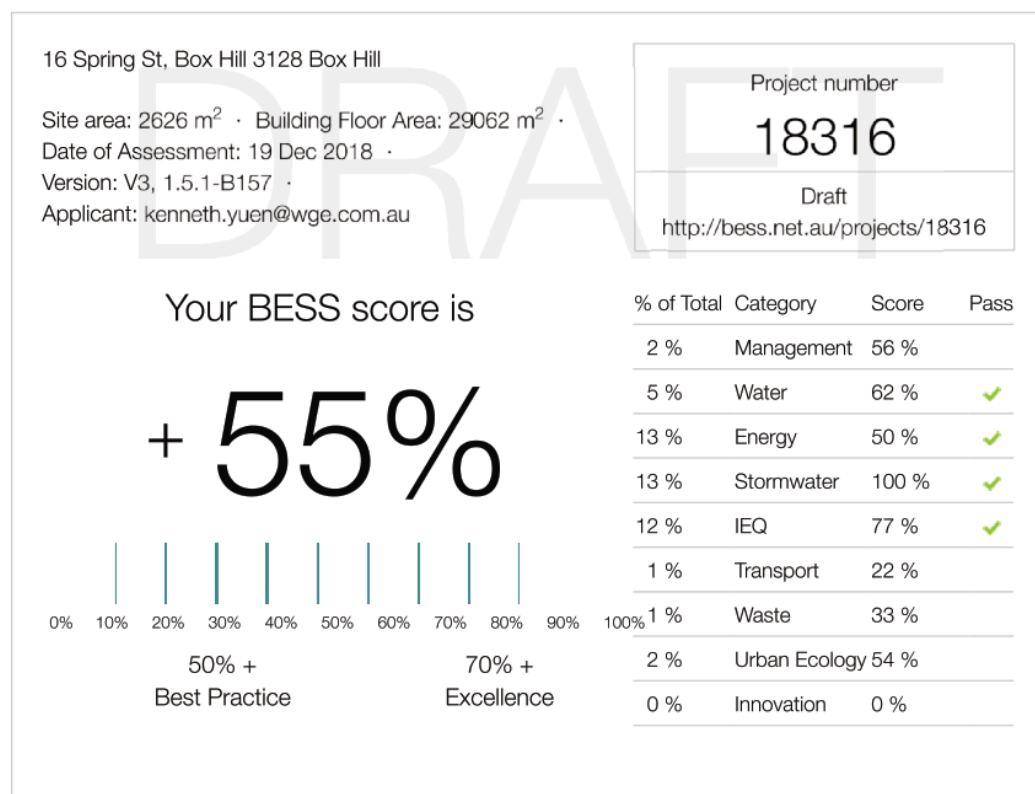
BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

BESS Report



This BESS report outlines the sustainable design commitments of the proposed development at 16 Spring St Box Hill VIC 3128. The BESS report and accompanying documents and evidence are submitted in response to the requirement for a Sustainable Design Assessment or Sustainability Management Plan at Whitehorse City Council.

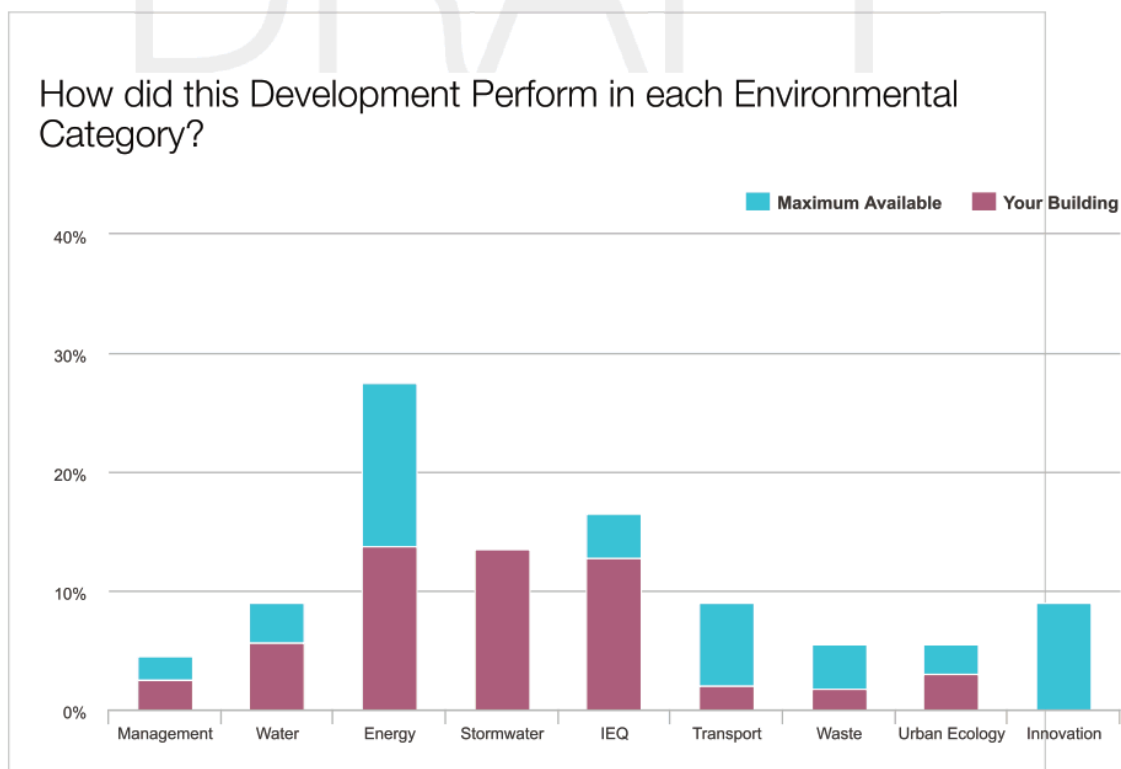
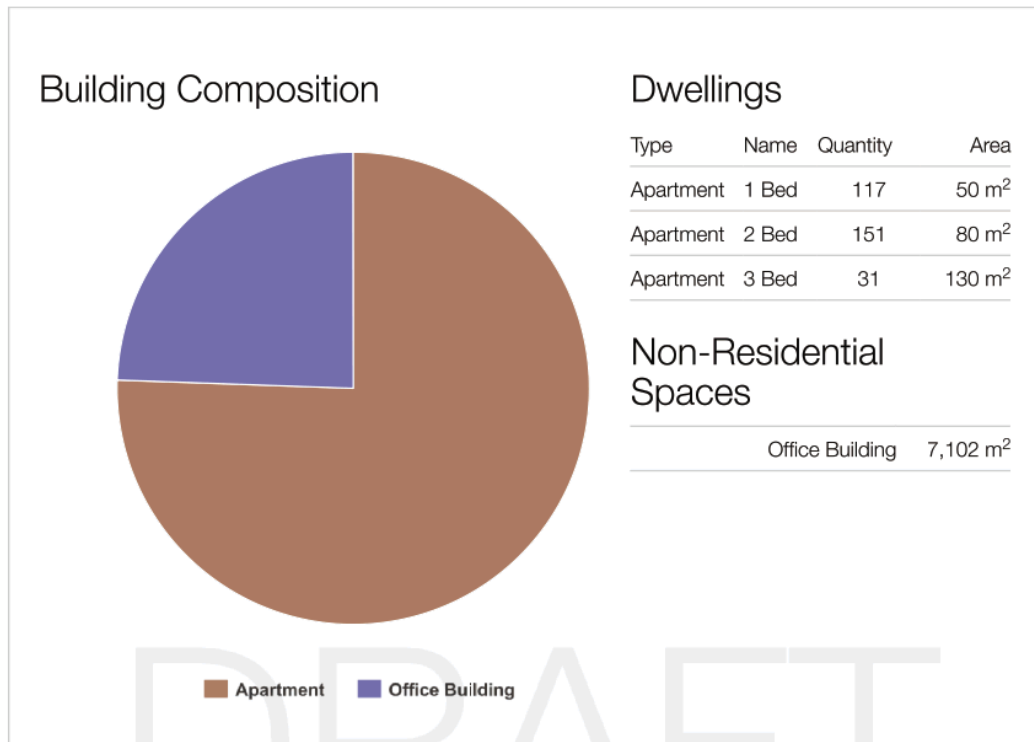
Note that where a Sustainability Management Plan is required, the BESS report must be accompanied by a report that further demonstrates the development's potential to achieve the relevant environmental performance outcomes and documents the means by which the performance outcomes can be achieved.



9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

12/19/2018

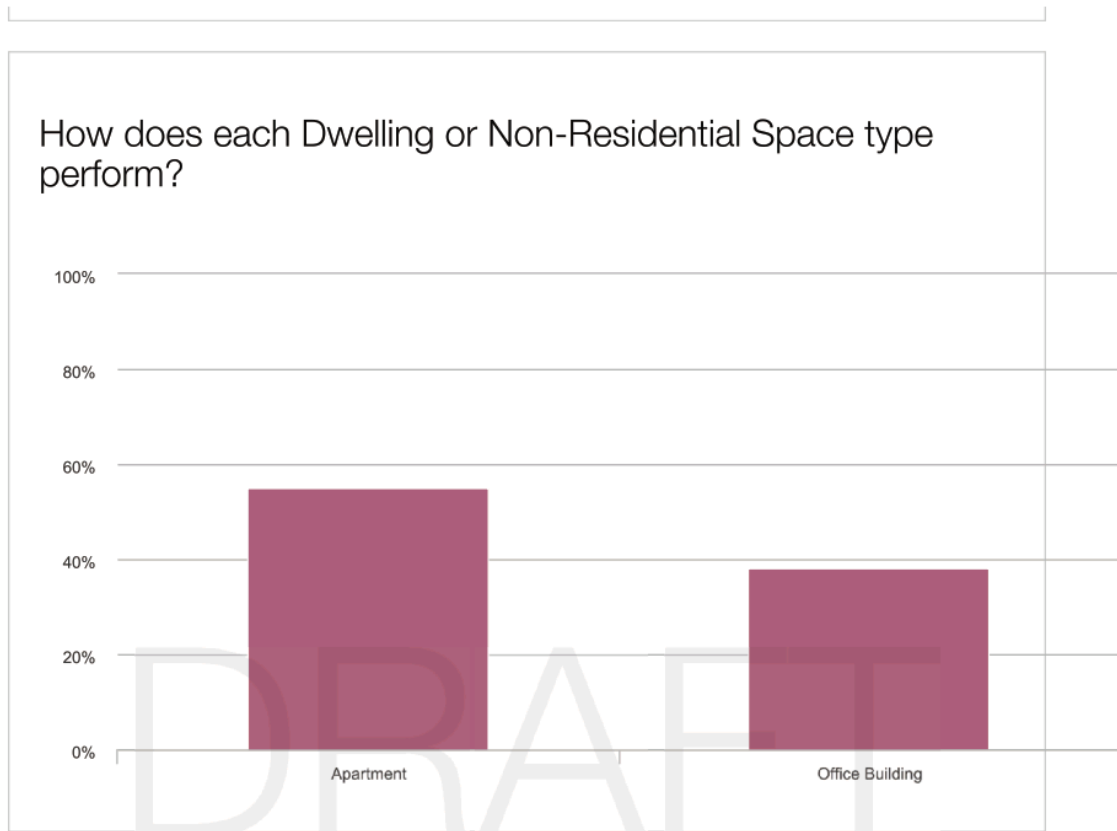
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Sustainable design commitments by category

The sustainable design commitments for this project are listed below. These are to be incorporated into the design documentation and subsequently implemented.

Management		56% - contributing 2% to overall score		
Credit		Disabled	Scoped out	Score
Management 2.2 Thermal Performance Modelling - Multi-Dwelling Residential				100 %
Management 3.1 Metering				100 %
Management 3.2 Metering				100 %
Management 3.3 Metering				100 %
Management 4.1 Building Users Guide				100 %

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

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Management 2.2 Thermal Performance Modelling - Multi-Dwelling Residential

100%

Score Contribution This credit contributes 18% towards this section's score.

Aim To encourage and recognise developments that have used modelling to inform passive design at the early design stage

Questions

Have preliminary NatHERS ratings been undertaken for all thermally unique dwellings?

Apartment

Yes

Management 3.1 Metering

100%

Score Contribution This credit contributes 9% towards this section's score.

Aim To provide building users with information that allows monitoring of energy and water consumption

Questions

Have utility meters been provided for all individual dwellings?

Apartment

Yes

Management 3.2 Metering

100%

Score Contribution This credit contributes 3% towards this section's score.

Aim To provide building users with information that allows monitoring of energy and water consumption

Questions

Have utility meters been provided for all individual commercial tenants?

Office Building

Yes

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BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

Management 3.3 Metering 100%

Score Contribution	This credit contributes 12% towards this section's score.
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Aim	To provide building users with information that allows monitoring of energy and water consumption
-----	---

Questions

Have all major common area services been separately submetered?

Apartment	Office Building
-----------	-----------------

Yes	Yes
-----	-----

Management 4.1 Building Users Guide 100%

Score Contribution	This credit contributes 12% towards this section's score.
--------------------	---

Aim	To encourage and recognise initiatives that will help building users to use the building efficiently
-----	--

Questions

Will a building users guide be produced and issued to occupants?

Project wide

Yes

Water 62% - contributing 5% to overall score

Credit	Disabled	Scoped out	Score
Water 1.1 Potable Water Use Reduction (Interior Uses)			50 %
Water 2.1 Rainwater Collection & Reuse (Additional Uses)			100 %
Water 3.1 Water Efficient Landscaping			100 %

Water Approachs

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

12/19/2018

BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

What approach do you want to use
Water? Use the built in calculation tools

Project Water Profile Questions

Are you installing a rainwater tank? Yes

Water fixtures, fittings and connections

	Office Building	1 Bed	2 Bed
Showerhead	Scope out	3 Star WELS (> 6.0 but <= 7.5)	3 Star WELS (> 6.0 but <= 7.5)
Bath	Scope out	Small Square Tub/ Combined Shower	Small Square Tub/ Combined Shower
Kitchen Taps	> 5 Star WELS rating	> 5 Star WELS rating	> 5 Star WELS rating
Bathroom Taps	> 5 Star WELS rating	> 5 Star WELS rating	> 5 Star WELS rating
Dishwashers	Scope out	> 5 Star WELS rating	> 5 Star WELS rating
WC	> 4 Star WELS rating	> 4 Star WELS rating	> 4 Star WELS rating
Urinals	> 4 Star WELS rating	Scope out	Scope out
Washing Machine Water Efficiency	> 4 Star WELS rating	> 4 Star WELS rating	> 4 Star WELS rating
Connected to which Tank	-1	-1	-1
		3 Bed	
Showerhead		3 Star WELS (> 6.0 but <= 7.5)	
Bath		Small Square Tub/ Combined Shower	
Kitchen Taps		> 5 Star WELS rating	
Bathroom Taps		> 5 Star WELS rating	
Dishwashers		> 5 Star WELS rating	
WC		> 4 Star WELS rating	
Urinals		Scope out	
Washing Machine Water Efficiency		> 4 Star WELS rating	
Connected to which Tank		-1	

Rainwater Tanks

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

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BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

	Tank	
What is the total roof area connected to the rainwater tank?	Square Metres	1454.0
Tank Size	Litres	60000.0
Irrigation area connected to tank	Square Metres	564.0
Is connected irrigation area a water efficient garden?	Yes	

Water 1.1 Potable Water Use Reduction (Interior Uses) 50%

Score Contribution	This credit contributes 50% towards this section's score.	
Aim	Water 1.1 Potable water use reduction (interior uses) What is the reduction in total water use due to efficient fixtures, appliances, and rainwater use? To achieve points in this credit there must be >25% potable water reduction. You are using the built in calculation tools. This credit is calculated from information you have entered above.	
Criteria	Percentage reduction in potable water use	
Questions		
Percentage Achieved ?	Percentage %	
Project wide		
%		
Calculations		
Annual Water Consumption (kL) (Reference)		
Project wide		
53227		
Annual Water Consumption (kL) (Proposed)		
Project wide		
39394		
% Reduction in Potable Water Consumption	Percentage %	
Project wide		
25 %		

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

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BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

Water 2.1 Rainwater Collection & Reuse (Additional Uses) 100%

Score Contribution	This credit contributes 25% towards this section's score.
Aim	What is the additional reduction in potable (mains) water use due to rainwater harvesting? Additional water uses for rainwater include non-potable demands such as irrigation, pools, commercial process uses and taps for washdown. Note: tank water will only be available for additional uses if it not required for internal uses. If the property uses an alternative water source, the alternative water source is deemed to meet 90% of additional non-potable water use requirements. You are using the built in calculation tools. This credit is calculated from information you have entered above in the rainwater tanks section.
Criteria	What is the additional reduction in potable (mains) water use due to using rainwater or an alternative water source?

Questions

Percentage Achieved ? Percentage %

Project wide

%

Calculations

Rainwater collection & reuse (additional uses) Percentage %

Project wide

100 %

Water 3.1 Water Efficient Landscaping 100%

Score Contribution	This credit contributes 12% towards this section's score.
Aim	Are water efficiency principles used for landscaped areas? This includes low water use plant selection (e.g. xeriscaping) and specifying water efficient irrigation (e.g. drip irrigation with timers and rain sensors). Note: food producing landscape areas and irrigation areas connected to rainwater or an alternative water source are excluded from this section.

Questions

Will water efficient landscaping be installed?

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BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

Project wide

Yes

Energy

50% - contributing 13% to overall score

Credit	Disabled	Scoped out	Score
Energy 1.1 Thermal Performance Rating - Non-Residential			37 %
Energy 1.2 Thermal Performance Rating - Residential			16 %
Energy 2.1 Greenhouse Gas Emissions			100 %
Energy 2.3 Electricity Consumption			100 %
Energy 2.4 Gas Consumption			24 %
Energy 3.1 Carpark Ventilation			100 %
Energy 3.4 Clothes Drying			100 %
Energy 3.6 Internal Lighting - Residential Multiple Dwellings			100 %
Energy 3.7 Internal Lighting - Non-Residential			100 %
Energy 4.1 Combined Heat and Power (cogeneration / trigeneration)			N/A

Dwellings Energy Approaches

What approach do you want to use for Energy? Use the built in calculation tools

Project Energy Profile Questions

Gas Supply Natural Gas

Dwelling Energy Profiles

	1 Bed	2 Bed	3 Bed
Below the floor is	Another Occupancy	Another Occupancy	Another Occupancy
Above the ceiling is	Another Occupancy	Another Occupancy	Another Occupancy
Exposed sides	2	2	2
NatHERS Annual Energy Loads - Heat MJ/sqm	100.0	100.0	120.0
NatHERS Annual Energy Loads - Cool MJ/sqm	22.0	22.0	22.0

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BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

	1 Bed	2 Bed	3 Bed
NatHERS star rating	6.5	6.5	6.5
Type of Heating System	D Reverse cycle space	D Reverse cycle space	D Reverse cycle space
Heating System Efficiency	5 Star	5 Star	5 Star
Type of Cooling System	Refrigerative space	Refrigerative space	Refrigerative space
Cooling System Efficiency	6 Stars	6 Stars	6 Stars
Type of Hot Water System	L Gas Central Storage gas	L Gas Central Storage gas	L Gas Central Storage gas
Clothes Line	A No drying facilities	A No drying facilities	A No drying facilities
Clothes Dryer	J Clothes dryer 5 stars	J Clothes dryer 5 stars	J Clothes dryer 5 stars

Non-Residential Spaces Energy Profiles

	Office Building
Heating, Cooling & Comfort Ventilation - Electricity - baseline ^{kWh}	100.0
Heating, Cooling & Comfort Ventilation - Electricity - proposed ^{kWh}	75.0
Heating - Gas - baseline ^{MJ}	100.0
Heating - Gas - proposed ^{MJ}	89.0
Hot Water - Gas - baseline ^{MJ}	100.0
Hot Water - Gas - proposed ^{MJ}	90.0
Peak Thermal Cooling Load - Baseline ^{kW}	100.0
Peak Thermal Cooling Load - Proposed ^{kW}	80.0

Energy 1.1 Thermal Performance Rating - Non-Residential

37%

Score Contribution	This credit contributes 9% towards this section's score.
Aim	Reduce reliance on mechanical systems to achieve thermal comfort in summer and winter - improving comfort, reducing greenhouse gas emissions, energy consumption, and maintenance costs.
Criteria	What is the % reduction in heating and cooling energy consumption against the reference case (NCC 2016 BCA Volume 1 Section J)

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

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BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

Questions

Criteria Achieved ?

Calculations

Total Improvement Percentage %

Office Building

21 %

Energy 1.2 Thermal Performance Rating - Residential

16%

Score Contribution This credit contributes 21% towards this section's score.

Aim Reduce reliance on mechanical systems to achieve thermal comfort in summer and winter - improving comfort, reducing greenhouse gas emissions, energy consumption, and maintenance costs.

Criteria What is the average NatHERS rating?

Questions

NATHERS Rating ? Stars

Calculations

Average NATHERS Rating (Weighted) Stars

Apartment

6.5

Energy 2.1 Greenhouse Gas Emissions

100%

Score Contribution This credit contributes 9% towards this section's score.

Aim Reduce the building's greenhouse gas emissions

Criteria Are greenhouse gas emissions >10% below the benchmark

Questions

Criteria Achieved ?

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BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

Calculations

Reference Building with Reference Services (BCA only) kg CO2

Apartment	Office Building
1446968.0	129.3

Proposed Building with Proposed Services (Actual Building) kg CO2

Apartment	Office Building
610567.1	98.4

% Reduction in GHG Emissions Percentage %

Apartment	Office Building
57 %	23 %

Energy 2.3 Electricity Consumption

100%

Score Contribution	This credit contributes 9% towards this section's score.
Aim	Reduce consumption of electricity
Criteria	Is the annual electricity consumption >10% below the benchmark

Questions

Criteria Achieved ?

Calculations

Reference kWh

Apartment	Office Building
1038343.9	100.0

Proposed kWh

Apartment	Office Building
299759.3	75.0

Improvement Percentage %

Apartment	Office Building
71 %	25 %

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BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

Energy 2.4 Gas Consumption 24%

Score Contribution	This credit contributes 9% towards this section's score.
Aim	Reduce consumption of electricity
Criteria	Is the annual gas consumption >10% below the benchmark?

Questions

Criteria Achieved ?

Calculations

Reference MJ

Apartment	Office Building
4117255.9	200.0

Proposed MJ

Apartment	Office Building
4945520.2	179.0

Improvement Percentage %

Apartment	Office Building
-20 %	10 %

Energy 3.1 Carpark Ventilation 100%

Score Contribution	This credit contributes 9% towards this section's score.
--------------------	--

Questions

If you have a basement carpark, is it either: (a) fully naturally ventilated (no mechanical ventilation system), or (b) use Carbon Monoxide monitoring to control the operation and speed of the ventilation fans

Project wide

Yes

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Energy 3.4 Clothes Drying 100%

Score Contribution	This credit contributes 3% towards this section's score.
Criteria	Does the combination of clothes lines and efficient dryers reduce energy (gas+electricity) consumption by more than 10%?

Questions

Criteria Achieved ?

Calculations

Reference kWh

Apartment

134862.0

Proposed kWh

Apartment

69716.8

Improvement Percentage %

Apartment

48 %

Energy 3.6 Internal Lighting - Residential Multiple Dwellings 100%

Score Contribution	This credit contributes 7% towards this section's score.
Aim	Reduce energy consumption associated with internal lighting

Questions

Is the maximum illumination power density (W/m2) in at least 90% of the relevant Building Class at least 20% lower than required by Table J6.2a of the NCC BCA (2013) Volume 1 Section J (Class 2 to 9) and clause 3.12.5.5 NCC BCA (2013) Volume 2 Section J (Class 1 and 10)

Apartment

Yes

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Energy 3.7 Internal Lighting - Non-Residential 100%

Score Contribution This credit contributes 2% towards this section's score.

Aim Reduce energy consumption associated with internal lighting

Questions

Is the maximum illumination power density (W/m2) in at least 90% of the relevant building class at least 20% lower than required by Table J6.2a of the NCC 2016 BCA Volume 1 Section J (Class 2 to 9)

Office Building

Yes

Energy 4.1 Combined Heat and Power (cogeneration / trigeneration) N/A

This credit was scoped out: No cogeneration or trigeneration system in use.

This credit was disabled: No cogeneration or trigeneration system in use.

Aim Reduce energy consumption

Criteria Does the CHP system reduce the class of buildings GHG emissions by more than 25%?

Stormwater 100% - contributing 13% to overall score

Credit Disabled Scoped out Score

Stormwater 1.1 Stormwater Treatment 100 %

Which stormwater modelling are you using? Melbourne Water STORM tool

Stormwater 1.1 Stormwater Treatment 100%

Score Contribution This credit contributes 100% towards this section's score.

Aim To achieve best practice stormwater quality objectives through reduction of pollutant load (suspended solids, nitrogen and phosphorus)

Criteria Has best practice stormwater management been demonstrated?

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Questions

STORM score achieved

Project wide

100

Flow (ML/year) % Reduction

Project wide

-

Total Suspended Solids (kg/year) % Reduction

Project wide

-

Total Phosphorus (kg/year) % Reduction

Project wide

-

Total Nitrogen (kg/year) % Reduction

Project wide

-

Calculations

Min STORM Score

Project wide

100

IEQ

77% - contributing 12% to overall score

Credit	Disabled	Scoped out	Score
IEQ 1.1 Daylight Access - Living Areas			100 %
IEQ 1.2 Daylight Access - Bedrooms			100 %
IEQ 1.4 Daylight Access - Non-Residential			33 %
IEQ 1.5 Daylight Access - Minimal Internal Bedrooms			100 %
IEQ 2.1 Effective Natural Ventilation			66 %

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Do all living areas and bedrooms have a floor-to-ceiling height of at least 2.7m? Yes

Does all glazing to living areas achieve at least 60% Visible Light Transmittance (VLT)? Yes

Do all living areas have an external facing window (not into a courtyard, light well or other major obstruction)? Yes

Does the building(s) comply with the requirements of the building separation tables? Yes

Dwellings IEQ Approachs

What approach do you want to use for IEQ? Use the built in calculation tools

Rooms

Please provide the following room profiling information below.

	Office Building, West - Setback Bedroom	Office Building, West - Perimeter Bedroom	Office Building, West - Perimeter (Deep Bedrooms)
Room Designation	Bedroom	Bedroom	Bedroom
Quantity	6	16	4
Auto-Pass	No	No	No
Room Floor Area Square Metres	9.5	9.1	15.3
Vertical Angle Angle (degrees)	100.0	180.0	180.0
Horizontal Angle Angle (degrees)	84.0	180.0	180.0
Window Area Square Metres	8.1	8.1	7.8
Window Orientation	West	West	West
Glass Type	Grey Double (VLT 0.32)	Grey Double (VLT 0.32)	Grey Double (VLT 0.32)
	Office Building, South - West Bedroom	Office Building, North - West Bedroom	Office Building, North - East Bedroom
Room Designation	Bedroom	Bedroom	Bedroom
Quantity	4	2	5
Auto-Pass	Yes	Yes	Yes
Room Floor Area Square Metres	-	-	-
Vertical Angle Angle (degrees)	-	-	-

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		Office Building, South - West	Office Building, North - West	Office Building, North - East
Horizontal Angle	Angle (degrees)	-	-	-
Window Area	Square Metres	-	-	-
Window Orientation		South-West	North-West	North-East
Glass Type		Grey Double (VLT 0.32)	Grey Double (VLT 0.32)	Grey Double (VLT 0.32)
		Office Building, East - Set back	Office Building, East - Perimeter (Deep Rooms)	Office Building, South - East
Room Designation		Bedroom	Bedroom	Bedroom
Quantity		6	6	3
Auto-Pass		No	No	Yes
Room Floor Area	Square Metres	9.5	15.3	-
Vertical Angle	Angle (degrees)	100.0	180.0	-
Horizontal Angle	Angle (degrees)	84.0	180.0	-
Window Area	Square Metres	8.1	7.8	-
Window Orientation		East	East	South-East
Glass Type		Grey Double (VLT 0.32)	Grey Double (VLT 0.32)	Grey Double (VLT 0.32)
		Office Building, East Perimeter	Office Building, North facing	Office Building, West - Set back
Room Designation		Bedroom	Living	Living
Quantity		16	6	4
Auto-Pass		No	No	No
Room Floor Area	Square Metres	9.1	40.0	20.7
Vertical Angle	Angle (degrees)	180.0	100.0	100.0
Horizontal Angle	Angle (degrees)	180.0	95.0	82.0
Window Area	Square Metres	8.1	10.3	9.7
Window Orientation		East	North	East
Glass Type		Grey Double (VLT 0.32)	Grey Double (VLT 0.32)	Grey Double (VLT 0.32)
		Office Building, West - Perimeter	Office Building, South facing	Office Building, East - Set Back
Room Designation		Living	Living	Living
Quantity		9	6	6
Auto-Pass		No	No	No

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		Office Building, West - Perimeter	Office Building, South facing	Office Building, East - Set Back
Room Floor Area	Square Metres	30.0	40.0	20.7
Vertical Angle	Angle (degrees)	180.0	100.0	100.0
Horizontal Angle	Angle (degrees)	180.0	85.0	82.0
Window Area	Square Metres	8.1	10.3	9.7
Window Orientation		West	South	East
Glass Type		Grey Double (VLT 0.32)	Grey Double (VLT 0.32)	Grey Double (VLT 0.32)
Office Building, East - Perimeter				
Room Designation		Living		
Quantity		10		
Auto-Pass		No		
Room Floor Area	Square Metres	30.0		
Vertical Angle	Angle (degrees)	100.0		
Horizontal Angle	Angle (degrees)	180.0		
Window Area	Square Metres	8.1		
Window Orientation		East		
Glass Type		Grey Double (VLT 0.32)		

IEQ 1.1 Daylight Access - Living Areas

100%

Score Contribution	This credit contributes 25% towards this section's score.
Aim	To provide a high level of amenity and energy efficiency through design for natural light.
Criteria	What % of living areas achieve a daylight factor greater than 1%

Questions

Percentage Achieved ? Percentage %

Apartment

50 %

Calculations

Calculated percentage Percentage %

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

12/19/2018

BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

Apartment

100 %

IEQ 1.2 Daylight Access - Bedrooms

100%

Score Contribution	This credit contributes 25% towards this section's score.
--------------------	---

Aim	To provide a high level of amenity and energy efficiency through design for natural light.
-----	--

Criteria	What % of bedrooms achieve a daylight factor greater than 0.5%
----------	--

Questions

Percentage Achieved ? Percentage %

Apartment

80 %

Calculations

Calculated percentage	Percentage %
-----------------------	--------------

Apartment

100 %

IEQ 1.4 Daylight Access - Non-Residential

33%

Score Contribution	This credit contributes 8% towards this section's score.
--------------------	--

Aim	To provide a high level of amenity and energy efficiency through design for natural light.
-----	--

Criteria	What % of the nominated floor area has at least 2% daylight factor?
----------	---

Questions

% Achieved ?

Office Building

40 %

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

12/19/2018

BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

IEQ 1.5 Daylight Access - Minimal Internal Bedrooms 100%

Score Contribution	This credit contributes 8% towards this section's score.
Aim	To provide a high level of amenity and energy efficiency through design for natural light and ventilation.

Questions

Do at least 90% of dwellings have an external window in all bedrooms?

Apartment

Yes

IEQ 2.1 Effective Natural Ventilation 66%

Score Contribution	This credit contributes 25% towards this section's score.
Aim	To provide fresh air and passive cooling opportunities.
Criteria	What % of dwellings are effectively naturally ventilated?

Questions

% Achieved ?

Apartment

60 %

Transport 22% - contributing 1% to overall score

Credit	Disabled	Scoped out	Score
Transport 2.1 Electric Vehicle Infrastructure			100 %

Transport 2.1 Electric Vehicle Infrastructure 100%

Score Contribution	This credit contributes 22% towards this section's score.
Aim	To facilitate the expansion of infrastructure to support electric vehicle charging

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

12/19/2018

BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

Questions

Are facilities are provided for the charging of electric vehicles?

Project wide

Yes

Waste

33% - contributing 1% to overall score

Credit	Disabled	Scoped out	Score
Waste 2.2 - Operational Waste - Convenience of Recycling			100 %

Waste 2.2 - Operational Waste - Convenience of Recycling 100%

Score Contribution This credit contributes 33% towards this section's score.

Aim To minimise recyclable material going to landfill

Questions

Are the recycling facilities at least as convenient for occupants as facilities for general waste?

Project wide

Yes

Urban Ecology

54% - contributing 2% to overall score

Credit	Disabled	Scoped out	Score
Urban Ecology 1.1 Communal Spaces			75 %
Urban Ecology 2.1 Vegetation			75 %
Urban Ecology 2.2 Green Roofs			100 %

Urban Ecology 1.1 Communal Spaces 75%

Score Contribution This credit contributes 11% towards this section's score.

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

12/19/2018

BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

Aim	To encourage and recognise initiatives that facilitate interaction between building occupants	
Criteria	Is there at least the following amount of common space measured in square meters : * 1m ² for each of the first 50 occupants * Additional 0.5m ² for each occupant between 51 and 250 * Additional 0.25m ² for each occupant above 251	
Questions		
Common space provided	Square Metres	
Apartment	Office Building	
500.0	200.0	
Calculations		
Minimum Common Space Required	Square Metres	
Apartment	Office Building	
277	279	
Urban Ecology 2.1 Vegetation	75%	
Score Contribution	This credit contributes 45% towards this section's score.	
Aim	To encourage and recognise the use of vegetation and landscaping within and around developments	
Criteria	How much of the site is covered with vegetation, expressed as a percentage of the total site area.	
Questions		
Percentage Achieved ?	Percentage %	
Project wide		
25 %		
Urban Ecology 2.2 Green Roofs	100%	
Score Contribution	This credit contributes 11% towards this section's score.	

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

12/19/2018

BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

	<p>Aim</p> <p>To encourage the appropriate use of green roofs, walls and facades to mitigate the impact of the urban heat island effect.</p>
	<p>Questions</p> <p>Does the development incorporate a green roof?</p>
	<p>Project wide</p> <p>Yes</p>
	<p>Innovation</p> <p>0% - contributing 0% to overall score</p>

Items to be marked on floorplans

0 / 17 floorplans & elevation notes complete.

Management 3.1: Individual utility meters annotated	Incomplete
Management 3.2: Individual utility meters annotated	Incomplete
Management 3.3: Common area submeters annotated	Incomplete
Energy 3.1: Carpark with natural ventilation or CO monitoring system	Incomplete
Energy 3.4: External lighting sensors annotated	Incomplete
Water 2.1: Location of rainwater tanks as described	Incomplete
Water 3.1: Water efficient garden annotated	Incomplete
Stormwater 1.1: Location of any stormwater management systems used in STORM or MUSIC modelling (e.g. Rainwater tanks, raingarden, buffer strips)	Incomplete
IEQ 1.1: If using BESS daylight calculator, references to floorplans and elevations showing window sizes and sky angles.	Incomplete
IEQ 1.2: If using BESS daylight calculator, references to floorplans and elevations showing window sizes and sky angles.	Incomplete
IEQ 1.5: Floor plans with compliant bedrooms marked	Incomplete
IEQ 2.1: Dwellings meeting the requirements for being 'naturally ventilated'	Incomplete
Transport 2.1: Location of electric vehicle charging infrastructure	Incomplete

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

12/19/2018

BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

Waste 2.2: Location of recycling facilities	Incomplete
Urban Ecology 1.1: Size and location of communal spaces	Incomplete
Urban Ecology 2.1: Vegetated areas	Incomplete
Urban Ecology 2.2: Green roof	Incomplete

Documents and evidence

0 / 11 supporting evidence documentation complete.

Management 2.2: Preliminary NatHERS assessments	Incomplete
Energy 1.1: Energy Report showing calculations of reference case and proposed buildings	Incomplete
Energy 3.1: Provide a written explanation of either the fully natural carpark ventilation or carbon monoxide monitoring, describing how these systems will work, what systems are required for them to be fully integrated and who will be responsible for their implementation throughout the design, procurement and operational phases of the building life.	Incomplete
Energy 3.6: Provide a written description of the average lighting power density to be installed in the development and specify the lighting type(s) to be used.	Incomplete
Energy 3.7: Provide a written description of the average lighting power density to be installed in the development and specify the lighting type(s) to be used.	Incomplete
Stormwater 1.1: STORM report or MUSIC model	Incomplete
IEQ 1.1: If using an alternative daylight modelling program, a short report detailing assumptions used and results achieved.	Incomplete
IEQ 1.2: If using an alternative daylight modelling program, a short report detailing assumptions used and results achieved.	Incomplete
IEQ 1.4: A short report detailing assumptions used and results achieved.	Incomplete
IEQ 1.5: A list of compliant bedrooms	Incomplete
IEQ 2.1: A list of naturally ventilated dwellings	Incomplete

The Built Environment Sustainability Scorecard (BESS) has been provided for the purpose of information and communication. While we make every effort to ensure that material is accurate and up to date (except where denoted as 'archival'), this material does in no way constitute the provision of professional or specific advice. You should seek appropriate, independent, professional advice before acting on any of the areas covered by BESS.

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12/19/2018

BESS - 16 Spring St, Box Hill VIC 3128, Australia_R002

DRAFT

APPENDIX B NATHERS PRELIMINARY RATINGS

NATHERS PRELIMINARY RATINGS

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

19/12/2018

16 Spring Street,
Box Hill



16-18 Spring Street Box Hill

First Rate Energy Rating Assessment

Preliminary

JOB NO. 35628
Rev 4

CLIMATE ZONE	AVERAGE ENERGY INTENSITY (MJ/m ²)	AVERAGE STAR RATING	MINIMUM STAR RATING	No. Of Rated Apartment	Total Number of Apartments
62	98.4	6.7	6.0	34.0	38

Level	Apt No.	Apt Type	Area (m ²)	Heating - MJ/m ²	Cooling - MJ/m ²	Energy Rating - MJ/m ²	Star Rating	Total Energy - MJ
L 4	1	35628_Studio 1	19.8	28.50	20.50	49.0	8.3	970.20
	2	35628_Studio 2	21.6	42.40	21.90	64.3	7.8	1388.88
	3	35628_Studio 3	21.6	42.00	21.80	63.8	7.8	1378.08
	4	35628_Studio 4	19.8	28.30	20.20	48.5	8.3	960.30
	5	35628_Studio 5	19.8	28.50	20.50	49.0	8.3	970.20
	6	35628_Studio 6	48.1	103.40	20.30	123.7	6.0	5949.97
	7	35628_Studio 7	48.1	102.40	17.90	120.3	6.1	5786.43
	8	35628_Studio 8	19.8	30.20	18.10	48.3	8.3	956.34
	9	35628_Studio 9	19.8	30.10	18.20	48.3	8.3	956.34
	10	35628_Studio 10	21.6	43.00	17.40	60.4	7.9	1304.64
	11	35628_Studio 11	21.6	43.60	17.40	61.0	7.9	1317.60
	12	35628_Studio 12	19.8	30.20	18.10	48.3	8.3	956.34
L 5 - 17	1	35628_Lvl5-12_Apt1	40.7	76.80	13.20	90.0	7.0	3663.00
	2	35628_Lvl5-12_Apt2	54.5	65.90	13.60	79.5	7.4	4332.75
	3	35628_Lvl5-12_Apt3	56.8	101.10	18.30	119.4	6.2	6781.92
	4	35628_Lvl5-12_Apt4	56.8	101.80	16.70	118.5	6.2	6730.80
	5	35628_Lvl5-12_Apt5	54.5	69.30	11.20	80.5	7.3	4387.25
	6	35628_Lvl5-12_Apt6	40.7	70.90	12.10	83.0	7.2	3378.10
	7	35628_Lvl5-12_Apt7	43.5	105.20	18.30	123.5	6.0	5372.25
	8	35628_Lvl5-12_Apt8	40.7	78.30	12.60	90.9	7.0	3699.63
	9	35628_Lvl5-12_Apt9	40.7	78.30	12.60	90.9	7.0	3699.63
	10	35628_Lvl5-12_Apt10	56.8	72.90	11.40	84.3	7.2	4788.24
	11	35628_Lvl5-12_Apt11	56.8	84.70	18.20	102.9	6.6	5844.72
	12	35628_Lvl5-12_Apt12	56.8	84.40	18.90	103.3	6.6	5867.44
	13	35628_Lvl5-12_Apt13	55.3	69.30	13.70	83.0	7.3	4589.90
	14	35628_Lvl5-12_Apt14	40.7	69.70	14.40	84.1	7.2	3422.87
	15	35628_Lvl5-12_Apt15	56.8	101.10	18.30	119.4	6.2	6781.92
L 18 - 24	1	35628_Lvl18-24_Apt01	67.5	89.90	14.40	104.3	6.6	7040.25
	2	35628_Lvl18-24_Apt02	89.9	102.90	15.90	118.8	6.2	10680.12
	3	35628_Lvl18-24_Apt03	89.9	102.80	13.60	116.4	6.3	10464.36
	4	35628_Lvl18-24_Apt04	67.5	85.00	12.50	97.5	6.8	6581.25
	5	35628_Lvl18-24_Apt05	89.9	99.20	13.90	113.1	6.4	10167.69
	6	35628_Lvl5-12_Apt8	40.7	78.30	12.60	90.9	7.0	3699.63
	7	35628_Lvl18-24_Apt07	68.7	81.40	12.40	93.8	6.9	6444.06
	8	35628_Lvl18-24_Apt08_R001	89.9	91.80	16.70	108.5	6.4	9754.15
	9	35628_Lvl18-24_Apt09_R001	89.9	92.30	14.20	106.5	6.5	9574.35
	10	35628_Lvl18-24_Apt10	68.7	85.60	14.40	100.0	6.7	6870.00
	11	35628_Lvl5-12_Apt15	56.8	101.10	18.30	119.4	6.2	6781.92

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19/12/2018

16 Spring Street,
Box Hill



Preliminary Building Fabric Assumptions:

External Walls: R 2.8 total Lightweight Stud/Spandrel Walls

Exposed Roof: R3.2 total

Exposed Floors : R2.2 total

Semi Exposed Walls: R2.3 total

Concrete Slab Structure/Floors

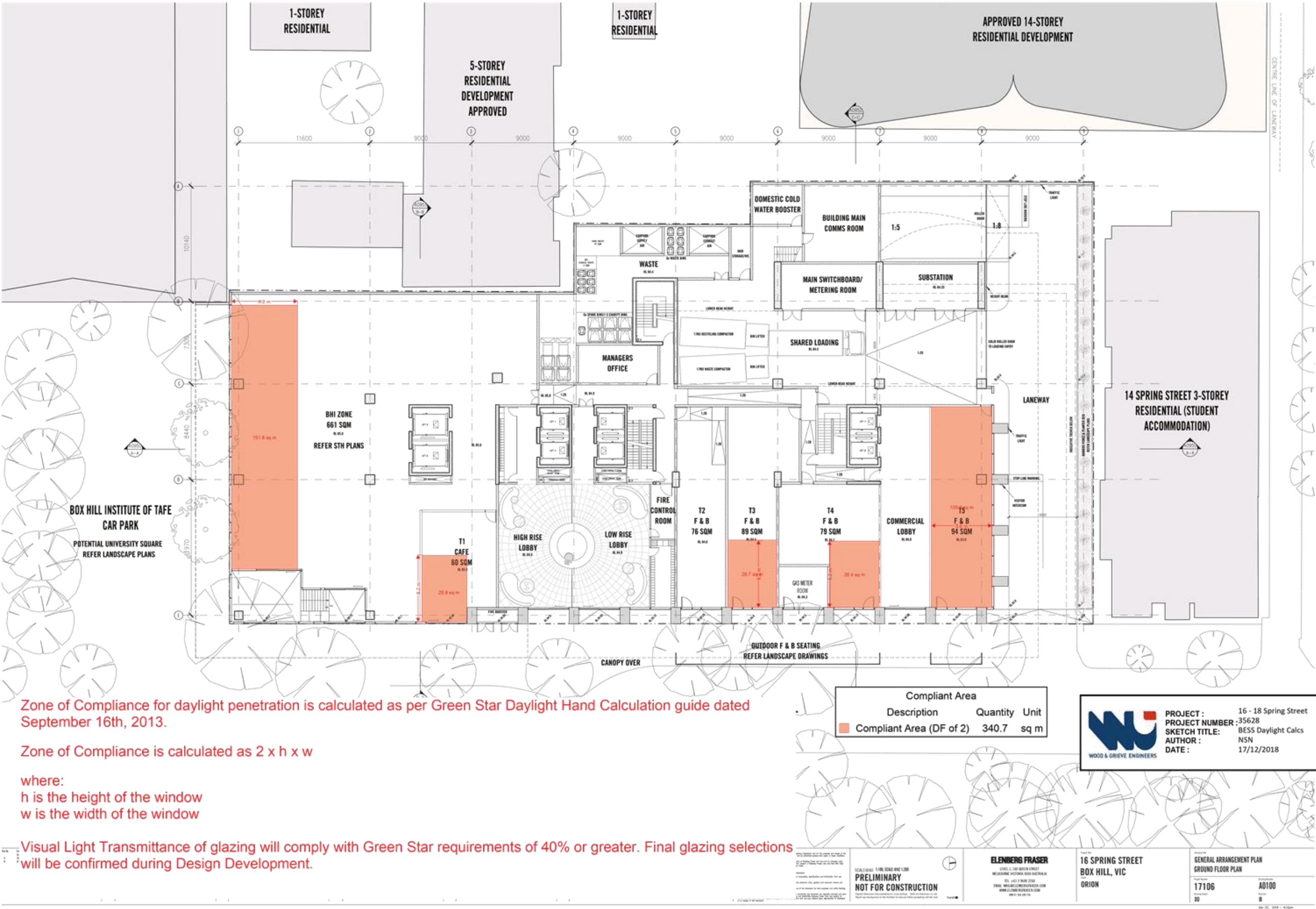
Glazing performance : U-value 2.95 W/m2.K, SHGC 0.3. Equivalent to a Low-e DGU system with solar control.

Modelling results are preliminary in nature to confirm the projects ability to comply with BESS energy targets and BADS cooling loads.
Final glazing selections and facade construction details and layouts to be further developed in schematic design phase.

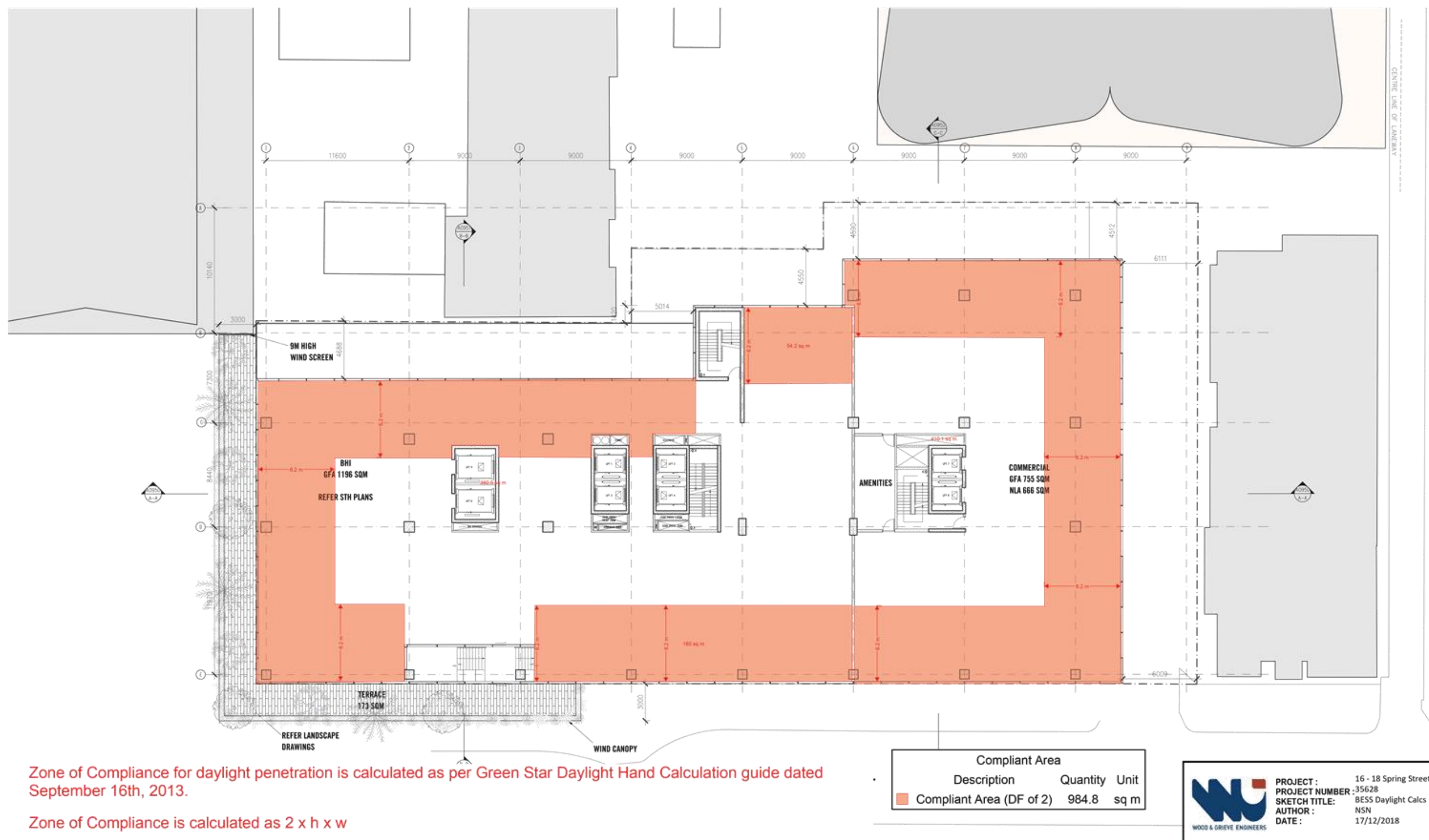
APPENDIX C DAYLIGHT HAND CALCULATIONS

DAYLIGHT HAND CALCULATIONS

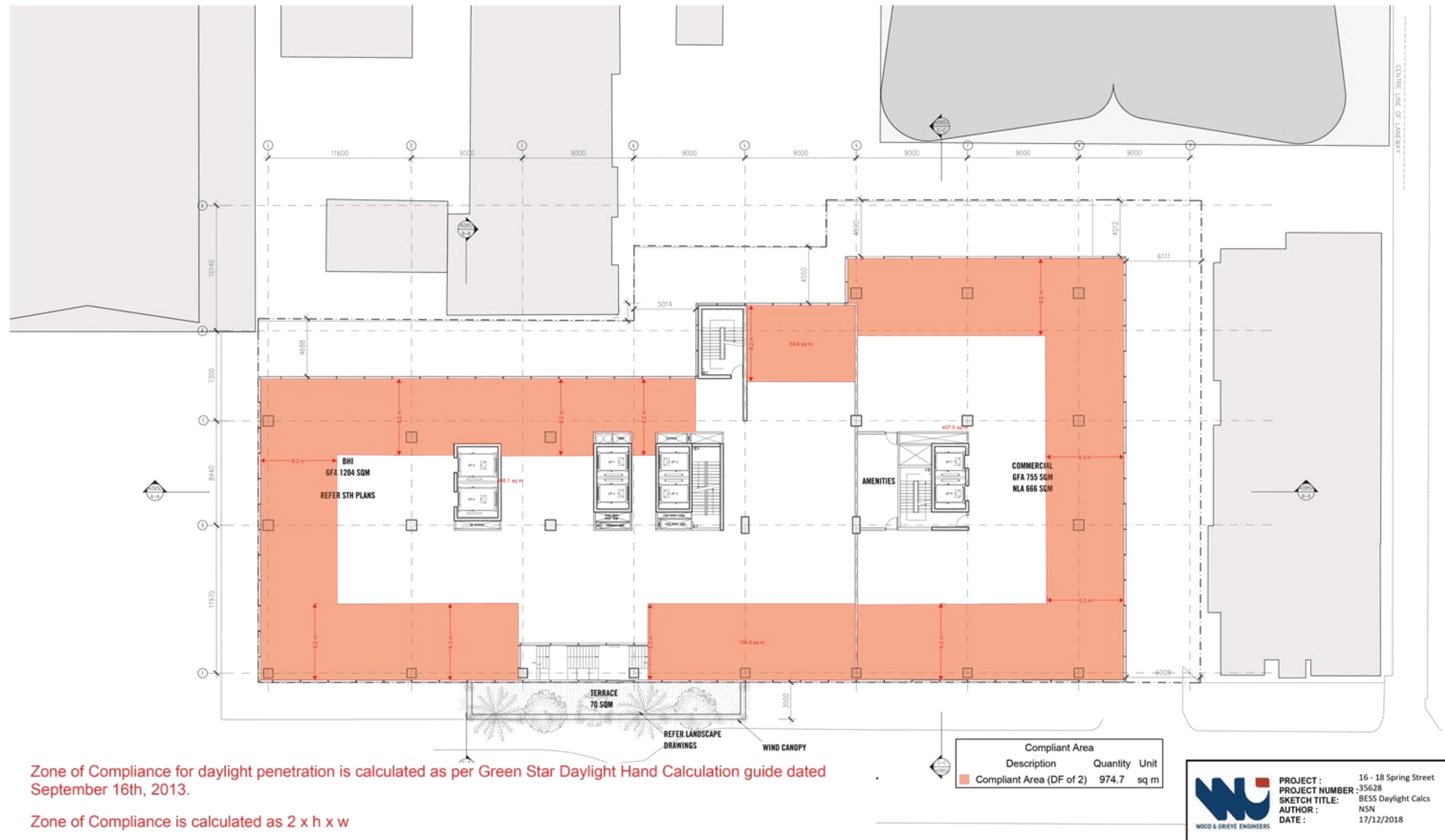
9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers



9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers



9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers



Zone of Compliance for daylight penetration is calculated as per Green Star Daylight Hand Calculation guide dated September 16th, 2013.

Zone of Compliance is calculated as $2 \times h \times w$

where:

h is the height of the window

w is the width of the window

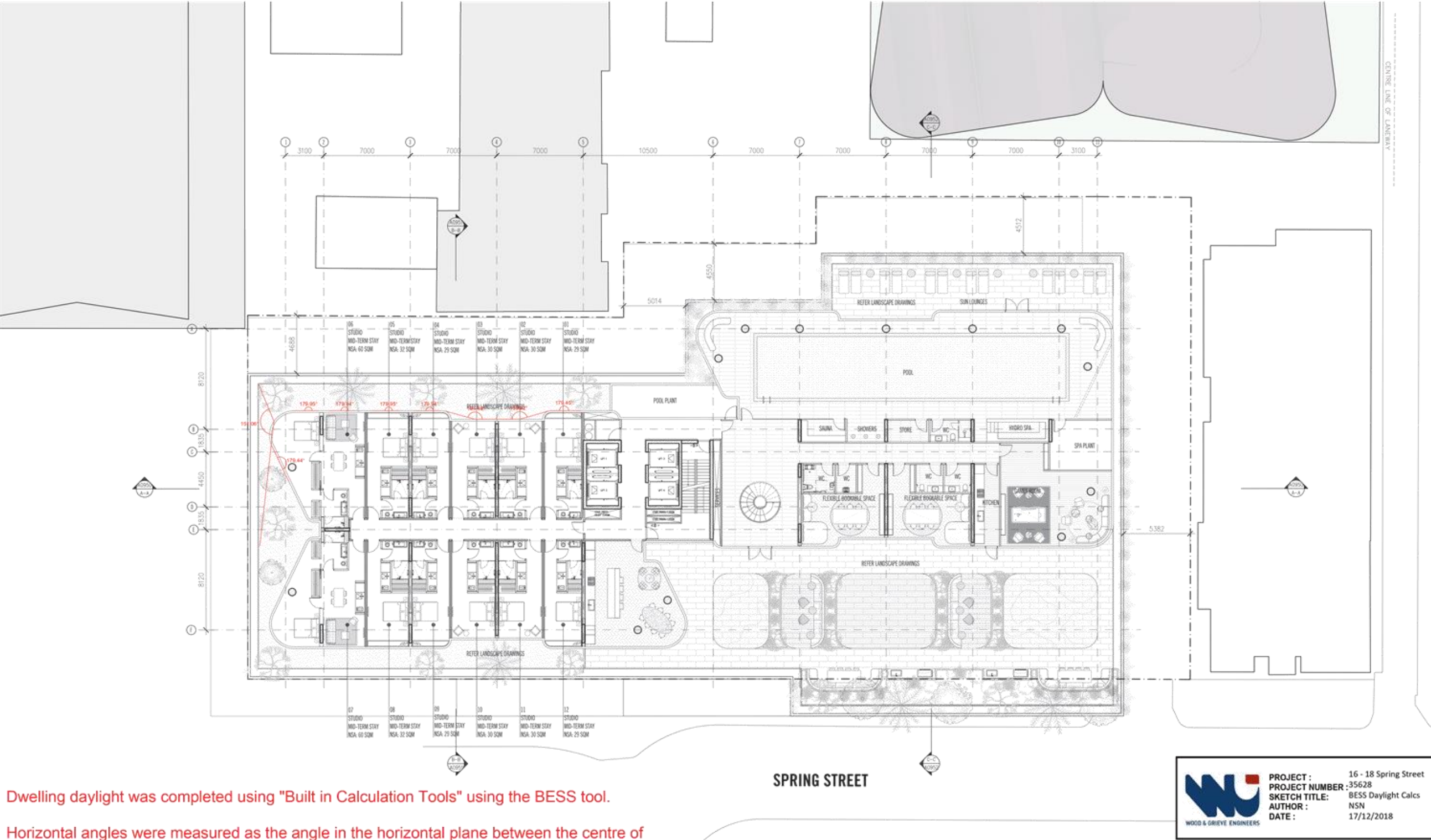
Visual Light Transmittance of glazing will comply with Green Star requirements of 40% or greater. Final glazing selections will be confirmed during Design Development.

where:
h is the height of the window
w is the width of the window

Compliant Area		
Description	Quantity	Unit
Compliant Area (DF of 2)	976.2	sq m


PROJECT : 16 - 18 Spring Street
PROJECT NUMBER : 35628
SKETCH TITLE : BESS Daylight Calculations
AUTHOR : NSN
DATE : 17/12/2018

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers

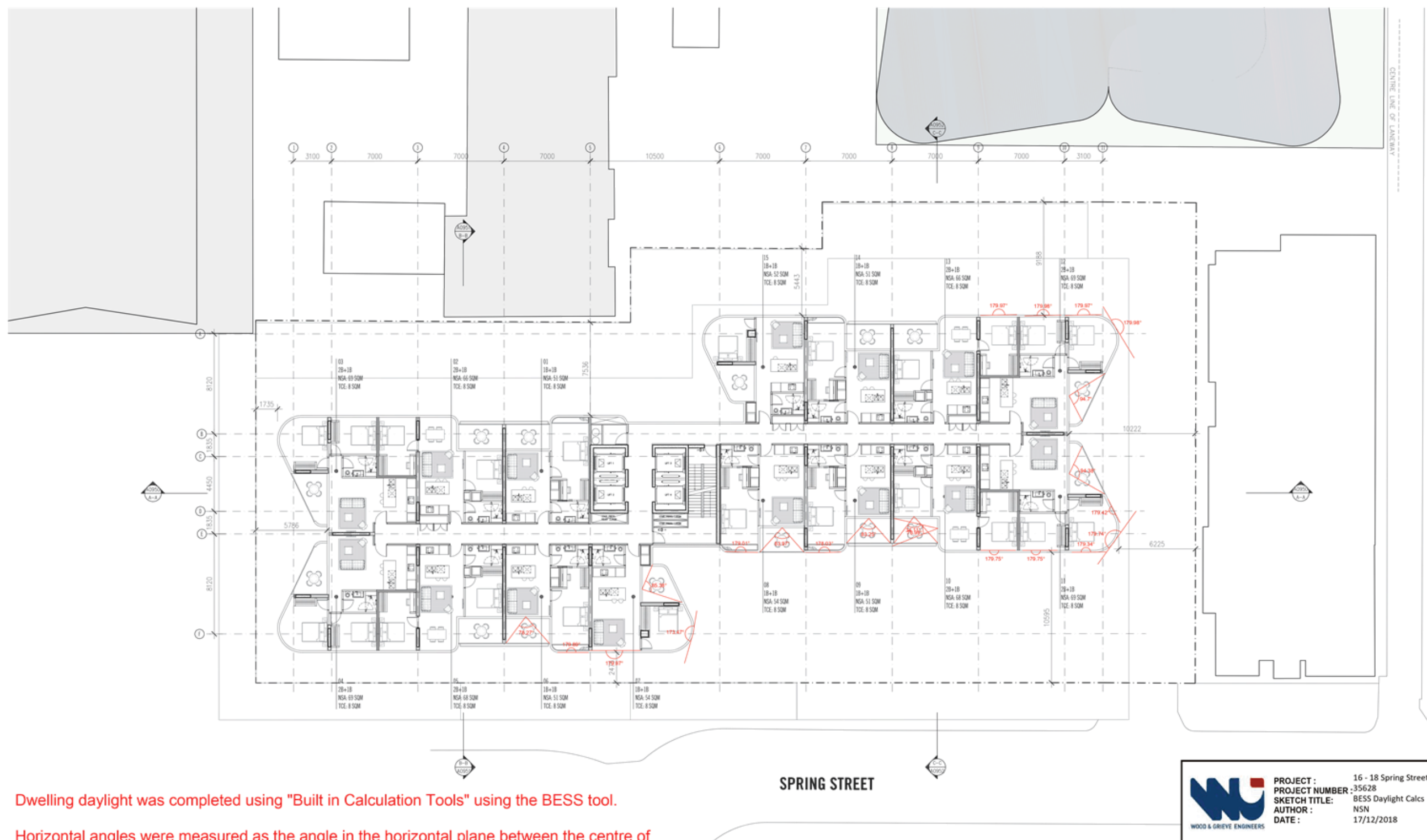


Dwelling daylight was completed using "Built in Calculation Tools" using the BESS tool.

Horizontal angles were measured as the angle in the horizontal plane between the centre of glass of the external window to adjacent obstructions.

Vertical angles were measured as the angle in the vertical plane between the centre of glass of the external window to adjacent obstructions.

9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers



Dwelling daylight was completed using "Built in Calculation Tools" using the BESS tool.

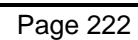
Horizontal angles were measured as the angle in the horizontal plane between the centre of glass of the external window to adjacent obstructions.

Vertical angles were measured as the angle in the vertical plane between the centre of glass of the external window to adjacent obstructions.

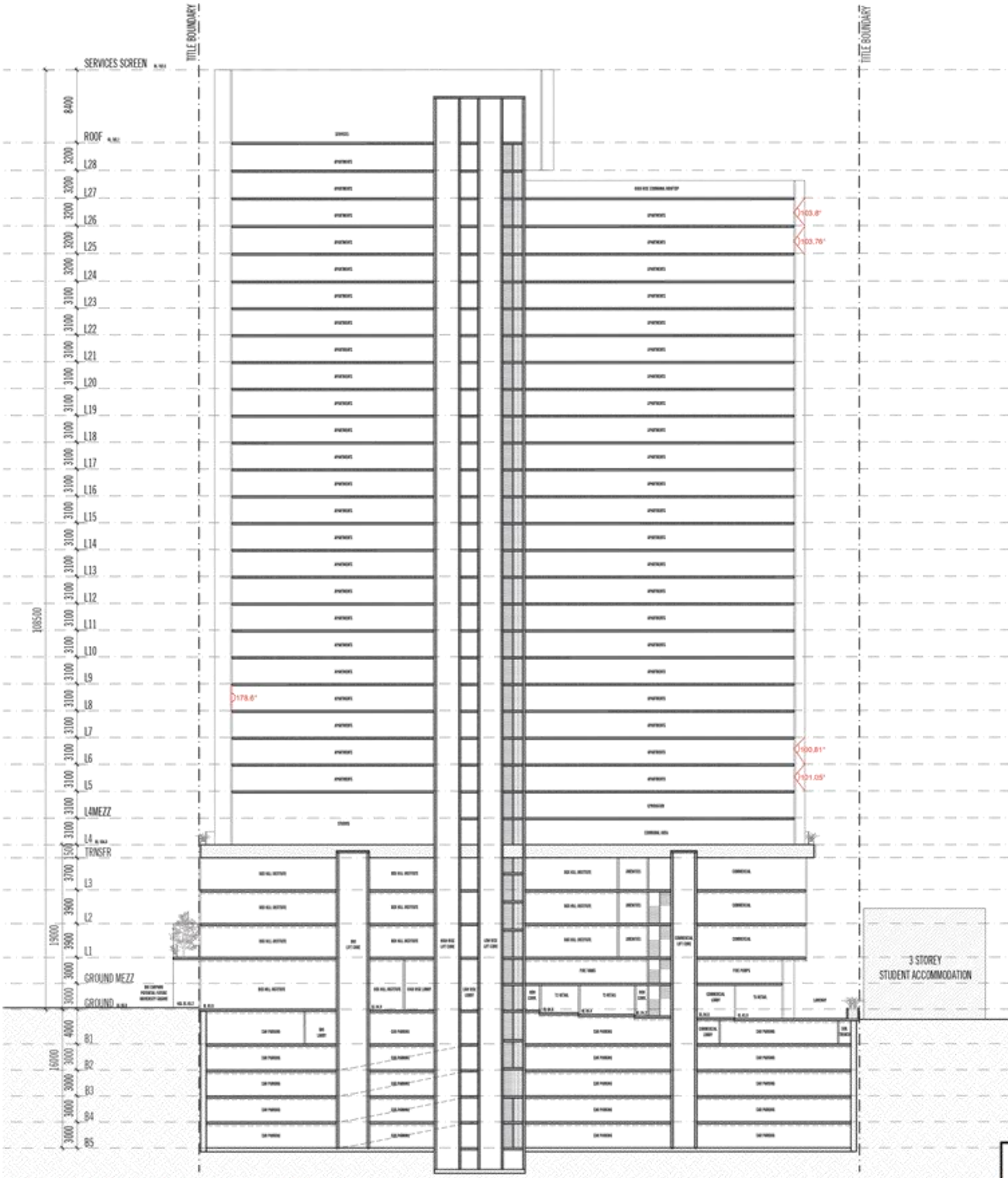
<p>16 SPRING STREET BOX HILL, VIC ORION</p>	<p>GENERAL ARRANGEMENT PLAN LEVEL 05-12 FLOOR PLAN</p>	<p>17106</p>	<p>A0105</p>
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Dwelling daylight was completed using "Built in Calculation Tools" using the BESS tool.

Vertical angles were measured as the angle in the vertical plane between the centre of glass of the external window to adjacent obstructions.




9.1.2 – ATTACHMENT 3. Sustainability Management Plan: Wood and Grieve Engineers



Dwelling daylight was completed using "Built in Calculation Tools" using the BESS tool.

Horizontal angles were measured as the angle in the horizontal plane between the centre of glass of the external window to adjacent obstructions.

Vertical angles were measured as the angle in the vertical plane between the centre of glass of the external window to adjacent obstructions.



PROJECT : 16 - 18 Spring Street
PROJECT NUMBER : 35628
SKETCH TITLE: BESS Daylight Calcs
AUTHOR : NSN
DATE : 17/12/2018

<p>SCALE: 1:100 SCALE: 1:100 PRELIMINARY NOT FOR CONSTRUCTION</p>	<p>ELENBERG FRASER 16 SPRING STREET BOX HILL, VIC 3086 TEL: +61 3 9489 2200 WWW.ELENBERGFRASER.COM</p>	<p>PROJECT: 16 SPRING STREET BOX HILL, VIC ORION</p>	<p>SECTION AA Drawing Number: 17106 Revision: A Date: 01/04/2019</p>
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CITY OF WHITEHORSE
Date: 29/1/2019
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0318-0529-02 - R002

December 2018

16 Spring Street **Box Hill**

Landscape & Public Realm Concept - Development Plan Report

Level 6, 6 Riverside Quay, Southbank, VIC 3006
T (03) 9429 6133
www.tract.com.au

9.1.2 – ATTACHMENT 4. Landscape & Public Realm Concept Plan: Tract Consultants

Tract Consultants

Quality Assurance

CITY OF WHITEHORSE

Date: 29/1/2019

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QUALITY ASSURANCE

Quality Assurance Report Card	
Project Name	0318-0529-02_R002 16SS Development Plan_REV04
Document Number	R02
Revision (See below)	04
Prepared By	BH
Reviewed By	NP
Approved By	AW
Date of Issue	6th November 2018

Rev No.	Date	Brief Detail on Revisions	Prepared By	Approved By
00	31 August 2018	Development Plan Report	Bryce Hinton	Nigel Parker
01	4th September 2018	Development Plan Report	Bryce Hinton	Nigel Parker
02	6th September 2018	Development Plan Report	Bryce Hinton	Nigel Parker
03	17th September 2018	Development Plan Report	Robyn Oliver	Nigel Parker
04	6th November 2018	Development Plan Report	Bryce Hinton	Nigel Parker

Landscape and Public Realm Concept
Development Plan Report

16 Spring Street, Box Hill VIC 3128

Prepared by:

For:

Tract
Landscape Architects
Urban Designers
Town Planners



With Key Stakeholders:



9.1.2 – ATTACHMENT 4. Landscape & Public Realm Concept Plan: Tract Consultants

Contents

0318-0529-02_R002 16SS Development Plan_REV04

CITY OF WHITEHORSE
Date: 29/1/2019
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03	Development Plan	6
04	Spring Street Extension Plan	7
03	Edge Treatments	9
04	Public Realm Material & Furniture Palette	10
05	Public Realm Planting Palette	11

01 BOX HILL INSTITUTE EDUCATION PRECINCT

“The City of Whitehorse accommodates some key institutions with the Box Hill Hospital, Box Hill Institute of TAFE and Deakin University being important social, cultural and economic activities..All of these facilities are important in ensuring that the City of Whitehorse is a prime residential location for families & students and are important to the economy of the City.”

Whitehorse Planning Scheme - 21.07 Economic Development

The development of the 16 Spring Street site offers the Box Hill Institute (BHI) the opportunity to remain as one of the key local institutions in facilitating a thriving local economy for the City of Whitehorse.

The “Plan Melbourne 2017 - 2035” growth strategy forms a strategic planning scheme for the growth of wider Melbourne. The strategy is based on a number of principles including the enhancement of Melbourne’s livability and creating a more connected and sustainable city. Plan Melbourne has identified Box Hill as a Metropolitan Activity Centre (MAC) and provides opportunities for businesses within the precinct to evolve as major regional activity institutions through development of retail, public transport, health, justice, education, entertainment and medium and higher density residential typologies.

With rapid growth of service-orientated Industries within the Box Hill Metropolitan Activity Centre occurring in recent years and continued development, consolidation and densification of the BHI Elgar and Nelson Road Campus’ it is important for the wider precinct to be considered and to some extent master planned to ensure that future development occurs within an integrated campus approach.

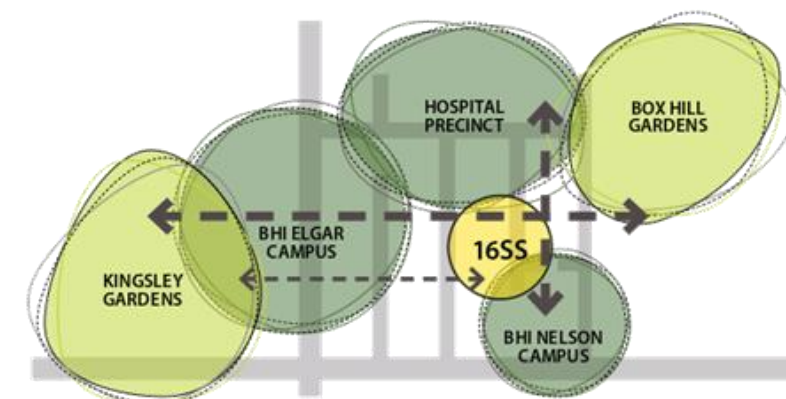
16 Spring Street lies in a strategic development zone for the Box Hill Institute with its location between the Nelson Road and Elgar Road Campuses. These two campuses are separated by Poplar Street and Wellington Street which predominately consist of small residential blocks. The wider BHI precinct is bordered by the Box Hill and Epworth Hospitals to the north, Box Hill Gardens to the north east and Kingsley Gardens to the south west. This results in a campus that is positioned between two major community spaces with a lack of integrated pedestrian connections between its two campuses and the northern hospital precinct.

By providing an innovative solution to public open space within the 16 Spring Street development proposal, the site will become the “missing link” for the precinct. With the BHI precinct being a campus between the gardens, the 16 Spring Street development will provide and enhance pedestrian connections for students and the broader community between the Box Hill and Kingsley Gardens. East-west connections will predominately consist of laneway enhancement programs while north-south connections will consist of larger public realm areas providing a number of institutional activation programs. The provision for nurses training facilities, consultation rooms and short stay accommodation within the architectural program of the 16 Spring Street Development will also provide a vital user connection with the Epworth and Box Hill Hospitals forming a northern edge to the BHI campus.

The landscape master plan and proposed program aims to complement the BHIG strategic plan of building community capacity and enriching the lives of young people and adults through lifelong learning and personal development. This will be achieved through the inclusion of inspiring outdoor learning spaces, provision for better entertainment zones and the general improvement in the quality of life within the Box Hill Institute precinct.

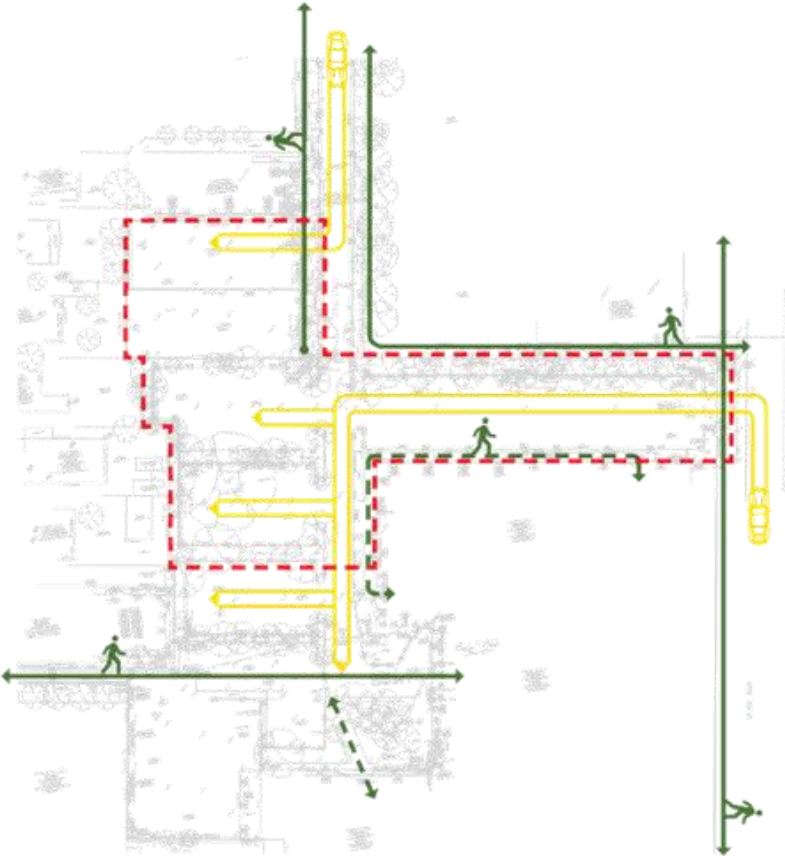
The following documents have been reviewed and considered in the preparation of the landscape master plan and program;

- i. Box Hill Institute Group Strategic Plan 2017-2020
- ii. Whitehorse Planning Scheme - Section 21.07 Economic Development 2016
- iii. Box Hill Transit City Activity Centre Structure Plan 2007
- iv. Box Hill Institute Spring Street Development - Rev 04 2017 - SJB



Box Hill Institute Precinct Diagram

02 SITE ANALYSIS



Circulation

The site is currently dominated by car parking with fences gated access. These significantly impact on pedestrian circulation through the site from Spring Street with many people utilising the private connection to Nelson Road on the southern side of the Salvation Army building.

Vehicle access into the site is predominately through the Nelson Road entrance allowing vehicles to park within the three western car parks as well as delivery access to existing built form.



Vegetation

There is a large number of existing trees on the site that delineate the different car parks and provide significant shade. The majority of the tree species within the site are *Eucalyptus sideroxylon* that have a dark trunk offset by grey green foliage.

It is expected that all existing trees outside of the built form extent will be retained within the landscape design proposal. This will enable good shade opportunities and amenity to the development of the site.



Existing Conditions



9.1.2 – ATTACHMENT 4. Landscape & Public Realm Concept Plan: Tract Consultants



9.1.2 – ATTACHMENT 4. Landscape & Public Realm Concept Plan: Tract Consultants



9.1.2 – ATTACHMENT 4. Landscape & Public Realm Concept Plan: Tract Consultants

Tract Consultants

Spring Street Extension Plan



Fig. 1 South west view of development site

05

EDGE TREATMENTS



Furniture

Elevated timber platforms will be built around existing trees will ensure continued health and vigour while providing numerous seating and gathering opportunities for residents and visitors to the development. These platforms will be framed by insitu concrete walls that form links to built form materiality and create a higher level of informal seating. Additional operator provided cafe furniture can be located at specific nodes outside of retail space for further street front activation.

WSUD

The extension of Spring Street to form connections with Nelson Road will provide a number of 90° and parallel parking spaces. Utilising the existing kerb and stormwater network on the northern edge of the carpark will be cost effective and provides the opportunity for the introduction of WSUD garden beds. These garden beds will have an engineered soil profile that filtrates, often polluted, surface runoff water collected from the carpark.

Steel Inlay

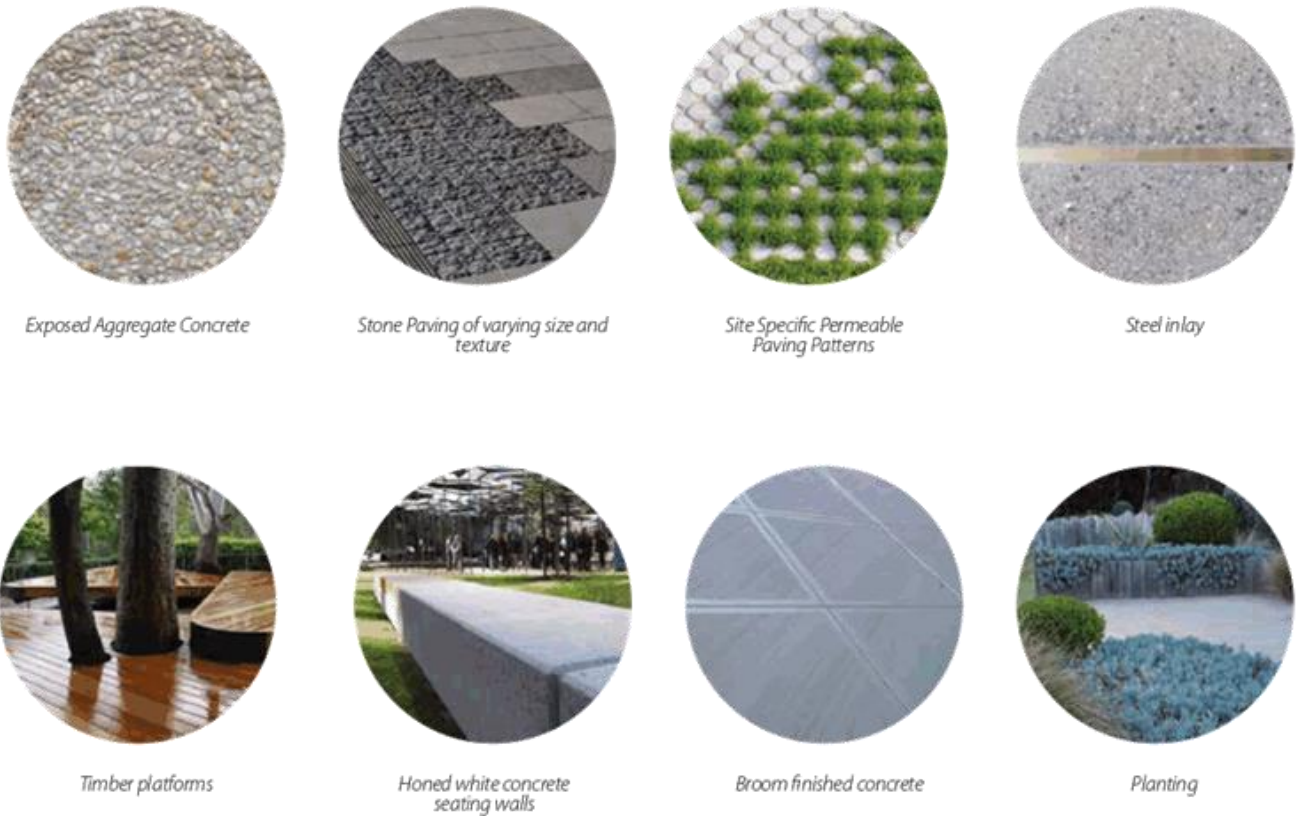
A steel inlay will be used within the public realm to create a visual and material change between the areas designed specifically for pedestrians and the elevated shared zone. This inlay will be a powdercoated mild steel providing contrasting colour to the surrounding stone pavement.

06 PUBLIC REALM MATERIAL & FURNITURE PALETTE

Public Realm | Materials

The material palette for the public realm aims to complement materials outlined in the City of Whitehorse Urban Design Guidelines for the surrounding precinct while forming links to the proposed built form. Bluestone paving of varying sizes will be used to differentiate pedestrian and vehicular low speed zones with the use of split face cobbles that will for a textural change and alert drivers that they are entering a space where a high level of pedestrian activity will occur. The use of a exposed coloured concrete will transition the pedestrian from areas of high activation into more traditional roadside pavements.

Steel inlays will form visual separations between pedestrian and low speed vehicle zones while large timber platforms and honed concrete walls will form physical barriers between the two areas. Broom finished grey concrete will be used for footpaths next to the proposed Spring Street extension.



Public Realm | Furniture

Furniture elements within the public realm will contribute to building a sense of community for the BHI precinct. The built form will also be reflected in the design of other elements such as bike hoops and the specification of loose cafe style furniture by F & B operators. Lighting will compliment the steel inlay by creating a degree of separation between pedestrian and shared zones after hours.



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Planting Palette

0318-0529-02_R002 1655 Development Plan_REV04

07 PUBLIC REALM PLANTING PALETTE

Public Realm | Plant Species

	Botanical Name	Common Name
Trees	<i>Eucalyptus sideroxylon</i>	Red Ironbark
	<i>Lagerstroemia indica</i>	Crepe Myrtle
	<i>Magnolia grandiflora</i>	Bull Bay
	<i>Prunus 'Shimidsu Sakura'</i>	Japanese Flowering Cherry
	<i>Quercus palustris</i>	Pin Oak
	<i>Tristanopsis laurina</i>	Water Gum
Shrubs:	<i>Leucophyta brownii</i>	Cushion Bush
	<i>Liriope muscari 'Royal Purple'</i>	Royal Purple Lily-turf
	<i>Lomandra 'Tanika'</i>	Fine-Leaf Lomandra
	<i>Strelitzia reginae</i>	Bird of Paradise
	<i>Westringia fruticosa 'Blue Gem'</i>	Native Rosemary
Groundcovers:	<i>Cotyledon orbiculata</i>	Silver Waves
	<i>Dianella revoluta</i>	Black Anther Flax Lily
	<i>Juniperus sabina 'Tamariscifolia'</i>	Juniper
	<i>Juniperus horizontalis</i>	Savin Juniper
	<i>Ophiopogon planiscapus</i>	Black Mondo Grass
WSUD:	<i>Carex appressa</i>	Tall Sedge
	<i>Carpobrotus rossii</i>	Native Pig Face
	<i>Convolvulus sabatius</i>	Ground Morning Glory
	<i>Hardenbergia violacea</i>	Purple Coral Pea
	<i>Kleinia mandraliscae</i>	leu Chalksticks
	<i>Limonium perezii</i>	Perennial Statice
	<i>Lomandra longifolia</i>	Creeping Boobialla
	<i>Phormium tenax</i>	New Zealand Flax



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Tract
Mixed Use Development
16 Spring Street, Box Hill VIC 3128
Prepared by **Tract Consultants**
for **Orion International**
0318-0529-02
06th December 2018

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16-18 Spring Street, Box Hill
Community Infrastructure Assessment

Final Report

Prepared by ASR Research
On behalf of Orion East Pty Ltd
September, 2018

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16-18 Spring Street, Box Hill
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1. Introduction

1.1 Background

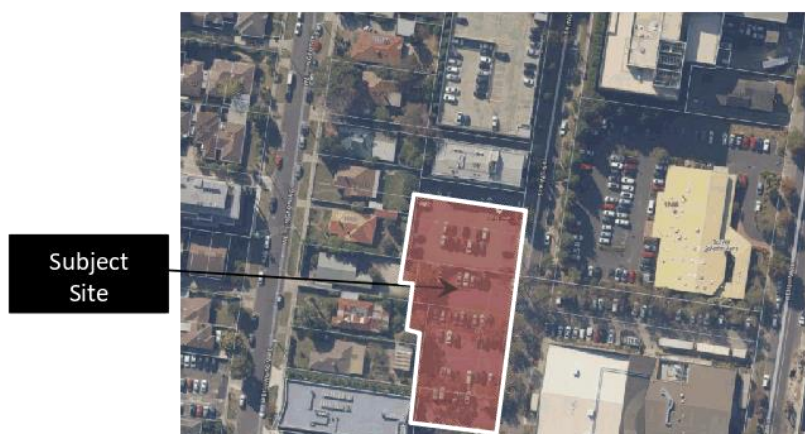
ASR Research was engaged by BMDA, working on behalf of Orion East Pty Ltd (“the client”), to prepare the following community infrastructure assessment associated with the proposed development of 16-18 Spring Street, Box Hill (the “subject site”). Figure 1 below shows the location of the subject site which occupies approximately 2,630 square metres of land to the north of Whitehorse Road, in the Box Hill Metropolitan Activity Centre. The subject site forms part of the Box Hill Institute Nelson Campus and is currently being used for at-grade car parking. It has a partial frontage to Spring Street of 30 metres.

The Box Hill Metropolitan Activity Centre is located 13 km to the east of the Melbourne CBD. The Activity Centre is strategically located with connections available via:

- Lilydale and Belgrave railways lines;
- 109 tram route;
- Whitehorse Road; and
- Elgar Road and Station Street to Doncaster and Waverly areas.

The Box Hill Metropolitan Activity Centre surrounds Whitehorse Road from Kingsley Gardens in the west to Box Hill town hall in the east. The Site is centrally located within the Hospital and Western TAFE Precinct of the Activity Centre.

Figure 1 – Location of 16-18 Spring Street, Box Hill



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1.2 Development Proposal

The development proposal consists of a 29-storey mixed-use building, containing:

- A 4-storey podium (non-residential uses);
- 298 apartments consisting of:
 - 12 x studios (4%): for short to medium stay only and not full-time residents;
 - 90 x 1 bed / 1 bath (30%);
 - 60 x 2 bed / 1 bath (20%);
 - 108 x 2 bed / 2 bath (36%); and
 - 28 x 3 bed (9%).
- Education facilities (nurse training facilities) for Box Hill Institute (BHI);
- Medical Centre (consulting rooms), Shop, and Food and Drink Premises;
- Four levels of basement car parking; and
- A new Street connecting Spring Street to Nelson Road.

Permanent residents of the development will have exclusive access to an indoor recreation facility and a separate lounge / function room facility. The indoor recreation facility will contain a pool, gymnasium, yoga / meditation room and sauna / steam room. The lounge / function room facility will contain a kitchen, multiple private dining rooms and garden lounge area. Approximately 1,000 square metres of floor area in total will be included to accommodate these two facilities. It should also be noted that students attending BHI's various Box Hill campuses have access to on-site facilities and services including, cafeterias, libraries at both Elgar and Nelson campuses, educational and personal counselling, student activities and representation, welfare services, support for students with disabilities, student wellbeing officers, support for indigenous students and support for international students.

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1.4 Assessment Objectives

The subject site is affected by Schedule 8 to the Development Plan Overlay (DPO8) in the Whitehorse Planning Scheme. DPO8 includes a requirement to prepare “a community infrastructure assessment to determine the impact of development on the demand for such facilities”.

The assessment includes the following objectives:

- Identify and classify the existing community infrastructure that exists generally within 1.5 kilometres of the subject site;
- Determine the extent to which community infrastructure gaps exist within the 1.5-kilometre population catchment of the subject site;
- Identify potential community infrastructure demands, requirements and opportunities associated with the development of the subject site assuming a dwelling yield of 286 (excludes 12 short to medium stay dwellings for non-permanent residents); and
- Identify existing Council and other agency strategic community infrastructure needs and recommendations that may need to be addressed by future development of the subject site.

2. Assessment Scope & Catchment Details

2.1 Scope of Community infrastructure Items Reviewed

Appendix 2 of this report contains maps showing the existing supply of community infrastructure generally within a 1.5-kilometre radius of the subject site and Appendix 3 contains indicative estimates of demand and / or supply requirements for each form of community infrastructure. It is envisaged that the subject site will only moderately impact on local level community infrastructure forms that are typically managed by local government, and some higher order community infrastructure forms owned and / or managed by Local Government which have larger population catchments.

For the purposes of undertaking this assessment an audit of the following community infrastructure categories were selected:

1. Early years services;
2. Open space (active and passive);
3. Community meeting spaces, libraries and learning centres;
4. Indoor recreation facilities;

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5. Education facilities;
6. Health services;
7. Police & Emergency services; and
8. Residential aged care.

Categories 1 to 3 are typically (but not exclusively) Local Government responsibilities and are often (but not always) included in development contribution agreements associated with significant land use developments. However, government education facilities (typically primary and secondary schools), where deemed to be required within a land use development, are generally funded (both land and building costs) by the State Government.

Although not prescriptive different forms of community infrastructure generally have different population catchments as shown in Table 1 on the following page.

Table 1 – Scope of Community infrastructure Items Assessed

Population Catchment Hierarchy	Items
Level 1 Neighbourhood Level <i>Provision ratios up to 10,000 people</i>	<ul style="list-style-type: none"> • Open space (passive and active) • Local playgrounds • Local bicycle / pedestrian pathways (on and off-road) • Kindergartens • Playgroups • Government primary schools • Neighbourhood house (Inc. Community education services) • Community meeting spaces (Council and Non-Council) • Senior citizens groups • Long Day Child Care • Public art installations • Social housing
Level 2 Precincts (2-3 Neighbourhoods) <i>Provision ratios between 10,000 and 30,000 people</i>	<ul style="list-style-type: none"> • Occasional Child Care • Government secondary Schools • Catholic primary Schools • Maternal and Child Health Services • Indoor recreation centres • Residential aged care
Level 3 Cluster of Precincts (District) <i>Provision ratios between 30,000 people and 60,000 people</i>	<ul style="list-style-type: none"> • Libraries • Council aquatic / leisure centres • Community arts centres • Other non-government secondary schools • Community health centres
Level 4 Municipal Level Provision for the total municipality	<ul style="list-style-type: none"> • Principal Bicycle Network (on and off-road) • Civic centres
Level 5 Regional Level Provision for 2 or more municipalities	<ul style="list-style-type: none"> • Highest Order Performance Arts Facility • Universities/TAFEs • Public and private hospitals

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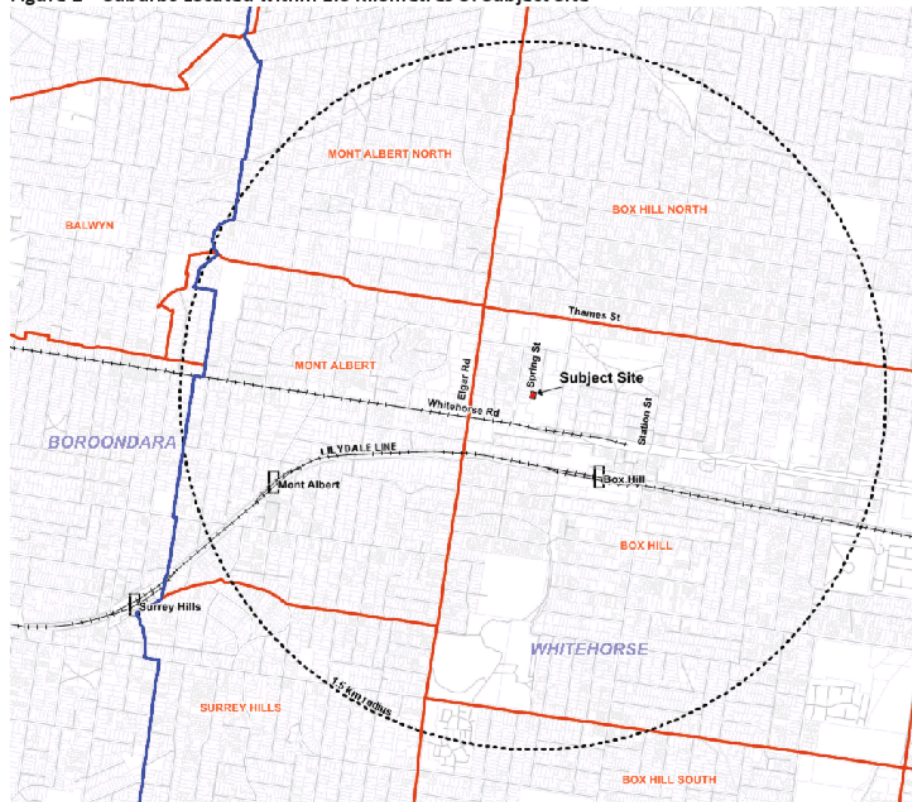
2.2 Subject Site 1.5 Kilometre Population Catchment

Figure 2 below shows the 1.5-kilometre population catchment area of the subject site. While the site is located in Box Hill, the 1.5-kilometre population catchment also includes parts of the following suburbs:

- Box Hill North to the north;
- Mont Albert North to the north-west;
- Mont Albert to the west;
- Surrey Hills to the south west; and
- Box Hill South to the south.

More details about dwelling and population assumptions associated with the development of the subject site are outlined in Section 5 of this report.

Figure 2 – Suburbs Located within 1.5 Kilometres of Subject Site



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3 Review of Statutory Framework & Other Strategic Documents

3.1 Overview

This section reviews:

- Two key statutory documents that inform future community infrastructure priorities for the City of Whitehorse: 1) the Whitehorse Planning Scheme, and 2) *Plan Melbourne 2017*.
- Other Council and non-Council strategic documents of potential relevance to this assessment.

The review allows for existing statutory requirements and broader strategic objectives to be identified and assessed for its potential relevance and application to the subject site.

3.2 Whitehorse Planning Scheme

The Planning Scheme is a statutory document that guides and shapes development in Whitehorse. It includes State Government provisions as well as local policies specific to Whitehorse and a strategic vision for the municipality.

The Whitehorse Planning Scheme contains a number of Clauses of potential relevance to the development of the subject site. These include:

- Clause 21.01 Municipal Profile;
- Clause 21.08 Infrastructure;
- Clause 22.07 Box Hill Metropolitan Activity Centre;
- Clause 22.15 Public Open Space Contribution Policy;
- Schedule to Clause 52.01 (Public Open Space Contribution);
- Clause 56.03-3 (Planning for Community Facilities Objective); and
- Clause 56.05-2 (Public Open Space Provision Objectives).

A summary of each of these Clauses is provided on the following pages.

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3.2.1 Clause 21.01 Municipal Profile

The City hosts many activities of importance to the Eastern region of Melbourne and several of State importance. These are viewed as strengths, which the City can build upon, including:

- Box Hill Metropolitan Activity Centre and its provision of important education, health and commercial facilities. These include the Box Hill Institute of TAFE, Box Hill and Epworth Hospitals and a branch of the Australian Taxation Office.

3.2.2 Clause 21.08 Infrastructure

Key issues include:

- Council needs to further investigate the opportunities to introduce Development Contributions to ensure that appropriate facilities are provided where new development is occurring within the City.
- Council has the responsibility to utilise open space contributions to help meet its future open space needs. Land contributions will be taken in certain areas where there is an opportunity to improve existing open space linkages and provision in accordance with Clause 22.15.

Objectives

- To ensure that adequate road capacity is provided to meet the future needs of the City.
- To obtain appropriate and sustainable developer contributions for infrastructure.
- To ensure that the community is provided with safe, efficient and accessible walking, cycling and public transport options.
- Improve road safety in Whitehorse to reduce the number of road injuries and deaths.

Strategies

Strategies to achieve these objectives include:

- Ensuring that land set aside for future roads is put to use where appropriate.
- Developing a road hierarchy that has regard to the abutting land uses and connectivity.
- Maintaining a hierarchy that distributes locally generated traffic onto the arterial road network.
- Discouraging non-locally generated transport activity from using the local road network.

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- Developing parking precinct plans for selected shopping centres to effectively manage the provision of parking as required.
- Identifying the type of developer contributions required to meet the infrastructure needs resulting from a development.
- Obtaining developer contributions toward cumulative infrastructure needs to which the development will add further demand.
- Providing better pedestrian and bicycle path links throughout the municipality.
- Actively promoting extensions and improvements to the public transport network to service the needs of the community.
- Advocate for the state government to address high crash locations on arterial roads, as well as locations where there is high potential for crashes to occur.

3.2.3 Clause 22.07 Box Hill Metropolitan Activity Centre

Objectives

- To ensure that the Box Hill Metropolitan Activity Centre can continue to expand in line with market demand.
- To ensure that future development within the Box Hill Metropolitan Activity Centre seeks to maximise employment growth for Whitehorse.
- To ensure that Box Hill provides accessible, lively and comfortable public spaces that offer diverse opportunities for recreation and social engagement.
- To support walking as the primary means of access in and around Box Hill and encourage most trips of 1km or less to be taken on foot.
- To encourage cycling as a sustainable and healthy means of travel within Box Hill and for trips of up to 5km between the Activity Centre and surrounding areas.
- To encourage significantly increased use of public transport and reduced rates in the use of private vehicular transport for travel to and from the Box Hill Activity Centre.
- To carefully manage vehicular traffic in Box Hill to support choice of travel mode and create transit supportive roads (as defined by the Box Hill Transit City Activity Centre Structure Plan 2007).
- To ensure that car parking in Box Hill balances access, sustainable transport and land use needs, consistent with the Box Hill Central Activities Area Car Parking Strategy 2013.
- To ensure that Box Hill accommodates a more intensive and diverse range of activities that increase choices and opportunities, support synergies between different uses, encourage use of sustainable transport and complement surrounding areas.

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- To ensure that development and use in the Box Hill Transport and Retail Precinct are appropriate to its role and function as a regional transport interchange for rail, bus, tram and taxi services.

Policy

It is policy that use and development of land is consistent with the vision for the centre, and the activity and built form precincts in the Box Hill Transit City Activity Centre Structure Plan (2007). The Clause contains a number of policies relevant to the assessment including public spaces, pedestrian mobility and bicycle access, land use mix and economic and social activities. The details of each of these are outlined below.

Public Places

The responsible authority will encourage use and development that:

- Protects and improves access to existing public open spaces.
- Improves the design and management of public places.
- Creates new public spaces and facilities.
- Develops synergies between public spaces and uses at their edges.
- Explores the provision of alternative kinds of spaces (as defined by the Box Hill Transit City Activity Centre Structure Plan 2007).
- Encourages private sector provision of recreational facilities.

Pedestrian mobility and bicycle access

The responsible authority will encourage use and development that:

- Widens footpaths wherever possible.
- Improves pedestrian crossings of busy streets.
- Improves connectivity of the pedestrian network.
- Enhances streets as public spaces.
- Supports way-finding.
- Enhances personal and community safety.
- Provides secure parking and amenities for cyclists.
- Creates a local network of bicycle routes.
- Provides information to encourage cycling.

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Land use mix and economic and social activities

The responsible authority will encourage use and development that:

- Provides for the expansion of the Metropolitan Activity Centre in line with market need.
- Seeks to maximise growth in employment for the City of Whitehorse.
- Supports the continued development of key activity clusters.
- Fills strategic gaps in the local retail offer while being appropriate to a Metropolitan Activity Centre.
- Creates more and diverse opportunities for housing.
- Creates opportunities for affordable housing.
- Supports social and economic development and lifestyle aspirations.
- Encourages complementary mixed uses and links between activities.

3.2.4 Clause 22.15 Public Open Space Contribution

This policy applies to all development proposals.

It is policy that:

Location

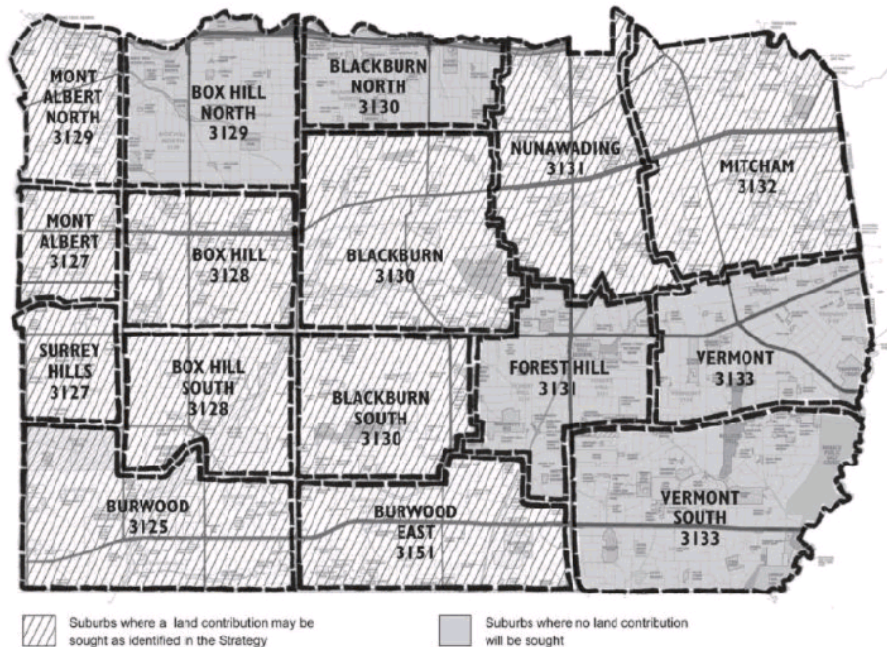
Land contributions for public open space will generally be preferred over cash contributions for the purposes of Clause 52.01 of the scheme within the areas identified in Map 1. Land will be requested and accepted at Council's discretion, in accordance with the open space land requirements identified in the WOSS (Whitehorse Open Space Strategy).

In all other areas of the municipality, a cash contribution equal to the amount specified in Clause 52.01 is preferred, at Council's discretion.

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Map 1 – Whitehorse Open Space Strategy 2007, Sub-precincts



Selection criteria for public open space

In locations where a land contribution may be sought over a cash contribution, it is policy that the following criteria be used to determine whether any part of the land in a development proposal is appropriate to be contributed as public open space at the time of the subdivision of the land or building.

Land to be contributed:

- Should meet the minimum size for the site to meet its intended purpose, on its own or in combination with adjoining land. The minimum size parcels for each type of open space is as follows:
- Regional open space, unlimited.
- Municipal open space, minimum 3 hectares.
- Neighbourhood open space, minimum 1 hectare.
- Local open space, minimum 0.26 hectare (up to 0.99 hectare).
- Small local open space, 0.03 hectares (up to 0.25 hectare).
- Linking space, minimum 5 metres wide.

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- Should be in good physical condition (e.g. free of contamination and weed infestation).
- Should not be affected by adjoining land use in a way that diminishes the ecological, social or cultural value of the open space.
- Should have existing biodiversity values or the potential to contribute to these values in existing or future habitat corridors.
- Should contribute to the wider open space network including forming open space corridor links.
- Should enhance any indigenous or non-indigenous heritage values.
- Should be accessible or have the potential to be accessible.
- Should be visually prominent and be accessible by at least two access points or local roads.
- Should have the potential to accommodate a range of formal and informal recreational uses.
- Should be close to a range of transport options for residents to access the site, including proximity to public transport, linear shared trails and major roads.
- Should not be unduly restricted by services or easements.
- Should enhance the liveability of neighbourhoods by providing visual relief and adequate levels of sunlight.
- Should enhance the character and attractiveness of the neighbourhood.

Land that does not meet all of the above criteria may still be appropriate as open space for the purposes of Clause 52.01.

Design

In locations where this policy has identified a preference for a land contribution rather than a cash contribution, an applicant should consult the responsible authority very early in the site analysis phase of a proposal to ascertain whether any part of the land might be suitable and required for public open space purposes.

The design of a building on land where public open space will be required should accommodate the provision of public open space in a manner that meets the selection criteria for public open space.

If a contribution under Clause 52.01 is likely to be imposed as a land contribution, and the responsible authority is satisfied that an additional part of the land which generally meets the selection criteria for public open space in Clause 22.15-3 should be acquired, the responsible authority should consult with

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the applicant to determine whether the development application could be modified to enable provision of the additional land to Council at Council's cost.

Contributions greater than 4%

Contributions greater than 4% (as may be required under Clause 52.01) should have regard to:

- The selection criteria for public open space.
- The open space type and required land size.
- The existing characteristics of the site including features to be retained.
- The intensity of the proposed development and surrounding development.
- The quantity of the additional population and the anticipated demographics based on the development design.
- Recommendations for the site and surrounding area contained in the Whitehorse Open Space Strategy.
- Any other relevant strategic planning document.

3.2.7 Schedule to Clause 52.01 of the Whitehorse Planning Scheme (Public Open Space Contribution)

As shown in Figure 8 the Schedule to Clause 52.01 of the Whitehorse Planning Scheme requires all subdivision to provide a 4% minimum public open space contribution. However, a subdivision of land on a strategic site (as defined by the Whitehorse Open Space Strategy or Council or State Government) may require a contribution rate greater than 4% subject to negotiation of a development plan. Contributions can be either in the form of land or cash contribution.

Figure 3 - Schedule to Clause 52.01

Type or location of subdivision	Amount of contribution for public open space
The subdivision of land on a strategic site (as defined by the Whitehorse Open Space Strategy or Council or State Government).	Minimum 4%. Contribution rate greater than 4% subject to negotiation of a development plan.
All other land	4%

Source: Whitehorse Planning Scheme

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3.2.8 Clause 56.03-3 of the Whitehorse Planning Scheme (Planning for Community Facilities Objective)

The objective of this Clause is:

To provide appropriately located sites for community facilities including schools, libraries, preschools and childcare, health services, police and fire stations, recreation and sports facilities.

Standard C4

A subdivision should:

- Implement any relevant regional and local community facility strategy, plan or policy for the area set out in this scheme.
- Locate community facilities on sites that are in or near activity centres and public transport.
School sites should:
 - Be integrated with the neighbourhood and located near activity centres.
 - Be located on walking and cycling networks.
 - Have a bus stop located along the school site boundary.
 - Have student drop-off zones, bus parking and on-street parking in addition to other street functions in abutting streets.
 - Adjoin the public open space network and community sporting and other recreation facilities.
 - Be integrated with community facilities.
 - Be located on land that is not affected by physical, environmental or other constraints.

Schools should be accessible by the Principal Public Transport Network in Metropolitan Melbourne and on the regional public transport network outside Metropolitan Melbourne.

Primary schools should be located on connector streets and not on arterial roads. New State Government school sites must meet the requirements of the Department of Education and Training and abut at least two streets with sufficient widths to provide student drop-off zones, bus parking and on-street parking in addition to other street functions.

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3.2.9 Clause 56.05-2 of the Whitehorse Planning Scheme (Public Open Space Provision Objectives)

The objectives of this Clause are:

- To provide a network of quality, well-distributed, multi-functional and cost-effective public open space that includes local parks, active open space, linear parks and trails, and links to regional open space.
- To provide a network of public open space that caters for a broad range of users.
- To encourage healthy and active communities.
- To provide adequate unencumbered land for public open space and integrate any encumbered land with the open space network.
- To ensure land provided for public open space can be managed in an environmentally sustainable way and contributes to the development of sustainable neighbourhoods.

Standard C13

The provision of public open space should:

- Implement any relevant objective, policy, strategy or plan (including any growth area precinct structure plan) for open space set out in this scheme.
- Provide a network of well-distributed neighbourhood public open space that includes:
 - Local parks within 400 metres safe walking distance of at least 95 percent of all dwellings. Where not designed to include active open space, local parks should be generally 1 hectare in area and suitably dimensioned and designed to provide for their intended use and to allow easy adaptation in response to changing community preferences.
 - Additional small local parks or public squares in activity centres and higher density residential areas.
 - Active open space of a least 8 hectares in area within 1 kilometre of 95 percent of all dwellings that is:
 - Suitably dimensioned and designed to provide for the intended use, buffer areas around sporting fields and passive open space
 - Sufficient to incorporate two football/cricket ovals
 - Appropriate for the intended use in terms of quality and orientation
 - Located on flat land (which can be cost effectively graded)

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- Located with access to, or making provision for, a recycled or sustainable water supply
- Adjoin schools and other community facilities where practical
- Designed to achieve sharing of space between sports.
- Linear parks and trails along waterways, vegetation corridors and road reserves within 1 kilometre of 95 percent of all dwellings.

Public open space should:

- Be provided along foreshores, streams and permanent water bodies.
- Be linked to existing or proposed future public open spaces where appropriate.
- Be integrated with floodways and encumbered land that is accessible for public recreation.
- Be suitable for the intended use.

3.3 Plan Melbourne 2017

Plan Melbourne 2017 is a metropolitan planning strategy that defines the future shape of the city and state over the next 35 years. Integrating long-term land use, infrastructure and transport planning, Plan Melbourne sets out the strategy for supporting jobs and growth, while building on Melbourne's legacy of distinctiveness, liveability and sustainability. The plan includes:

- 9 principles to guide policies and actions
- 7 outcomes to strive for in creating a competitive, liveable and sustainable city
- 32 directions outlining how these outcomes will be achieved
- 90 policies detailing how these directions will be turned into action

In addition, a separate 5-year Implementation Plan with 112 actions has been developed. Of particular relevance to this assessment are the directions and policies outlined in Outcome 2 (housing related directions) and Outcome 5 (community infrastructure related directions). The directions and policies associated with these two outcomes are summarised below.

Outcome 02: Melbourne provides housing choice in locations close to jobs and services

Manage the supply of new housing in the right locations to meet population growth and create a sustainable city

- Maintain a permanent urban growth boundary around Melbourne to create a more consolidated, sustainable city

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- Facilitate an increased percentage of new housing in established areas to create a city of 20-minute neighbourhoods close to existing services, jobs and public transport
- Plan for and define expected housing needs across Melbourne's regions
- Provide certainty about the scale of growth in the suburbs

Deliver more housing closer to jobs and public transport

- Facilitate well-designed, high-density residential developments that support a vibrant public realm in Melbourne's central city
- Direct new housing and mixed-use development to urban-renewal precincts and sites across Melbourne
- Support new housing in activity centres and other places that offer good access to jobs, services and public transport
- Provide support and guidance for greyfield areas to deliver more housing choice and diversity
- Require development in growth areas to be sequenced and staged to better link infrastructure delivery to land release

Increase the supply of social and affordable housing

- Utilise government land to deliver additional social housing
- Streamline decision-making processes for social housing proposals
- Strengthen the role of planning in facilitating and delivering the supply of social and affordable housing
- Create ways to capture and share value uplift from rezonings

Facilitate decision-making processes for housing in the right locations

- Support streamlined approval processes in defined locations
- Facilitate the remediation of contaminated land, particularly on sites in developed areas of Melbourne with potential for residential development

Provide greater choice and diversity of housing

- Facilitate housing that offers choice and meets changing household needs
- Provide a range of housing types in growth areas

Outcome 05: Melbourne is a city of inclusive, vibrant and healthy neighbourhoods

Create a city of 20-minute neighbourhoods

- Create mixed-use neighbourhoods at varying densities
- Support a network of vibrant neighbourhood activity centres

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Create neighbourhoods that support safe communities and healthy lifestyles

- Improve neighbourhoods to enable walking and cycling as a part of daily life

Deliver community infrastructure to support strong communities

- Facilitate a whole-of-government approach to the delivery of community infrastructure
- Create health and education precincts to support neighbourhoods
- Support not-for-profit community services to build social capital and stronger communities
- Provide and protect land for cemeteries and crematoria

Deliver local parks and green neighbourhoods in collaboration with communities

- Develop a network of accessible high-quality, local open spaces
- Support community gardens and productive streetscapes

3.4 Other Relevant Strategic Documents

A number of Whitehorse City Council and other non-Council agency strategies, plans and policies were identified and reviewed for potential relevance to the community needs analysis. Council policies, strategies and plans are reviewed in Table 2 below. A summary of important non-Council community infrastructure strategies is provided in Appendix 1 of this report, and where applicable, discussed as part of the more detailed assessment in Section 5 of this report.

Table 2 – Existing Strategic Directions & Actions Potentially Relevant to the Assessment

Strategy
Corporate Strategies
Council Vision 2013-2023
<p>The Council Vision 2013-2023 is a high level strategic document. It articulates the aspirations of the community about the future. It is a broad set of statements about the type of city the community wants to see in ten years including high level goals which describe how this might be achieved. This is complemented by a set of guiding principles to ensure consistency in how Council plans and delivers on the Vision in the long term. The vision includes the following 5 strategic directions:</p> <ul style="list-style-type: none"> • Strategic Direction 1: Support a healthy, vibrant, inclusive and diverse community. • Strategic Direction 2: Maintain and enhance our built environment to ensure a liveable and sustainable city. • Strategic Direction 3: Protect and enhance our open spaces and natural environments. • Strategic Direction 4: Strategic leadership and open and accessible government. • Strategic Direction 5: Support a healthy local economy. <p>Relevant goals include:</p> <ul style="list-style-type: none"> • Accessible, inclusive and integrated services and facilities that meet community needs • A safe and welcoming city • A range of programs and initiatives that facilitate wellbeing and connectedness • Recognition and celebration of arts, culture, recreation, sport, leisure and community wellbeing. • An accessible and well connected city • Flexible, quality amenities and services that support the needs of individuals and the community • Well maintained infrastructure and community facilities

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<p>Strategy</p> <ul style="list-style-type: none"> • A leader in environmental sustainability in our community and organisation. • Recognition of the importance of quality green and accessible open space available to all ages and abilities • A natural environment that has been well maintained and enhanced.
<p>Whitehorse Community Plan 2017-2021</p> <p>The Council Plan details how it will secure the municipality's liveability, prosperity and sustainability now and into the future while also focusing on our approach to working with our community, key stakeholders, community organisations and other levels of government to achieve its goals.</p> <p>The key goals are:</p> <ul style="list-style-type: none"> • Goal 1.1: A safe, inclusive, resilient and diverse community which benefits from good health and wellbeing through the delivery of services, facilities and initiatives • Goal 2.1: A well-connected City with a balanced approach to growth supported by infrastructure and development that respects our neighbourhood character • Goal 3.1: A place where passive and active open space is highly valued, shared and enhanced • Goal 4.1: Good governance and resource management • Goal 4.2: A high performing and engaged workforce • Goal 4.3: A Council that communicates effectively, engaging with our community to enable the delivery of services and facilities that meet the needs of our diverse community • Goal 5.1: Work in partnership to support a strong, active local economic environment that attracts investment and provides economic opportunities for businesses and employment for people <p>Relevant measures to address these goals include:</p> <ul style="list-style-type: none"> • 2.1.4 Maintain, renew and sustainably invest in our community infrastructure that is relevant, modern and accessible, and can accommodate multi purpose usage • 2.1.5 Maintain, enhance and create shared community spaces that promote the neighbourhood character and provide a safe and enjoyable meeting place for everyone • 2.1.6 Provide and maintain an infrastructure network that meets the needs of development growth while supporting residents, businesses and visitors in their daily activities • 2.1.7 Continue to encourage sustainable and quality retrofit of existing infrastructure (Council facilities, street lighting) • 3.1.2 Continue to retain, enhance and increase the amount of open spaces to meet the needs of our diverse community with amenities that encourage opportunities for shared use
<p>Whitehorse Health and Wellbeing Plan 2017-2021</p> <p>This iteration of the Municipal Public Health and Wellbeing Plan, Whitehorse Health and Wellbeing Plan 2017-2021 (the Plan) is Council's sixth plan and represents Council's long term commitment and endeavour towards working in partnership to improve the health and wellbeing of the municipality. This Plan builds upon the work undertaken in previous plans, strengthening Council's approach to supporting a healthy, vibrant, prosperous and sustainable community.</p> <p>The health and wellbeing goals align with Council's Strategic Directions 2013-2023, reflective of the integrated planning processes between the Council Plan 2017-2021 and the Whitehorse Health and Wellbeing Plan 2017-2021 for the municipality:</p> <ol style="list-style-type: none"> 1. Support a healthy, vibrant, inclusive and diverse community 2. Maintain and enhance our built environment to ensure a livable and sustainable city 3. Protect and enhance our open space and natural environments 4. Provide strategic leadership and an open and accessible government 5. Support a healthy local economy <p>Key actions identified by the Plan and relevant to the assessment include:</p> <ul style="list-style-type: none"> • Plan, promote and deliver a range of amenities and programs to enable all people to access health and fitness, wellness and social activities across the municipality • Promote physical and mental wellbeing of adults and children through education and access to safe, enjoyable, sustainable, active transport modes such as cycling and walking • Increase access to shared spaces for physical activity and social connections by building multi-use, youth-friendly infrastructure • Improve access to shared spaces for physical activity and social connections by building multi-use, disability and female-friendly infrastructure • Redevelop the Whitehorse Centre as a cultural and community facility for Whitehorse and beyond • Increase access to shared spaces for physical activity and sports participation, in particular for the sports of soccer and cricket • Plan for the needs of multiple users of Council-managed open spaces to promote a shared, welcoming community • Make open spaces more welcoming to older people to increase their social connections and physical activity

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<p>Strategy</p> <ul style="list-style-type: none"> Facilitate opportunities for young people to engage with employment, training and education, including targeted support for vulnerable young people Encourage developers to incorporate health and other services in new developments to meet the needs of the growing population Promote investment in mixed use/multi-purpose development to increase local employment opportunity
<p>Open Space</p> <p>City of Whitehorse Open Space Strategy (2007)</p> <p>The Whitehorse Open Space Strategy sets out a cohesive direction for the future provision, planning, design and management of publicly owned land that is set aside for leisure, recreation and nature conservation purposes. This direction aims to build upon the excellent existing system of open space already established in Whitehorse to cater to the growing and changing needs of the community and the protection of the natural environment. This includes land that is owned by a range of public authorities including Council, Parks Victoria, Melbourne Water and VicRoads.</p> <p>The Strategy describes various features of the existing open spaces in Box Hill. These include:</p> <ul style="list-style-type: none"> There are five large Municipal reserves located within Box Hill. Four of the five are sporting or restricted sporting reserves and, Box Hill Gardens which is predominantly an informal unstructured Municipal open space with tennis courts. There are other smaller reserves distributed through Box Hill. There are a range of Educational Institutions in the vicinity of Whitehorse Road including Box Hill TAFE, Our Lady of Sion Girls College and Box Hill High School. The TAFE College has highly developed and built grounds without open space and Box Hill High School has a small oval which is located adjacent to Whitehorse Reserve. Adjacent to Whitehorse Reserve is the Box Hill Cemetery and, the old gates and entry to the cemetery are located on the western side of Whitehorse Reserve. The Box Hill Cemetery is used as walking link for residents on the southern side of the railway north to Whitehorse Road. The Catholic Schools has sports grounds, however, public access is not permitted. The Box Hill Mall, located in the central activity area of Box Hill near the station, is well used with 72% of respondents stating they use urban squares. This is an ancillary open space and, its future design and management is included in the Urban Design Framework and Structure Plan for Box Hill and, is not included in this Strategy. <p>The Strategy indicates that Box Hill is generally well provided for with the exception of the gap area in the vicinity of the Activity Centre and to the north of Whitehorse Road, immediately east of Station Street. These will need to be addressed for both the existing and future population, particularly given Box Hill will receive the largest increase in residential population of all the suburbs in Whitehorse.</p> <p>Overall recommendations relevant to Box Hill are summarised below.</p> <ul style="list-style-type: none"> Council to investigate and construct a shared trail connection between the Gardiners Creek trail and Koonung Creek via Bushy Creek trail. This will allow a circuit shared trail network along the Yarra River, Koonung Creek and Gardiners Creek. The shared trail will need to partially be an on-road link and may require liaison with VicRoads depending on the final alignment selected. Council to improve the on-road links between Victoria Glenmore Chain and Surrey Park over Station Street to improve accessibility and use of Surrey Park by Box Hill residents east of Station Street. This area is located within a Higher Density Precinct and is therefore anticipated to receive higher levels of use. Council to identify opportunities to achieve additional open space as an extension to the Victoria Glenmore Chain in future development applications in the area to improve the east-west link between Thurston Street road reserve and Victoria/Glenmore Chain. Upgrade facilities in Box Hill Gardens to cater to the proposed expansion to the residential population in the Activity Centre, particularly on the northern side of Whitehorse Road. Investigate provision of new Small Local open space that connects to the Victoria/Glenmore Chain to the east of Station Street which will improve the open space connection to Thurston Street and Surrey Park, and provide local facilities within safe walking distance for linear open space link context. Investigate provision of new Small Local open space in the area bounded by the railway to the north, Elgar Road to the west, Thurston Street to the east and Kintore Crescent to the south. This would be partially funded by Council and partially by open space contributions as the provision of this space will meet existing and future population open space needs. Continue to upgrade facilities in Kingsley Gardens to accommodate the increased use of the reserve by Box Hill TAFE students as the TAFE college expands Upgrade Surrey Dive to accommodate new residents from this site in accordance with Precinct. In the longer-term, investigate options for future open space provision in the vicinity of the historic buildings and connect to Surrey Dive open space reserve, pending resolution of environmental issues. Upgrade the pedestrian connection between Victoria/Glenmore Chain and Surrey Park by improving streetscapes of Ashted Road and Howard Street including a pedestrian crossing over Station Street. This will improve the east-west connection between open space reserves.

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<p>Strategy</p> <ul style="list-style-type: none"> As part of the future Masterplan for RHL Sparks Reserve, investigate the alignment of a Shared Trail or a walking path to the western side of RHL Sparks Reserve, connecting to the existing footbridge over Canterbury Road and the pedestrian lights at the corner of Canterbury Road and Middleborough Road. This will improve the connection for residents of Box Hill to Gardiners Creek. Upgrade pedestrian access connections over the railway line at Linsley Park with pram crossings and other traffic treatments to improve access between William Street, Linsley Street and north to Graham Place. Improve pedestrian crossing at the corner of Windsor Crescent and Elgar Road to improve access into Surrey Park for residents of Mont Albert and Surrey Hills. This will then provide access to Surrey Park, Surrey Drive, Surrey Crescent Reserve, Thurston Street Road Reserve and connection to Box Hill centre. An east-west link is required in the area bordered to the west by Station Street, south by Whitehorse Road and the north by Thames Street and east by Clota Avenue. Investigate future provision of open space in the gap area identified on the plans (bordered to the west by Station Street, the south by Whitehorse Road, the north by Thames Street and the east by Clota Avenue). In the interim, Council to liaise with the Catholic Primary School and Girls College regarding public access to school grounds after hours to assist with addressing the gap in open space provision in the interim. <p>Box Hill Gardens Master Plan: Once and Future Gardens February 2011</p> <p>In 2007 the Whitehorse City Council completed its Open Space Strategy, which outlines the direction for the future provision, planning, design and management of Council's public open space. The Strategy recommended the development of a master plan for Box Hill Gardens as a high priority project. In line with this strategy, in 2008 Council commenced the development of the new master plan for the gardens.</p> <p>Box Hill Gardens – Priorities</p> <p>The following is a priority list of recommendations contained within the master plan:</p> <p>STAGE 1: YEARS 1 – 4</p> <ul style="list-style-type: none"> Storm water Harvesting - Stage 1 - Install storm water diversion, treatment system, underground storage, sub surface irrigation. Multi-use Activity Area - Stage 1 - Demolish existing courts and building, grade area, install new surface, line-marking, retaining walls. Great Trees - Stage 1 - Remove low value trees. Undertake essential pruning/remedial tree works. Begin new plantings. Energy Harvesting - Stage 1 - Remove existing lighting. Install new conduit, poles and lighting for main thoroughfare paths. Circulation - Stage 1 - Install circuit pathway and lighting to circuit pathway. Fun and Folly - Install new signage. <p>STAGE 2: YEARS 5 – 8</p> <ul style="list-style-type: none"> Meeting Space - Stage 1 - Move existing BBQs to new area, grade new area and create hard surface. Install initial furniture, bins to area. Respite from City - Install decking areas to Nelson Road and Irving Ave edges of the gardens including seating. Multi-use activity area - Stage 2 - Install shade structure, new toilet, seating. Energy Harvesting - Stage 2 - Install photo voltaic array. Great Trees - Remove Shipley St gravel car park. Install permeable pavement and gravel mulch around Oak avenue. Fun and Folly - Install decorative garden beds and edging. <p>STAGE 3: YEARS 9 – 12</p> <ul style="list-style-type: none"> Storm water Harvesting - Stage 2 - Install decking to pond edge. Install seating. Circulation - Stage 2 - Upgrade garden entries, undertake landscaping, install seating. Meeting Space - Stage 2 - Install new hard paved area, BBQs, furniture. Play Ribbon - Reconfigure existing playgrounds and construct "Play Ribbon". Open Lawn - Remove existing lawn and resurface with drought resistant grasses. Great Trees - Stage 2 - Install seating, undertake further planting. <p>STAGE 4: YEARS 13 – 16</p> <p>Complete all master plan works as yet undertaken, including -</p> <ul style="list-style-type: none"> Artworks. Circuit path strands. Shade structure for play ribbon. Shade Structure for meeting space. Planting works. Upgrade Irving Avenue edge. <p>Recreation</p> <p>City of Whitehorse Recreation Strategy: 2015–2024</p>
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Strategy
<p>The Recreation Strategy has been prepared to provide Council with a decision-making framework for recreation and sport for the next 10 years. It has been prepared in consultation with the community and builds on the achievements of the previous Recreation Strategy. Key actions areas listed under four key themes are highlighted below:</p> <p>THEME 1 – Active Communities Actions</p> <ul style="list-style-type: none"> • Increasing levels of physical activity • Older adults and recreation centres • Older adults – promotion of opportunities • Physical activity programs • Sport participation pathways • Minimising barriers to walking and cycling to schools • Young adult participation in physical activity • Alternative sport participation options through clubs • Peak Sporting Association New Initiatives • Active Participation promotion • Get Active In Whitehorse Parks <p>THEME 2 – Effective Information and Communication Actions</p> <ul style="list-style-type: none"> • Information systems • Administrative systems and procedures • Social media and technology <p>THEME 3 – Flexible Facilities Actions</p> <ul style="list-style-type: none"> • Park master plans • Integrated planning of pathways • Skate facilities – Box Hill South • Skate facilities – Vermont South • Partnerships with schools • Access to sports pavilions • Potential upgrade of sports fields • Access to sports fields • ‘Service driven’ asset planning • Pavilion development guidelines • Usage guidelines for sports fields • Elgar Park Master Plan • Melbourne East Regional Sport and Recreation Strategy • Netball Courts • Indoor courts • Gymnastics • Indoor Sports Study • Accessible Facilities • Advocacy for New Facilities • Bicycle Strategy <p>THEME 4 – Deliverable Partnerships Actions</p> <ul style="list-style-type: none"> • Sporting Facilities Guidelines • Club amalgamations • Club development programs • Managing clubs’ growth • Volunteers <p>Melbourne East Regional Sport and Recreation Strategy</p> <p>The Melbourne East Regional Sport and Recreation Strategy identifies the current gaps in regional facility provision and provides clear strategic directions and a planning framework to assist stakeholders and funding providers to prioritise and develop regional projects.</p> <p>Strengthen relationships with the Department of Education and Training to enable opportunities for community access to existing and future sport and recreation facilities on Department of Education and Training land.</p> <p>Establish partnerships with key organisations including Parks Victoria, Melbourne Water, Vic Roads, Bicycle Network Victoria, the Victorian Trails Committee, Bushwalking Victoria and Cycling Victoria to identify high priority recommendations for the development of the regional shared trail network.</p>

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Strategy
<p>High priority projects required to meet the future sport and recreation needs of Melbourne's East have been grouped into four broad categories to help guide future planning, development and decision making:</p> <ol style="list-style-type: none"> 1. shared recreation trails 2. indoor sports courts 3. specialised indoor facilities 4. and a destination for mountain biking <p>Although other key regional sport and recreation facilities, such as aquatic centres and athletics tracks, are not considered high priorities, the renewal and upgrade of these facilities to meet local demand is recognised and will be required in the future.</p> <p>Exploring opportunities to expand and increase the capacity of existing facilities to meet future regional demand for sport and recreation activities should be considered and balanced with the need and opportunity for new facility development.</p> <p>The Strategy identifies the Box Hill to Ringwood Path as a key priority.</p>
Early years and youth services
<p>Whitehorse Municipal Early Years Plan 2014-2018</p> <p>The Whitehorse Municipal Early Years Plan, Whitehorse: A City for all Children, provides a clear direction for Council and its partners to continue working together to improve outcomes for children from birth to the age of 12 and their families.</p> <p>A city for all children incorporates:</p> <ul style="list-style-type: none"> • Healthy, active and thriving children • Secure, supported and engaged families • Quality services for all children & families • Safe, welcoming and inclusive community for all children & families <p>These four key elements have been adopted as the pillars, or key directions, of Council's Municipal Early Years Plan 2014-2018 and are supported by 23 targeted objectives and 70 strategic actions. These strategies are intrinsically linked to higher level strategies contained within the Whitehorse Council Plan 2014-18) and the Municipal Public Health & Wellbeing Plan – Health & Wellbeing in Whitehorse 2013-17.</p> <p>Relevant actions include:</p> <ul style="list-style-type: none"> • 3.6 Facilitate early years service network and partnership groups to share information, promote increased partnering and enhance service collaboration. • 3.7 Continue to explore opportunities to collocate other appropriate allied early childhood service professionals within Council's family centres. • 3.8 Promote the co-location of kindergartens with primary schools where feasible. • 3.9 Proactively strengthen the relationship and collaboration between early years service providers and primary schools. • 3.21 Work with kindergarten committees to develop strategies for increasing the availability of kindergarten places for both 3 and 4 year old children. • 3.22 In partnership with key service providers and schools, identify and advocate for increased mental health and other support services for children aged 9-12 years.
<p>Whitehorse Municipal Youth Plan 2014-2018</p> <p>The Whitehorse Municipal Youth Plan -Whitehorse: A City for all Young People, provides a clear direction for Council and its partners to continue working together to improve outcomes for young people aged 12-25 years who live, work and study in the City of Whitehorse. It aims to identify the most effective ways to improve health and wellbeing outcomes for young people and to develop an integrated approach to planning and service delivery throughout the municipality.</p> <p>The name of the plan, Whitehorse: A City for all Young People, was born out of one of the key themes identified through the development of the plan – the importance of a community in which all young people are safe, welcome, included, respected and accepted regardless of their ethnic origin, religion, language, gender, sexuality, ability or socio economic status. A city for all young people incorporates:</p> <ul style="list-style-type: none"> • Healthy, resilient and engaged young people • Secure families and relationships • Employment, training and education opportunities • Comprehensive services for all young people

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<p>Strategy</p> <ul style="list-style-type: none"> • Safe, welcoming and inclusive community for all young people <p>These five key elements have been adopted as the pillars, or key directions, of Council's Municipal Youth Plan 2014-2018 and are supported by 45 objectives and 98 actions. The plan identifies a strong vision for young people and a set of core principles that underpin the vision.</p> <p>Relevant actions include:</p> <ul style="list-style-type: none"> • Continue to develop, upgrade and connect Council public facilities that encourage and enable active lifestyles, including parks, gardens, open spaces and network of walking and off-road cycling tracks. • Encourage young people to be active, engaged, having fun and socialise through participation in sporting and recreation clubs, arts, culture and community groups, service clubs, youth groups and any other organised activity-focused group. • Work with youth service providers, schools, Box Hill Institute of TAFE and Deakin University to facilitate activities that promote social inclusion for young people of all backgrounds. • Investigate opportunities to extend library opening hours, specifically on weekends, in order to offer young people a safe and accessible place to study. • Work in partnership with Box Hill Institute of TAFE, Deakin University and secondary schools throughout Whitehorse to ensure that international students have adequate support in transitioning into life in Australia.
<p>Libraries / Neighbourhood Houses / Community Meeting Spaces</p> <p>Whitehorse City Council Arts & Cultural Strategy</p> <p>The purpose of developing an Arts & Cultural Strategy is to achieve:</p> <ul style="list-style-type: none"> - a research driven strategic Arts & Cultural Plan for Council that delivers organisational goals and incorporates the needs and aspirations of the broader community - outcomes that would influence planning and policy across a wide range of Council Departments rather than it being a stand-alone Arts & Cultural Strategy <p>Two major themes emerged as priorities for Arts & Culture in Whitehorse. These themes are identified as Arts and Cultural Pillars. These pillars form the foundation stones for arts and culture and outline both the services and community cultural development framework in Whitehorse. These pillars are:</p> <ol style="list-style-type: none"> 1. Arts & Cultural Facilities and Programs 2. Community Cultural Development. <p>Facility and Program Provision Gaps</p> <p>It is recommended that Council, as part of its future service planning give priority to:</p> <ol style="list-style-type: none"> 1. facility provision gaps at the Whitehorse Centre in the areas of performance space, rehearsal space, studio and workshop space, exhibition space, music performance opportunities and venues, access for all abilities to facilities 2. consider opportunities for improved access to diverse music options within the City of Whitehorse 3. program provision for people with children, people with disabilities, young people and older people 4. undertaking a service driven asset management review of Council's community halls and other facilities to ensure that over time, facilities are improved to meet the service needs of community and capacity of facilities for arts and cultural activities 5. working with the Library Corporation and Neighbourhood Houses to develop a process for increased collaboration in arts and cultural planning and programming <p>Box Hill Community Arts Centre and its programs</p> <p>It is recommended that Council:</p> <ol style="list-style-type: none"> 1. undertake a business case review for Box Hill Community Arts Centre to provide a comprehensive plan for the Centre and its programs with particular reference to analysis of: <ul style="list-style-type: none"> - further community engagement opportunities at the Centre and through outreach programs - current service levels and unmet demand for further services - current operation resources and those required for future services - the art centre's future facility needs and gaps 2. identify and pursue opportunities to form further collaborative relationships with local educational institutions. <p>Box Hill Town Hall</p> <ol style="list-style-type: none"> 1. in line with the Box Hill Central Activities Area Car Parking Strategy review options and communication methods to inform users of the facility of car parking options in the local area. As part of this work a review of way finding signage, vehicle and pedestrian movement will be completed 2. expansion of the marketing plan to promote the Box Hill Town Hall and minor halls for increased utilization

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<p>3. a review for further engaging community groups from the Hub as well as external organisations to use the Box Hill Town Hall for arts and cultural programming opportunities</p> <p>Festivals and Events</p> <p>It is recommended that Council:</p> <ol style="list-style-type: none"> 1. undertake a review of Council's festivals and events program to determine if the current offering of events meet community need and identify gaps in service <ul style="list-style-type: none"> - review marketing strategies associated with Council run events - review the costs and resources required to deliver Council's Festival Season 2. undertake a review of community run events program with particular reference to: <ul style="list-style-type: none"> - assessment of costs and resourcing needs of Council to support community managed events and the ability of community organisations to manage the safety and risks issues accompanying these events - how to best support local community driven festivals and events 3. assess the current festival and event sites and potential future site options to meet the needs of the festival and events in Whitehorse 4. continue to improve access to all festivals, and work with other Council departments to ensure access opportunities are understood and maximised <p>Whitehorse Artspace and its programs</p> <p>It is recommended that Council:</p> <ol style="list-style-type: none"> 1. undertake planning to improve the Artspace 'street presence' so the Artspace has better community access and improved opportunities to attract passing traffic 2. further marketing initiatives implemented to build local awareness of and increase access to art exhibitions and the Whitehorse Artspace 3. review the Artist in School Program with a particular focus on Council's role in facilitating the program to ensure this experience is maximised for the younger generation 4. continue to actively develop the municipal art collection and explore ways of improving access to and interpretation of the collection 5. develop public art collections at key points in the City <p>Whitehorse Centre and its programs</p> <ol style="list-style-type: none"> 1. to implement the findings and actions from the 2013/2014 Whitehorse Centre Redevelopment Project 2. investigate program gaps and opportunities to broaden the access for the community to experience performing arts. Develop the program into new markets, artists in residence and outreach programs to engage in different ways with the community <p>Community Spirit and Pride of Place</p> <p>It is recommended that Council:</p> <ol style="list-style-type: none"> 1. continue to work with indigenous and other cultural groups to develop arts & cultural programs that celebrate diversity, tolerance and understanding 2. incorporate actions into town planning and urban design strategies that encourage and enable ongoing and active inclusion of artworks and fine architecture into the local built and natural environment, ensuring heritage overlays are protected within the City of Whitehorse <p>Arts Industry Support</p> <p>It is recommended that Council:</p> <ol style="list-style-type: none"> 1. encourage practice within the local economy <ul style="list-style-type: none"> - explore cultural tourism opportunities - encourage professional arts practice within the local economy 2. develop an artists register to enhance the connection of artists within the community 3. further develop a collaborative relationship with local education institutions for the ongoing evolution of the strong arts and cultural heritage of Whitehorse
Aged care
<p>Whitehorse Positive Ageing Strategy 2012-2017</p> <p>The Whitehorse Positive Ageing Strategy 2012-2017 sets out Council's vision for an age-friendly community where the physical, social, and mental well-being of older people is promoted and strengthened. A wide range of services, facilities, and activities for older residents are currently provided by Council. These include Home & Community Care services, facilities, leisure centres, community services and open spaces. Council also provides financial support to community groups to assist with the delivery of programs and activities.</p>

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Strategy
<p>Strategic Objectives</p> <ol style="list-style-type: none">1. Promote the Physical and Mental Health of Older People2. Enhance Physical Infrastructure that Supports Positive Ageing3. Provide Information, Health and Support Services4. Encourage Greater Community Involvement and Connection5. Advocate for Improved Access to Services6. Respond to Changing Needs, Circumstances and Policy Directions <p>Relevant actions include:</p> <ul style="list-style-type: none">• Improve access to buildings, pathways, parks and public spaces.• Investigate opportunities for the co-location of housing, amenities, community services and facilities.• Upgrade community facilities in line with Council's capital works program to be more age friendly.• Explore with key partners the opportunities for an age friendly walking area• Advocate for improved urban planning to create more accessible, walkable, liveable neighbourhoods.

3.5 Implications of the Whitehorse Planning Scheme and Other Council Strategic Documents

Aside from public open space obligations contained within the Schedule to Clause 52.01 of the Whitehorse Planning Scheme no specific community infrastructure priorities associated with either the subject site or broader Box Hill Metropolitan Activity Centre have been identified by the review of strategic material. Significantly, Council does not have a formally adopted community infrastructure strategy for the Box Hill Metropolitan Activity Centre nor does the Whitehorse Planning Scheme contain a Development Contributions Plan Overlay for the Activity Centre.

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4. Community infrastructure Audit Analysis

4.1 Audit Finding Implications

Appendix 2 of this report provides an audit of the following existing community infrastructure categories generally located within 1.5 kilometres¹ of the subject site:

1. Open space (active and passive);
2. Early years services;
3. Community meeting spaces, libraries and learning centres;
4. Indoor recreation facilities;
5. Education facilities;
6. Health services;
7. Police & Emergency services; and
8. Residential and facility based aged care.

In undertaking the community infrastructure assessment, the report has relied on the **Melbourne Metropolitan Community Infrastructure Assessment: Local and Subregional Rates of Provision** (MMCIA) for comparing *capacity* (provision),² and utilised GIS analysis of various spatial layers supplied by various government agencies to assess accessibility.

4.2 Overview of Current Community infrastructure Provision Levels in Whitehorse

In undertaking the community infrastructure assessment, the report has relied on the **Melbourne Metropolitan Community Infrastructure Assessment: Local and Subregional Rates of Provision** (MMCIA) for comparing *capacity* (provision),³ and utilised GIS analysis of various spatial layers supplied by various government agencies to assess accessibility.

¹ Plan Melbourne, the city's metropolitan planning strategy, proposes a city made up of 20 minute neighbourhoods where every home will be within 20 minutes travel time of jobs, shops, cafes, schools, parks and community facilities. Rather than basing this on car based travel times, Plan Melbourne proposes it will be 20 minutes travel by active modes i.e. by public transport, walking and cycling. For the purposes of this assessment the 1.5 kilometre radius was chosen as it approximately equates to a 20 minute walk.

² It should be noted that one of the key limitations of relying largely on the MMCIA report as the basis of this assessment is that the capacity of existing infrastructure in Council locations to absorb current and future demand is not taken into account. This task was beyond the resources and timeframes of the project.

³ It should be noted that one of the key limitations of relying largely on the MMCIA report as the basis of this assessment is that the capacity of existing infrastructure in Council locations to absorb current and future demand is not taken into account. This task was beyond the resources and timeframes of the project.

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The MMCIA report was prepared in April 2015 by the now Victorian Planning Authority (then the Metropolitan Planning Authority) with assistance from Arup Pty Ltd in relation to data collection, modelling and analysis.

The report provides a detailed overview of the relative provision of Melbourne's community infrastructure and is intended to support a coordinated subregional approach to community infrastructure provision, at both a local and regional scale. It forms an important evidence base and planning tool to assist councils, the Victorian Planning Authority (VPA), State Government and the private sector to understand and plan for future community need in growing areas of Melbourne.

The report issues a strong note of caution in the use and interpretation of the data presented in the report. It points out that "local communities will use community infrastructure in different ways depending on their particular needs, aspirations, and resources." It states that "for this reason, this data should not be applied as 'benchmarks'... benchmarks imply that there is an agreed level of infrastructure provision that all areas should be aiming to provide" (page 2).

With this cautionary note in mind the following summary examines the relative levels of community infrastructure provision between Interface Councils and Greater Melbourne as a whole. It summarises most, but not all of the services and facilities presented in the MMCIA report. The community infrastructure forms selected from the report are:

- Kindergarten
- Long Day & Occasional Child Care
- Recreational Facilities
- Community Centres
- Libraries
- Arts & Cultural Facilities
- Primary Schools
- Secondary Schools
- Tertiary Education Facilities
- Health provision
- Aged Care Provision

Also of note is that these services and facilities are provided and / or managed by a diverse range of Government and Non-Government agencies and the private sector. These can be summarised as follows:

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Community Infrastructure Type	Main Providers
Kindergarten*	Mainly Local Government with some provision by non-government organisations and private providers (largely funded Kindergarten within Long Day Child Care centres)
Long Day & Occasional Child Care	Mainly private providers with some provision by Local Government, non-government agencies and education providers.
Recreational Facilities*	Mainly Local Government with some provision by the private sector (particularly indoor recreation facilities) and education providers.
Passive open space*	Mainly Local Government and State Government (largely in the form of larger regional parks).
Community Centres*	Mainly Local Government
Libraries*	Mainly Local Government
Arts & Cultural Facilities*	Mainly Local Government, non-government agencies and private providers
Primary Schools	State Government, Catholic Education Melbourne and other independent (private) providers.
Secondary Schools	State Government, Catholic Education Melbourne and other independent (private) providers.
Tertiary Education Facilities	Mainly Federal / State Government supported provision and private providers.
Health Services	Mixture of private and public (State and Federal funding sources) providers
Aged Care Provision	Mainly private providers with some provision by non-government agencies and other service providers (e.g. hospitals)

Those services and facilities listed above with an asterisk (*) indicate the community infrastructure where Local Government has the greatest level of responsibility in terms of provision and likely to have the highest financial impact on the funding program.

Table 3 on the following page compares the existing community infrastructure provision levels of Whitehorse, the Eastern Metropolitan Region and Greater Melbourne.

The City of Whitehorse has a similar or higher level of provision compared to Greater Melbourne in the following categories:

- Kindergarten facilities;
- Primary schools;
- Secondary schools
- Non-government secondary schools;
- Access times to both a University or TAFE campus;
- Licensed GPs and GP clinics;
- Specialist medical sites;
- Allied health sites; and
- Dentist sites.

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However, the data also reveals the City of Whitehorse has a lower level of provision in the following categories:

- Outdoor sports fields and other recreational areas and indoor sports fields;
- Aquatic facilities;
- Long day child care places;
- Libraries;
- Community centres;
- Non-government secondary schools;
- Community health service sites;
- Residential aged care places.

Table 3 – Comparison of Existing Community infrastructure Provision Levels in the City of Whitehorse

Community infrastructure Category	Whitehorse	Eastern Region	Greater Melbourne
Passive and active open space and recreation facilities			
<i>Number of recreational areas per 1,000 population</i>	0.6	0.8	0.8
Active open space			
<i>Number of sports fields per 1,000 population</i>	0.30	0.35	0.31
Indoor recreation			
<i>Number of indoor sports venues per 1,000 population</i>	0.06	0.1	0.09
Aquatic facilities			
<i>Number of swimming pools per 100,000 population (melways)</i>	2.5	3.2	3.14
<i>Number of swimming pools per 100,000 population (SRV)</i>	1.9	2.7	2.84
Early Years Services			
Kindergartens			
<i>Funded enrolments per licensed place in non-long day care facilities</i>	0.98	1.08	1.21
<i>Number of Kindergartens per 1,000 eligible population</i>	20.6	22.7	18.56
Long Day Child Care			
<i>Number of licensed long day care places per 1,000 eligible population</i>	253.1	269.5	281.36
Occasional Child Care			
<i>Number of licensed occasional care places per 1,000 eligible population</i>	32.2	38.0	29.54
Libraries & Community Centres			
<i>Number of libraries per 100,000 population</i>	3.1	3.2	3.60
<i>Number of community centres per 100,000 population</i>	10.5	10.9	11.34
Education			
Primary Schools			
<i>Number of primary schools (government and non-government) per 1,000 eligible population</i>	2.9	3.2	2.78
<i>Number of government primary schools per 1,000 eligible population</i>	1.7	2.0	1.66

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Community infrastructure Category	Whitehorse	Eastern Region	Greater Melbourne
<i>Number of non-government primary schools per 1,000 eligible population</i>	1.1	1.1	1.14
Secondary Schools			
<i>Number of secondary schools (government and non-government) per 1,000 eligible population</i>	1.2	1.1	1.22
<i>Number of government secondary schools per 1,000 eligible population</i>	0.6	0.5	0.54
<i>Number of non-government secondary schools per 1,000 eligible population</i>	0.5	0.6	0.66
Higher Education			
<i>Proportion of population residing within 20 minutes private vehicle travel of a university</i>	100%	89	84.4
<i>Proportion of population residing within 20 minutes private vehicle travel of a TAFE</i>	100%	93	92
Primary & Acute Health			
GPs			
<i>Number of licensed general practitioners per 1,000 population</i>	1.4	1.25	1.2
<i>Number of GP clinics per 1,000 population</i>	0.60	0.54	0.53
Specialist medical and allied health			
<i>Number of Specialist medical sites per 1,000 population</i>	0.50	0.34	0.45
<i>Number of allied health sites per 1,000 population</i>	0.70	0.57	0.53
Dental			
<i>Number of dentists sites per 1,000 population</i>	0.30	0.26	0.25
Community health			
<i>Number of community health service sites per 100,000 population</i>	1.20	1.4	2.36
Aged Care			
<i>Number of aged care places per 1,000 planning population</i>	74	86	85

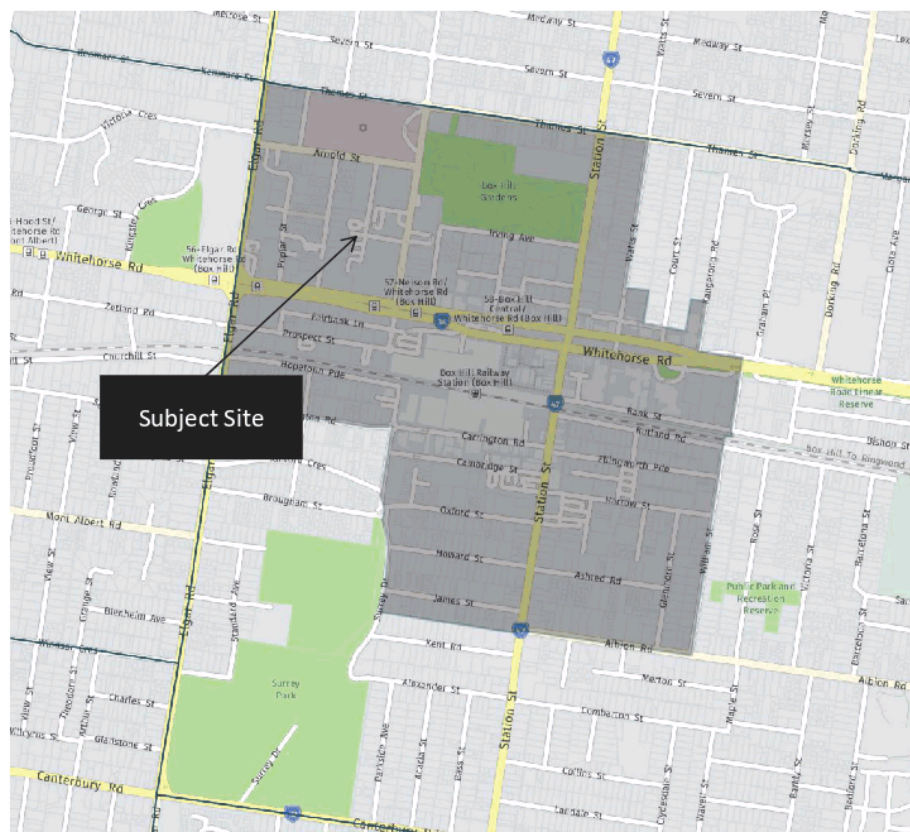
4.3 Box Hill Activity Centre Forecast Population & Dwelling Change

The subject site is located in the northern section of the Box Hill Activity Centre (refer to Figure 4 on the following page) which is bounded by Thames Street in the north, Watts Street, Kangerong Road, Linsley Street and William Street in the east, Albion Road, James Street and Carrington Road in the south and Elgar Road in the west.

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Figure 4 – Subject Site within the Context of the Box Hill Activity Centre



As shown in Table 4 below the population of the Box Hill Activity Centre is currently estimated to be approximately 6,700 and is anticipated to increase by approximately 115% over the next 18 years. By 2036 the population of the Box Hill Activity Centre is forecast to reach approximately 14,400 people (an increase of approximately 7,700 people). The number of dwellings in the Box Hill Activity Centre is forecast to grow from approximately 3,300 in 2018 to 7,000 in 2036, with the average household size remaining steady at approximately 2.3 persons per household.

Table 4 - Forecast Population, Households and Dwellings: Box Hill Activity Centre

Summary	2018	2021	2026	2031	2036	Total Change	% Change
Average household size	2.3	2.32	2.33	2.30	2.28	-0.02	-1%
Dwellings	3,277	4,344	5,601	6,414	6,964	3,687	113%
Households	2,834	3,823	5,013	5,740	6,231	3,397	120%
Total Population	6,692	9,070	11,875	13,397	14,379	7,687	115%

Source: City of Whitehorse Population and household forecasts, 2016 to 2036, prepared by .id the population experts, October 2017

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**5. Assessment of Development Generated Community
infrastructure Demand**

5.1 Community infrastructure Standards and Demand and Supply Estimates

Appendix 3 of this report provides indicative estimates for various forms of community infrastructure that lend themselves to some form of quantifiable demand and / or supply measure. The source of these demand / supply measures is also identified in Appendix 3. ***It should be emphasised that the numbers indicated should not be interpreted as final provision recommendations for the subject site's dwelling and population assumptions.*** Community infrastructure assessments also require existing strategic priorities be taken into consideration, as well as the capacity of existing services and facility to meet current and future needs.

5.2 Subject Site Dwelling and Population Assumptions

The dwelling and population assumptions used to prepare this assessment are as follows

- A dwelling yield of 286 apartments (this excludes the 12 short to medium stay term studio apartments as they do not accommodate permanent residents);
- Average household size of 2.3⁴; and
- Population yield of 658.

Population yields anticipated for both the proposed development of the subject site and the broader Box Hill Activity Centre by 2036 are shown in Table 5 on the following page. The age cohorts shown reflect a requirement for (but not necessarily restricted to) the following types of services and / or facilities:

- 0 - 3 Years - Maternal and Child Health Services, Playgroups;
- 4 Years - Preschool Services;
- 0-6 Years - Long Day Child Care, Occasional Child Care, Maternal and Child; Health Services, Family Day Care, Specialist Early Intervention Services;

⁴ Source: City of Whitehorse Population and household forecasts, 2016 to 2036, prepared by .id, October 2017. Average household size estimate of 2.3 is for the Box Hill Activity Centre by the year 2036.

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- 5-11 Years - Primary School, After Hours School Care, School Holiday; Programs, Family Day Care;
- 0-14 Years – Participation by children in organised sport and leisure activities
- 12-17 Years - Secondary School, School Holiday programs;
- 15 years and over - Participation in organised sport and leisure activities
- 55+ Years- Senior Citizens Groups and Centres;
- 70+ Years - HACC Services, Nursing Homes/Aged Hostels / Retirement Villages;
- Centre Based Support Services (e.g. Planned Activity group); and
- All population age cohorts – Libraries, Neighbourhood Houses etc.

Table 5 - Target Population Projections for key Community infrastructure Age Cohorts

Age Cohort	Community infrastructure types the age cohort is relevant to	Spring Street Box Hill	Box Hill Activity Centre by 2036
0-3	MCH, Playgroups	21	465
4	4 Year Old Kindergarten	5	105
0-4	Long Day Child Care & Occasional Child Care	26	570
5-11	Primary School enrolments, out of school hours care	23	502
0-14	Participation in organised children's sport	59	1,283
15+	Participation in organised youth & adult sport	599	13,100
15-24	Participation in higher education (youth & young adult)	149	3,248
25+	Participation in higher education (older adults)	451	9,852
12-17	Secondary School enrolments	30	648
70+	Residential & home based aged care services	75	1,636
0 to 69 years	HACC services (younger clients)	583	12,747
Total Population		658	14,383
Dwellings		286	6,964

Based on the *City of Whitehorse Population and household forecasts, 2016 to 2036*, the subject site will represent approximately 4.1% of all dwellings located within the Box Hill Activity Centre by 2036 (6,964 dwellings).

5.4 Summary of Development Generated Demand Impacts & Recommended Response Measures

Table 6 on the following pages summarises the key findings, issues and demand impacts associated with the proposed development of subject site and outlines recommended response measures for each form of community infrastructure.

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Table 6 – Detailed Assessment of Community Infrastructure Response Measures for Proposed Development of East Village

Service / Community infrastructure type	Key Assessment Findings	Recommended Response Measures
Passive Open Space	<ul style="list-style-type: none"> There are 2 main passive open space reserves within close proximity of the subject site: 1) Box Hill Gardens located a short distance north east of the site, and 2) Kingsley Gardens located west of the site across Elgar Road. The Schedule to Clause 52.01 of the Whitehorse Planning Scheme requires all subdivision to provide a 4% minimum public open space contribution. However, a subdivision of land on a strategic site (as defined by the Whitehorse Open Space Strategy or Council or State Government) may require a contribution rate greater than 4% subject to negotiation of a development plan. Contributions can be either in the form of land or cash contribution. The size of subject site 2,620 square metres. Based on a 4% public open space contribution requirement generates a requirement for approximately 105 square metres of public open space. 	<p>The subject site is too small to provide any meaningful on-site passive open space provision given the minimum public open space contribution rate of 4% as outlined in the Schedule to Clause 52.01 of the Whitehorse Planning Scheme. However, a financial public open space contribution to off-site public open space improvements is supported by this assessment (e.g. as part of the ongoing implementation of the Box Hill Gardens Masterplan). The contribution rate is assumed to be a minimum of 4% of the site's value but will require confirmation by Council.</p>
Active Open Space	<ul style="list-style-type: none"> Standard C13 of Clause 56.05-2 of the Whitehorse Planning Scheme (Public open space provision objectives) states that the provision of public open space should provide a network of well-distributed neighbourhood public open space that includes active open space of a least 8 hectares in area within 1 kilometre of 95 percent of all dwellings. There are 3 sporting reserves located within a 1-kilometre radius of the subject site. These are Hagenaue Reserve, Mont Albert Reserve and Surrey Park. Other sporting reserves just outside the 1 kilometre radius are Springfield Park, Box Hill City Oval, Whitehorse Reserve and RHL Sparks Reserve. The proposed development will generate additional demand for a variety of structured sports and physical activities. The main activities and demand estimates are as follows: Fitness/Gym - 166 Swimming - 77 Golf - 29 Basketball – 28 Australian football - 26 Tennis - 25 Football/soccer - 25 Netball – 24 Plates - 24 	<p>The subject site is too small to provide any meaningful on-site active open space provision given the minimum public open space contribution rate of 4% as outlined in the Schedule to Clause 52.01 of the Whitehorse Planning Scheme. Given the existing supply and close proximity to a number of sporting reserves this assessment does not recommend a contribution toward active open space measures.</p> <p>However, it is worth noting that the development of the subject site proposes to include gym and pool facilities for the exclusive use of residents living within the development.</p>

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Service / Community infrastructure type	Key Assessment Findings	Recommended Response Measures
	Yoga - 20	
Early Years Services <i>Long Day Child Care</i>	<p>Overall</p> <ul style="list-style-type: none"> There are 5 Long Day Child Care facilities within 1.5 kilometres of the subject site: 1) Box Hill Early Learning Centre (55 places); 2) Paisley Park Early Learning Centre (42 places); 3) Goodstart early Learning Box Hill – Whitehorse Road (82 places); 4) Watts Street Children's Centre (80 places), and 5) Mary's Little Lambs Early Learning Centre (50 places). The proposed development would generate the equivalent of 7 long day child care places. 	Given the relatively large supply levels and low demand estimates this assessment does not support the need for an additional long day child care service within the development.
<i>4 & 3 year old sessional Kindergartens</i>	<ul style="list-style-type: none"> There are 3 sessional Kindergarten facilities located within the 1.5 kilometre catchment: 1) Parkside Pre-school to the north; 2) St Augustine's Kindergarten to the west and 3) St Peter's Kindergarten to the east. The proposed development would generate the equivalent of 3 sessional Kindergarten enrolments. 	Given the adequate supply levels and low demand estimates this assessment does not support the need for additional sessional Kindergarten facilities within the development.
<i>Maternal & Child Health</i>	<ul style="list-style-type: none"> The Burgess Family Centre located north of the subject site is the only MCH service within the 1.5 kilometre catchment. The proposed development would generate the equivalent of 0.04 sessions of MCH per week. 	Given the very low demand estimate this assessment does not support the need for additional MCH facilities within the development.
<i>Occasional Child Care</i>	<ul style="list-style-type: none"> There are 4 occasional child care services within the 1.5 kilometre catchment: 1) Aqualink Box Hill Creche; 2) Biala Box Hill; 3) Clota Cottage and 4) Heathways. The proposed development would generate the equivalent of 0.8 occasional child care places. 	The low demand estimates do not support the need for additional occasional child care facilities within the development.
<i>Playgroups</i>	<ul style="list-style-type: none"> There are 3 playgroup venues within the 1.5 kilometre catchment. The proposed development would generate the equivalent of 0.4 playgroup sessions per week. 	The demand estimates do not support the need for on-site facilities to accommodate playgroup programs within the development.
Community Meeting Spaces	<ul style="list-style-type: none"> There are six main Council owned community facilities offering meeting spaces for hire within the 1.5 kilometre catchment. These are: <ul style="list-style-type: none"> - Clota Cottage Neighbourhood House - Kerrimuir Neighbourhood House - Strabane Chapel Hall - Box Hill Community Arts Centre; - Box Hill Town Hall and Community Hub and - Louise Multicultural Community Centre. 	Given the existing supply of community facilities, the modest scale of the proposed development, and its intention to include function and meeting rooms within the development to service the needs of its own residents, no contribution toward the construction of new or redeveloped community meeting spaces is recommended.

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Service / Community Infrastructure type	Key Assessment Findings	Recommended Response Measures
Neighbourhood Houses & Arts Cultural Facilities	<ul style="list-style-type: none"> There are 2 Neighbourhood Houses located within 1.5 kilometres of the subject site (Clota Cottage Neighbourhood House located to the east of the subject site, and Kerimuir Neighbourhood House located to the north east of the subject site). There are a number of other important community and arts / cultural facilities in the catchment including: <ul style="list-style-type: none"> - Louise Multicultural Community Centre; - Box Hill Community Arts Centre; and - Box Hill Town Hall and Community Hub. All these facilities offer public meeting spaces along with Strabane Chapel Hall located north west of the subject site. 	Existing Neighbourhood House provision appears to be adequate, a new stand-alone service appears not be justified.
Libraries	<ul style="list-style-type: none"> There is 1 library facility (Box Hill Library) located within the 1.5-kilometre population catchment. The Box Hill Library is located a short distance east of the subject site and forms one of four libraries in the City of Whitehorse managed by Whitehorse Manningham Regional Library Corporation. Box Hill Library has recently undergone some internal refurbishment works to improve services for library users. The proposed development would generate approximately 6,600 additional library loans per annum and 3,000 additional library visits per annum. It is also worth noting that the Box Hill Institute has a Library which provides services to: 1) students (including off-campus students); 2) staff and 3) the public (by arrangement). 	The existing Box Hill Library will adequately cater for the projected demand increases generated by the subject site for public library services.
Council Indoor Aquatic Leisure Centres	<ul style="list-style-type: none"> The subject site is located within close proximity of Aqualink Box Hill, one of Whitehorse Council's two main aquatic leisure centres. The facility, located south of the subject site in Surrey Park, includes the following facilities and services: <ul style="list-style-type: none"> - 25m 6-lane heated indoor pool - 25-metre 10-lane heated outdoor pool - Toddlers' pool with beach entry - Learn-to-swim pool - Surrey Park Swim Club learn-to-swim program - Water play area - Fab Living (for older adults) - 26m by 9m warm-water therapy pool - Triple-spring-board diving pool and training program - 700m² state-of-the-art gymnasium with high tech equipment - Four multi-use group fitness spaces with high tech audio visual system 	The existing Aqualink Box Hill facility will adequately cater for the projected demand increases generated by the subject site for public leisure services. However, it is worth noting that the development of the subject site proposes to include gym and pool facilities for the exclusive use of residents living within the development.

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Service / Community infrastructure type	Key Assessment Findings	Recommended Response Measures
	<ul style="list-style-type: none"> - Contemporary café - 30-place short-stay crèche - Three-court multi-use stadium - Outdoor soccer and tennis courts - Merchandise. • The proposed development assumptions are likely to generate 20 additional Council leisure centre memberships, and the equivalent of 0.1 indoor multipurpose courts. 	
Education Facilities	<ul style="list-style-type: none"> • There are six education facilities within a 1.5 km radius of the subject site (3 campuses of Box Hill Institute, 2 Government Secondary Schools, 1 Government Primary School, 1 Catholic Secondary School, 1 Catholic Primary) and a large number of other schools located just outside the catchment area. • Current enrolment numbers at the existing primary and secondary schools in the catchment area are as follows: <ul style="list-style-type: none"> - Mont Albert Primary School (Government P-6) – 718 enrolments - Box Hill Senior Secondary College (Government Senior Secondary 10-12) – 481 enrolments - Koonung Secondary College (Government Secondary 7-12) – 949 enrolments - Our Lady of Sion College (Catholic Secondary 7-12) – 932 enrolments - St Francis Xavier's School (Catholic Primary P-6) – 354 enrolments • The proposed development will generate an additional (approximate only): <ul style="list-style-type: none"> - 16 Government Primary school enrolments; - 4 Catholic Primary School enrolments; - 2 non-Government Primary School enrolments; - 16 Government Secondary school enrolments; - 65 Catholic Secondary School enrolments; and - 7 non-Government Secondary School enrolments. • By 2036 the Box Hill Activity Centre will generate the following enrolment demands (approximate only): <ul style="list-style-type: none"> - 356 Government Primary school enrolments; - 85 Catholic Primary School enrolments; - 40 non-Government Primary School enrolments; - 343 Government Secondary school enrolments; - 123 Catholic Secondary School enrolments; and - 143 non-Government Secondary School enrolments. <p><i>Catholic Education Melbourne (CEM)</i></p>	<p>The demand estimates do not support the need for additional primary and secondary education facilities within the proposed development. It is recommended that Council consult with both the Department of Education and Training and Catholic Education Melbourne to confirm the provision strategy for primary and secondary schools within or close to the Box Hill Metropolitan Activity Centre.</p> <p>The proposed development will provide BHI and the population catchment it serves with a new, high quality nursing education facility that can cater for up to 200 students. This represents a very significant outcome for educational infrastructure in the region and reinforces the role of the Box Hill Metropolitan Activity Centre as a key location for higher education and health service provision in the region.</p> <p>The new nurse training facility will strengthen BHI's existing role in the provision of industry training centres and facilitate industry linkages with the likes of Eastern Health and (which operates the Box Hill Hospital) and the Epworth Eastern Hospital. It allows BHI to act as an education and training hub for students and industry from a wide area of metropolitan Melbourne, including outer suburban areas in the eastern corridor.</p> <p>This assessment recommends Council acknowledge the inclusion of the nurse training facility as a significant community infrastructure contribution to the Metropolitan Activity Centre and the broader region. The proposal is consistent with the directions outlined by Plan Melbourne 2017.</p>

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Service / Community infrastructure type	Key Assessment Findings	Recommended Response Measures
Police & Emergency Services	<ul style="list-style-type: none"> CEM's Melbourne Archdiocese Strategic Provision Plan, 2014 (refer to Appendix 1 for more details) does not identify the need for additional Catholic school facilities within or near the vicinity of the subject site. <p>The 1.5-kilometre catchment contains:</p> <ul style="list-style-type: none"> Box Hill Police Station to the east; MFB Fire Station 20 to the east; Box Hill Mica 5 Ambulance Station to the north; and Box Hill Ambulance Station to the south. <p>The close proximity of existing police and emergency services in the catchment will ensure response times to the subject site will be very satisfactory.</p>	The existing supply and proximity of nearby facilities does not support the need for additional police and emergency services within the development.
Acute & Community Health Services	<p>The 1.5-kilometre catchment includes the Box Hill Hospital (a public hospital operated by Eastern Health), Epworth Eastern Hospital (a private hospital) and Carrington Health (a public community health service). These facilities confirm that health service provision within the Box Hill Metropolitan Activity Centre is very significant.</p> <p>The proposed development of the subject site generates the equivalent of 2 public and private hospital beds.</p>	<p>Given the close proximity of the subject site to both acute and community health services, additional acute and community health service provision within the development is not recommended. However, it should be noted that the proposed development will include the following two key facilities directly relevant to health service provision:</p> <ol style="list-style-type: none"> 1. A 200 student Nurse Training Facility; and 2. A medical centre. <p>This assessment recommends Council acknowledge the inclusion of the nurse training facility as a significant community infrastructure contribution to the Metropolitan Activity Centre and the broader region.</p>
Residential Aged Care	<p>The 1.5-kilometre catchment contains the following two residential aged care facilities supplying a total of 173 beds:</p> <ul style="list-style-type: none"> Mecwacare Simon Price Centre (53 beds); and Uniting AgeWell Box Hill (120 beds); <p>The proposed development generates the equivalent of 6 additional residential aged care beds and the broader Box Hill Metropolitan Activity Centre the equivalent of 128 beds.</p>	Given existing supply levels and projected demand estimates this assessment does not consider the inclusion of residential aged care within the proposed development to be a high priority.

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6 Conclusions and Recommendations

Based on the information presented and analysed in the previous sections of this report a summary of key conclusions and recommendations is summarised below.

6.1 General Conclusions

- The 1.5 kilometre catchment is currently well serviced by a diversity of both local and higher order community infrastructure forms, and is located within close proximity of, and easily accessible to some significant public open spaces (e.g. Box Hill Public Gardens).
- The subject site will generate very moderate additional demands on existing community infrastructure, notwithstanding the fact that the overall projected growth for the Box Hill Activity Centre is quite significant.
- Based on a dwelling yield of 286 dwellings, the proposed development of the subject site will generate a residential population of approximately 658 (assuming an average household size 2.3 persons).
- An additional 286 dwellings is likely to increase the number of dwellings within the Box Hill Activity Centre by approximately 9% (based on 2018 City of Whitehorse Population Forecasts showing the Box Hill Activity Centre had approximately 3,277 dwellings – note: the percentage calculated will decrease as other housing stock is constructed within the catchment); and
- However, by 2036, it is anticipated that the subject site will represent approximately 4.1% of all dwellings located within the Box Hill Activity Centre (based on the City of Whitehorse Population Forecasts showing the Box Hill Activity Centre will have 6,964 dwellings by 2036).

6.2 Public Open Space & Recreation

Passive Open Space

1. The subject site is too small to provide any meaningful on-site passive open space provision given the minimum public open space contribution rate of 4% as outlined in the Schedule to Clause 52.01 of the Whitehorse Planning Scheme. However, a financial public open space contribution to off-site public open space improvements is supported by this assessment (e.g. as part of the ongoing implementation of the Box Hill Gardens Masterplan). The

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contribution rate is assumed to be a minimum of 4% of the site's value but will require confirmation by Council.

Active Open Space

2. The subject site is too small to provide any meaningful on-site active open space provision given the minimum public open space contribution rate of 4% as outlined in the Schedule to Clause 52.01 of the Whitehorse Planning Scheme. Given the existing supply and close proximity to a number of sporting reserves this assessment does not recommend a contribution toward active open space measures.

Indoor Recreation Facilities

3. The existing Aqualink Box Hill facility will adequately cater for the projected demand increases generated by the subject site for public leisure services. However, it is worth noting that the development of the subject site proposes to include gym and pool facilities for the exclusive use of residents living within the development.

6.3 Council Community Services

Early Years Services

4. Given the relatively large supply levels and low demand estimates this assessment does not support the need for an additional long day child care service within the development.
5. Given the adequate supply levels and low demand estimates this assessment does not support the need for additional sessional Kindergarten facilities within the development.
6. Given the very low demand estimate this assessment does not support the need for additional MCH facilities within the development.
7. The low demand estimates do not support the need for additional occasional child care facilities within the development.
8. The demand estimates do not support the need for on-site facilities to accommodate playgroup programs within the development.

Council Community Centres

9. Given the existing supply of community facilities, the modest scale of the proposed development, and its intention to include function and meeting rooms within the

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development to service the needs of its own residents, no contribution toward the construction of new or redeveloped community meeting spaces is recommended.

Library

10. The provision of existing library facilities within the catchment area is considered to be adequate; both in terms of supply and proximity. Therefore, no response measures are recommended.

6.4 Education

11. The demand estimates do not support the need for additional primary and secondary education facilities within the development. It is recommended that Council consult with both the Department of Education and Training and Catholic Education Melbourne to confirm the provision strategy for primary and secondary school provision within or close to the Box Hill Metropolitan Activity Centre.
12. The proposed development will provide BHI and the population catchment it serves with a new, high quality nursing education facility that can cater for up to 200 students. This represents a very significant outcome for educational infrastructure in the region and reinforces the role of the Box Hill Metropolitan Activity Centre as a key location for higher education and health service provision in the region.
13. The new nurse training facility will strengthen BHI's existing role in the provision of industry training centres and facilitate industry linkages with the likes of Eastern Health and (which operates the Box Hill Hospital) and the Epworth Eastern Hospital. It allows BHI to act as an education and training hub for students and industry from a wide area of metropolitan Melbourne, including outer suburban areas in the eastern corridor.
14. This assessment recommends Council acknowledge the inclusion of the nurse training facility as a significant community infrastructure contribution to the Metropolitan Activity Centre and the broader region. The proposal is consistent with the directions outlined by Plan Melbourne 2017.

6.5 Police & Emergency Services

15. The existing supply and proximity of nearby facilities does not support the need for additional police and emergency services within the development.

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6.6 Health

16. Given the close proximity of the subject site to both acute and community health services, additional acute and community health service provision within the development is not recommended. However, it should be noted that the proposed development will include the following two key facilities directly relevant to health service provision:
- A 200 student Nurse Training Facility; and
 - A medical centre.
17. This assessment recommends Council acknowledge the inclusion of the nurse training facility as a significant community infrastructure contribution to the Metropolitan Activity Centre and the broader region.

6.7 Residential Aged Care

18. Given existing supply levels and projected demand estimates this assessment does not consider the inclusion of residential aged care within the proposed development to be a high priority.

6.8 Consistency with Statutory Policies and Other Strategic Documents

19. Aside from public open space obligations contained within the Schedule to Clause 52.01 of the Whitehorse Planning Scheme no specific community infrastructure priorities associated with either the subject site or broader Box Hill Metropolitan Activity Centre have been identified by the review of strategic material. Significantly, Council does not have a formally adopted community infrastructure strategy for the Box Hill Metropolitan Activity Centre nor does the Whitehorse Planning Scheme contain a Development Contributions Plan Overlay for the Activity Centre.

6.9 Further Process Related Recommendations

20. Further discussion with Whitehorse City Council is recommended to confirm its level of support for the conclusions and recommendations outlined by this assessment.

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Appendices

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Appendix 1. Review of Non-Council Strategic Documents

Table 7 – Non-Council Strategies and Plans

Document Name
<p>Melbourne Archdiocese Strategic Provision Plan 2014: Eastern Region Archdiocese of Melbourne Catholic Education Office Melbourne (September 2014)</p> <p>The Catholic Education Office – Archdiocese of Melbourne (CEOM) seek to fulfil a mission to ensure that every Catholic child, whose parents so choose, has access to Catholic education and to provide Catholic families and communities with a quality education options that promotes the Church's teachings.</p> <p>To this end, the CEOM commissioned this research and analysis to determine demand for Catholic schools now and into the future and compare this with existing and planned schools across the entire Archdiocese of Melbourne. The study involved extensive review of existing strategic provision planning, development of a robust enrolment demand model, and development of a series of reports and interactive tools for the CEOM to use beyond the life of the project.</p> <p>This is the report for the Eastern Sub-Region which includes 66 parishes and has been highly urbanised already, with the peri-urban areas designated as areas of stable to low growth. It does not contain any growth areas.</p> <p>The report concluded that:</p> <p>– <i>“The Eastern Region is largely stabilised in terms of urban development and there is no new schools or closure of existing schools required. There will be a small ongoing degree of growth in enrolment demand within the middle ring as urban regeneration continues across Melbourne. This can easily be accommodated by the existing over-provision of schools across the sub-region. However, the over-provision in this sub-region is supporting broad under-provision in the Northern and Western regions and as the local demand increases this will put increasing pressure on these areas to provide sufficient facilities locally”.</i></p>
<p>Health 2040: Advancing health, access and care</p> <p>The organisation's vision is for all Victorians to have:</p> <ul style="list-style-type: none"> • better health – skills and support to be healthy and well • better access – fair, timely and easier access to care • better care – world-class healthcare every time. <p>Better health</p> <ul style="list-style-type: none"> • A system geared to prevention as much as treatment • Everyone understands their own health and risks • Illness is detected and managed early • Healthy neighbourhoods and communities encourage healthy lifestyles <p>Better access</p> <ul style="list-style-type: none"> • Care is always there when people need it • More access to care in the home and community • People are connected to the full range of care and support they need • There is fair access to care <p>Better care</p> <ul style="list-style-type: none"> • Target zero avoidable harm • Healthcare that focuses on outcomes • People are active partners in care • Care fits together around people's needs

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Document Name
<p>Eastern Health 2022: The Strategic Clinical Service Plan 2012–2022</p> <p>Eastern Health is one of Melbourne’s largest metropolitan public health services. It provides a comprehensive range of high quality acute, sub-acute, palliative care, mental health, drug and alcohol, residential care, community health and statewide services to people and communities that are diverse in culture, age, socio-economic status, population and healthcare needs. It operates 7 hospitals (1,514 beds) including the Box Hill Hospital and its catchment includes the municipalities of Boroondara, Knox, Manningham, Maroondah, Whitehorse and Yarra Ranges.</p> <p>The Strategic Clinical Service Plan is based around nine principles that articulate what Eastern Health aims to achieve through its clinical service development in the ten years to 2022. These principles are well-aligned with the principles as outlined by the Victorian Government in the Metropolitan Health Plan.</p> <ol style="list-style-type: none"> 1. Re-orientate inpatient (bed-based) services to be provided in ambulatory settings, including home, where appropriate to do so. 2. Maximise utilisation of all Eastern Health infrastructure and align future service expansion with forecast geographical demand for public health services in the mid-section of Eastern Health’s primary catchment area – specifically Yarra Ranges (Lilydale), Maroondah (Croydon) and Knox (North-East). 3. Implement rapid assessment and early intervention models of care. 4. Adopt and implement the Eastern Health Streams of Care as a basis for Eastern Health’s patient care delivery system 5. and ensure capacity is geared to these streams appropriately 6. Expand Eastern Health clinical services and progress planning for facilities to meet the current and future needs of the community and ensure a minimum 70 per cent self-sufficiency rate in the areas required. 7. Establish models of care that are tailored to the requirements of older people within all services. 8. Consider new models for the delivery of patient-focused maternity and paediatric services that are safe and consistent across Eastern Health. 9. Consider capacity and infrastructure options for planned, short cycle streams of care and chronic disease (ambulatory) streams of care where it is not possible to deliver these services in the home or community. 10. Explore opportunities with St Vincent’s Health and other health services to ensure timely access for Eastern Health patients to tertiary services that are not within the Eastern Health service profile. 11. Enable our health professionals to work to their full and extended scope of practice. 12. Establish and enhance coordinated, multi-disciplinary specialty and ambulatory clinics, providing patients with a ‘one-stop-service’. 13. Expand and promote Advance Care Planning protocols and procedures across all Eastern Health sites. 14. Invest in partnerships with general practitioners, community providers and Medicare locals. 15. Achieve Eastern Health-wide orientation of all clinical services and access points. 16. Develop specific strategies for targeted groups on the elective surgical waiting list to enhance preparedness for admission, improve communication, reduce functional decline and enhance quality of life while they are waiting for admission. 17. Orientate Eastern Health care delivery systems around the time of day and days of week that the community demonstrates it needs healthcare. 18. Develop an active research program whereby research is translated into clinical practice at Eastern Health and clinical practice is used to inform research. 19. Achieve the appropriate blend of generalist and sub- specialist clinical staff to improve self-sufficiency in particular areas of clinical practice and ensure Eastern Health provides a level of service equal to or better than other services in Melbourne. 20. Respect and value diverse communities through tailored models of care. 21. Align Clinical Support services with the clinical service profile of each hospital.
<p>Victoria Police Blue Paper: A Vision for Victoria Police In 2025</p> <p>Based on an understanding of the role of Victoria Police, the principles of policing, and the external and internal challenges facing Victoria Police, A Vision for Victoria Police in 2025 lays out three proposed strategic directions to enhance public safety, and increase value for money for the Victorian community through its investment in Victoria Police:</p> <p>1. Better matching of resources to demand by rethinking the traditional operating model</p> <p>The Paper makes the following observations on this direction:</p>

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<p><i>The traditional police service delivery model needs to shift from one based on an historical geographic footprint, to one that is mobile, technologically-advanced, and more responsive to changing demand. The type and location of police operations should be determined by what is required to provide the best possible service to the community. For example, larger, consolidated 'supersites' should replace many of the smaller and less operationally-effective traditional police stations. The supersite – or sites - in each Division should be the central 'hub' that supports a variety of other Victoria Police service points for local communities, such as 'shopfronts', mobile police stations, and self-service kiosks for non-urgent issues. In rural Victoria, multiple hubs might be required. Supersites should be multi-disciplinary centres where Victoria Police is co-located with other public services'".</i></p> <p>2. Improving capability through workforce reform and technology</p> <p>The Paper makes the following observations on this direction:</p> <p><i>"Victoria Police officers need to be far better supported by modern technology. They need to have the information and systems to do their work in a more 'virtual' environment, and to be freed from time-consuming paperwork. Technology should also support a strong culture of information security.</i></p> <p><i>Frontline officers should not need to return to their supersite during their shift: the proportion of an officer's time spent in the community (not in a police complex) should increase from 54 per cent to around 80 per cent. Each supersite should be designed to accommodate an IT system which allocates tasks and coordinates police operations. The system would integrate audio and video feeds from mobile and fixed sensor platforms, advanced analytics, and advice from partner agencies. It would also have capacity for a custody suite, operated by a private provider.</i></p> <p><i>Victorians should be able to report crime and suspicious activity through online self-service portals, and provide pictures and video to assist in offender identification. There should also be a dedicated non-emergency telephone line, where the public can talk directly to a staff member who can take their report and provide access to crime prevention information. Individuals should be able to track the progress of their reports via a secure online system. The system would, via social media, provide the community with real time alerts and requests for assistance to solve a crime or problem."</i></p> <p>3. Collaborating more closely through partnerships</p> <p>The Paper makes the following observations on this direction:</p> <p><i>"Different types of partnerships with the community are necessary:</i></p> <ul style="list-style-type: none"> <i>• An effective model of local policing in collaboration with residents and business owners will remain of vital importance, for maintaining and building community trust and confidence in Victoria Police.</i> <i>• Local policing partnerships should use practical and wide-reaching methods for public participation to shape local priorities (such as community forums and social media platforms). A more personal approach, through greater face-to-face interaction with identified individual police officers – recognisable 'faces' – is vital.</i> <i>• Victoria Police must increase the trust that communities of identity (relating to gender, ethnicity, religion, sexuality, age, capacity or otherwise) have in its ability to serve them as well and treat them as fairly as anybody else.</i> <i>• Victoria Police needs to engage with businesses in a different way for mutual benefit, based on enduring structures and processes.</i> <i>• Police and private security firms need to work together to deter crime and maintain public order most effectively, but police should retain an involvement in the regulation of the industry and could become involved in the training of its members".</i> <p>VICSES Corporate Plan 2015-2018</p> <p>The mission outlined in this Strategy is for VICSES to partner with communities, government, other agencies and business to provide timely and effective emergency management services, building community preparedness, disaster resilience and contributing to risk prevention.</p> <p>The strategic themes and associated actions outlined by the Plan are:</p> <p>1. People and Culture</p>

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Document Name
<ul style="list-style-type: none"> • Implement the VICSES Our People strategy 2014-2018 • Develop a VICSES volunteer strategy <p>2. Community and Industry Partnerships</p> <ul style="list-style-type: none"> • Develop and deliver a community connection program that meets the diverse needs of the communities in which VICSES operates • Foster wide support from industry, business and/or employers for the VICSES, and its volunteer members, to deliver services to the community <p>3. Government Support</p> <ul style="list-style-type: none"> • Develop and deliver a Government and Local Government engagement and advocacy strategy • Develop appropriate business cases for investment in VICSES capability and establish appropriate advocacy programs • Contribute to the delivery of the Emergency Management Victoria Strategic Action Plan <p>4. Service Delivery</p> <ul style="list-style-type: none"> • Implement the Planning the Future Together strategy recommendations • Implement the information communication technology strategy 2014-2018 • Develop a Memorandum of Understanding between emergency services to better deliver support for diverse communities <p>5. Community Awareness</p> <ul style="list-style-type: none"> • Develop and implement a strategic communication strategy and corporate communications plan • Develop a community resilience strategy
<p>Ambulance Victoria Strategic Plan 2017-2022</p> <p>This Strategic Plan outlines how Ambulance Victoria will continue its recent operational reforms, to provide Victorians with a world-class emergency ambulance service over the next five years.</p> <p>The Plan focuses on achieving four key outcomes and associated priorities:</p> <p>Outcome1 - An exceptional patient experience</p> <ul style="list-style-type: none"> • Providing safe, high quality, timely and expert patient care every time • Helping people to make informed decisions about their emergency health care • Connecting people with the care they need • Using research and evidence to continuously learn and improve our services <p>Outcome 2 - Partnerships that make a difference</p> <ul style="list-style-type: none"> • Working with communities to deliver local emergency health care solutions • Collaborating with our partners to improve health outcomes • Planning for and responding to major events and emergencies • Sharing knowledge, experience and data <p>Outcome 3 - A great place to work and volunteer</p> <ul style="list-style-type: none"> • Keeping our people safe, and physically and psychologically well • Providing an inclusive and flexible workplace • Developing a culture of continual learning and development • Embedding an ethical, just and respectful culture <p>Outcome 4 - A high performing organisation</p>

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<ul style="list-style-type: none">• Embracing innovative ideas, systems and technology• Being accountable for our actions and outcomes• Improving our integrated service model• Operating in a financially and environmentally sustainable way
<p>Court Services Victoria Strategic Asset Plan:2016-2031</p> <p>The purpose of this Plan is to deliver safe, secure and sustainable court and tribunal assets via excellent and expert asset management.</p> <p>Court Services Victoria (CSV) aims to enable provision of accessible justice for all Victorians through a portfolio of buildings that are safe, secure and sustainable to meet the service needs of the jurisdictions, court and tribunal users and community, now and into the future.</p> <p>The key priority focus areas are:</p> <ul style="list-style-type: none">• Enabling specialist court infrastructure including family violence response• Ensuring safe, flexible, future proofed and fit-for-purpose environments• Delivering Melbourne CBD Legal Precinct (the Precinct) development requirements• Delivering Melbourne growth corridor development priorities• Implementing the Court Services Delineation Model across metropolitan and regional Victoria• Identifying a set of principles that will determine proper priorities and allocation of resources for new capital works and maintenance of the existing asset base both within and between the CBD, metropolitan Melbourne, and regional Victoria. <p>The strategy responds to the defined service needs of all jurisdictions, incorporating the following components over a 15 year period:</p> <ul style="list-style-type: none">• Investment in ten new court and tribunal facilities• Expansion of five existing court and tribunal facilities• Upgrade and lifecycle management across the court portfolio<ul style="list-style-type: none">- Accommodating the new Court Services Delineation Model- Replacing/upgrading critical infrastructure- Increase in recurrent maintenance funding• Divestment of up to thirteen properties• Release of up to ten leased properties.

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Appendix 2 Audit Maps of Existing Community infrastructure

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Early Years Services

Figure 5 - Early Years Facilities within 1.5 Kilometres of Subject Site



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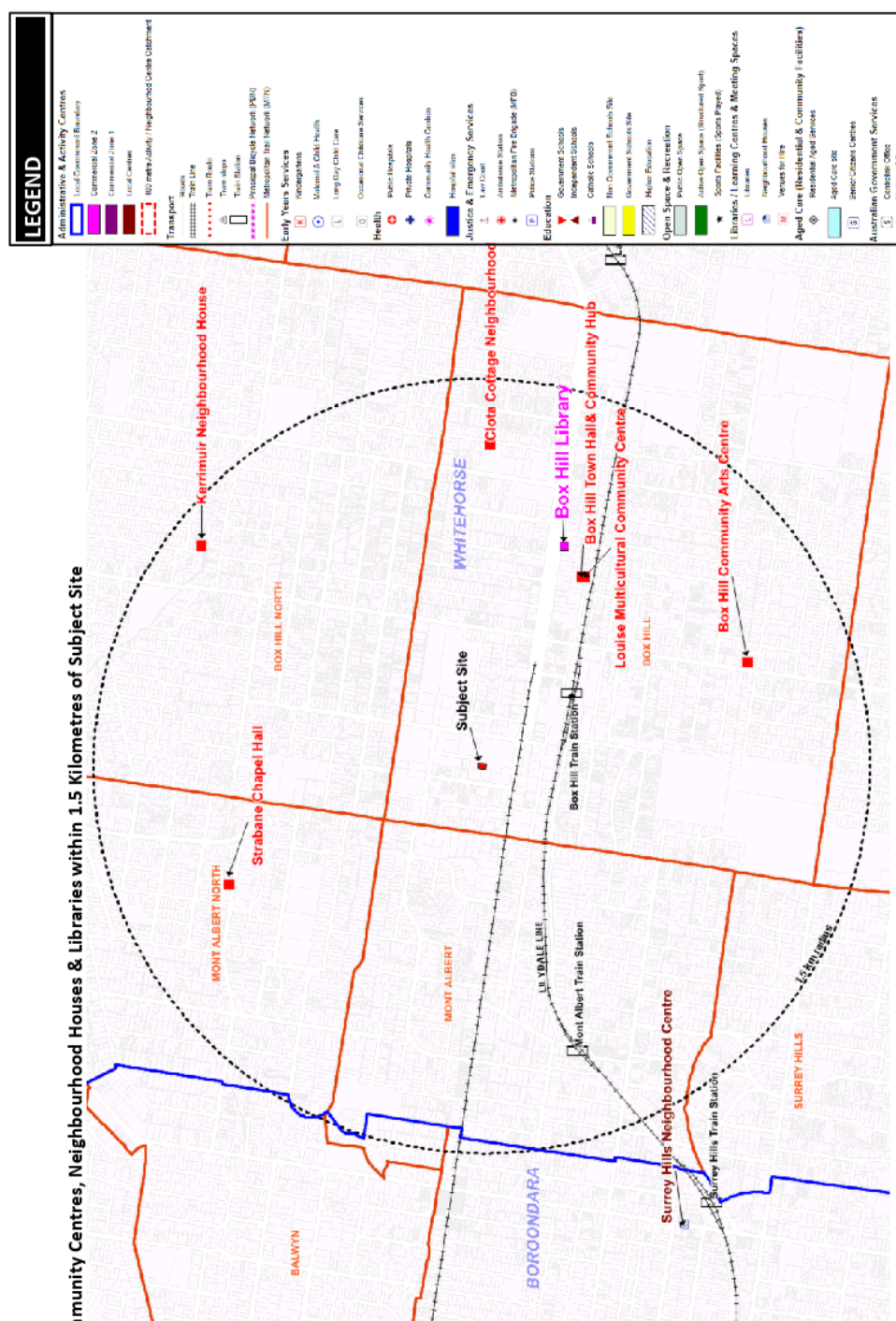
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Community Meeting Spaces, Libraries & Learning Centres

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Figure 6 – Community Centres, Neighbourhood Houses & Libraries within 1.5 Kilometres of Subject Site



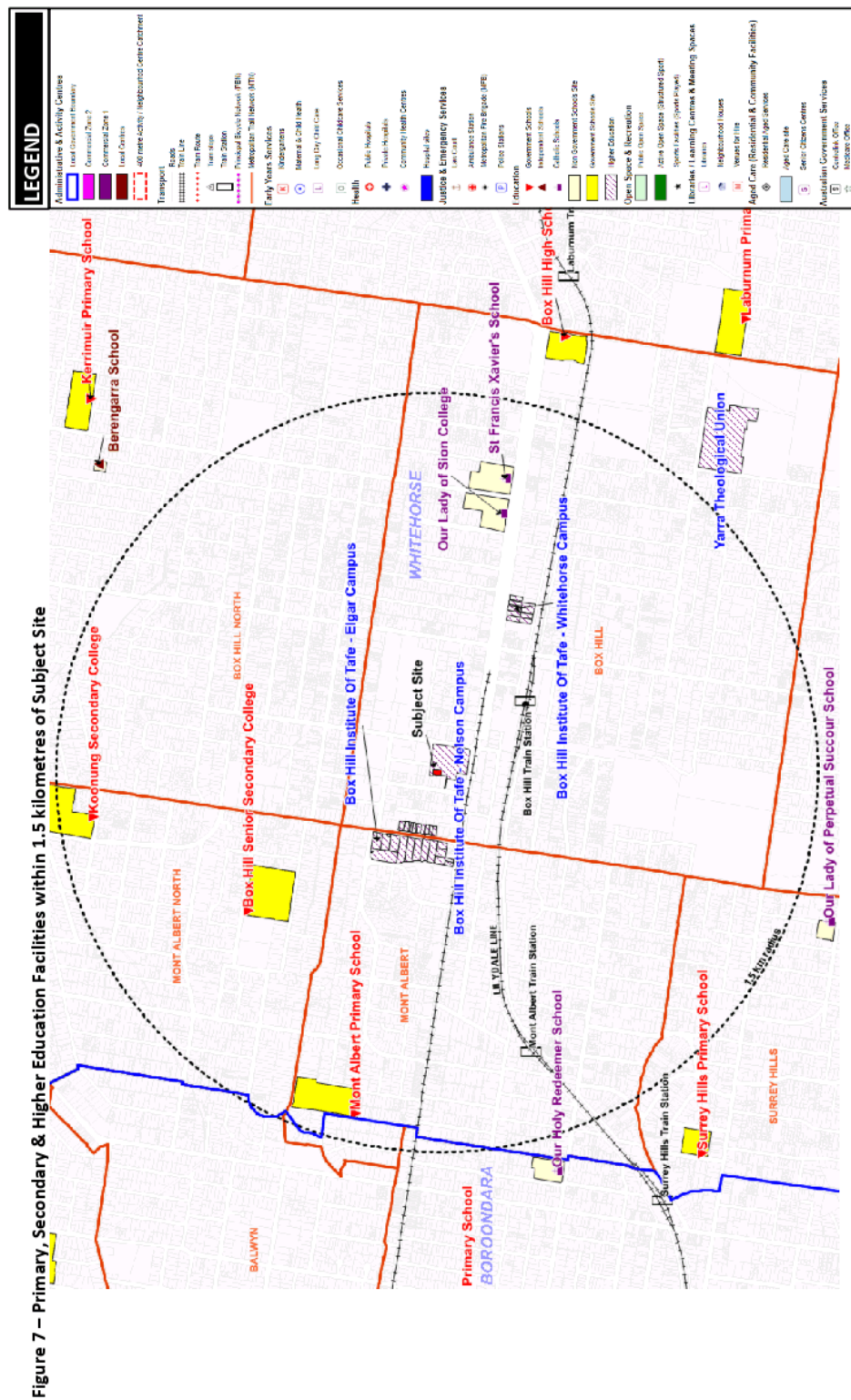
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Education Facilities

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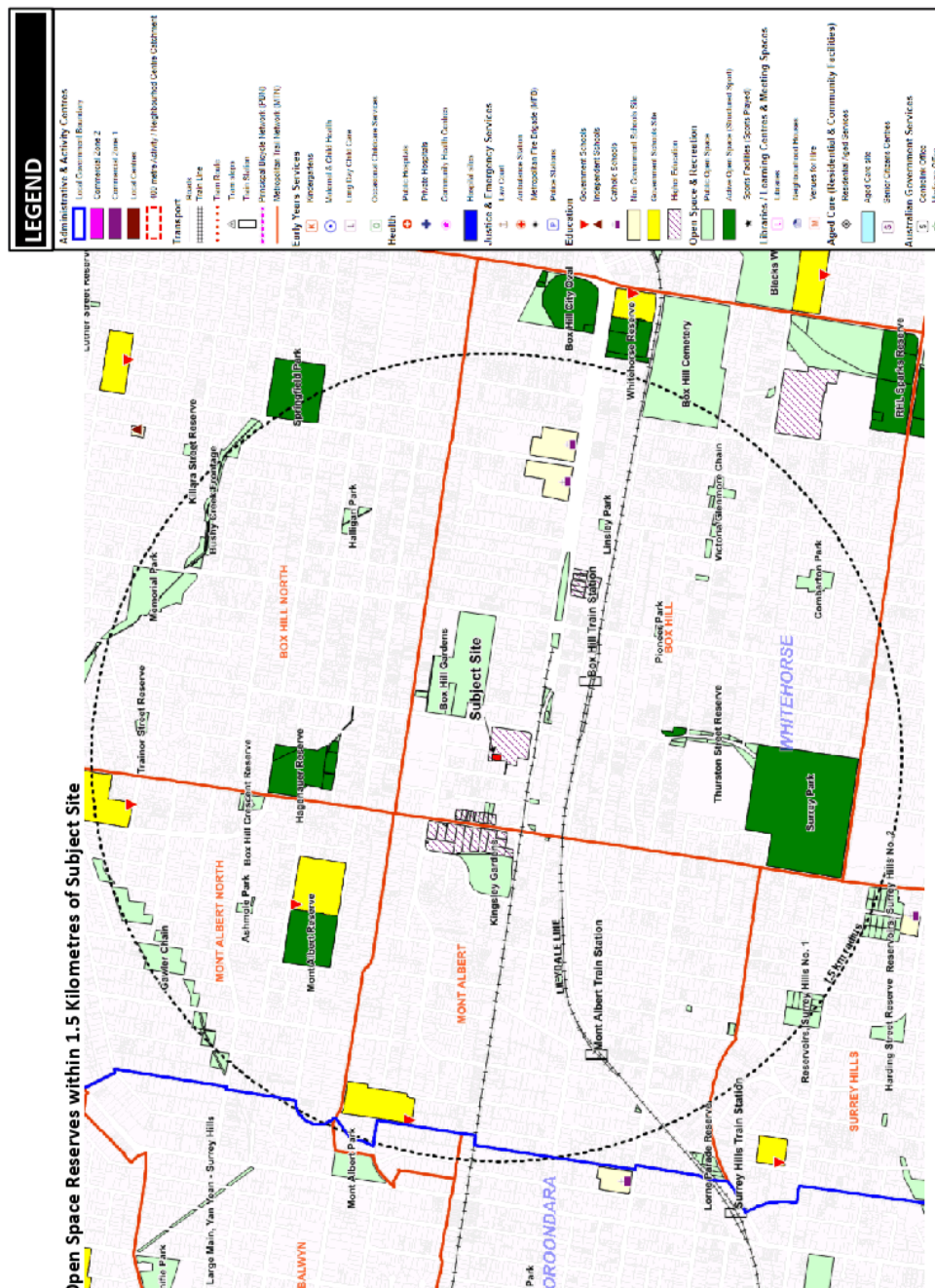
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Open Space

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Figure 8 – Main Public Open Space Reserves within 1.5 Kilometres of Subject Site



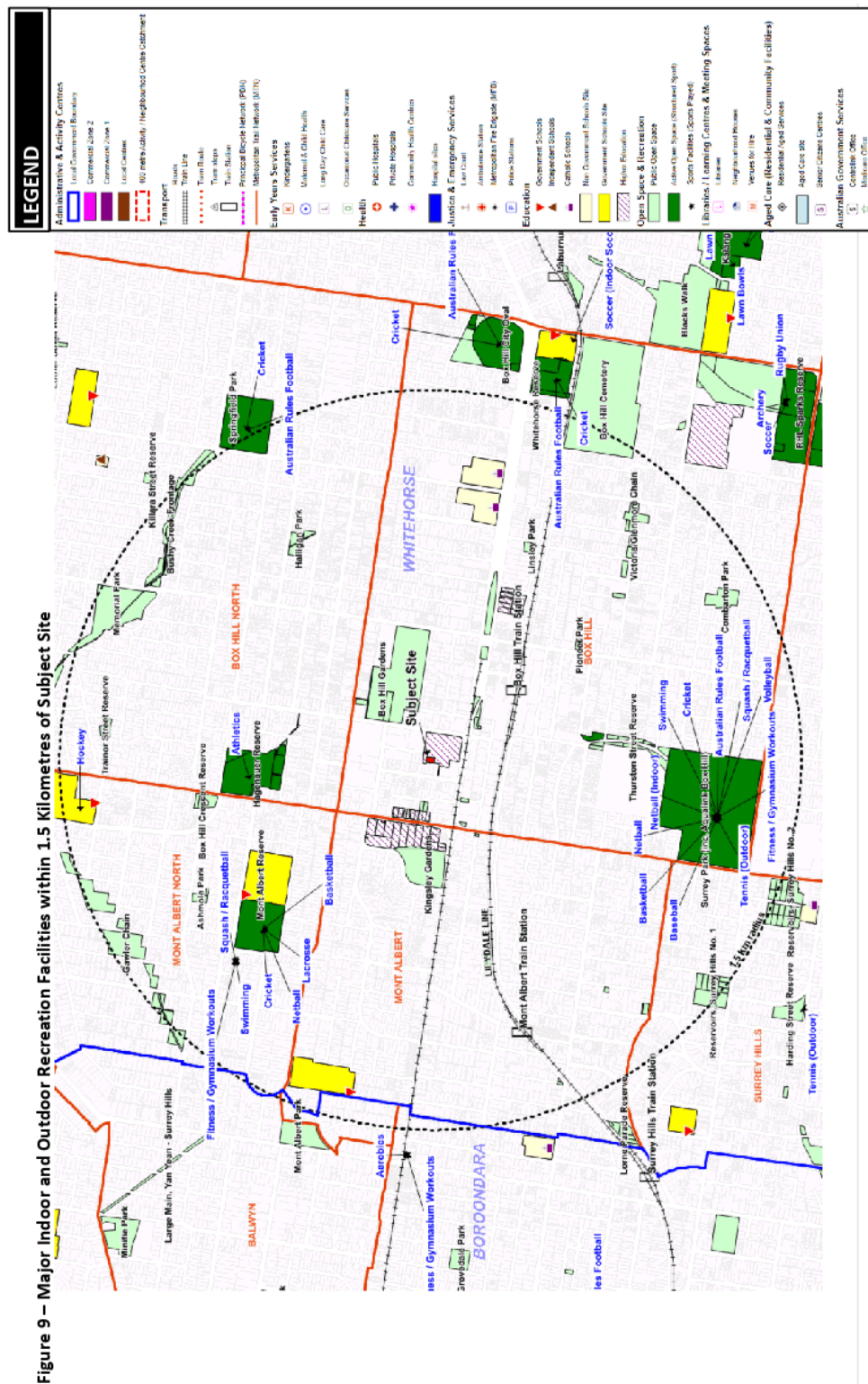
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Outdoor & Indoor Recreation Facilities

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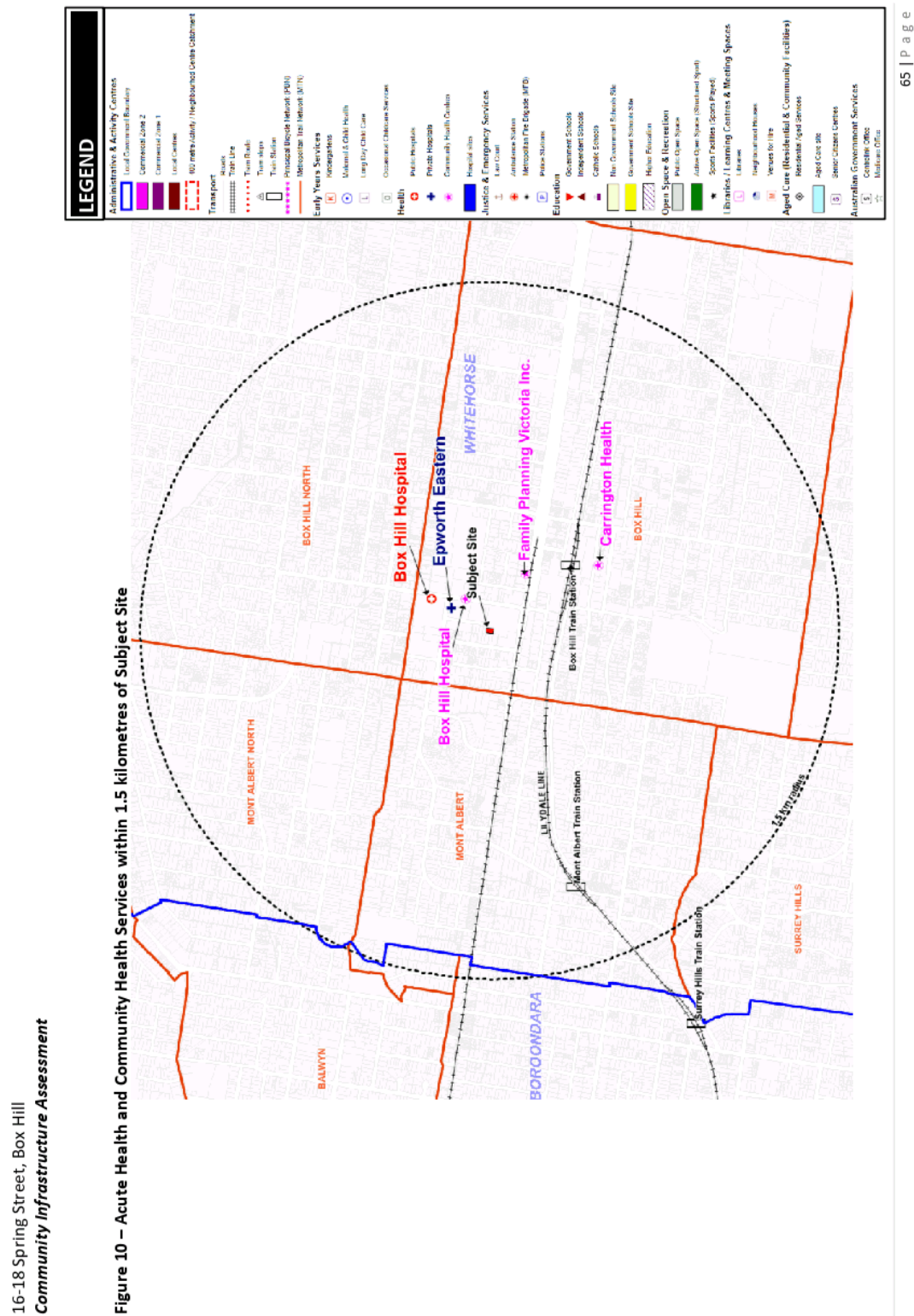


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Acute & Primary Health Services

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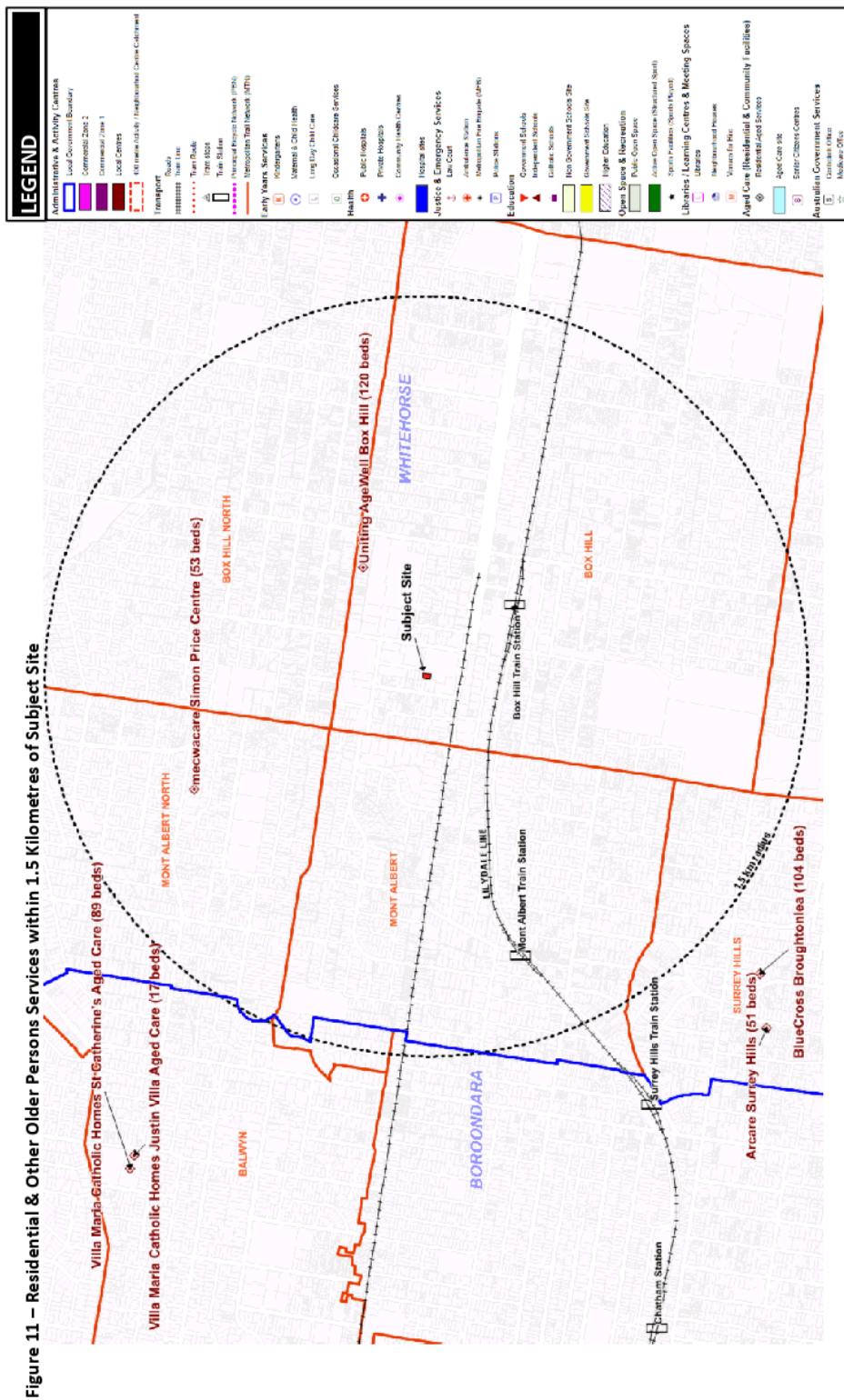
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Residential Aged Care & Other Aged Care Services

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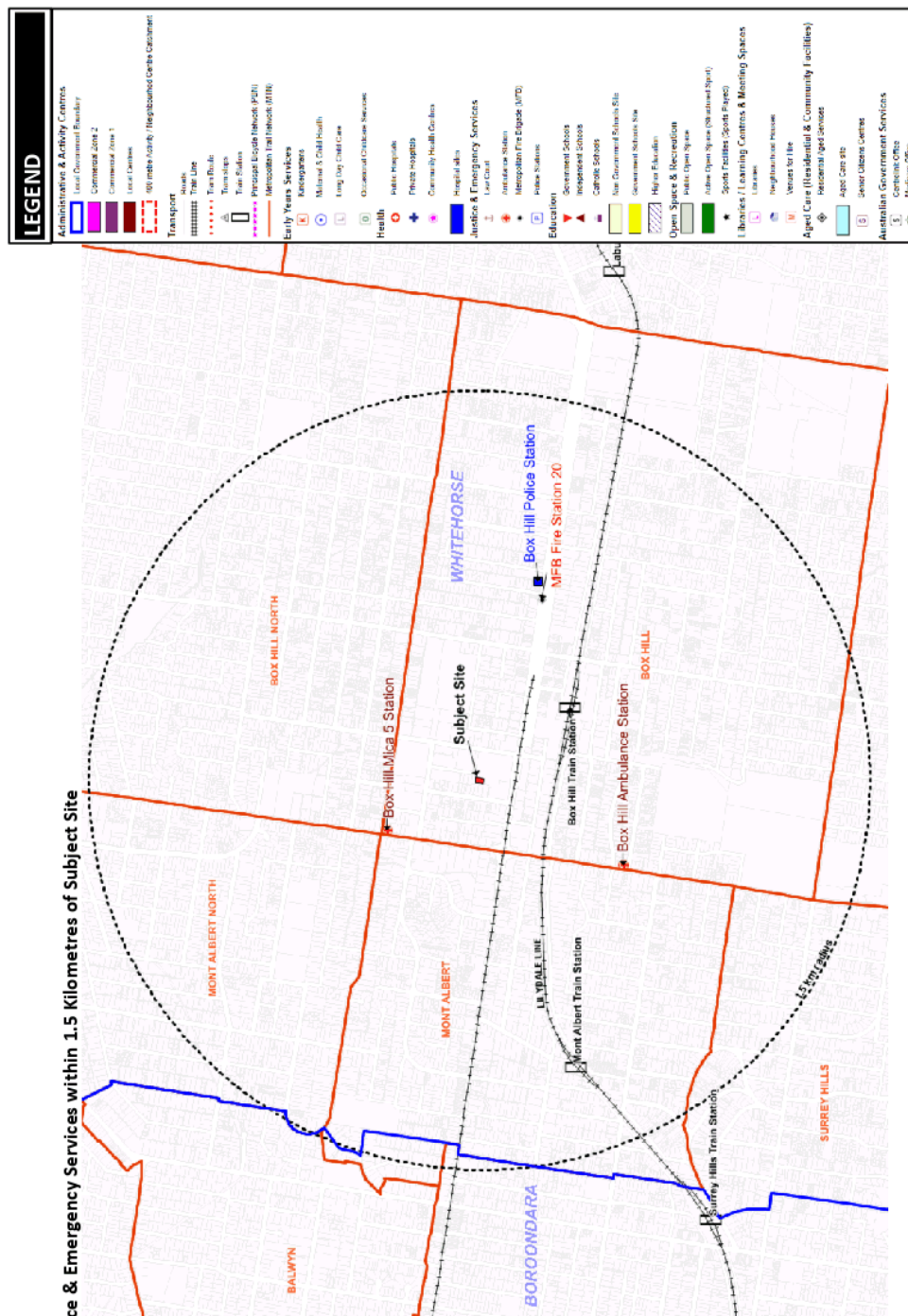
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Police & Emergency Services

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Figure 12 - Justice & Emergency Services within 1.5 Kilometres of Subject Site



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Appendix 3. Community infrastructure Standards & Demand & Supply Estimates

Table 9 on the following pages shows the main community infrastructure provision standards (and its source) used for the purposes of this assessment, and the indicative demand and supply estimates generated by the proposed development. It should be noted that these standards reflect what the ultimate needs of the community are.

The standards were developed from a variety of sources to assist with estimating both the demand for, and supply of community infrastructure within area. The sources of these standards include:

- *Melbourne Metropolitan Community Infrastructure Assessment*, Victorian Planning Authority (2015);
- *Precinct Structure Plan Guidelines* (PSP Guidelines), Victorian Planning Authority (2010);
- *Planning for Community Infrastructure in Growth Areas* (PCIGA), ASR Research (2008);
- Population and census data, and other survey data from sources such as the Australian Bureau of Statistics;
- Municipal Strategies & Plans;
- Other indicative guidelines provided by State Government Departments (e.g. Department of Education & Training) and key non-Government agencies (e.g. Catholic Education Melbourne), some of which are identified within the PCIGA report, but others were obtained during the course of the consultation process undertaken as part of the update.

As noted in Section 5.2 of this report, the community infrastructure demand and supply estimates are based on a development scenario of 286 dwellings.

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Table 8 - Description of Community infrastructure Provision Standards & Demand & Supply Estimates for Subject Site (286 dwellings) and Box Hill Activity Centre

Community infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Spring Street Box Hill	Box Hill Activity Centre by 2036
Public open space	4%	Minimum 4%	Clause 52.01 Whitehorse Planning Scheme	105	Not available
Organised Sport Facility & Participation Estimates					
Indoor and outdoor recreation facilities					
Indoor recreation centres / courts	10,000	Total population per court	Typical standard used by some Melbourne Growth Area Councils (note: individual LGAs vary on their views about the "desired" benchmark and some have no documented working benchmark).	0.1	1
Council aquatic / leisure centre memberships	3.4%	% of Population who are members of a Council aquatic / leisure centre	Based on 2010 CERM Pl [®] Operational Management Benchmarks for Australian Public Sports & Aquatic Centres	22	489
Council aquatic / leisure centres	88,500	Approximate total population per facility in Whitehorse (2018)	ASR Research calculation based on City of Whitehorse having 2 Council indoor aquatic leisure centres (2018).	0.0	0.2
Participation in organisation/venue based activity: Adults (people aged 15 and over)					
Fitness/Gym	27.7%	As above	Australian Sports Commission, AusPlay Survey (AusPlay): July 2016 to June 2017 Victoria Data	166	3,630
Swimming	9.0%	As above	As above	54	1,183
Golf	4.8%	As above	As above	29	625
Pilates	4.0%	As above	As above	24	521
Basketball	3.5%	As above	As above	21	462
Tennis	3.4%	As above	As above	20	444
Football/soccer	3.4%	As above	As above	20	441
Yoga	3.3%	As above	As above	20	433
Netball	3.1%	As above	As above	19	406

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Community infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Spring Street Box Hill	Box Hill Activity Centre by 2036
Australian football	3.0%	As above	As above	18	399
Organised participation by activity - top 10 activities (children aged 0 to 14)					
Swimming	39%	As above	Australian Sports Commission, AusPlay Survey (AusPlay): July 2016 to June 2017 Victoria Data	23	499
Australian football	16%	As above	As above	9	201
Basketball	12%	As above	As above	7	156
Cricket	9%	As above	As above	5	116
Dancing (recreational)	8%	As above	As above	5	109
Netball	8%	As above	As above	5	108
Football/soccer	8%	As above	As above	5	106
Tennis	8%	As above	As above	5	102
Gymnastics	8%	As above	As above	5	100
Athletics, track and field (includes jogging and running)	4%	As above	As above	2	50
Early Years Services					
Kindergartens					
Number of 4 year olds participating in 4 year old Kindergarten	100%	% of all eligible children participating in 4 Year Old Subsidised Kindergarten	Aspirational service target of State and Local Government	5	105
Total number of enrolments in 4 year old sessional Kindergarten	69%	% of participating children (see above) enrolled at a Sessional Kindergarten service	Victorian Child and Adolescent Monitoring System (VCAMS), Department of Education & Training Based on indicator 31.4 Number of four year old kindergarten enrolments in a long day care or integrated children's services setting for Whitehorse: 31% (2015 data).	3	72
Number of Kindergarten rooms when proposed policy changes are implemented	66	Number of sessional Kindergarten rooms required if 1 Kindergarten room	ASR Research constructed measure assuming one kindergarten room is licensed for 33 places	0.1	1.1

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Community infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Spring Street Box Hill	Box Hill Activity Centre by 2036
Number of 3 year olds participating in 3 year old Kindergarten	50%	accommodates 66 enrolments per week			
Number of 3 year old groups per week	22	% of children participating in 3 Year old Kindergarten	ASR Research constructed measure using data from other municipalities	2	54
Maternal & Child Health		Number of 3 year old kindergarten participants per 3 year old kindergarten group	ASR Research constructed measure based on typical group sizes operating in other municipalities	0.1	2.5
Number of MCH Full-Time Nurses	130	1 FT nurse per 130 children 0 years	ASR Research calculated measure using actual Growth Area Council data (2008)	0.0	0.9
Number of MCH consulting units	1	Number of MCH consulting units required per FT nurse	ASR Research calculated measure using actual Growth Area Council data (2008)	0.0	0.9
Playgroup					
Number of 2 hr playgroup sessions per week	50	Total number of children aged 0-3 years required to generate demand for a 2 hour playgroup session per week	ASR Research constructed measure using Playgroup Victoria	0.4	9
Occasional Child Care					
Number of occasional child care places	32.2	Total number people aged 0 to 4 years per licensed place	Victorian Planning Authority, Melbourne Metropolitan Community Infrastructure Assessment: Local and Subregional Rates of Provision (MIMC). A provision rate of occasional child care places equal to that documented by the MMCA report (2015) for Whitehorse	0.8	18
Number of occasional child care centres	30	Total number of facilities required based on number of licensed places generated (see above)	ASR Research constructed measure based on a typical sized occasional child care facility.	0.0	0.6
Long Day Child Care Centres					

9.1.2 – ATTACHMENT 5.

Community Infrastructure Assessment: ASR Research

16-18 Spring Street, Box Hill
Community Infrastructure Assessment

Community infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Spring Street Box Hill	Box Hill Activity Centre by 2036
Number of Long Day Child Care places	253.1	Total number of licensed places per 1,000 children aged 0 to 4 years	Victorian Planning Authority, Melbourne Metropolitan Community Infrastructure Assessment: Local and Subregional Rates of Provision (MMCIA). A provision rate of long day child care places equal to that documented by the MMCIA report (2015) for Whitehorse	7	144
Number of Long Day Child Care centres	120	Total number of facilities required based on number of licensed places generated (see above)	ASR Research constructed measure based on a typical large sized long day child care facility.	0.1	1.2
Community Centres, Meeting spaces, Neighbourhood Houses & Libraries					
Local multipurpose community centre	3,000	Number of dwellings per local facility	ASR Research constructed measure typically applied in Melbourne's outer growth areas.	0.1	2.3
multipurpose community meeting space seating capacity	130	Total number people per seat	ASR Research constructed measure	5	111
Neighbourhood Houses					
Number of Neighbourhood Houses	15,000	Total population per Neighbourhood House	ASR calculation of the total number of people in Victoria (2015 population estimate of 5.88 million) per Neighbourhood House in Victoria (approximately 400 in 2015). Based on data provided by the Neighbourhood Houses Victoria website (https://www.nhvic.org.au/)	0.0	1.0
Libraries					
Number of library loans annum	10.1	Total loans per person	Public Libraries Victoria Network, 2015-16 PLVN Annual Statistical Survey (2016), Whitehorse Manningham Regional Library Corporation	6,644	145,268
Number of library visits per annum	4.5	Total visits per person	Public Libraries Victoria Network, 2015-16 PLVN Annual Statistical Survey (2016), Whitehorse Manningham Regional Library Corporation	2,960	64,724
Number of library facilities	3.1	Library facilities per 100,000 people	Victorian Planning Authority, Melbourne Metropolitan Community Infrastructure Assessment: Local and Subregional Rates of Provision (MMCIA). A provision rate for libraries equal to that documented by the MMCIA report (2015) for Whitehorse	0.0	0.4
Education Enrolment & Facility Estimates					

9.1.2 – ATTACHMENT 5.

Community Infrastructure Assessment: ASR Research

16-18 Spring Street, Box Hill
Community Infrastructure Assessment

Community infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Spring Street Box Hill	Box Hill Activity Centre by 2036
Primary Schools					
Govt Primary Enrolment	71%	% of 5-11 year old population	Australian Bureau of Statistics, 2016 Census of Population and Housing, based on data for the City of Whitehorse	16	356
Catholic Primary Enrolment	17%	% of 5-11 year old population	As above	4	85
Non Govt Primary Enrolment	8%	% of 5-11 year old population	As above	2	40
Total Primary Enrolment	96%	% of 5-11 year old population	As above	22	482
Secondary Schools					
Govt Secondary Enrolment	53%	% of 12-17 year old population	Australian Bureau of Statistics, 2016 Census of Population and Housing, based on data for the City of Whitehorse	16	343
Catholic Secondary Enrolment	19%	% of 12-17 year old population	As above	6	123
Non Gov Secondary Enrolment	22%	% of 12-17 year old population	As above	7	143
Total Secondary Enrolment	94%	% of 12-17 year old population	As above	28	609
TAFE					
TAFE Full-Time Enrolment (15 to 24)	3.6%	% of 15-24 year old population	Australian Bureau of Statistics, 2016 Census of Population and Housing, based on data for the City of Whitehorse	5	117
TAFE Full-Time Enrolment (25+)	0.7%	% 25 + year old population	As above	3	69
TAFE Part-Time Enrolment (15 to 24)	1.9%	% of 15-24 year old population	As above	3	62
TAFE Part-Time Enrolment (25+)	0.8%	% 25 + year old population	As above	4	79
Universities				15	326
University Full-Time Enrolment (15 to 24)	38.2%	% of 15-24 year old population	As above	57	1,241
University Full-Time Enrolment (25+)	2.6%	% 25 + year old population	As above	12	256

9.1.2 – ATTACHMENT 5.

Community Infrastructure Assessment: ASR Research

16-18 Spring Street, Box Hill
Community Infrastructure Assessment

Community infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Spring Street Box Hill	Box Hill Activity Centre by 2036
University Part-Time Enrolment (25 to 24)	2.7%	% of 15-24 year old population	As above	4	88
University Part-Time Enrolment (25+)	1.6%	% 25 + year old population	As above	7	158
Primary & Acute Health Services					
Number of public and private hospital beds	3.9	Number of public and private beds per 1,000 people	Australian Institute of Health & Welfare, Australian hospital statistics 2015–16	3	56
Number of public hospital beds	2.4	Number of public beds per 1,000 people	Australian Institute of Health & Welfare, Australian hospital statistics 2015–16	2	35
General practices	0.37	Number of general practices per 1,000 people	Victorian Government Department of Health, Metropolitan Health Plan Technical Paper (Inner East), May 2011	0.2	5
Dental services	0.31	Number of dental services per 1,000 people	Victorian Government Department of Health, Metropolitan Health Plan Technical Paper (Inner East), May 2011	0.2	4
Pharmacies	0.19	Number of pharmacies per 1,000 people	Victorian Government Department of Health, Metropolitan Health Plan Technical Paper (Inner East), May 2011	0.1	3
Projected hospital admissions	444.6	Hospital admissions per 1,000 people	Victorian Government Department of Health, Metropolitan Health Plan Technical Paper (Inner East), May 2011	292	6,395
Emergency presentations	153.2	Emergency presentations per 1,000 people	Victorian Government Department of Health, Metropolitan Health Plan Technical Paper (Inner East), May 2011	101	2,203
Drug & alcohol clients	2.8	Drug & alcohol clients per 1,000 people	Victorian Government Department of Health, Metropolitan Health Plan Technical Paper (Inner East), May 2011	2	40
Mental health clients	6.5	Mental health clients per 1,000 people	Victorian Government Department of Health, Metropolitan Health Plan Technical Paper (Inner East), May 2011	4	93
Aged Care & HACC					
Aged Care					
Number of residential aged care beds	78	Number of beds per 1000 people aged 70 years +	Proposed Australian Government Planning Ratio by 2021	6	128

9.1.2 – ATTACHMENT 5.

Community Infrastructure Assessment: ASR Research

16-18 Spring Street, Box Hill
Community Infrastructure Assessment

Community infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Spring Street Box Hill	Box Hill Activity Centre by 2036
Number of Community Aged Care Packages	45	Number of Community Aged Care Packages per 1000 people aged 70 years +	Proposed Australian Government Planning Ratio by 2021	3	74
Number of Community Aged Care Packages	2	Number of Community Aged Care Packages per 1000 people aged 70 years +	Proposed Australian Government Planning Ratio by 2021	0	3
HACC Services					
Total HACC clients	34.9	Total Clients per 1,000	Public Health Information Development Unit (PHIDU), Social Health Atlas of Australia: Victoria. Data by Local Government Area. Published 2018: July 2018. Whitehorse Data	3	57

9.1.3 Implementation of Sustainability Strategy 2016-2022: Energy Efficiency Capital Works Proposal

Attachment 1 EAGA EPC Tranche 1 Case Study

9.1.3 – ATTACHMENT 1. EAGA EPC Tranche 1 Case Study

**Eastern Alliance for Greenhouse
Action partner with Ecosave to
deliver guaranteed savings across
four councils in regional Victoria**



The Eastern Alliance for Greenhouse Action (EAGA) was formed in 2008 in response to community concerns about climate change and a desire to drive action in a coordinated manner in the eastern region. EAGA's members (eight councils including: Boroondara, City of Glen Eira, Knox City Council, Maroondah City Council, Stonnington Council, City of Monash, City of Whitehorse and Yarra Ranges Council) identified the need to provide leadership, overcome jurisdictional barriers and work more collaboratively. Accordingly, EAGA is committed to responding to the challenges of climate change through the delivery of programs that aim to: reduce greenhouse gas emissions throughout the region and provide support for regional adaptation to climate change impacts

EAGA has recently embarked on a joint Energy Performance Contracting (EPC) program – the first of its kind in the Australian Local Government sector.

In October 2016, EAGA released an Expression of Interest for Energy Services Companies (ESCOs) to engage EAGA with the view to deliver comprehensive range of energy conservation measures to participating council members. Ecosave was one of three Energy Performance Contractors among Honeywell and Schneider Electric shortlisted to respond to the Request for Proposal. Ecosave was successfully awarded the Detailed Facility Studies (DFS) for Yarra Ranges, Maroondah, Boroondara and Knox Councils, following a unanimous decision by EAGA's executive team and member councils.

These four councils are the first members to initiate the EPC process. A dedicated staff member (the EAGA Major Energy Project Officer) has been employed to manage the project's implementation. As additional councils begin their own EPC process in subsequent years, they will be able to access the Major Energy Projects Officer and share in associated costs.

The EPC projects for all four councils are now in the implementation phase which include major asset renewal across 28 buildings to achieve cost reductions through energy efficiency (approximately \$2.8 million) and reduced greenhouse gas emissions (by more than 5,200 GHG tonnes per year!)



Source:
www.eaga.com.au

9.1.3 – ATTACHMENT 1. EAGA EPC Tranche 1 Case Study

Ecosave is currently implementing the following Energy Conservation Measures across Yarra Ranges, Boroondara, Maroondah and Knox City Councils:

High Efficiency Lighting	LED upgrades, fittings, refurbishments and re-lamping.
HVAC and Mechanical	Boiler replacements HVAC replacements including new air conditioning units HVAC refurbishments Pool HVAC optimisation Overnight load reduction Variable Speed Drives
Utility	Solar PV (More than 632 kW in rooftop mounted Solar PV) Power Factor Correction Voltage Regulation
BMS & Analytics	BMS upgrades Improved central building control at sites BMS Fine Tuning and Analytics
Building Fabric	Window films Pool blankets

This Joint EPC is a holistic set of energy efficiency, renewable energy and distributed generation measures across a suite of facilities that are capable of delivering sufficient savings to finance the full cost of the project.

- Aquatic centres including Pools, Gymnasiums and Health Clubs
- Town Halls and Council Offices
- Museums
- Libraries
- Arts Centres
- Community and Family Centres
- Recreational Centres

Through working together in a joint process, EAGA Councils aim to:

- Streamline market engagement process through a single Expression Of Interest (EOI) and Request for Quotation (RFQ) process
- Generate sufficient scale to attract more responses from interested ESCOs
- Capture cost savings through reduced project management fees and costs associated with the Detailed Feasibility Study (DFS) and Monitoring and Verification (M&V) stages
- Generate implementation efficiencies through information sharing across participating Councils

A fundamental element of the EPC process is that the savings are contractually guaranteed to EAGA Councils by Ecosave. Savings delivered by the project after the repayments are complete will be retained and may be reallocated towards other Council priorities

9.2.1 Living Melbourne: Our
Metropolitan Urban Forest

Attachment 1 Living Melbourne: Our Metropolitan
Urban Forest

Attachment 2 Endorsement of Living Melbourne Form



LIVING MELBOURNE

Our metropolitan urban forest

April 2019

9.2.1 – ATTACHMENT 1. Living Melbourne: Our Metropolitan Urban Forest

The following organisations have endorsed *Living Melbourne: our metropolitan urban forest*. Endorsement means organisations support *Living Melbourne's* Vision, Goals and Actions and commit to work in partnership with the other endorsing organisations towards its implementation.

[Logos]

Suggested citation: The Nature Conservancy and Resilient Melbourne (2019) *Living Melbourne: Our Metropolitan Urban Forest*. The Nature Conservancy and Resilient Melbourne, Melbourne.

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9.2.1 – ATTACHMENT 1. Living Melbourne: Our Metropolitan Urban Forest

Vision

Our thriving communities are resilient, connected through nature.

9.2.1 – ATTACHMENT 1.

Living Melbourne: Our Metropolitan Urban Forest

Foreword

Message from 100 Resilient Cities

On behalf of the entire 100 Resilient Cities Network of cities and partners, I would like to congratulate Resilient Melbourne, The Nature Conservancy, and all of the organisations who have co-authored *Living Melbourne*, a robust metropolitan response to multiple urban resilience challenges. *Living Melbourne* is a truly collaborative and strategic approach to connect existing greening and urban forest approaches across metropolitan Melbourne.

A flagship action from the Resilient Melbourne strategy, *Living Melbourne* is the cumulative result of over two years of collaboration to develop the evidence base for greening a city. In 2017, Resilient Melbourne hosted Chief Resilience Officers from New Orleans, Durban, Boulder and Semarang to discuss biodiversity and develop a set of recommendations for cities hoping to use nature to build resilience. This exchange led to a set of clear guidelines based on the principle that natural infrastructure is real infrastructure that allows cities to meet goals and service targets while also providing co-benefits to the community.

Living Melbourne was built on these lessons and provides a framework not only for Melbourne but for global peers like Milan and Paris that are now seeking to better incorporate nature into the fabric of their cities, the lives of their citizens and the foundations of their policies. *Living Melbourne* represents a first for Australia as well as global best practice as Melbourne's nature-based approach emerges at a metropolitan scale to deliver benefits to the city's most vulnerable residents. This is a fine example of how cities in the 100 Resilient Cities network are convening technical experts, city practitioners, private sector partners and communities to bridge the gap between city challenges and practical solutions.

Living Melbourne builds on this city's legacy of liveability and seeks to plant roots for the continued high quality of life for which Melbourne is known. I commend this work and encourage you and your organisations support it by incorporating its actions into your operational plans and budgets. I wish you well in your ongoing ambition to make your great city, Melbourne, truly liveable, both now and in the future.

Michael Berkowitz
Global President
100 Resilient Cities

9.2.1 – ATTACHMENT 1. Living Melbourne: Our Metropolitan Urban Forest

Message from The Nature Conservancy

The Nature Conservancy is proud to work with 100 Resilient Cities and Resilient Melbourne as partners to present *Living Melbourne* – Melbourne's first metropolitan urban forest strategy.

As a global organisation that conserves the lands and waters on which all life depends, The Nature Conservancy focuses its work on four key priorities, one of which is the building of healthy cities.

Cities are growing – fast. By 2050, two thirds of the world's population will live in urban areas. Cities' footprints are expanding at an alarming rate, putting habitat, human health, and access to food and water at risk. But with smart planning, science-based solutions and strong partnerships, we believe that cities can become resilient, healthy and equitable. Melbourne is a perfect place to start to combat problems caused by this super-rapid growth.

As nature comes under increasing threat from climate change, the destruction of natural habitats, and unsustainable urbanisation, it is more important than ever to understand that people are an essential part of the solution. And to harness the power of people in the conservation of nature, they need to have a connection to it. That's why The Nature Conservancy sees *Living Melbourne* as an important opportunity to transform Melbourne's approach to urban greening. I hope it will encourage Melburnians to value their urban nature for its biodiversity values and for the benefits it offers them – from cooler neighbourhoods to better physical and mental health.

I'm confident that *Living Melbourne* will inspire the city's residents, and allow them and others around the world to aspire to a future where cities value the contribution that nature makes to our urban environment.

Pascal Mittermaier
Managing Director, Global Cities
The Nature Conservancy

Aboriginal acknowledgement

Living Melbourne, and its many contributors and owners, respectfully acknowledges Aboriginal people as Australia's First Peoples and the local Traditional Owners as the original custodians of the land and water on which we rely and operate. We specifically acknowledge the Traditional Owners and we pay our respects to Elders past, present and future. We acknowledge the continued cultural, social and spiritual connections that Aboriginal people have with the lands and waters, and recognise and value that the Traditional Owner groups have cared for and protected for thousands of generations. We recognise and value the essential and continuing contribution of Aboriginal people to the region.

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Executive summary

Living Melbourne: our metropolitan urban forest is a bold new strategy for a greener, more liveable Melbourne. It presents a vision of international significance in its massive scale, its outstanding collaboration, and its use of new and innovative mapping technology.

In developing the strategy, we have brought together 32 metropolitan councils, state government agencies, non-government and community organisations, and other partners united around a common vision for an urban forest – **thriving and resilient communities, connected through nature**. *Living Melbourne* establishes tangible next steps for action to turn that vision into reality.

Made up of all the trees, shrubs, grasses, soil and water on public and private land across metropolitan Melbourne, our urban forest protects human health, nurtures abundant nature and strengthens natural infrastructure.

Living Melbourne aims to create a profound shift in the way we think about, build, grow and value Melbourne. Until recently, cities have existed in conflict with nature. Increasingly, around the world, people understand that the success and long-term viability of cities depend on them being able to live alongside nature. This is neatly expressed in Melbourne through the concept of our urban forest.

The urban forest cleans our air and water, reduces damaging heat in our neighbourhoods, and provides valuable habitat for flora and fauna. Exposure to nature reduces stress and the incidence of mental illness, and it provides opportunities to strengthen community bonds by providing spaces where people can congregate and recreate.

The 21st century will be remembered as the urban century, the century with the most significant urban growth ever witnessed. This is not news for Melbourne. With a population of eight million people projected for 2051, we will soon be the largest city in one of the most urbanised nations on the planet.¹ Given the difficulties that we will face in the urban century, it is crucial that we create and nurture our urban forest.

Melburnians value and are proud of their parks and gardens. Admirable efforts are already under way to add to the natural features that make our city a safe, healthy and pleasant place to live. But Melbourne's urban forest is under pressure. Changes in urban form, a growing population and climate change – including increasing urban heat – leave it vulnerable. At the moment we lack a metropolitan-wide approach to assess and reduce the harm that these trends inflict upon the city and existing urban forest. This strategy, *Living Melbourne: our metropolitan urban forest*, is a timely and invaluable opportunity to rise to these challenges.

In pursuit of the vision – thriving and resilient communities, connected through nature – and the three goals that support this vision – healthy people, abundant nature and natural infrastructure – this strategy proposes a series of actions to help our rapidly changing city better protect, connect and enhance our urban forest. The strategy, if implemented, will help transform the city for the benefit of all Melburnians.

The strategy's six recommended actions are:

Action 1: Protect and restore species habitat, and improve connectivity.

Action 2: Set targets and track progress.

9.2.1 – ATTACHMENT 1.

Living Melbourne: Our Metropolitan Urban Forest

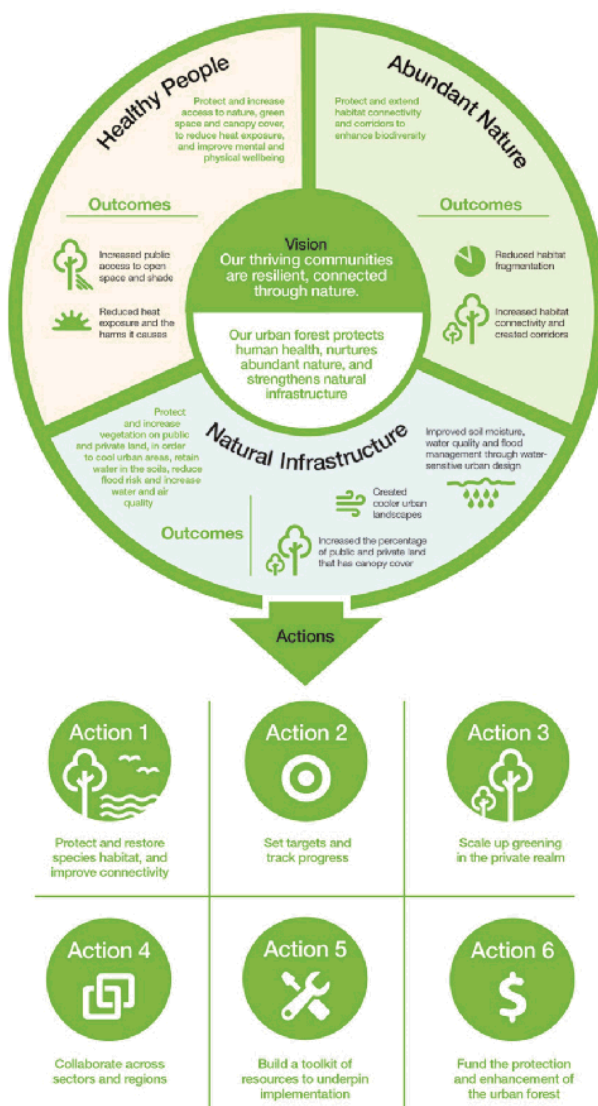
Action 3: Scale up greening in the private realm.

Action 4: Collaborate across sectors and regions.

Action 5: Build a toolkit of resources to underpin implementation.

Action 6: Fund the protection and enhancement of the urban forest.

Living Melbourne's vision extends to 2050. However, we expect that the strategy will be reviewed regularly as our urban forest science, implementation expertise and achievements grow.



9.2.1 – ATTACHMENT 1. Living Melbourne: Our Metropolitan Urban Forest

Introduction

Why do we need this strategy?

More than ever before, we need nature in our cities. Melbourne is predicted to be a city of eight million people by 2051, which would make it the largest city in one of the world's most urbanised nations.² Although growth brings tremendous opportunities for innovation and economic development, it also threatens the natural environment and the many ecosystem services it provides to Melburnians.

These 'ecosystem services' include clean drinking water, respite from rising summer temperatures through heat mitigation, and protection from flooding – to name just a few. There are also many broader benefits, such as improving social connection and cohesion, reducing energy costs, encouraging outdoor activity, providing shade and cooling our city, helping to build a stronger individual and collective identity and improving habitats for native species.

Protecting and enhancing natural areas and habitat for flora and fauna in cities is essential for strengthening our resilience to acute shocks and chronic stresses, many of which will be exacerbated by climate change and rapid urbanisation. The time to act is now.

Melbourne's liveability is under threat

Melburnians are proud of their leafy streets, public gardens, parkways along rivers and creeks, grassy basalt plains in the west, and the Dandenong Ranges that climb above the eastern suburbs. Our natural environment contributes to Melbourne's status as one of the world's most liveable cities. Our city's liveability requires a healthy natural environment, accessible to all.

Our economy also relies upon the greenness of our city. Destination Melbourne's 2017 report shows that visitors to Melbourne, who contribute approximately \$8 billion to our annual economy, rank parks and gardens as Melbourne's number-one unique attribute, and as the city's top 'must do' attraction.³

However, as metropolitan Melbourne expands outwards and also becomes more densely populated, green space is shrinking, putting many of our natural values at risk. Despite the perception of extensive green areas, some of Melbourne's local government areas have among the lowest urban tree canopy cover in Australia.⁴ With Melbourne's population growing and its area expanding, we must act now if we are to maintain and improve our city's liveability and appeal for generations to come.

Our urban forest protects human health, nurtures abundant nature, and strengthens natural infrastructure

The urban forest is made up of native and exotic trees, shrubs, grasslands and other vegetation, growing on public and private land across metropolitan Melbourne, and the soil and water that support them. This includes vegetation in parks, reserves and private gardens, along railways, waterways, main roads and local streets, and on other green infrastructure such as green walls and roofs. The urban forest encompasses all types of vegetation and ecosystems, but among the most iconic elements are its trees and shrubs.

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Fauna is an important component too, with complex interrelations between animals and plants helping to maintain the urban forest.

The urban forest plays a significant role in making our city a place where we can all thrive. But Melbourne's urban forest is also under pressure. A denser urban form will increasingly crowd out opportunities for trees, while a changing climate and higher urban temperatures put physical stress on the forest. Urban expansion beyond its current footprint threatens existing vegetation and natural values. This is already happening across the city.

Our current fragmented approach to managing the urban forest increases its vulnerability. Investing in the protection, strengthening and expansion of the urban forest will bring many opportunities, including better management of our water resources, higher quality and better-connected natural habitat, and easier access to green space for all Melburnians. The benefits of, challenges to, and opportunities presented by the urban forest are discussed later in this document.

Taking action for a *Living Melbourne*

Living Melbourne: our metropolitan urban forest is bringing together councils, state government agencies, non-government and community organisations, residents, and other partners, to work towards a shared vision for the urban forest: thriving and resilient communities, connected through nature. This strategy focuses on improving the quality and quantity of trees and vegetation in the urban forest – whether on public or private land. While acknowledging that canopy cover is a particularly important measure of the urban forest's ability to benefit the community and the environment⁵, this document does not advocate intervention in situations where it is not ecologically appropriate to do so. Urban forests should be managed to reduce risks such as fire and ecological vulnerability in the system.

This strategy sets out six actions to enable and inspire our rapidly growing city to better protect and strengthen its natural assets. It is supported by solid evidence presented in the accompanying *Living Melbourne: Our Metropolitan Urban Forest Technical Report* (the *Technical Report*).⁶ Collaboration is a central element of this strategy. Only by working collaboratively between organisations, land tenures, and regions can we understand the needs, agree on priorities for protection and improvement, set targets, and track progress. Together, we can build on the strong foundation of urban forest initiatives already started or under way in Melbourne. In this way we can bring city-wide benefits that could not be achieved by individual neighbourhoods, infrastructure operators, businesses or governments acting alone.

Protecting and enhancing Melbourne's urban forest is a vital part of planning for shocks and stresses. Box 1 illustrates the link between urban resilience and nature.

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Living Melbourne: Our Metropolitan Urban Forest

Box 1: Urban resilience and the urban forest

Urbanisation, globalisation and climate change are causing more people to move to cities. This presents a series of additional challenges, reducing and threatening the liveability of those cities.

In response, the urban resilience movement pioneered by 100 Resilient Cities (100RC) seeks to build the capacity of a city's individuals, communities, institutions, businesses and systems to adapt, survive and thrive – no matter what kinds of chronic stresses and acute shocks they experience. By equipping themselves to cope not only with acute shocks (such as fires and floods), but also with the chronic stresses that weaken the fabric of a city on a day-to-day or cyclical basis (such as social inequity, overburdened public transport and chronic water shortages), cities are better able to deal with disruptions, while also enjoying a higher quality of life every day.

To build resilience we must look at our city in its entirety, to understand its many assets and systems and how they interact with each other. Nature is increasingly recognised as one of our most valuable resilience assets: the urban forest and the biodiversity that it supports can take pressure off our increasingly strained built infrastructure. The urban forest helps reduce the damage caused by several types of shocks and stresses. Failure to protect and improve our urban forest is a missed opportunity to unlock the economic, health and social dividends that strengthen Melbourne's ability to thrive, no matter what the future holds.

Shocks and stresses on cities



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Benefits, challenges and opportunities

Benefits of nature and the urban forest

The urban forest brings a multitude of benefits to a city. But many of the ecosystem services that nature provides to the urban realm are currently served by grey infrastructure (such as reticulated water supply and stormwater drainage systems). The costs of maintaining this grey infrastructure generally increase over time, while its level of service declines. In the City of Melbourne alone (which makes up approximately 0.4 per cent of metropolitan Melbourne's land mass) amenity valuations estimated that the 70,000 trees in streets and parks had an approximate worth of \$700 million.⁷

A 2005 study of five US cities estimated that every \$1 spent on planting and maintaining trees generated annual benefits ranging from \$1.37 to \$3.09 – a strong return on investment.⁸ Similarly, a more recent study by the US Forest Service and the University of California found that every \$1 spent on tree planting and maintenance in Californian cities brought \$5.82 in benefits.⁹

Trees and other vegetation are essential components of urban infrastructure, providing a range of benefits, as described further below, with more detailed information and analysis provided in Chapter 3 of the *Technical Report*.

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Figure 1: Benefits of nature and the urban forest



Social connection and cohesion

Urban green spaces – such as parks – foster social cohesion, inclusion and interaction. They give residents a stronger sense of place and local identity, and reduce fear and crime levels in the community. Urban forests and urban green space provide places to hold major events, festivals and celebrations throughout the city. Events and spaces can bring together diverse groups of people by providing a public realm that is available for everyone to enjoy. Green spaces play an especially important role in integrating minority groups into the wider society, and can help new immigrants adapt to their host country.¹⁰

'We live opposite a beautiful park ... it's right at our doorstep. We feel very, very lucky to live opposite this beautiful park, it's very well maintained by the local council and it's highly utilised. So even just out there walking, I've got to know people in my neighbourhood.'
– female resident of Wyndham'.¹¹

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Connection to Country

The flourishing of, and interactions between, our diverse plants, animals, soils and waterways are important to the identity of current and future generations. Aboriginal Victorians, the Traditional Owners of the land, attach great value to biodiversity, which is core to many cultural practices and obligations. Connection to Country is fundamentally important for Victorian Aboriginal communities.¹²

This connection builds stronger individual and collective identity, a sense of self-esteem, resilience, and helps to improve people's health, education, economic stability and community safety.¹³ Increasingly, we understand that *all* parts of society benefit from being closely connected to nature. Box 2 provides a summary of one project that has involved Traditional Owners in not only the long-term vision for the Yarra River, but its policy framework, strategic planning and future actions.

Box 2: The Yarra Strategic Plan – a whole of government project, led by Melbourne Water

In 2017, the landmark *Yarra River Protection (Wilip-gin Birrarung murrn) Act* (the Act) passed through the Victorian Parliament, enshrining in law the protection of the Yarra River.

The Act identifies the Yarra River and its corridor as 'one living, integrated natural entity for protection and improvement' and recognises Traditional Owners' custodianship and intrinsic connection to the river.

The Wurundjeri have a unique knowledge and connection to the Birrarung. In early 2018, the Wurundjeri developed their vision for the Birrarung in a policy titled *Nhanbu narrun ba ngargunin twarn Birrarung* (Ancient Spirit and Lore of the Yarra). This policy defines the Wurundjeri's aspirations for planning, policy and decision-making to enhance the integrity of the Yarra Strategic Plan.

In line with community feedback, the Act calls for modern governance which recognises the importance of the Yarra River and its parklands to the economic prosperity and vitality of Melbourne. Once complete, the Yarra Strategic Plan will give effect to the Yarra River 50 Year Community Vision and *Nhanbu narrun ba ngargunin twarn Birrarung*, to enable agencies and Traditional Owners to plan, protect and manage the river corridor as one living, integrated natural entity.

Socio-economic benefits

Green spaces provide important socio-economic benefits, such as reducing energy costs by shading against heat, reducing maintenance costs, and boosting business activity. By shading buildings in summer, trees reduce the need for air-conditioning, and can reduce annual cooling costs by between \$30 and \$400 per year, depending on the height of the tree. Blacktown Council in Sydney, in partnership with the Cool Streets initiative, found that changes to street design could reduce carbon dioxide emissions, cool neighbourhoods and reduce power bills for residents. Cool Streets found that annual average household savings from tree shading were \$249.¹⁴

Trees can also protect asphalt pavements from heat, reducing the need for regular maintenance.¹⁵ Figure 2 is a thermal image of an urban street. It shows an urban street with large trees. The surface temperature is indicated on the right of the image in the scale bar. It illustrates that shaded surfaces (the darker colours) are significantly cooler than unshaded surfaces (lighter colours) such as the roads and footpath.

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Figure 2: Thermal image of an urban street with large trees (courtesy Banyule City Council, image © ENSPEC)



Green infrastructure on commercial sites has been found to encourage economic activity by attracting customers who stay longer and return more frequently.¹⁶

Although there is currently no total valuation of the benefits and savings attributable to Melbourne's metropolitan trees, one study used iTree Eco software, a common and well-accepted method, to value as many local government tree assets as possible across metropolitan Melbourne.¹⁷ Thirteen tree asset databases were suitable for analysis. In total, the economic savings in the form of pollution removal, carbon storage, carbon sequestration, and avoided water run-off were calculated at \$6 million per year. More importantly, the cost of replacing these assets with similar trees – based on size, species, health and location – was calculated at \$2.5 billion. These two figures, which could be extrapolated across the metropolitan area for all 32 councils, are for only a relatively small proportion of the total tree canopy of Melbourne.

Physical and mental health

Urban forests improve people's physical and mental health by reducing heat stress, encouraging physical activity, and offering recreational opportunities. The urban forest provides space that encourages the types of physical activity that reduce people's risk of developing chronic heart disease, diabetes, dementia and some cancers. Easily accessible green spaces and trees have positive effects on people's wellbeing, improving their mental health.¹⁸ Scientific research highlights the wellbeing benefits of contact with nature, and disconnection from nature impacting detrimentally on human happiness and ecology.¹⁹ Purely being in the outdoors can be effective in strengthening wellbeing for vulnerable populations.²⁰ Research that looked at environments which promote people's health and wellbeing identified green open spaces as playing a key role in this process.²¹

A study of more than 200,000 Australians aged 45 years and over found that those who had more than 20 per cent green space within a one-kilometre radius of their home were significantly more likely to walk and participate in physical activities rated as 'moderate to vigorous'. Greener neighbourhoods lead not only to weekly participation, but also to more frequent sessions of walking and moderate to vigorous activity, such as jogging and team

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sports. These findings suggest that the amount of green space available to middle-aged and older adults in their neighbourhood environments influences their level of physical activity.²²

Urban forests also cool surrounding environments. Built-up areas of cities can be as much as 7°C warmer than surrounding areas.²³ This 'urban heat island effect' is caused by the heat-absorptive thermal mass of concrete, bitumen and bricks. The urban heat island disproportionately affects vulnerable people, including young children, the elderly, people who are unwell or socially isolated, and those who are financially disadvantaged.²⁴

The *Living Melbourne* strategy takes a further step towards determining where the urban forest will be most beneficial, particularly for vulnerable communities, by using heat-mapping and socio-economic indicators. Some of our metropolitan councils have been leading the way in their urban forest strategies. For example, Yarra City Council considers three criteria to help identify areas of greatest need for improving and protecting the urban forest, including new plantings:

- hotspots – where more heat is currently being retained in the urban landscape, locally exacerbating the urban heat island effect
- social vulnerability – areas with significant populations of people deemed to be especially vulnerable to extreme heat and heatwaves
- pedestrian activity zones – areas of high pedestrian thoroughfare or congregation, or active transport activity, including school zones.²⁵

Moreland City Council has developed an urban heat island action plan – see Box 3.

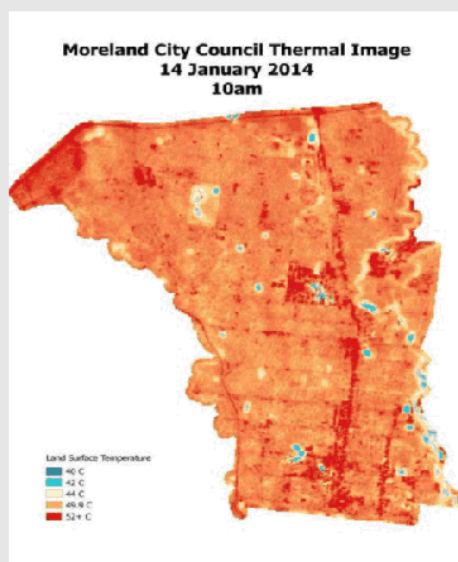
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Box 3: Heat planning case study

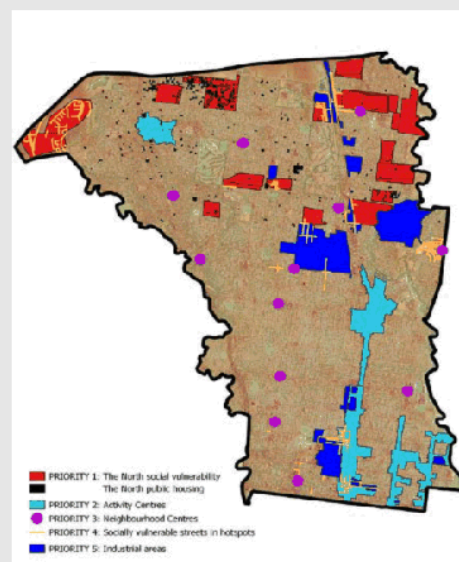
The Moreland City Council's *Urban Heat Island Effect Action Plan* prioritises heat-reduction initiatives by considering the intersection between human vulnerability and urban hot spots.

Satellite thermal imaging (below, left) was used to identify Moreland's hot spots – areas of concentrated heat retention – such as major roads, commercial and industrial centres, and new residential subdivisions. This information was then used to prioritise schools, childcare centres, kindergartens, activity centres, neighbourhood shopping strips and industrial areas for cooling strategies (below, right). In this way, Moreland's *Action Plan* ensures that heat-reduction measures are being taken where they are most needed.

City of Moreland: thermal image²⁶



City of Moreland: priorities for heat mitigation²⁷



This case study suggests ways to reduce heat across our city generally, and to respond to heatwaves, which are discussed in Box 4. The Department of Environment, Land, Water and Planning has worked in partnership with RMIT University, the University of Western Australia, CSIRO, and the Clean Air and Urban Landscapes Hub of the National Environmental Science Program to develop a heat vulnerability mapping dataset for 2014. This data assists with heat-action planning and is available via the Victorian Government Spatial DataMart.

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Box 4: Heatwaves in Victoria

Heatwaves have taken more human lives than any other natural hazard in Australia since European settlement²⁸, and are projected to increase in frequency, duration and intensity over coming decades.

In Melbourne, deaths begin to rise when the mean daily temperature reaches 28°C, with hospital admissions for heart attack increasing by 10.8 per cent when the mean daily temperature reaches 30°C.²⁹ When the average temperature is higher than 27°C for three consecutive days, hospital admissions increase by 37.7 per cent. This suggests that even a small reduction in temperature during a heatwave will reduce the numbers of deaths. One of the most effective ways to reduce temperatures is to provide shade trees.

Ecosystem services

In addition to shading and cooling our cities, urban forests:

- improve stormwater quality by reducing run-off
- improve air quality by capturing and filtering pollutants, including ozone, sulphur dioxide, nitrogen oxides, and particulates
- mitigate climate change by capturing and storing carbon dioxide
- reduce emissions from powering air-conditioning equipment, by cooling the environment.

Melbourne's metropolitan parks are estimated to release, on average, more than 31 tonnes of nitrogen per annum into the waters of Port Phillip Bay and Westernport Bay. However, it has been estimated that a similar-sized residential area would release 213 tonnes (an additional 182 tonnes) of nitrogen per annum into these two bays. This would also incur additional stormwater treatment costs in order to protect and maintain the water quality of the bays.³⁰

Retaining stormwater in the urban environment not only helps protect natural areas from polluted stormwater run-off, but also reduces flooding and the use of potable (drinkable) water for non-potable needs (such as irrigation), improves soil moisture and soil health, decreases the urban heat island effect, and supports healthy green infrastructure with its associated amenity value.³¹ The importance of water-sensitive urban design and integrated water management is further explored later in this strategy.

Ecosystem health

Melbourne's urban forest is rich in biodiversity. The metropolitan region is positioned at the confluence of seven bioregions, resulting in a rich mosaic of different plant communities. Bioregions are broad geographical regions composed of clusters of interacting ecosystems that share common physical and biological features, such as climate, geology, landforms, soils and vegetation. Most of Melbourne sits in the bioregion of the Gippsland Plain (in the east and south-east), Highlands Southern Fall (in the outer east) and Victorian Volcanic Plain (in the north and west). A total of 93 recognised ecological vegetation classes occur across almost 28 per cent of this land, many of which are endangered or vulnerable. Rivers, creeks, wetlands and swamps add to the complexity and richness of habitats.

Metropolitan Melbourne supports a diverse array of native plant and animal species. More than 2,000 native plant species grow in the Melbourne region. The backyards and

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streetscapes of our city and suburbs are also home to many plant species that are not native to the region or to Australia. Reflecting the significant changes that have occurred in the region since European settlement in 1788, there are 34 species of plants and 52 species of animals that are listed as threatened under the national *Environment Protection and Biodiversity Conservation Act 1999*, plus 64 species of plants and 95 species of wildlife listed under Victoria's *Flora and Fauna Guarantee Act 1988*.³² Please see Chapter 2 of the *Technical Report* for further information about biodiversity and conservation across metropolitan Melbourne, including a map of Melbourne's bioregions.

In Melbourne, streetscapes with native trees support significantly more diverse and abundant populations of native birds than streets with mostly exotic trees.³³ Although many local government authorities maintain good inventories of their street trees, there is no comprehensive picture of street trees across the entire metropolitan area. There is limited data about the trees in our parks and open spaces, and almost no information about the species of trees and other vegetation on privately owned land such as backyards (see 'Opportunities for the urban forest'). At the neighbourhood level, the highest number of native bird species per hectare is found in native vegetation in parks and reserves³⁴. The size of urban remnant vegetation in Melbourne is a major determinant of bird diversity (the larger the area, the greater the diversity).³⁵ Large old trees are disproportionate providers of the structural elements (such as hollows, and coarse woody debris) that are crucial habitat resources for many fauna species. But in urban areas these large old trees are particularly susceptible to loss.³⁶

Most of those natural areas that are in urban landscapes are fragmented. In order to survive, many species' populations must be able to disperse, as this facilitates gene flow. A common conservation approach is to create or improve connectivity by restoring habitat using corridors, stepping stones and buffer zones.³⁷ Effective connectivity comprises structural connectivity (physical linkages and proximity of landscape components) and functional connectivity (species movement needs and behavioural responses to the structural connectivity).³⁸ Some species may need to move very little, while others may require greater freedom but are constrained by hard barriers such as fences or roads.

Depending on the movement needs of different species, functional connectivity may or may not require physical habitat connectivity. Therefore the same landscape will have different levels of functional connectivity for different species. We need to consider connectivity at various scales: local, regional, metropolitan-wide and beyond. Understanding and designing ways to maintain and restore structural and functional connectivity in cities is complex and still in its infancy, although some local government authorities have been working on this concept (Box 5).³⁹

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Box 5: Hume City Council and Brimbank City Council: connectivity priorities

Hume City Council and Brimbank City Council used the 'guild approach' to determine the connectivity priorities for their ecological connectivity plans. An important part of this work was a series of expert workshops to decide on parameters such as:

- broad habitat types across the council districts and bounding areas (for instance, woodlands, riparian, grasslands)
- the appropriate guilds (groups of species with common attributes) and structural connectivity needs (for instance, species-specific movement capabilities, thresholds, needs, and minimum habitat patch size)
- selection of the focal species for each guild, (shown in bold text in the table below).

The result of the analysis was a matrix, comprising four main habitats, two dispersal capabilities (longer and shorter relative distances) and 10 focal species. A fifth general habitat for a long disperser was included, to represent species less affected by fragmentation and capable of greater dispersal.

Habitat	Disperser capability	
	Longer disperser	Shorter disperser
Grassland	Brown Songlark Fat-tailed Dunnart Plains-wanderer Red-chested Button-quail Stubble Quail	Australasian Pipit Golden Sun Moth Grassland Earless Dragon Little Whip Snake Striped Legless Lizard Tussock Skink
Woodlands and forest	Brown Treecreeper Agile Antechinus Grey-crowned Babbler	Cunningham's Skink Diamond Firetail Fuscous Honeyeater Grey Shrike-thrush Speckled Warbler White-throated Treecreeper Yellow-faced Honeyeater
Riparian	Azure Kingfisher Common Ringtail Possum Common Wombat Nankeen Night-Heron Southern (Large-footed) Myotis Swamp Wallaby Common Wombat	Eastern Yellow Robin Southern Water Skink Sugar Glider Swamp Rat White-browed Scrubwren
Wet habitat	Baillon's Crake Buff-banded Rail Eastern Long-neck Turtle Lowland Copperhead Rakali	Brown Toadlet Growing Grass Frog Lesueur's Tree Frog
Generalist	Eastern Grey Kangaroo Short-beaked Echidna	

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Encouragingly, there are many good examples across Melbourne where the creation of corridors and the restoration of quality habitat have resulted in the return of animal species that are otherwise susceptible to urban development. Box 6 describes the case study of Westgate Park in inner Melbourne, which has achieved remarkable results.

Box 6: Westgate Park case study

Many parks in the Melbourne area have a friends' group of volunteers to assist the public land manager with restoration and stewardship. The Friends of Westgate Park, in partnership with Parks Victoria, have welcomed people of all ages and backgrounds to volunteer their time and effort over the last 19 years. Together, they have transformed the 64-hectare park by planting 300,000 plants in nine ecological zones.

This major landscaping project has seen the return of a range of small bird species not present in the surrounding suburbs, including White-browed Scrubwrens and Superb Fairy-wrens. In recognition of their work, the Friends of Westgate Park won the 2010 Urban Landcare Award.

Challenges for Melbourne's urban forest

Melbourne and its urban forest are facing some key challenges, including:

- a growing, densifying, and sprawling urban form
- climate change
- threats to nature
- fragmented governance
- diverse community attitudes to trees and vegetation

A growing and densifying urban form

Australia is one of the most highly urbanised nations in the world, with 84 per cent of the population living in cities, towns and suburbs.

From 2012 to 2017, Melbourne accommodated 87 per cent of Victoria's total population growth.⁴⁰ A combination of natural increase and net immigration will make Melbourne Australia's largest city, with a population of 8 million people by 2051, accounting for 80 per cent of Victoria's population. To house this growing population, more than 1.6 million new dwellings will be needed, resulting in further density in existing areas and the addition of new suburbs on the urban fringe.

The characteristics of recent and projected urban growth present remarkably different prospects and challenges for the urban forest in Melbourne. On the one hand urban development reduces total green cover (trees, shrubs and grasses). On the other hand, in outer growth areas, tree canopy and vegetation structure is being created through urban development where it may not have previously existed.

Until about 1990, much of Melbourne's residential development consisted of detached houses that took up about one-third of the lot, with a large backyard.⁴¹ However, since that time there has been a trend towards building larger houses on smaller greenfield plots in new suburbs, and urban infill in established urban areas. The latter includes larger new

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houses replacing smaller, older houses, extensions to existing houses, and medium-density to high-density development of townhouses and apartments (Figure 3). These processes combine to reduce lawn and garden size and increase impervious surfaces.

One study compared plot ratios in older established suburbs to those in newer suburbs.⁴² The difference was considerable: in the older, established Melbourne suburb about 30 per cent of the plot was covered by buildings and hard surfaces, whereas in a newer Melbourne suburb this increased to about 65 per cent.

Figure 3: Historic vs recent growth patterns in established urban areas in Melbourne's Eastern Region



(a) 1996



(b) 2018

Images (a) and (b) show a redevelopment of three single dwellings that maximises construction over the allotment area, resulting in less private open space, overall vegetation and canopy cover (source: Explore Whitehorse).



(c) 2009



(d) 2018

Images (c) and (d) illustrate that higher residential density and single-dwelling renovation (or construction of new dwellings) can reduce backyard space, vegetation and canopy.

This results in larger areas covered by impervious surfaces, and less potential habitat for flora and fauna (source: Nearmap).

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(e) 2010



(f) 2018

Images (e) and (f) show a redevelopment of four allotments with four detached dwellings to yield 12 dwellings – a gain of eight dwellings.

However, there is a corresponding loss of significant vegetation cover, an almost complete loss of canopy and potential habitat, and a gain in impervious surfaces (source: Neamap).

Conversely, in our western and northern growth areas, canopy trees are being planted in new streetscapes. These improve amenity and provide shade on previously rural land that consisted of cleared or largely treeless plains supporting a mixture of exotic and native grasslands (Figure 4).

Figure 4: Historic vs current growth patterns in urban growth areas



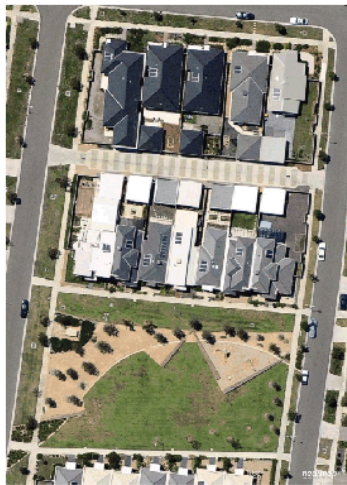
(a) 2010 Northern Region, Melbourne



(b) 2018 Northern Region, Melbourne

Images (a) and (b) show the substantial growth of canopy trees in and around a new recreation reserve in Melbourne's Northern Region (Source: Neamap).

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(c) 2010 Northern Region, Melbourne



(d) 2018 Northern Region, Melbourne

Images (c) and (d) show the growth of street trees over an eight-year period in Melbourne's Northern Region.

Note that due to the relatively small size of the privately owned spaces, street trees and park trees provide most of the canopy cover (source: Nearmap).

The retention and expansion of the urban street tree canopy continues to be challenged by regulations governing powerline clearance, which mandate minimum clearance distances between vegetation and overhead powerlines, depending on the type of infrastructure in place. Solutions need to be developed to encourage electricity distribution systems that minimise vegetation loss, such as underground cables, aerial bundles and insulation. Solutions are also needed for similar threats posed to the urban forest by other utility services.

In greenfield developments, the pavements and nature strips have been narrowed. This has the effect of reducing space available for planting large canopy trees, with room for root growth constrained by underground utility services.

Another challenge is to increase the tree canopy on our road reserves (particularly on boulevards and major roads) without increasing risks to property and human life. The introduction of flexible wire-rope safety barriers provides an opportunity, in collaboration with Department of Transport, to achieve this balance on high speed roads. Research indicates that while roadside trees are one of the most common structures involved in single-vehicle crashes, they can also help calm traffic, reduce drivers' stress and have been correlated with reduced driving speeds⁴³.

As we face a larger population and a denser urban environment, the benefits of the urban forest have never been more important, yet these growth trends present a significant threat to the health of the urban forest. Denser urban forms generally have greater areas covered by impervious surfaces, reducing the soil moisture that trees need in order to grow and to survive during dry periods. Also, water flows more quickly off these surfaces, leading to increased soil erosion. Taller buildings cast shade over environments that would otherwise be suitable for vegetation, and soil is compacted, making it more difficult for plants to thrive.

Climate change

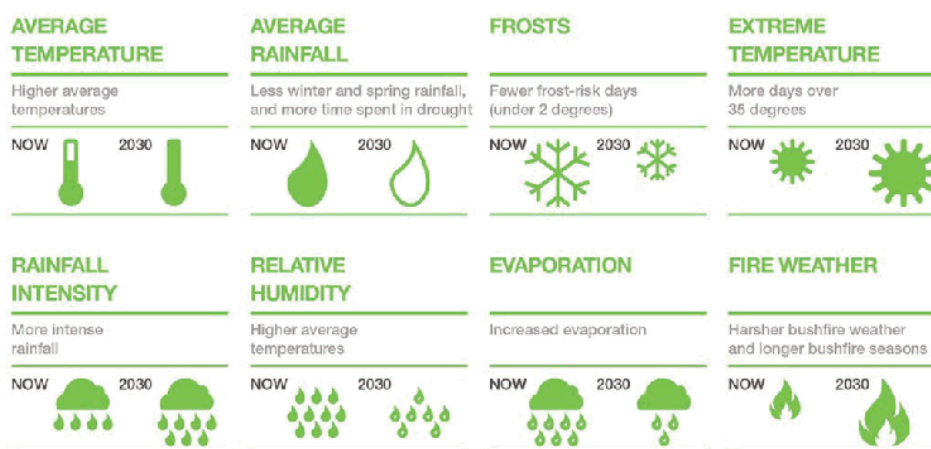
Climate research continues to show that maximum and minimum temperatures are rising in Australia. Such changes will expose Melburnians to more frequent and intense droughts,

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fires, heatwaves, extreme rainfall, and coastal inundation (see Figure 5). Climate change makes the urban forest more susceptible to pests and diseases, thus increasing the frequency of tree death, further reducing canopy cover.

Australia's climate has warmed by an average of approximately 1°C since 1910.⁴⁴ With this has come an increase in the duration, frequency and intensity of heatwaves, increase in extreme fire weather, a decline in April–October rainfall, and rising sea levels, which amplify the effects of high tides and storm surges. These trends are expected to continue.

Figure 5: Projections for temperature changes in Melbourne⁴⁵



Even if there are considerable reductions in global greenhouse gas emissions in the near future, the lag in the climatic system means that much harm is already unavoidable, requiring communities and organisations to change their behaviour and practices in response. Urban form changes slowly – the long lives of trees and vegetation require planning decisions to account for long-term climate changes and the uncertainties these changes will bring.

Rising temperatures and extreme heat

As average temperatures rise, many trees are becoming increasingly vulnerable, including exotic species from colder climates and indigenous species that thrive only in relatively narrow climatic bands.⁴⁶ When extreme heat is combined with low soil moisture, some trees' foliage and bark can scorch, which can lead to declines in tree and ecosystem health. Warmer temperatures also change the geographical extent of pests and diseases, by affecting life cycles, habitat suitability and reproduction rates. The urban forest will face new risks and challenges as pest and disease ranges change.

Rainfall, droughts and floods

Droughts have become more frequent and intense due to climate change, with confident predictions that this trend will continue. Between 1997 and 2009, Victoria experienced a period now known as the Millennium Drought. In some communities, long periods under severe water restrictions caused the death of significant trees in parks, led to the closure of

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sports fields and compromised the survival of some businesses such as nurseries.⁴⁷ In 2015 the total rainfall across Melbourne's water catchments was more than 15 per cent below the 30-year average, and the total catchment inflow was more than 40 per cent below the long-term average.⁴⁸ Increasing evaporation due to higher temperatures and declining rainfall will exacerbate reductions in soil moisture caused by impervious surfaces. This reduces urban vegetation's resilience to droughts and hot days.

Despite an overall trend of declining rainfall, more of the rain that does fall will be in increasingly heavy downpours. This is likely to lead to more frequent flooding, particularly in urbanised and small catchments. Flooding and inundation can contribute to soil erosion, tree instability and tree death.

Threats to nature

Victoria has experienced biodiversity loss over the past two centuries due to land development, land clearing, water pollution, fire, pest plants and animals and, more recently, reduced resilience under climate change.⁴⁹ Historically, urban growth and densification have been major causes of natural habitat loss around the world. Melbourne is no exception.⁵⁰

Melbourne's fauna is dynamic, and changes in species presence and abundance are largely the result of changes to the extent, structure and composition of habitat over time, as well as adaptation by some species to the urban environment.

Despite Melbourne's relatively high proportion of public open space and overall native vegetation cover, many species of native flora and fauna have declined.⁵¹ Further losses can be expected due to species extinction, unless we put additional effort into sustaining plant populations.⁵² Higher urban density not only reduces backyard size and opportunities for conservation, it also reduces opportunities for people to connect with nature at home.

Despite these known broad-scale trends in urban growth, there is still much to learn about the consequences of urbanisation for biodiversity, and how best to design cities and towns to conserve biodiversity and maintain healthy ecosystems.⁵³ Best practice guidelines are lacking on how to halt biodiversity loss and increase biodiversity.⁵⁴

Fragmented governance

Federal, state and local governments, utility providers, property developers and residents all have roles – formal and informal – to play in the governance and management of our urban forest. Relationships between the tiers of government are complex and sometimes effective cooperation is easier said than done. However, the urban forest does not recognise or adhere to administrative boundaries. This situation of fragmented governance hampers our ability to plan for and adequately protect our metropolitan urban forest across different jurisdictions and land tenures.

Despite the many benefits that we know they provide, most trees are not protected by planning or environmental controls. Individual trees are sometimes protected through controls such as local laws or planning overlays. Many municipalities have their own local laws, which require permits to remove or carry out works to trees on both public and private property. Significant tree registers recognise and protect individual trees that are of high value to the community and some councils have their significant tree registers linked to a relevant planning overlay.

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Thirteen of Melbourne's councils are leading the way in protecting and improving the urban forest in their municipal areas through urban forest strategies, in which the active involvement of private landholders is essential. Many other local government authorities have urban landscape, open space or street tree strategies that also benefit the urban forest.

Managing and developing our urban forest requires us to bring together many different organisations to work collaboratively towards both a long-term vision and short-term priorities. Significant progress has already been made in this regard, providing a strong foundation for further integrated efforts between sectors and regions. Landcare is one example of an inclusive, community approach to natural habitat protection and development across Australia (Box 7).

Box 7: Landcare – an Australian model fostering social connection

Landcare groups are communities of volunteers who take action to improve their local environment. A Landcare group usually starts when community members with common objectives notice a local environmental problem that needs to be remedied, and come together to make it happen. Landcare builds social capital in rural communities and helps communities promote sustainable land and water management and tackle common problems across farm boundaries. These groups have proven that community-based, decentralised, sustainable land and water management can be extremely successful.

Landcare became an Australian national program in July 1989, when the Australian Government, with bipartisan support, announced its *Decade of Landcare* plan and provided \$320 million to the National Landcare Program. Since then, Landcare groups have formed across Australia, and in more than 20 countries around the world. Because Landcare's cornerstones are to be community-owned and community-led, bipartisan in nature, and encouraging integrated management of environmental assets, it has a number of positive attributes that are relevant to the *Living Melbourne* strategy.

Diverse community attitudes to trees and vegetation

Councils, and other public land management agencies, apply significant resources to managing, maintaining and expanding the urban forest on behalf of their local community. The majority of community members appreciate and respect the multitude of benefits that the urban forest provides and are actively involved in its stewardship. However, some do not share this view.⁵⁵

Residents have diverse attitudes to trees and vegetation. Trees are planted for many reasons including for their beauty, to improve the appearance of gardens, to enhance privacy, to attract native wildlife and improve the appearance and value of private houses. However, councils must also manage community feedback and requests that arise from both real and perceived risks. Reasons often cited for removing trees include advanced age, root damage to foundations or utility infrastructure, limbs or trees at risk of falling and the risk of fire.⁵⁶

Understanding community perceptions of the urban forest is required as a critical step to help frame positive messages, and develop new – and support existing — behaviour-change programs that empower the community to promote the urban forest. It will also be critical to assist the development of community information that will inform private decision-making. Taking a strategic and informed approach will improve the way we select appropriate

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species for planting in different places, and improve the relationship community members have with their urban forest.

Opportunities for the urban forest

Mapping the urban forest

To better inform the strategic approach of connecting and enhancing our metropolitan urban forest, *Living Melbourne* has developed new mapping resources including imagery and mapping derivatives. These can be used by partners to set priorities for their investment, and regional opportunities to scale up existing efforts.

We used eCognition Essentials software provided by global software developer Trimble, to map metropolitan Melbourne's urban forest. The two main sources of data were:

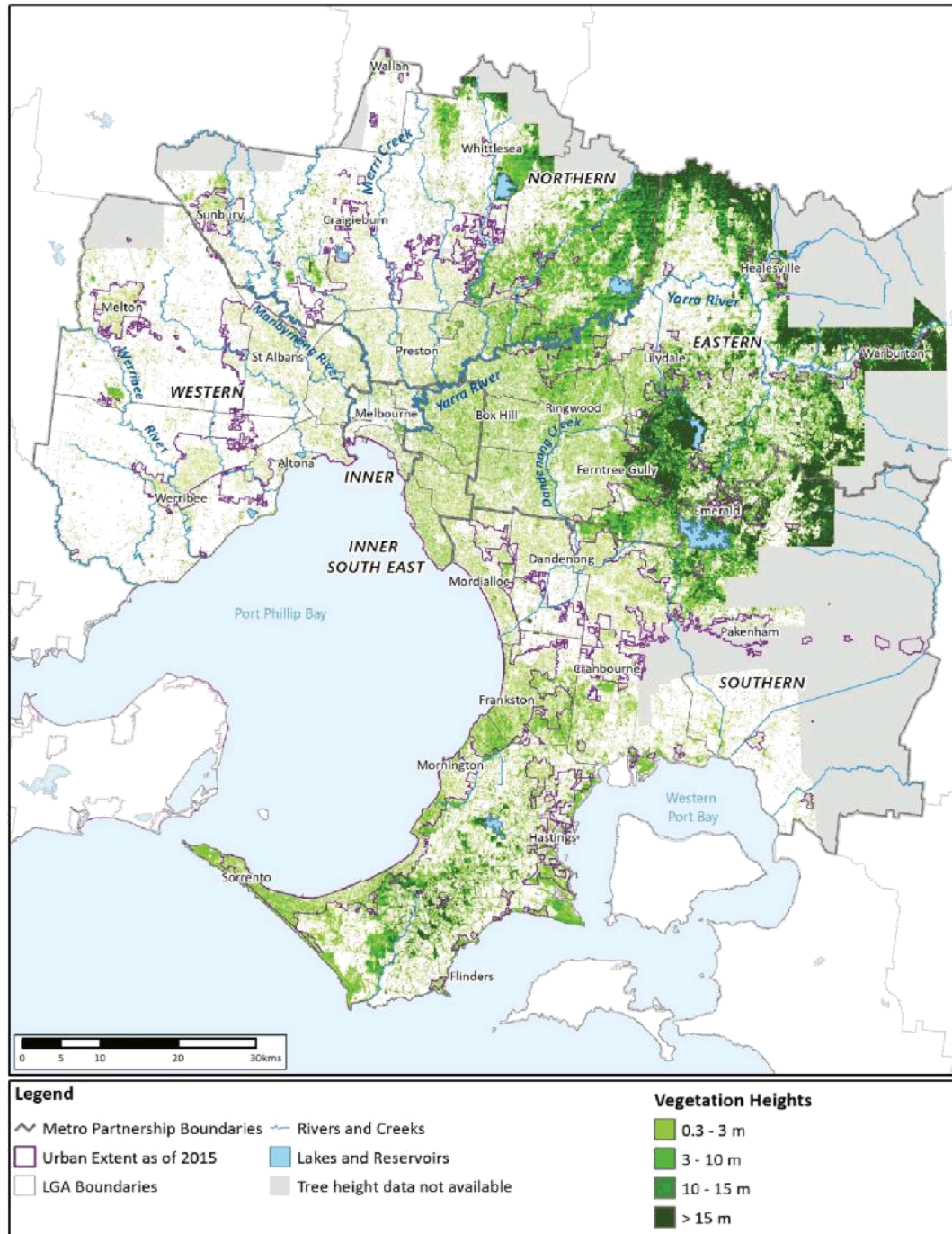
- two-metre resolution multispectral satellite imagery provided by DigitalGlobe
- Victorian Government Light Detection and Ranging (LiDAR) datasets

These data sets were prepared and formatted before being processed by the eCognition Essentials software. The output provides a map of the distribution and height of vegetation across metropolitan Melbourne (Figure 6). For further information and maps please refer to Chapter 6 of the *Technical Report*.

Mapping the urban forest is essential for its development, protection, maintenance and growth. Comprehensive and accurate maps give government authorities and other land managers the information they need to make informed decisions about improving, re-establishing and connecting Melbourne's natural environments. Canopy cover is an important measure of the urban forest's ability to benefit the community and the environment.⁵⁷ Developing a consistent, metropolitan-wide vegetation and canopy map for this *Living Melbourne* strategy is a critical step in assessing the current status of Melbourne's urban forest, and for setting future targets and actions.

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Figure 6: Melbourne's urban forest



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Table 1 provides a regional breakdown of the distribution of canopy cover across metropolitan Melbourne. 'Canopy' is defined as vegetation above three metres in height.

The metropolitan urban area has a total canopy cover of 15 per cent. Canopy cover is highest in the Eastern (25%) and Inner South-East (22%) regions. The Southern (16%), Inner (13%) and Northern (12%) regions have less canopy cover. Canopy cover is lowest in the Western Region (4%).

Table 1: Canopy cover in urban Melbourne*

Metropolitan region	Percentage of land with canopy cover (of trees 3 metres high or taller)
Eastern	25
Inner South-East	22
Southern	16
Inner	13
Northern	12
Western	4
Total metropolitan tree canopy	15

*Figures rounded to nearest whole number

The different regions vary widely in canopy cover. This is a result of their natural attributes – which influence vegetation patterns – combined with the historical development and growth of Melbourne.

One important factor is Melbourne's location at the confluence of multiple bioregions. For example, the vegetation types that existed in Melbourne before European settlement included grasslands and grassy woodlands in the west, heaths and heathy woodlands in the south-east, and dry forests in the east.

In addition to these natural differences, Melbourne's development and growth since the 1830s has had an important influence on the shape and form of today's urban forest. Settlers' preferences for elevation, views, water and mature trees meant that Melbourne's early development moved outwards from the original European settlement on the banks of the Yarra River to the north-east, east and south-east, and tended to be on the hillier, treed terrain.⁵⁸ The flatter northern and western areas – largely grassland plains – were considered less hospitable and desirable.

These underlying differences are critical – any work on the urban forest across Melbourne must respond to these characteristics. Both the natural systems and built urban form, including infrastructure, should be considered in all efforts to protect and enhance our urban forest.

Habitat connectivity

Connectivity and the ability of animals to move, and plants to disperse, within or between patches of habitat is critical for conservation. Many individual patches are too small and widely dispersed to support viable populations. It is therefore important that green spaces, such as gardens and public open space, are not viewed at the individual scale, but instead considered collectively as interconnected networks of green spaces across the urban

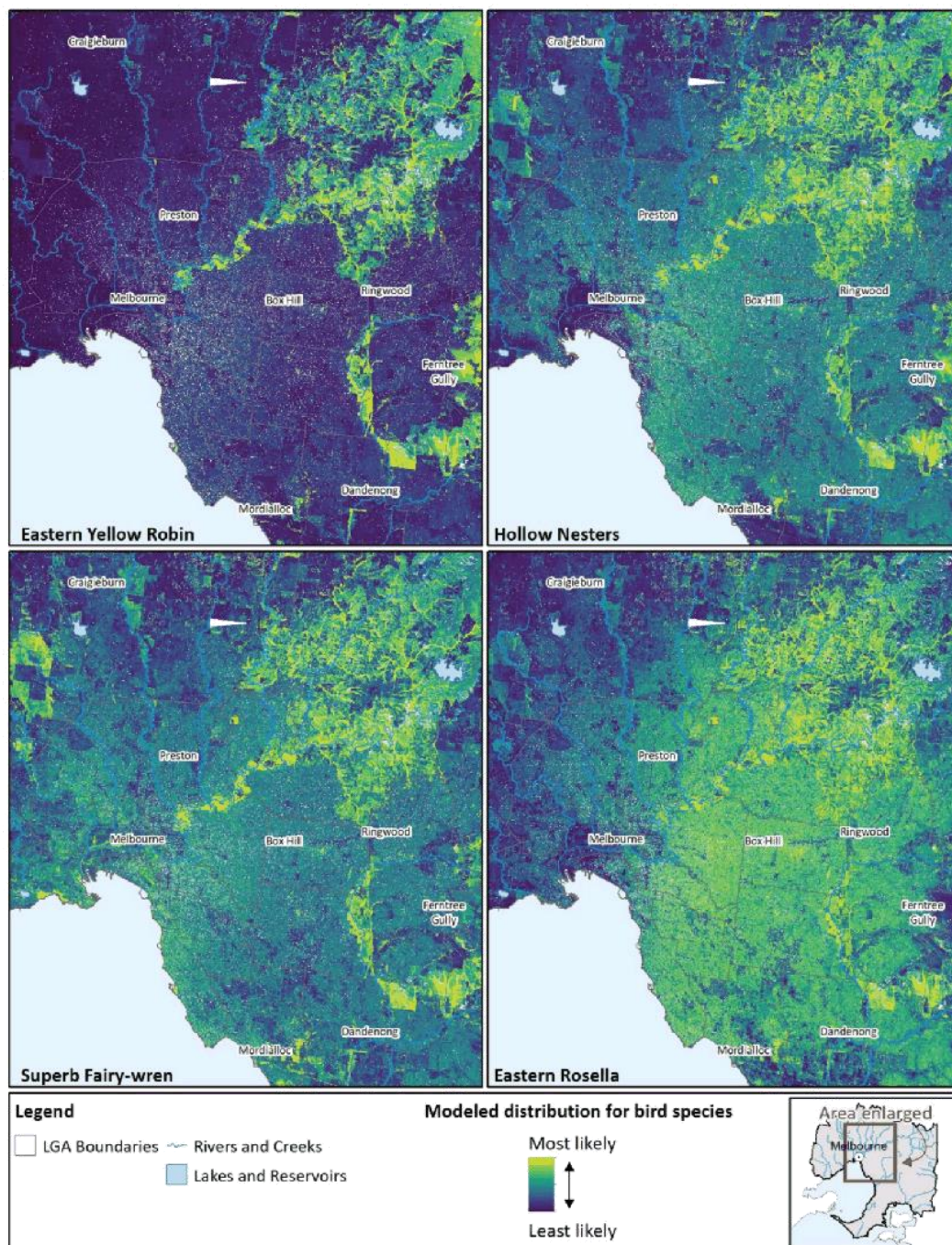
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landscape. By extending the urban forest, we can link and create an interconnected matrix of green spaces across our diverse urban landscape.

Using the urban forest canopy cover mapping layer with bird atlas data (supplied by BirdLife Australia) and other important datasets (such as ecological vegetation classes), enables the modelling of different levels of connectivity and landscape permeability for different bird species and bird groups (see Figure 7 and the *Technical Report* for more details).

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Figure 7: Modelled distribution for various bird species or bird groups in Melbourne's urban landscape, with suitability ranging from most likely (yellow) to least likely (dark blue)



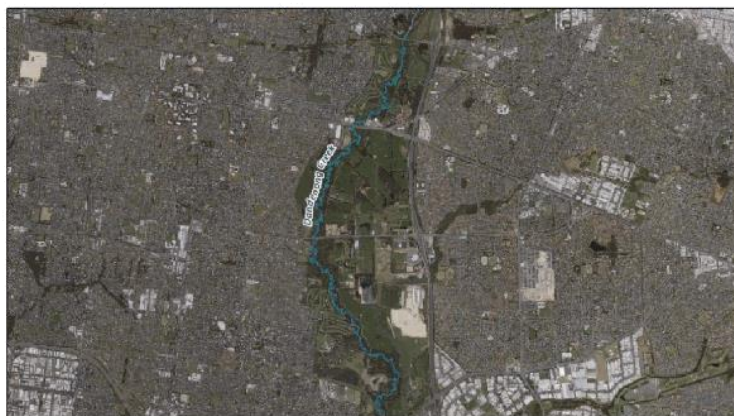
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The high suitability of particular riparian corridors (such as along the Yarra River and Dandenong Creek) for many of these species highlights the importance of these features for the persistence of some species in the urban landscape, and the importance of connectivity. However, for species that are better able to exist in the urban environment, suitable habitat and connectivity are also provided by streetscapes and backyards.

Identifying a network of existing and potentially new habitat corridors at different scales for a range of species (and protecting and improving these corridors) will be an important step in creating an enhanced urban forest for Melbourne. For example, combining habitat models based on species records and known habitat preferences with canopy mapping can reveal areas for future corridor improvement, as illustrated in Figure 8.

Figure 8: Canopy mapping and bird species habitat modelling used together, to reveal areas suitable for corridor improvement by expanding the urban forest: Dandenong Creek Valley Parklands in eastern Melbourne

- a) Current aerial photography of part of the Dandenong Creek Valley Parklands in eastern Melbourne.**

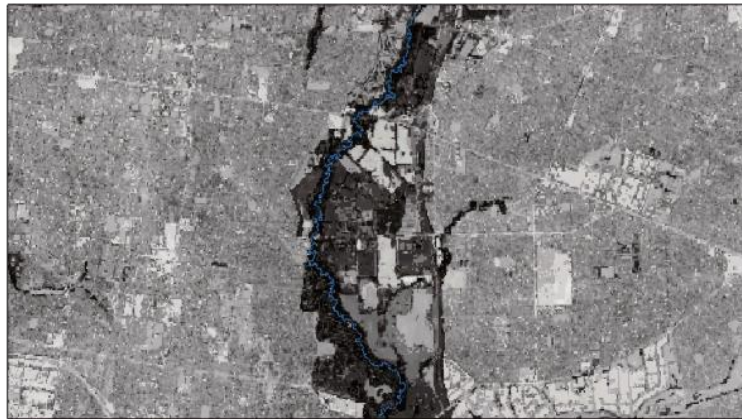


- b) Mapped canopy cover over the Dandenong Creek Valley and surrounding suburbs over aerial photography.**



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- c) Likelihood of occurrence for a suite of hollow-nesting bird species in the Dandenong Creek Valley (black and dark grey areas are most likely) (see also Figure 7 and the *Living Melbourne Technical Report* for more details).



- d) Canopy cover (green) overlaid on hollow-nesting bird species suitability. The visible areas of darkest shading (black and dark grey) indicate areas without existing canopy that could be suitable for restoration and connectivity improvement for hollow-nesting bird species.



Correlations between the urban forest and heat vulnerability

In developing the *Living Melbourne* strategy, we analysed land surface temperature (Figure 9) using a variety of Australian Bureau of Statistics indices, such as the Socio-Economic Indexes for Areas, which ranks areas in Australia according to relative socio-economic advantage and disadvantage. This found a close correlation between hot spots in the landscape and vulnerable populations. We also found, in most cases, a greater number of hot spots where the percentage of residential rental properties is higher and where weekly household income is lower.

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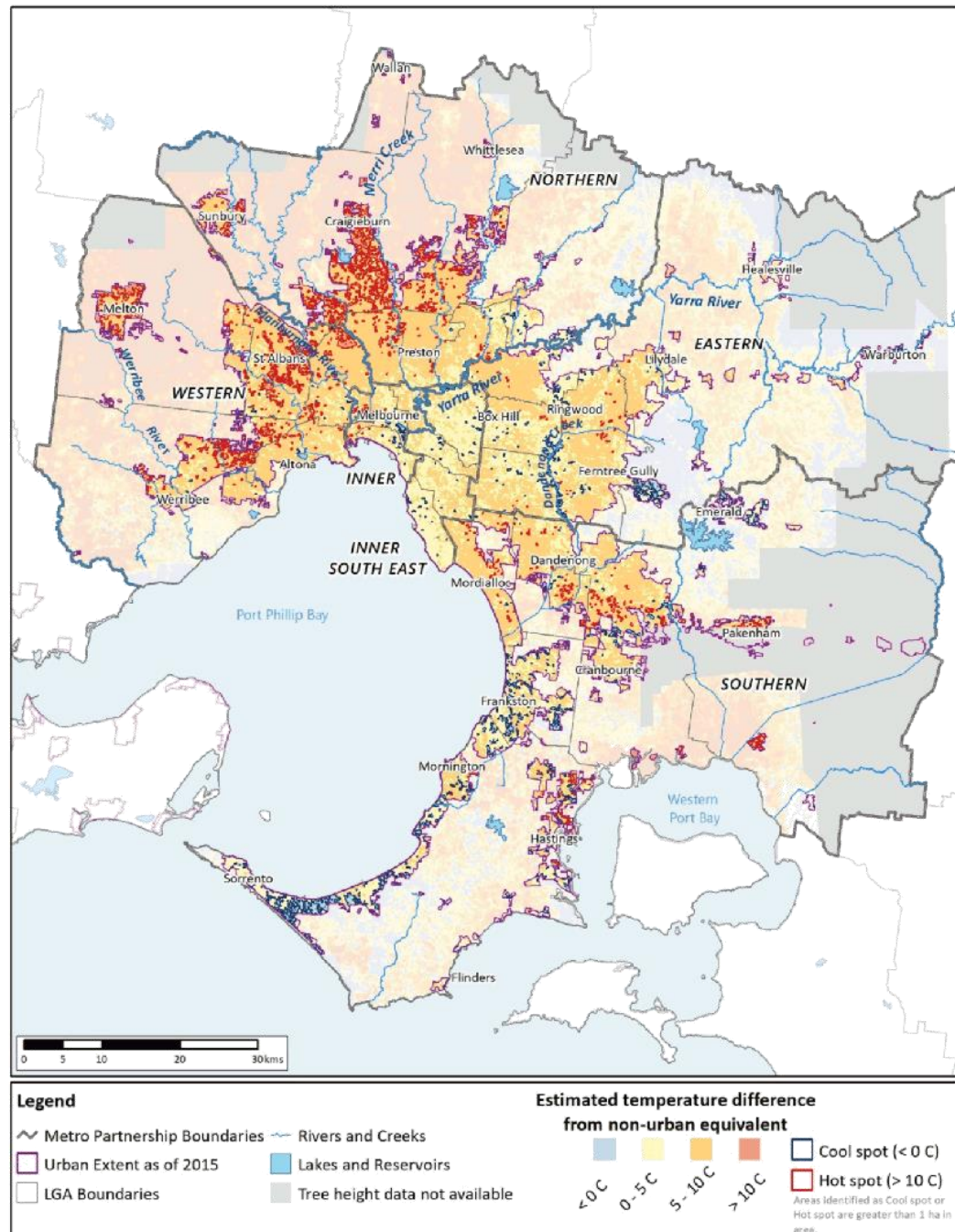
The land surface temperature analysis was also undertaken to explore the effect of total vegetation cover and vegetation height. About half of metropolitan Melbourne is 5°C above the city's estimated non-urban baseline temperature. This applies to about 80 per cent of the Northern and Western regions. It also shows that, overall, in cool spots (areas that are equal to or below their estimated non-urban baseline temperature) there is more vegetation and far more canopy (vegetation greater than three metres in height). On average, hot spots have less than three per cent canopy and no tall trees (trees greater than 15 metres high). Vegetation between three and 10 metres high is predominant across Melbourne, and provides for more cool spots.

The highest numbers of hot spots occur in the north, west and south of Melbourne. The north and west also have far more hot spots than cool spots. The size of hot spots and cool spots varies: hot spots in the east are on average three hectares in area, compared to hot spots in the west averaging nearly 10 hectares in area. The opposite is true for the cool spots: these are larger in southern and eastern Melbourne (which is more heavily vegetated) and smaller in the north and west.

A full analysis is provided in Chapter 7 of the *Technical Report*.

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Figure 9: Urban heat islands across metropolitan Melbourne. Hot spots ($> 10^{\circ}\text{C}$ warmer than non-urban conditions) bordered in bright red. Cool spots (areas that are equal to or below their estimated non-urban baseline temperature = $< 0^{\circ}\text{C}$) bordered in dark blue.



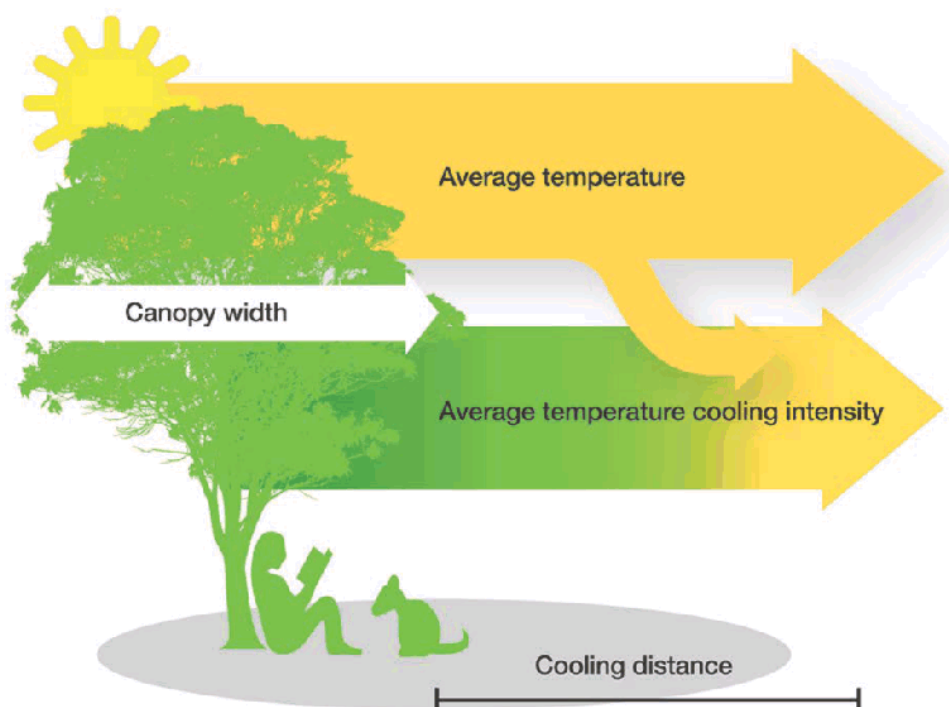
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Trees and temperature reduction

In urban areas, individual trees can substantially lower maximum summer daytime air temperatures at the street and pedestrian level. They do this in two ways: by transpirative cooling and by shading.⁵⁹ However, the shading of sealed surfaces under a tree canopy is particularly important in improving pedestrian thermal comfort, because it dramatically lowers surface temperatures, and the mean radiant temperature to which pedestrians are exposed.⁶⁰

A tree canopy produces a 'cooling intensity' (the reduction in average air temperature under a tree canopy compared to the temperature outside the patch covered by the canopy, expressed in degrees Celsius). The cooling intensity of urban trees can vary substantially between tree species but generally, the larger the canopy, the greater the cooling intensity. The cooler air from beneath the canopy then disperses away from the patch and slowly mixes with the adjacent hot air. The further the air moves from the canopy, the closer it gets to the average temperature in the city, as illustrated in Figure 10. Further discussion about tree species can be found in Chapter 3 of the *Technical Report*.

Figure 10: Temperature mitigation by trees (© Mackinzie Jones, Apertures)



One of the most effective ways to reduce temperatures is to provide shade trees in combination with increased permeable surfaces that will retain more moisture in the landscape.

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Compared with moist and shaded environments, a built-up city with one million or more people can have average air temperature increases of 1°C to 3°C during the day, and up to 12°C during the night.⁶¹ Inner Melbourne temperatures have shown peaks up to 7°C higher than those of surrounding rural areas.⁶²

The cover provided by trees and other vegetation can affect cooling intensity in two ways. First, vegetative cover shades impervious surfaces, preventing the sun's rays from hitting them. This inhibits the storage and subsequent release of heat, which would contribute to the urban heat island effect. Trees that are tall enough to create a large shaded area under their canopy are more useful than short vegetation. Trees also transpire water as they grow and photosynthesise. This water absorbs surrounding warmth and is converted from liquid into water vapour, which in turn prevents an increase in air temperature.⁶³

Like vulnerability overall, the harm caused to human health by excessive heat is concentrated in particular parts of the population, particularly the elderly, young children, socially isolated persons, people with chronic disease, and those in built-up urban areas. Around the world, people are living longer and Australia is no exception. The percentage of our population aged 65 or older is projected to increase from 14 per cent in 2012 to 25 per cent in 2051. In Victoria, 2.2 million people, or 21.5 per cent of the state's population, will be 65 years or older by 2051. Higher urban temperatures disproportionately affect elderly people.⁶⁴

Water-sensitive urban design

We need access to enough water to meet basic human needs and to support a healthy environment and economy. The Millennium Drought from 1997 to 2009 highlighted that water from any source is a valuable resource, which we need to use efficiently. Without enough water, efforts to maintain and extend the urban forest will be unsuccessful.

Rainwater, stormwater and recycled water are valuable resources which can potentially be used to reduce demand on the water supply system and help sustain our urban forest. It will be important to continue to explore and invest in the right mix of sustainable water supply options to ensure urban forests establish and thrive. As more surfaces become impermeable – and as climate change reduces rainfall and increases heat, evaporation and the variability of what rain there is – we must make the most of advances in urban water management.

Water-sensitive urban design (WSUD) is one such solution that uses better urban planning and design to clean, re-use and absorb stormwater, stopping it from reaching our waterways by mimicking the natural water cycle. The urban forest is a vital part of this process. WSUD integrates 'urban planning with the management, protection, and conservation of the urban water cycle' and 'ensures water management is sensitive to natural hydrological and ecological processes'.⁶⁵ By making decisions that recognise water as a valuable, vulnerable and finite resource, we can provide water to our cities and maintain a healthy urban forest.

WSUD supports the urban forest by harvesting, using and re-using stormwater, and establishing wetlands and water infiltration systems. Conversely, the urban forest plays an important role in WSUD, by reducing evaporation, slowing and absorbing water run-off, and trapping pollutants.

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Improving urban air quality

The *Victorian State of the Environment Report 2018* identifies opportunities to consider air quality when making urban planning decisions, particularly in relation to urban green space and opportunities to reduce reliance on motor vehicles and other sources of air pollution.⁶⁶

The project Green for Good: Assessing the Health Returns of Green Investment assessed the effects of green infrastructure on the health of children in the city of Louisville, Kentucky, USA. A screen of mature trees and shrubs was planted along the busy road in front of a school; urine and blood tests were taken from the children and staff three weeks before and three weeks after the screen was installed. The results showed that, under certain conditions, the green wall bio-filter reduced particulate pollution by 60 per cent. A large body of literature suggests that trees can provide localised but meaningful reductions in airborne particulate matter. But tree planting should complement – not replace – other efforts to reduce particulates in the air.⁶⁷

Developing the *Living Melbourne* strategy

Global and local momentum

The rapid urban growth being experienced by Melbourne is part of a worldwide trend. A recent assessment of global urbanisation patterns and biodiversity loss confirms that we are now witnessing the most significant urban growth in human history.⁶⁸

The United Nations Department of Economic and Social Affairs estimates that, by 2050, roughly 68 per cent of the world's population will be urban.⁶⁹ This means that the next 30 years will see the largest human settlement transformation in human history. It forecasts that, by 2050, 2.4 billion more people will be living in cities, a rate of urban growth that is equivalent to building a city with the population of London every seven weeks. In the space of 30 years, humanity will urbanise an area of 1.2 million square kilometres, nearly the size of the Northern Territory.

The United Nations 2030 Agenda for Sustainable Development provides a worldwide plan for dignity, peace and prosperity for people and the planet, now and in the future. *Living Melbourne* supports the following Sustainable Development Goals⁷⁰ (Figure 11):

- Goal 3: Good health and wellbeing
- Goal 6: Clean water and sanitation
- Goal 11: Sustainable cities and communities
- Goal 13: Climate action
- Goal 14: Life below water
- Goal 15: Life on land
- Goal 17: Partnerships for the goals

Figure 11: The United Nations Global Goals for Sustainable Development



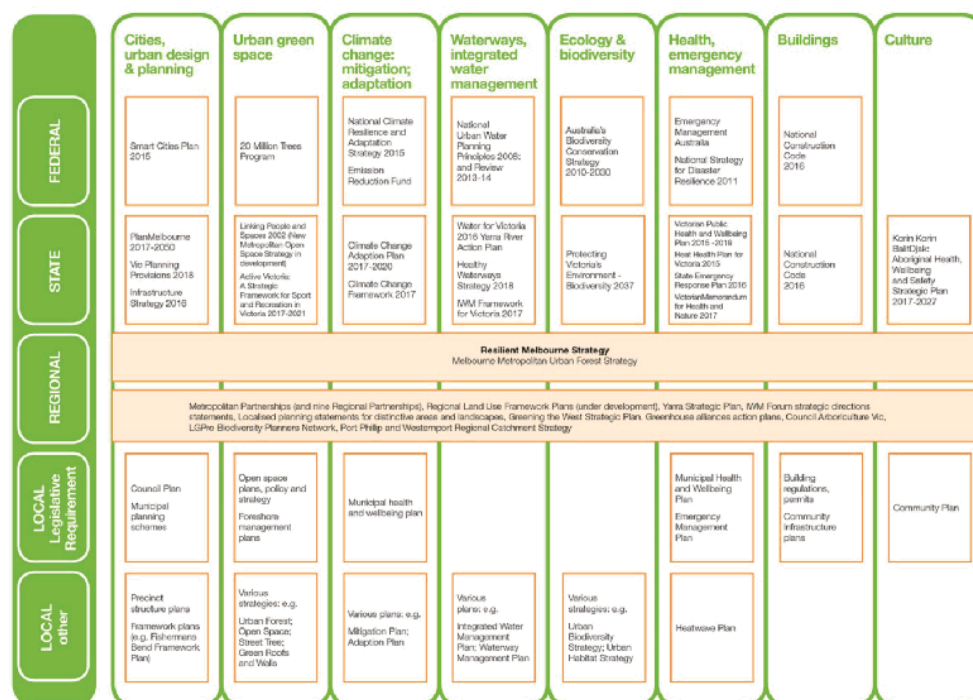
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Policies relevant to metropolitan Melbourne's urban forest

Many local, Victorian and Australian government policies and strategies have implications for Melbourne's urban forest (Figure 12). This section summarises important documents (with further details provided in Chapter 5 of the *Technical Report*).

Figure 12: Major government policies and actions relevant to Melbourne's urban forest



Local government urban forest strategies

All councils in metropolitan Melbourne recognise, in their strategies and policies on public open space, the value of green space and tree canopy cover. This is why, when the *Resilient Melbourne* strategy was created, the metropolitan urban forest was the most strongly supported action.

At the time of writing the *Living Melbourne* strategy, 13 local government authorities have an urban forest strategy and are making efforts to maintain or increase tree canopy cover. Although some strategies focus narrowly on street trees and canopy on public land, others also consider vegetation on private land, have performance measures, are long term, and use a broad definition of an urban forest. Many more councils have urban landscape, open space, or street tree strategies which also contribute to the urban forest.

Currently, eight municipalities have specific tree requirements in the schedules to their residential zones for development proposals for two or more dwellings. Requirements include elements such as a minimum number of trees per specified area, and specific

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characteristics of trees such as size, maturity, canopy tree and species. Additional responsibilities are assigned to local governments through the Victoria Planning Provisions garden area requirement, introduced in March 2017, which applies to two residential zones: General Residential and Neighbourhood Residential. Councils must now assess the garden areas in residential development proposals that require a planning permit on lots over 400 square metres in those two zones; stipulated minimum standards must be met.

Victorian Government policies and strategies

A range of Victorian Government documents provide support and guidance relating to Melbourne's urban forest. These include *Plan Melbourne 2017–2050*, the *Victorian Climate Change Adaptation Plan 2017–2020*, *Protecting Victoria's Environment – Biodiversity 2037*, and the *Victorian Public Health and Wellbeing Plan*, among others.

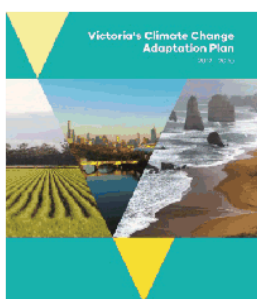


Plan Melbourne 2017–2050

Victoria has set a strong policy direction towards cooling and greening, to help create a city that is more sustainable, resilient and better adapted to the changing climate. *Plan Melbourne 2017–2050*, the state's long-term plan to accommodate Melbourne's future growth in population and employment, supports the need to maintain and enhance its urban forest.

Direction 6.3 'Integrate urban development and water cycle management to support a resilient and liveable city' understands that by considering the whole water cycle when planning for urban areas, we can improve wastewater management and recycling, support urban greening and cooling, protect waterways, minimise the impact of flooding and improve water security.

Direction 6.4 'Make Melbourne cooler and greener' and Direction 6.5 'Protect and restore natural habitats', explicitly encourage 'maintaining and enhancing ... [the] urban forest of trees and vegetation' and support 'the development of the metropolitan urban forest strategy'.⁷¹

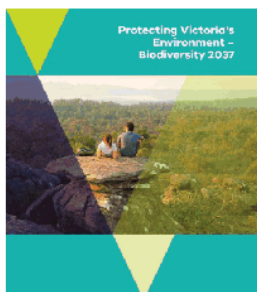


Victoria's Climate Change Adaptation Plan 2017–2020

Victoria's Climate Change Adaptation Plan 2017–2020 sets out the Victorian Government's priorities for leading and supporting the community to adapt to climate change from 2017 to 2020.⁷² It explains how the government will support adaptation and coordinate action on different scales (local, regional, and sectoral). Important elements of this plan include improving how we consider climate change when making decisions about the built environment, and taking immediate steps to minimise the urban heat island effect and manage risks to the transport system.

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Protecting Victoria's Environment – Biodiversity 2037

Protecting Victoria's Environment – Biodiversity 2037 is the Victorian Government's plan to stop the decline of biodiversity and improve the state's natural environment over the next 20 years. It highlights the need to create more liveable and climate-adapted local communities, by planting trees to reduce heat and creating a network of natural and designed green spaces. Like *Plan Melbourne 2017–2050*, *Protecting Victoria's Environment: Biodiversity 2037* also refers specifically to the metropolitan-wide urban forest strategy.



Victorian Public Health and Wellbeing Plan 2015–2019

The *Victorian Public Health and Wellbeing Plan 2015–2019* sets out a long-term agenda for improving health and social wellbeing in Victoria.⁷³ In setting high-level goals for change and improvement, the plan recognises and seeks to complement many existing and emerging plans, strategies and policies for improving public health. A statutory link between the *Climate Change Act 2010* and the *Public Health and Wellbeing Act 2008* has been made that requires councils to regard the *Climate Change Act* when preparing a municipal public health and wellbeing plan. The Department of Health and Human Services has developed guidance about how to consider climate change in planning strategies and actions across councils.

Another important Victorian Government strategy is currently in development: the *Metropolitan Open Space Strategy*, described in Box 8.

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Box 8: Metropolitan open space strategy

Plan Melbourne 2017–2050 recognises green infrastructure as essential to liveable cities and healthy communities.

Partnerships between Victorian and local government authorities will look for new ways to optimise use of and access to public land and make open space accessible and enjoyable for all Melburnians. A new investment framework, to be developed as part of the new metropolitan open space strategy under Action 93 of *Plan Melbourne 2017–2050*, will reinforce and complement the legacy and foundations of past planning to create a fairer and more equitable open space network.

The map below is from the Plan for General Development, Melbourne, commissioned by the Metropolitan Town Planning Commission in 1929, which recognised the value of Melbourne's radial waterways to the open space network. The legacy of the commission's important work still influences Melbourne's urban form today.



Healthy Waterways Strategy 2018–28 and Integrated Water Management Framework 2017

Water authorities, consistent with the strategy *Water for Victoria*, are recognising their important role in supporting a healthy urban forest. Melbourne Water's *Healthy Waterways Strategy 2018–28* is a strategy shared by Melbourne Water, state and local governments, water corporations and the community. It covers the rivers, creeks, estuaries and wetlands of the Port Phillip and Westernport Region, providing a single framework to protect and improve the waterways' environmental, social, economic and cultural values for the community.

Integrated water management is essential if we are to provide enough water to support our urban forest. The *Integrated Water Management Framework 2017* describes the benefits of

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consistent and strategic collaboration in the water sector – water corporations, local governments, and catchment management authorities – and with other organisations involved in land use planning. Box 9 illustrates the importance for the urban forest of work by our water authorities.

Box 9: The importance of water authorities

Public utilities such as Melbourne Water are active in cooling and greening our city. Melbourne Water has committed to 'investing directly in improving 30 hectares of green spaces for shade and cooling across Melbourne by 2021'.⁷⁴

Water-sensitive urban design in Melbourne is supported by several state and local government policies, including the Victorian Planning Provisions, precinct structure plans and the *Integrated Water Management Framework for Victoria*. Additionally, water authorities are applying water-sensitive urban design in their business strategies, such as Melbourne Water's *Healthy Waterways Strategy*, *Stormwater Strategy*, and *Integrated Water Future for Melbourne's North*.

Water for Victoria

Water for Victoria, the state's water plan, argues for the use of diverse water sources to protect public spaces.⁷⁵ In particular, it encourages water corporations to work with local government and other managers of public open space to identify water sources that can be used to maintain community assets such as gardens and street trees, and seek opportunities to cool the city in order to improve community health, wellbeing and liveability.

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Living Melbourne: A new way forward

How was the strategy devised?

The development of the *Living Melbourne* strategy is a 'flagship action' under the *Resilient Melbourne* strategy. The Nature Conservancy and Resilient Melbourne have developed this strategy in collaboration with many other organisations and individuals. They also drew upon the advice of a Senior Reference Group and a Technical Advisory Group. This process included a series of workshops to guide development of the strategy, incorporate stakeholder perspectives and review the strategy as it progressed. The four major workshops helped us to:

- establish the baseline and set the initial vision (local government only)
- develop the strategic foundation
- identify technical evidence to guide the strategy
- frame and develop the draft strategy.

The parties involved were metropolitan Melbourne's 32 local government authorities, Victorian Government departments and statutory agencies, technical experts, land managers, policy makers, planners, developers and community representatives.

How to use this strategy

This strategy sets out a program of interrelated actions that will work together to bring metropolitan Melbourne closer to our vision of 'thriving communities that are resilient and connected through nature'. This strategy has three goals: healthy people, abundant nature and natural infrastructure. Each goal will result in specified benefits for Melbourne's people and our forest.

The goals are to be achieved by actions – the steps we need to take to get there.

Much valuable work is already being led by metropolitan Melbourne's local governments, the Victorian Government, non-government and community organisations, private landowners and many others. What has been missing until now is a way for this work to be coordinated and supported at a metropolitan scale. Actions 1 to 6 set out a way to combine our efforts, enabling us to:

- protect and restore species habitat, and improve connectivity (Action 1)
- set targets and track progress (Action 2)
- scale up greening in the private realm (Action 3)
- collaborate across sectors and regions (Action 4)
- build a toolkit of resources to underpin implementation (Action 5)
- fund the protection, improvement and expansion of the urban forest (Action 6).

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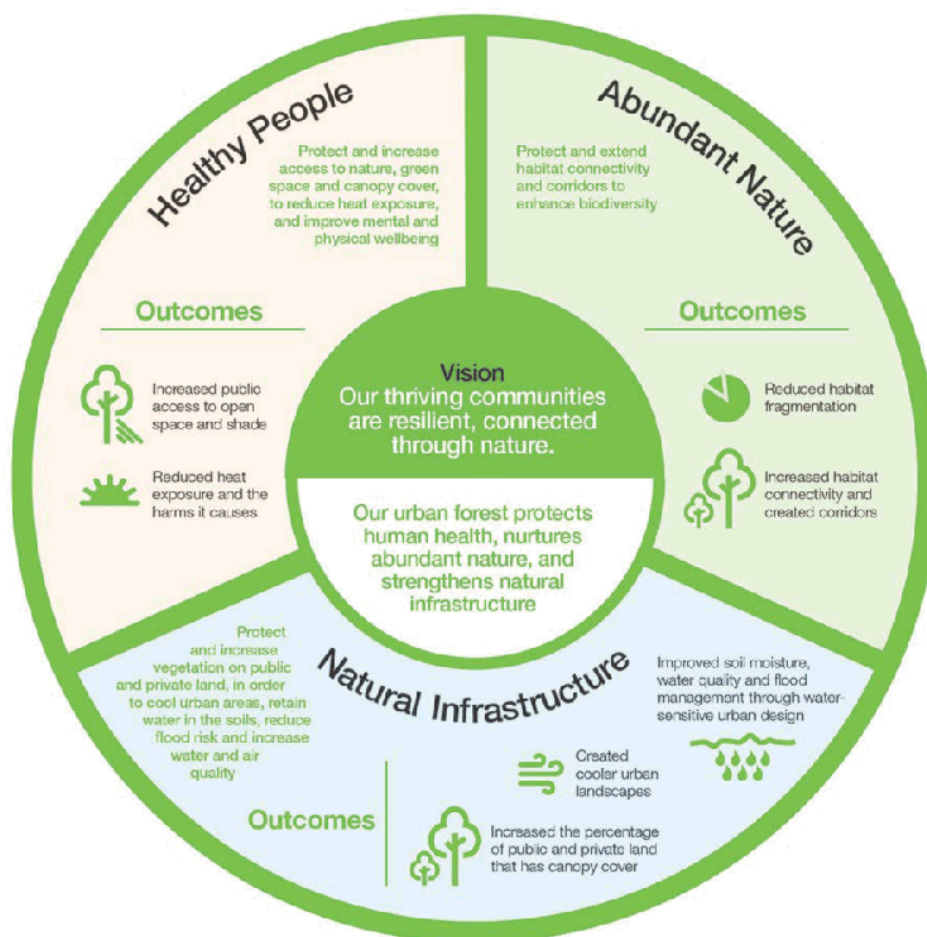
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Taking action for a *Living Melbourne*

This strategy has three goals:

- **Healthy people:** Protect and increase access to nature, green space and canopy cover, to reduce heat exposure, and improve mental and physical wellbeing
- **Abundant nature:** Protect and extend habitat connectivity and corridors to enhance biodiversity
- **Natural infrastructure:** Protect and increase vegetation on public and private land, in order to cool urban areas, retain water in the soils, reduce flood risk and increase water and air quality.

Figure 13: Three goals for a *Living Melbourne*



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Healthy people

Protect and increase access to nature, green space and canopy cover, to reduce heat exposure, and improve mental and physical wellbeing

Nature enriches our lives and improves our physical, mental, social and spiritual wellbeing. Traditional Owners have recognised this connection for thousands of years and their cultures reflect their profound connection to Country. Making nature accessible to more people in urban areas can instil a deeper connection with nature, and unlock the benefits of nature for people's lives and health. While this connection will remain fundamentally important to our First Peoples, there is now also wider understanding of how important such connections are.

A healthy, vibrant, biodiverse natural world enables the health of all creatures living on this earth.

We cannot achieve optimal human health without developing healthy natural environments. It is through shared responsibility and a collective effort to enable a flourishing natural world that we will position ourselves for better health into the future.

Dr Bruce Bolam
Chief Preventive Health Officer
Department of Health and Human Services

The urban forest supports cohesive and healthy communities by fostering social connections, contributing to a sense of place, and offering opportunities for relaxation and play. Exposure to nature improves our cognitive abilities, strengthens our immune systems and, by encouraging physical activity, reduces the incidence and harms of many non-communicable diseases. We must provide these benefits to all people in our city.

A healthy urban forest is also one of the most effective ways to reduce the temperature of the city and lessen the harm to mental and physical health caused by the urban heat island effect. Transpiration and shading reduce the mean temperature and greatly improve thermal comfort. Increasing our urban canopy and opening up access to nature will make our city safer during heatwaves, and people healthier in their daily lives.

We will know we have met this goal when we have:

- increased public access to open space and shade
- reduced heat exposure and the harms it causes.

Abundant nature

Protect and extend habitat connectivity and corridors to enhance biodiversity

There is widespread recognition that our natural environment is not only beautiful and provides essential ecosystem services, but also that it is fundamental to the health and wellbeing of every Victorian.⁷⁶ This understanding is reflected around the world, with an acceptance that nature in and near cities is crucial, not just for maintaining biodiversity but also for ensuring human wellbeing.⁷⁷ Although the urban forest provides many services to Melburnians, it is also important to acknowledge that native plants and animals also have

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significant intrinsic value, regardless of whether they provide tangible benefits to humans. As custodians of the natural environment, it is our duty to protect the biodiversity in our city.

Our cities are not outside nature. Wherever we live, we need green, healthy places for us to survive and prosper. Without plants and nature we simply would not exist. They give us not only life, but opportunities for reflection and inspiration. Above all, we need a diverse and resilient natural landscape, around and within our cities. And we need to understand and appreciate that landscape, in particular the demands of climate change and an increasing urban population.

Professor Tim Entwisle
Director and Chief Executive,
Royal Botanic Gardens Victoria

Urbanisation, land clearing and climate change are putting our fauna and flora under stress. Our improved understanding of the urban forest and the biodiversity it supports opens the way to achieve better results for nature in our increasingly urbanised world. Flora and fauna populations are more likely to survive when their habitat is protected and when they are able to disperse across landscapes. Improving connectivity and creating corridors to reduce habitat fragmentation is essential. However, for such work to have a chance of succeeding, urban growth plans need to incorporate information on biodiversity and ecosystem values and protect and expand remnant vegetation.

We will know we have met this goal when we have:

- reduced fragmentation of existing habitat
- increased habitat connectivity and created corridors

Natural infrastructure

Protect and increase vegetation on public and private land in order to cool urban areas, retain water in the soils, reduce flood risk, and increase water and air quality

Metropolitan Melbourne's urban forest provides important ecosystem services that are vital to supporting human life, health and wellbeing in our city. The urban forest filters our air and purifies water, protects our coast from flooding and erosion, provides opportunities for social connection, and shades and cools the city and suburbs. Only recently have these benefits been recognised. Human-made 'grey infrastructure' such as roads, drainage systems and power grids, have historically taken precedence over natural infrastructure in planning decisions.

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Research demonstrates that the benefits of natural infrastructure should be understood and valued in the broadest sense, inclusive of economic, environmental, health and social dividends. In urban areas natural infrastructure can act as a value multiplier across traditional infrastructure to create additional benefits for liveability and amenity that help make our cities thrive.

Appreciating the importance of prioritising natural infrastructure as an asset across our cities is vital to realising this value for all our citizens, today and for the generations that follow.

Jonathan Cartledge
Interim Chief Executive Officer
Green Building Council of Australia (GBCA)

We now know that natural infrastructure complements grey infrastructure and, in certain situations, is better at providing social, environmental and economic benefits. There are already planning policies and controls that encourage the retention of trees and a range of overlays available to councils to further protect valued trees. However, regulations and business models could be strengthened to further encourage our transport authorities, utility companies, local government authorities and developers to recognise the urban forest as essential infrastructure and afford it the protection and proper management it deserves. We must view nature and natural infrastructure as assets equally necessary for the successful operation of a society.

We will know we have met this goal when we have:

- increased the percentage of public and private land that has canopy cover
- created cooler urban landscapes
- improved soil moisture, water quality and flood management through water-sensitive urban design.

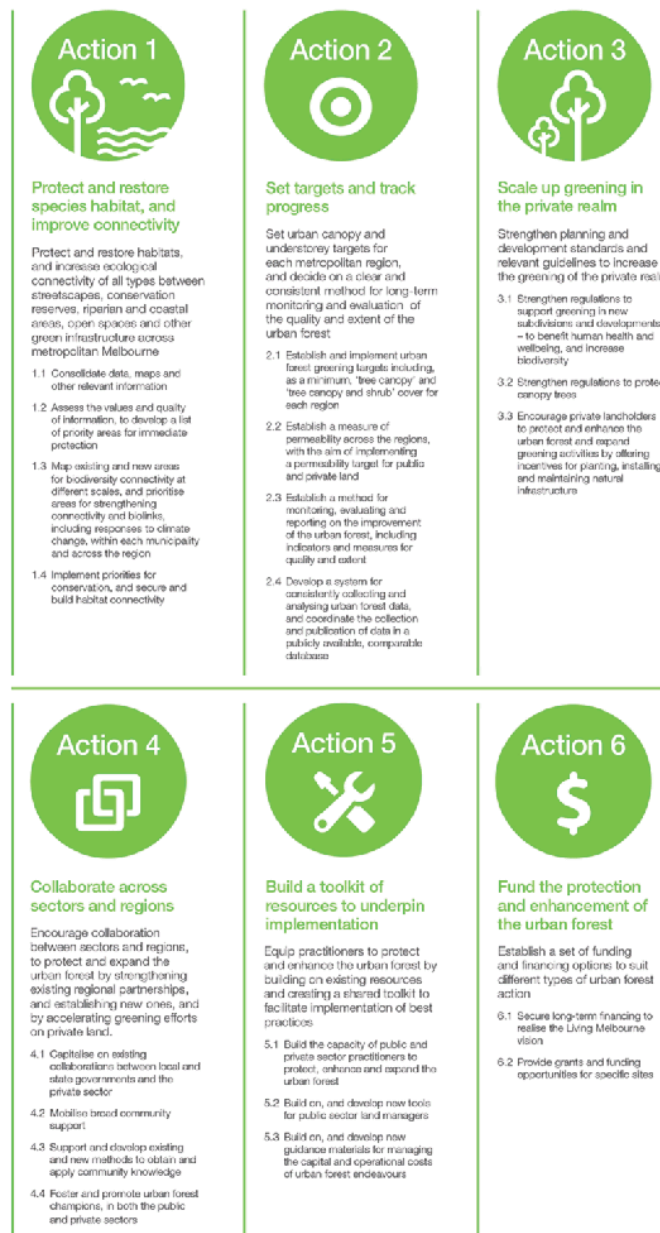
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Actions for a Living Melbourne

Living Melbourne's goals are supported by six actions, summarised below in Figure 14, and described in more detail over the following pages.

Figure 14 Six actions for a Living Melbourne



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Action 1: Protect and restore species habitat, and improve connectivity

Protect and restore habitats, and increase ecological connectivity of all types between streetscapes, conservation reserves, riparian and coastal areas, open spaces and other green infrastructure across metropolitan Melbourne

Why do we need to protect, restore and connect habitat?

Melbourne has one of the highest percentages of open green space of any city in the world. However, the distribution and extent of native vegetation varies, with inner-city areas retaining less original native vegetation and having a larger proportion of introduced flora species than Melbourne's outer suburbs.⁷⁸ Urban areas can play a significant role in conserving biodiversity, but without conscious efforts to protect and enhance habitat and linking corridors, our natural environment, which is 'fundamental to the health and wellbeing of every Victorian',⁷⁹ will continue to decline.

Restoring corridors and connectivity in Melbourne is required at different scales and will need different approaches. Efforts to restore corridors on public land, which often focus on riverine corridors, should give priority to indigenous plant species. In an urban setting, while indigenous plant species are usually best for fauna (especially mobile fauna such as birds, bats and insects), non-indigenous native plant species can also provide important resources (such as food and shelter). Although introduced species of trees and shrubs typically offer fewer resources to fauna, they still provide ecosystem services and, in neighbourhoods where introduced trees dominate, the habitat value of these areas can be improved by increasing structure (such as by planting shrubs and native understorey). We must manage the different elements of the urban forest collectively, building upon existing habitat and vegetation to form an interconnected matrix of green spaces across the urban landscape. Box 10 provides an example of the success of the Merri Creek revegetation works. It is an excellent example of successfully connecting natural habitats in a rapidly changing urban setting.

Box 10: Friends of Merri Creek

The Merri Creek corridor extends from rural open space to inner urban Melbourne, passing through residential and industrial landscapes including sites important to the Traditional Owners, the Wurundjeri people.

The Friends of Merri Creek is an active community group based in Melbourne. Since 1988 they have actively planned and replanted native vegetation, to restore the biodiversity of the creek and its landscape.

In addition to the greening that they have achieved over the years, the Friends foster social connection and cohesion through their activities. They hold regular creek-side activities and encourage community participation in their work, such as planting, site maintenance, surveying birdlife, testing water quality and running litter blitzes.

In addition, the Friends group is represented on the Merri Creek Management Committee, a non-profit organisation that operates the Merri Creek Environment Fund. The Friends have also played an important and successful role in opposing inappropriate development that would have harmed the creek and its surrounds.

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What needs to be done?

- 1.1 Consolidate data, maps and other relevant information
- 1.2 Assess the value and quality of information, to develop a list of priority areas for immediate protection
- 1.3 Map existing and new areas for biodiversity connectivity at different scales, and prioritise areas for strengthening connectivity and biolinks, including responses to climate change, within each municipality and across the region
- 1.4 Implement priorities for conservation, to secure and build habitat connectivity

Action 1.1: Consolidate data, maps and other relevant information

To get maximum return from any investment in protecting and enhancing the urban forest, we need to improve the completeness and accuracy of available information, including data and maps. For example, understanding where remnants of native habitat are can help us to better manage, protect and connect them.

We need to build upon the mapping done for this strategy, and systematically map natural habitat connectivity opportunities at different scales, across all jurisdictions and land tenures. Initial efforts should concentrate on:

- sites of biodiversity significance
- vegetation – whether indigenous, native or introduced – that provides habitat for fauna
- areas with future potential for habitat restoration (for instance, bare earth, non-native grassland).

Many organisations are already undertaking valuable data-collecting projects. For example, BirdLife Australia's bird atlas, when used with other datasets, helped demonstrate differing levels of connectivity for different bird species and bird groups in this strategy (see Figure 8).

Action 1.2: Assess the values and quality of information, to develop a list of priority areas for immediate protection

The information gathered in Action 1.1 must be carefully assessed to develop a list of priority areas for immediate protection. This assessment will help set priorities for efforts to protect important remnant vegetation, canopy trees and other essential habitat values.

Action 1.3: Map existing and new areas for biodiversity connectivity at different scales, and prioritise areas for strengthening connectivity and biolinks, including responses to climate change, within each municipality and across the region

Connectivity allows plants to pollinate and disperse, and animals to move in or between habitat areas, enabling gene dispersal, improving adaptation to climate change, and reducing the risk of extinction. Plants and animals move in different ways. Animals move over a large range of distances – from international migrations to crossing a road to forage for food. We need to better understand Melbourne's habitat connectivity at different scales, within individual municipalities and across the region, to protect what exists and identify opportunities for increasing connectivity. In prioritising and building connectivity, we must consider the effects of climate change.

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Action 1.4: Implement priorities for conservation, and secure and build habitat connectivity

Once areas for conservation have been mapped and prioritised, it is vital that action is taken to protect priority sites and create habitat corridors at various scales. This may include securing land when opportunities arise, to protect and expand corridors.

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Action 2: Set targets and track progress

Set urban canopy and understorey targets for each metropolitan region, and decide on a clear and consistent method for long-term monitoring and evaluation of the quality and extent of the urban forest

Why do we need to set targets, and track progress towards meeting them?

Clear, consistent and agreed methods for monitoring and evaluating the urban forest will be essential for tracking progress and managing the urban forest in response to changes that arise. These methods are also important for transparency and accountability. Although many municipalities are already setting their own urban forest targets, there is little coordination of target-setting between local government authorities and, until now, no metropolitan-wide approach.

Monitoring and evaluation is essential to ensure that the vegetation protection, enhancement and expansion actions being taken are effectively improving mental and physical wellbeing, reducing heat exposure and increasing access to nature, green space and canopy cover.

Monitoring and evaluation are also essential for designing financial models that will attract investment (described under Action 6).

Victoria's Department of Environment, Land, Water and Planning recognises, through *Plan Melbourne 2017–2050* (Action 91) the need to create urban forests throughout metropolitan Melbourne, and to work with local government authorities to establish greening targets for each of the metropolitan regions.⁸⁰

What needs to be done?

- 2.1 Establish and implement urban forest greening targets including, as a minimum, 'tree canopy' and 'tree canopy and shrub' cover for each region
- 2.2 Establish a measure of permeability across the regions, with the aim of implementing a permeability target for public and private land
- 2.3 Establish a method for monitoring, evaluating and reporting on the improvement of the urban forest, including indicators and measures for quality and extent
- 2.4 Develop a system for consistently collecting and analysing urban forest data, and coordinate the collection and publication of data in a publicly available, comparable database

Action 2.1: Establish and implement urban forest greening targets including, as a minimum, 'tree canopy' and 'tree canopy and shrub' cover for each region.

We need to adopt regional targets for canopy and vegetation across Melbourne that are based on a common analysis of metropolitan-scale vegetation. Targets for 'canopy cover' and 'canopy and shrub' for each region are proposed in Table 2.

As a starting point for regional agreement, *Living Melbourne* proposes targets that:

- are calculated based on vegetation in the existing urban area at 2015
- apply to all land (public and private) in each region
- recommend increases each decade

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- are supported by principles, including no net loss of tree or shrub cover on public and private urban land in each metropolitan region.

Research suggests that targets should be specific to each region, and should take into account local conditions such as development density, land use, and climate.⁸¹ After considering the literature, current local government authority urban forest strategies, and regional context, ambitious regional tree canopy cover targets of between 20 and 30 per cent are proposed. Because native understorey and tree canopy cover of at least 30 per cent benefits biodiversity,⁸² both tree canopy and shrub targets of between 30 and 50 per cent by 2050 are proposed.

The 2015 baseline and targets for each of the six metropolitan regions vary, as they acknowledge the historical development of these regions and the ecological characteristics of their underlying bioregions. For example, the Eastern Region of Melbourne was developed before the Western Region, and is largely in the Gippsland Plain bioregion, which before European settlement was mostly dry forest. The result is a canopy cover of about 25 per cent in 2015, a higher 2050 target, and less action required to achieve this target. By contrast, the Western Region is a newer urban growth area and is predominantly in the Victorian Volcanic Plain bioregion, which was originally a largely plains grassland landscape. The result is a 2015 canopy cover of only 4 per cent, a lower 2050 target, and significantly more effort required to achieve this target. Further discussion on the distribution of the urban forest between public and private land, and across Melbourne, can be found in Chapter 6 of the *Technical Report*.

In providing for 'tree canopy' and 'tree canopy and shrub' cover targets, *Living Melbourne* acknowledges the increasing difficulty of getting canopy trees into some densely developed, established urban areas, and into new greenfield developments. This applies to both public and private land. It also acknowledges that shrubs are important for shading, aesthetics and habitat.

Principles to guide the implementation of urban forest targets are set out below, along with thresholds for the percentage of vegetation to be maintained or established on public and private land. This emphasis on both public and private land is important to avoid a concentration of effort on public land only, when vegetation on private urban land currently makes up 58 per cent of the tree canopy cover across metropolitan Melbourne. Although this percentage varies between the metropolitan regions (see Chapter 6 of the *Technical Report*), it is important – for both biodiversity habitat and human health and wellbeing – that this canopy is protected and expanded. Local government authorities in these regions are encouraged to follow these principles.

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Principles to support the urban forest targets for Melbourne

- No net loss of tree or shrub cover on public or private land in each metropolitan region
- Regional targets for canopy cover must apply to both public and private land
- Implementation partners must strive to achieve the targets set for each category of public open space, road reserves, and private land
- No more than 70 per cent of the additional canopy and shrub cover planted to achieve targets should be on public land
- At least 30 per cent of the additional canopy and shrub cover planted to achieve targets should be on private land

Table 2 below is organised geographically. Achieving the targets across private and public land will require government-wide action in partnership with councils, water authorities, the wider community and the land development industry. Figure 15 illustrates the relative commencement points and potential progress towards targets for each region.

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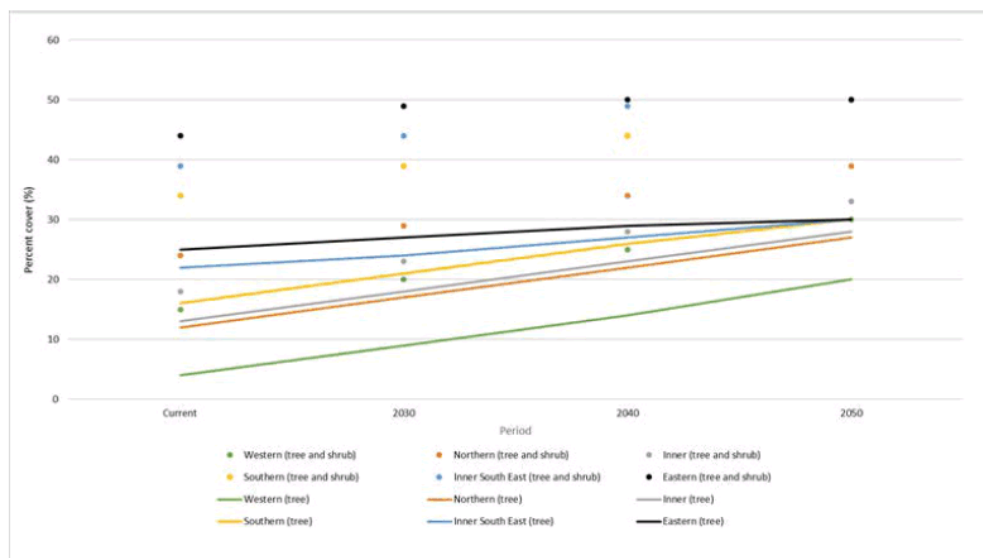
Table 2: Targets for tree canopy, and for canopy and shrubs, by region to 2050

Region	Local government authorities	Existing 2015		Target 2030		Target 2040		Target 2050	
		Total % tree canopy	Total % tree canopy & shrubs	Total % tree canopy	Total % tree canopy & shrubs	Total % tree canopy	Total % tree canopy & shrubs	Total % tree canopy	Total % tree canopy & shrubs
Western	Brimbank, Hobsons Bay, Maribymong, Melton, Moonee Valley, Wyndham	4	15	9	20	14	25	20	30
Northern	Banyule, Darebin, Hume, Mitchell, Moreland, Nillumbik, Whittlesea	12	24	17	29	22	34	27	39
Inner	Melbourne, Port Phillip, Yarra	13	18	18	23	23	28	28	33
Southern	Casey, Frankston, Greater Dandenong, Kingston, Mornington Peninsula, Cardinia	16	34	21	39	26	44	30	50
Inner South-East	Bayside, Boroondara, Glen Eira, Stonnington	22	39	24	44	27	49	30	50
Eastern	Knox, Manningham, Maroondah, Monash, Whitehorse, Yarra Ranges	25	44	27	49	29	50	30	50

Note: figures rounded to nearest whole number

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Figure 15: Tree canopy and tree and shrub cover targets: 2019–2050



Setting priorities for action

In addition to the considerations set out in Action 1.1, land managers should give priority to protecting and increasing vegetation – particularly canopy cover – in the following places:

- larger consolidated cool spots – to protect areas that contribute to reducing urban heat islands
- areas with a combination of high land surface temperatures, low percentage of canopy cover, and higher proportions of vulnerable community members – young children, older persons, culturally and linguistically diverse communities, public housing tenants, and socio-economically disadvantaged people
- schools, childcare centres, kindergartens, activity centres and neighbourhood shopping strips in hot areas
- new precincts and infrastructure developments
- locations where we can build on existing opportunities, such as extending Greening the Pipeline, Chain of Ponds collaboration, Friends of Merri Creek
- road reserves and streetscapes (where safety guidelines permit, for example behind flexible wire-rope safety barriers).

Action 2.2: Establish a measure of permeability across the regions, with the aim of implementing a permeability target for public and private land

Increasing our permeable surfaces is essential for the growth of our urban forest, because water is vital for vegetation growth. Hard surfaces on roads and roofs divert polluted stormwater into our drainage system, and from there into our catchments and Port Phillip

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Bay. This limits the ability of rain to infiltrate the soil and provide much-needed moisture for a healthy urban forest.

Increasing permeability allows water to be stored in the soil and used by vegetation to increase our canopy and green cover. Increasing permeable surfaces brings other benefits too, such as decreasing flood damage by limiting peak stormwater flows and floodwaters. Allowing water to infiltrate the entire soil profile is also critical. Surface irrigation exacerbates trees' vulnerability by encouraging shallow root systems, whereas deep watering encourages deep root growth, which is better able to reach soil moisture during low-rainfall periods.⁸³ Deep watering is easier to achieve in some soil types than others, so new ways may be needed to identify areas of lower rainfall and difficult soils.

Although a baseline analysis of permeability across metropolitan Melbourne was not available at the time of writing, the City of Melbourne has a goal for 40 per cent of the Elizabeth Street Catchment's soil surface to be unsealed by 2030, from a baseline of 17 per cent unsealed soil in 2014.⁸⁴ International examples of programs to increase permeable surfaces include cities in the United States such as Portland in Oregon,⁸⁵ Seattle in Washington⁸⁶ and Philadelphia in Pennsylvania.⁸⁷

Methods used to increase permeability across metropolitan Melbourne might include:

- applying integrated water cycle management design principles to increase the infiltration of stormwater for new street trees
- creating more open space
- creating more permeable roadsides, introducing new road median strips and widening existing ones
- using permeable paving materials
- building green roofs and walls

There is an opportunity to standardise increased permeability as part of municipal street upgrade programs by encouraging such street upgrades and renewals to embrace green infrastructure outcomes. The outcome would result in greener streets and increased permeability.

Together with other related requirements, clauses 54 and 55 of the Victoria Planning Provisions contain site permeability standards that at least 20 per cent of the site should not be covered by impermeable surfaces. Further detail can be found in Chapter 5 of the *Technical Report*.

Further work will be required to determine how to measure progress towards the Elizabeth Street Catchment permeability target. But we should be proactive in reducing impermeable surfaces in public and private urban spaces, to benefit our urban forest.

Action 2.3: *Establish a method for monitoring, evaluating and reporting on the improvement of the urban forest, including indicators and measures for quality and extent*

The success of this strategy depends on collaboration between all partners and tracking our progress to ensure that our efforts and investment are achieving our goals. Measuring, monitoring and maintaining an inventory of the urban forest are not new activities. However, current efforts are varied, and comparisons between them are difficult due to incomplete

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datasets, different methods and scales used, and the high costs of acquiring and analysing data. The development of a monitoring, evaluation, reporting and improvement framework will be essential for understanding the results of our actions, on the urban forest itself and more broadly on the socio-economic situation, health and wellbeing of communities. Box 11 sets out Action 91 of *Plan Melbourne 2017–2050*.

Box 11: Delivering *Plan Melbourne 2017–2050* to achieve a cooler, greener city

Plan Melbourne 2017–2050 recognises the urban heat island effect, climate change and the benefits of greening a rapidly growing city. It aims to make Melbourne cooler and greener, strengthen the metropolitan open space network, and better integrate urban development and water cycle management.

Action 91 proposes government-wide action to cool and green Melbourne through the creation of a metropolitan urban forest. This action includes working with local government and water authorities, supporting councils to develop municipal forest strategies, investigating green roof and green wall demonstration projects, and changing guidelines and regulations for subdivisions and new development. Spatial data on metropolitan Melbourne's green space network is also identified as a way to establish a detailed understanding of Melbourne's existing green cover, and how this is changing over time.

As a first step, the Department of Environment, Land, Water and Planning is working in partnership with RMIT University, the University of Western Australia, CSIRO, and the Clean Air and Urban Landscapes Hub of the National Environmental Science Program, to map and analyse vegetation, heat and land use across metropolitan Melbourne. This project is also supported by Melbourne Water. The project includes mapping 2014 and 2018 vegetation coverage, establishing an urban surface temperature baseline and mapping urban vulnerability. Some of this data is available via the Victorian Government Spatial DataMart.

Action 2.4: Develop a system for consistently collecting and analysing urban forest data, and coordinate the collection and publication of data in a publicly available, comparable database

Many different organisations and individuals help care for and monitor the urban forest, including citizens, researchers, and government bodies (such as those responsible for transport, planning, the environment, and water). They need a range of current and historical data on which to make decisions, manage resources under changing circumstances, continuously improve their work, and to provide an evidence-base for advocacy. Different types of data may be of interest to different people and groups, from data on the physical health of the urban forest, to data on ecosystem services, the health and wellbeing benefits provided by the urban forest, and the time and investment needed for its care.

Given recent technological advances in measuring and modelling, it is now possible to go beyond simply keeping inventories; we can quantify the many benefits of the urban forest. For transparency, and to allow the data to be used and contributed to by all, including residents and the community as a whole, data should be made publicly available and interactive online.

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Action 3: Scale up greening in the private realm

Strengthen planning and development standards and relevant guidelines to increase the greening of the private realm

Why do we need to green the private realm?

Land zoned for residential, commercial, industrial, special or rural use contributes more than 66 per cent of the existing tree canopy, with residential land alone contributing 58 per cent. With a trend towards larger houses on smaller lots in greenfield developments, and higher-density development in urban infill areas, gardens have become smaller, and impervious surfaces have increased. The result is a rapid diminishing of the urban forest, as room for vegetation in private space shrinks. Protecting, maintaining and nurturing the trees and suitable understorey vegetation on private land is critical to maintaining and expanding the urban forest. A full regional analysis can be found in Chapter 6 of the *Technical Report*.

Further, much greater use of green roofs and green walls is required, both to increase permeability of urban environments and to provide habitat. Box 12 describes how the cities of San Francisco and Denver are attempting to achieve this.

Box 12: Regulating for green roofs in San Francisco and Denver

The City of San Francisco implemented the first green roof mandate in the United States in January 2017: San Francisco Better Roofs. The legislation is part of the Sustainable City initiative, and requires most new residential and non-residential buildings applying for building permits to designate 15 to 30 per cent of roof space for either a living roof or solar power generation, using an existing state law that requires a portion of roof space to be 'solar ready'.

A cost-benefit study conducted by engineering firm Arup demonstrated that, although the up-front cost of installing a living roof is higher, the extra expense is 'largely offset by the avoided one-time stormwater management equipment costs' and that a 'living roof provides net financial benefit to the building owner, while providing significant additional benefit to the tenants, and the broader community'.⁸⁸

The City of Denver has implemented an even more robust green roof requirement. From 1 January 2018, all new construction with a gross floor area greater than 25,000 square feet (2,323 square metres) must cover at least 20 per cent of available roof space with greenery. And this percentage increases as the building becomes larger. The measure was approved by popular vote and used much of the data from San Francisco's program, including the study by Arup, to demonstrate the viability of green rooftops and their benefits for building owners.

What needs to be done?

- 3.1 Strengthen regulations to support greening in new subdivisions and developments – to benefit human health and wellbeing, and increase biodiversity
- 3.2 Strengthen regulations to protect canopy trees
- 3.3 Encourage private landholders to protect and enhance the urban forest and expand greening activities by offering incentives for planting, installing and maintaining natural infrastructure

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Action 3.1: *Strengthen regulations to support greening in new subdivisions and developments – to benefit human health and wellbeing, and increase biodiversity*

Maintaining and enhancing the urban forest should be integral to urban planning, construction and financing. There should be more and larger green spaces in new developments in the right locations, and existing green spaces on private land should be protected through mechanisms such as amenity valuations for trees used by some councils. Strong leadership is required to strengthen planning policies, provisions and regulations, and to enforce them.

Action 3.2: *Strengthen regulations to protect canopy trees*

Enforcement measures, such as financial penalties, are currently insufficient to deter the unpermitted removal of canopy trees and other vegetation. Regulations to protect canopy trees should be strengthened and enforced. Financial penalties could be used for breaches of these regulations to better deter tree removal on private land.

Action 3.3: *Encourage private landholders to protect and enhance the urban forest and expand greening activities by offering incentives for planting, installing and maintaining natural infrastructure*

While a range of funding opportunities are available for greening work on public land, less effort has been made to increase greening on private land. Incentives for urban greening in the private realm will be important for reaching canopy targets. A range of incentives can be used to encourage private landholders to continue and increase their greening efforts.

Box 13 describes how the City of Chicago is encouraging green roofs. Incentives range from attaching benefits (such as zoning upgrades, faster processing of permits, and reduced stormwater requirements) to desired activities, to reducing fees when developers act to protect or increase planting, or install natural infrastructure. Other financial mechanisms are outlined in Action 6.

Box 13: Encouraging green roofs in Chicago

In the City of Chicago's recently updated Sustainable Development Policy, green roofs are an important component. The revisions include a new points-based system; the points required in order to be compliant are obtained in several different ways. These can include certifications or designations, such as meeting the WELL Building Standard or earning Energy Star recognition. Installing a green roof on the entire net roof area of a building earns 20 points, while adding a green roof may also earn a floor area ratio bonus under a separate program to encourage the creation of green roofs.

In 2001, the City of Chicago installed a pioneering green roof on top of its city hall, which was planted with a mix of grasses and native prairie plants. This was used as an experiment to discover whether similar roofs could be viable in Chicago. Researchers have found that the vegetation reduces rooftop temperatures by at least 70°F (about 21°C) compared to the adjacent tar roof, and increases biodiversity in the area. The roof reduces stormwater run-off, and continues to serve as a laboratory to test plant viability, new rooftop designs, and urban beekeeping.

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Action 4: Collaborate across sectors and regions

Encourage collaboration between sectors and regions, to protect and expand the urban forest by strengthening existing regional partnerships, and establishing new ones, and by accelerating greening efforts on private land

Why do we need to collaborate across sectors and regions?

Although work is under way to protect and expand the urban forest across Melbourne, the fragmentation of these efforts within and between municipalities is one of the most significant barriers to reaching our urban forest goals. Achieving collective action by bringing people and projects together offers greater benefits, opportunities and efficiency. Box 14 describes three global urban sustainability networks.

Box 14: Global urban sustainability networks

The urban century offers enormous opportunity for humanity. Melbourne's participation in three international urban sustainability networks – 100 Resilient Cities, The Nature Conservancy, and ICLEI: Local Governments for Sustainability – puts it at the forefront of a global trend: creating a shared regional vision for nature and human wellbeing through urban conservation planning.

To help cities incorporate nature into their urban plans, ICLEI, in collaboration with The Nature Conservancy and the International Union for Conservation of Nature, has created CitiesWithNature, a global platform for cities and other sub-national governments that recognise and wish to increase the value of nature in and around cities.

What needs to be done?

- 4.1 Capitalise on existing collaborations between local and state governments and the private sector
- 4.2 Mobilise broad community support
- 4.3 Support and develop existing and new methods to obtain and apply community knowledge
- 4.4 Foster and promote urban forest champions, in both the public and private sectors

Action 4.1: Capitalise on existing collaborations between local and state governments and the private sector

Several successful alliances and cross-organisational governance agreements already exist in different parts of Melbourne. These should be the starting point for building further collaborations and alliances for greening across the city, including Greening the West (see Box 15). Further examples of collaborative alliances can be found in Chapter 4 of the *Technical Report*.

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Box 15: Greening the West

Greening the West is a regional collaboration to help communities in Melbourne's west expand green spaces in parks, reserves, streetscapes, roofs and walls, backyards, car parks, sporting fields and waterways. A total of 23 organisations – local government authorities, Victorian Government departments and agencies, water utilities and community groups – work successfully together to protect and enhance the urban forest, sharing knowledge and promoting and scaling up practical solutions in western Melbourne. The value of this collaboration is that, to date, Greening the West has generated \$30 million worth of green infrastructure projects in the Western Region of Melbourne.

For further detail of Greening the West's activities, see Chapter 4 of the *Living Melbourne Technical Report*.

Action 4.2: Mobilise broad community support

Galvanising the support of urban forest practitioners and the public will be fundamental to protecting and expanding the urban forest. To do this we must:

- understand the community's perceptions of the urban forest
- build on and support existing community education and behaviour-change programs that inform, involve and empower the community to promote the urban forest
- develop information for community use that will inform private decision-making
- devise a universal message that supports a long-term campaign to raise public awareness of, and support for, the urban forest.

Positive messaging, supported by broad-based awareness and behaviour-change programs and campaigns – such as Clean Up Australia and Gardens for Wildlife (Box 16) – are needed to communicate the benefits of the urban forest to all. Partners should collaborate to frame messages that will inform and attract all parts of the community.

Box 16: Gardens for Wildlife

Gardens for Wildlife is a network of community groups and councils involved in caring for native plants and animals in urban areas. A good example of a community/council co-designed education and behaviour-change program which leads to active stewardship on private land, Gardens for Wildlife helps individual landowners protect remnant vegetation, improve habitat, and create havens for wildlife. Launched in 2006, the Knox City Council's Gardens for Wildlife program was designed to encourage residents to provide habitat and food sources for threatened wildlife (e.g. birds, insects, and frogs), by planting indigenous plants or suitable exotic species in their gardens. The program is a partnership with the Knox Environment Society and has more than 800 contributing households. Gardens for Wildlife Programs have recently been expanded across Victoria, and there are 25 municipal areas that are part of the network.

Action 4.3: Support and develop existing and new methods to obtain and apply community knowledge

Local communities can help urban forest efforts by gathering and sharing important data, so that we target our investment in the urban forest wisely. Data is already available from aerial photography, global positioning systems, and light detection and ranging systems. These tell us much about tree cover, distribution and types. But to obtain specific tree information, such

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as species and numbers, we need to involve citizen scientists and draw on Aboriginal ecological knowledge.

Action 4.4: Foster and promote urban forest champions, in both the public and private sectors

Fostering urban forest champions and leaders, as well as forging partnerships between government departments, non-government organisations and community will help to disseminate, and gain support for, our vision throughout the community.

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Action 5: Build a toolkit of resources to underpin implementation

Equip practitioners to protect and enhance the urban forest by building on existing resources and creating a shared toolkit to facilitate implementation of best practices

Why do we need a toolkit of resources?

A range of information and experience exists on actions to protect and enhance our urban forest. But this information is disparate and incomplete. Building on existing materials and preparing guidelines, standards and toolkits of resources are important to help assist the many contributors to the development, management and maintenance of the urban forest.

What needs to be done?

- 5.1 Build the capacity of public and private sector practitioners to protect, enhance and expand the urban forest
- 5.2 Build on, and develop new tools for public sector land managers
- 5.3 Build on, and develop new guidance materials for managing the capital and operational costs of urban forest endeavours

Action 5.1: Build the capacity of public and private sector practitioners to protect, enhance and expand the urban forest

There are many parties involved in maintaining and expanding a healthy, resilient urban forest. Helping practitioners identify, agree on and adopt best practice is central to the successful protection and expansion of our urban forest. To do this, we must update existing vegetation asset-management guidelines, and provide technical training in their application, building skills and capacity across both the public and private sectors.

Box 17: National capacity building for the urban forest

The 2020 Vision has facilitated a national network aiming to make our urban areas 20% greener by 2020. To achieve this they bring together industry, business, NGOs, government, academia and individuals, providing tools, resources and networks necessary to reach this shared goal.

To date, the project has produced several reports to assist practitioners, including a *How to Create an Urban Forest Guide* (2015) and *Where are all the Trees* (2014). Such programs that bring peers together to exchange and build knowledge have been and will be important to achieve our shared aspirations for a connected and enhanced urban forest.

Action 5.2: Build on, and develop new tools for public sector land managers

Further investment is required to improve existing tools, develop new tools and provide a centralised place for such resources, creating a 'how to' reference point for all aspects of project planning and action. In particular, we need:

- materials that will help involve the wider community and the land development industry, such as best practice guidelines and case studies
- clear and agreed procedures to attract involvement by private and semi-public utility companies

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- vegetation-management and associated technical training for staff of utility companies, to improve decision-making.

There is a growing list of open-source tools, resources and reference materials that practitioners can apply to their greening efforts.

The Clearwater program (Box 18) is an example of a centralised resource disseminating best practice across a sector.

Box 18: Clearwater

Integrated water management and water-sensitive urban design improve water quality, reduce risks to human life and property, help us use water resources more efficiently, and improve the ability of water to maintain and strengthen economic, social and cultural values. Hosted and funded by Melbourne Water, Clearwater is a capacity-building program that works with the water industry to transform the way we manage water for healthy, connected communities. Clearwater supports water professionals, organisations and the water sector by improving skills, increasing knowledge and facilitating networking across Victoria. Melbourne is recognised as a world leader in urban water management, in part due to active collaboration and dissemination of best practice.⁸⁹ A similar approach is required if we are to realise the full benefits of the urban forest.

Action 5.3 Build on, and develop new guidance materials for managing the capital and operational costs of urban forest endeavours

Managing, maintaining and expanding the urban forest require significant capital and operational expenditure. Currently, every council contributes to the urban forest. It is estimated, based on data provided by councils, that that in 2017–18 between \$256 million and \$384 million – approximately \$8–\$12 million per council – was spent on the urban forest. Guidance on current and projected future costs will help all parties forecast future funding requirements more accurately, identify any unnecessary or unreasonable expenditures, and bring efficiencies in funding the urban forest.

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Action 6: Fund the protection and enhancement of the urban forest

Establish a set of funding and financing options to suit different types of urban forest action

Why do we need to fund the protection and enhancement of the urban forest?

Protecting and expanding the urban forest to connect natural habitats, create natural infrastructure and reach agreed targets requires a variety of greening actions, which inevitably need to be funded. Over the past several decades, the scientific evidence for the ecological, health and economic benefits of urban nature and natural infrastructure has become clearer. Estimates undertaken as part of developing this strategy, drawn from existing government and peer-reviewed sources, suggest that Melburnians already enjoy benefits from nature valued at close to \$5 billion dollars per annum. These benefits – known as ecosystem services – include improved air quality, flood risk reduction, climate change mitigation and reduced heat. Further information about the value of the metropolitan urban forest is provided in Chapter 10 of the *Technical Report*.

Reaching the canopy and broader vegetation targets set out in Action 2 will require an estimated investment of \$1 billion over the next 30 years, with the bulk of this investment to be made in the decade to 2030.

This funding is needed for:

- protecting and maintaining Melbourne's existing urban forest, including:
 - the protection of native vegetation (including grasslands), including through compliance and enforcement
 - operational management
 - replacement plantings
 - new plantings that increase the extent, diversity and quality of the urban forest on public land (such as parks, conservation reserves, other open spaces, road reserves and streetscapes) and on private land
 - the development of natural infrastructure, including as part of the Local Government Road Renewal Program and other asset replacement programs
- other complementary activities that maintain, expand and enhance the urban forest including:
 - community engagement and behaviour-change activities
 - new programs to drive good governance and collective impact
 - innovation and research, monitoring and evaluation
 - professional education and training
 - the involvement of the property industry and other industries to deliver the urban forest on private land

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What needs to be done?

- 6.1 Identify and secure long-term financing to realise the *Living Melbourne* vision
- 6.2 Provide grants and funding opportunities for specific sites

Action 6.1: Identify and secure long-term financing to realise the *Living Melbourne* vision **Identifying financing opportunities**

A range of financing tools will be required to achieve the goals of the *Living Melbourne* strategy. These sources range in scale and complexity from conventional government budget appropriations and philanthropy to public-private partnerships, ecosystem service payments, performance-based incentives and hybrid instruments that feature a range of revenue streams.

Importantly, the strategy recommends that at least 30% of the additional canopy and shrub cover planted to achieve targets should be on private land. To that end an important focus will be the design and implementation of financing tools that resolve the 'split incentives' that arise from public benefits (like wildlife habitat and improved air quality) being delivered on private property.

Collaborative work will continue with stakeholders and the private sector to identify and prioritise a suite of urban forest financing tools that can be implemented across metropolitan Melbourne. Examples of prospective financing tools that could be investigated further are outlined below.

While a significant injection of funds is required to achieve the ambitions of this strategy in the early years, land managers – both public and private – will need to consider how funds are used to support long-term maintenance. Although natural infrastructure generally becomes stronger and more valuable over time, it does require maintenance. Such work provides additional job opportunities and, particularly if tied to social procurement, can mean that the urban forest brings even greater and broader socio-economic benefits.

A Living Melbourne Sustainable Development Bond

As described earlier in the strategy, *Living Melbourne* supports seven of the United Nations' 17 Sustainable Development Goals (SDGs). Investment bonds linked to the SDGs could be a cost-effective way to obtain the funds needed to implement the actions recommended throughout this strategy.

A Living Melbourne Sustainable Development Bond would enable private sector investors, including philanthropic funds and endowments, to earn a financial return in exchange for providing financial capital for the urban forest. There is increasing global demand for these types of investments. In 2018, ANZ bank launched a €750 million SDG Bond to fund loans and expenditures that directly promote nine of the United Nations' 17 SDGs. The proceeds are intended to support projects that deliver social, economic and environmental benefits including funding for hospitals, schools, green buildings, clean water, public transport systems or clean energy.

Bonds are frequently underwritten by governments. Based on information from investors worldwide, a AAA-rated bond from an Australian government authority (whether state or federal) linked to the SDGs would be highly attractive to institutional investors.

A proportion of these funds could be made available to local government authorities, with other funds used to encourage planting, greening and water-sensitive urban design on large private landholdings. In notable cases funds could also support the acquisition of land to protect places of exceptionally high conservation value.

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Carbon finance

Domestic and international carbon emissions markets – while still relatively nascent – continue to emerge as an opportunity for financing reforestation. More than 50 countries have implemented some form of carbon pricing or carbon market. According to the World Bank, in 2018 the value of global carbon emissions pricing and trade topped \$110 billion, an increase of 52% in two years.

A partnership project will be initiated to explore opportunities to quantify and package local benefits that align with the ambitions of this strategy. The local benefits can be linked with voluntary carbon credits to attract new funding streams to new metropolitan greening work.

Corporations, government and other actors could purchase carbon credits to offset carbon emissions into the future, while also achieving local biodiversity benefits today. As changes occur in the regulated carbon market in Australia and globally post the 2020 review of the Paris Agreement, offset mechanisms would be able to evolve with those changes.

A number of carbon initiatives are already being explored in the Melbourne metropolitan area. In addition, some organisations already manage rural and regional carbon offset programs that could be adapted for the urban forest.

Action 6.2: *Provide grants and funding opportunities for specific sites*

To involve *all* of metropolitan Melbourne, it is not enough to target only larger institutions and those already able to comply with the kinds of monitoring and evaluation required for large investments. We also need a range of grants and other targeted funding mechanisms for smaller-scale and community efforts. Box 18 provides an example of a specific smaller-scale initiative — the City of Melbourne Urban Forest Fund (Box 19).

Box 19: **The Urban Forest Fund – Greening Howlett Street**

The City of Melbourne Urban Forest Fund provides financial support for new greening projects that otherwise would not be funded, such as green spaces, tree planting, vertical greening, or green roofs.

Approximately 75% of land in the City of Melbourne is privately owned or managed, offering huge potential for the private realm to contribute more towards greening our city. The Urban Forest Fund aims to build partnerships between government and the private sector to achieve greening above and beyond existing Council capital works investment. Established in 2017 with \$1.2 million in seed funding, the Urban Forest Fund will be increased by contributions from organisations and individuals who want to create a greener city.

One of the first partnership grants went to the 45-apartment Howlett Street complex in Kensington. The site currently has very little greenery, often floods and – despite having an outdoor public common area that connects two streets – sees little interaction between residents. With the support of a \$200,000 grant, residents have come together to create a project that will not only bring greening benefits, but also create rich and cohesive spaces for Howlett Street residents and the entire neighbourhood.

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Implementing the strategy

The *Living Melbourne* strategy has been prepared by The Nature Conservancy and Resilient Melbourne and on behalf of many partners across metropolitan Melbourne. To achieve its vision of thriving communities that are resilient and connected through nature, all sectors and regions have a role to play. Local government authorities across the metropolitan region will continue to perform an invaluable role as managers and custodians of many of the parks, streetscapes and open spaces that form a fundamental part of our urban forest. Their involvement is also essential for working with residents and the broader community to generate local action.

The Victorian Government, including its many departments and agencies, is leading initiatives such as Action 91 of *Plan Melbourne*, and the forthcoming Metropolitan Open Space Strategy, both of which will be central to the metropolitan-wide approach set out in *Living Melbourne*. State government authorities such as VicTrack, Department of Transport, Major Transport Infrastructure Authority, Parks Victoria and Melbourne Water, all of which design and manage large tracts of public land, will play a critical role in protecting and expanding our urban forest.

Beyond the public sector, non-government and community organisations, private land owners and many others will need to disseminate information and galvanise support if we are to make the *Living Melbourne* vision a reality. The residents of Melbourne, who all benefit from, and have a vested interest in, the urban landscape, will be essential to the implementation of many actions of this strategy. 'Friends of' groups, Landcare, and communities of practice are already making significant contributions to urban greening.

It is hoped that this strategy provides the missing link for us to all work better together. The endorsing organisations named at the front of this document have committed to work in partnership towards its implementation. Together we will develop an implementation plan to start operationalising *Living Melbourne*. The following partners are already working in this space, support *Living Melbourne* and are committed to its implementation. This list is not exhaustive and we invite others to be involved.

Earthwatch Institute

Earthwatch is an international environmental research organisation that has been running citizen science projects since 1971. Their mission is to empower people to save the natural world as we understand that if society is to survive, we must live in balance with nature. Through their programs they enable scientific discovery (to solve solutions to environmental problems), increase knowledge (so people can make more informed decisions) and provide an experience (personally connecting people to the issue). It is these three things combined that empowers long term behaviour change. Earthwatch can help implement *Living Melbourne* by:

1. Assisting with raising support for the urban forest by the community and industry
2. Assisting in implementation of the green infrastructure
3. Ongoing monitoring and management of the urban forest
4. Behaviour change within the community, so they are empowered to protect and grow the urban forest

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The Greater Metropolitan Cemeteries Trust (GMCT)

Established by the Victorian Government, The Greater Metropolitan Cemeteries Trust (GMCT) is a community-focused organisation operating 21 cemeteries in the north, east and west of Melbourne, contributing more than 600 hectares of open public space to local communities.

The GMCT is investing judiciously and planning carefully to provide a variety of burial, interment and memorialisation options to meet the diverse needs of Melbourne's communities now and into the future. The Trust's healthy perpetual maintenance reserve, which provides for the ongoing maintenance and preservation of sites, ensures the long-term sustainability of its cemeteries and the organisation. As an architect of these places, GMCT designs cemeteries that reflect Melbourne's rich cultural diversity and support the customs, traditions and burial practices of its people, and contributes to Melbourne's urban forests.

GMCT members play a fundamental role in caring for those who have lost a loved one and looking after those they have lost. Their services provide comfort and closure to families and individuals in times of need and cemeteries provide peaceful places for commemoration and reflection for locals and visitors alike. The Trust aspires to invest in expanding the Melbourne urban forest and contribute to the implementation of *Living Melbourne*.

Australian Institute Landscape Architects

The Australian Institute of Landscape Architects (AILA) champions quality design for public open spaces, stronger communities and greater environmental stewardship. They provide their members – in urban and rural Australia, and overseas – with training, recognition and a community of practice to share knowledge, ideas and action.

With their members, they anticipate and develop a leading position on issues of concern in landscape architecture. Alongside government and allied professions, AILA works to improve the design, planning and management of the natural and built environment.

AILA represents over 3,500 (and growing) members throughout Australia and overseas. As a not-for-profit professional association, their role is to serve the mutual interests of our members and the wider profession.

Nursery and Garden Industry Victoria

Nursery and Garden Industry Victoria (NGIV), is the peak industry body for the state's horticultural sector. NGIV represents the interests of the Victorian horticulture industry. It is a sector worth over \$1.6 billion that employs more than 11 000 people and engages with over 3000 stakeholders, ranging from small family-based operations to multinational organisations. A high percentage of their members are involved in production (turf and greenlife) and retail nurseries, while others are involved in horticulture-allied trades, botanic gardens, educational institutions and other not-for-profit organisations, including government-aligned green enterprises.

NGIV maintains strong connections with its members and the wider industry, and remains committed to the continued success of Victoria's horticulture industry.

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Clean Air Urban and Landscapes Hub

The Clean Air Urban and Landscapes (CAUL) Hub is one of six research hubs supported by the National Environmental Science Program, which aims to assist decision-makers to understand, manage and conserve Australia's environment by funding world-class biodiversity and climate science. The programme focuses on collaborative, practical and applied research that informs on-ground action.

The mission of the CAUL Hub is to take a holistic view on the sustainability and liveability of urban environments. They are producing the evidence base and collaborative partnerships to deliver better cities. Their approach:

- Collaboration across disciplines to tackle complex problems
- Engagement and partnerships with government, private industry and citizens
- Rigorous research with real-world impact
- Highlighting Indigenous perspectives in cities

CitiesWithNature – ICLEI Cities Biodiversity Centre

CitiesWithNature is a unique initiative by founding partners ICLEI Cities Biodiversity Center, The Nature Conservancy (TNC) and The International Union for the Conservation of Nature (IUCN) that recognises and enhances the value of nature in and around cities across the world. It provides a shared platform for cities and their partners to engage, connect and work on shared commitment towards a more sustainable world.

Each city that joins CitiesWithNature will be invited and guided along a journey to share its policies, plans, commitments, actions and results related to nature and the services of ecosystems, facilitated through a series of pathways, each dealing with a thematic focus area around urban nature. This will become a powerful resource where cities can connect, share, learn from and inspire each other to accelerate actions and raise ambitions.

2020 Vision

The 2020 Vision has facilitated a national network aiming to make our urban areas 20 per cent greener by 2020. To achieve this they bring together industry, business, NGOs, government, academia and individuals, providing tools, resources and networks necessary to reach this shared goal.

To date, the project has produced several reports to assist practitioners, including a *How to Create an Urban Forest Guide* (2015) and *Where are all the Trees* (2014). Such programs that bring peers together to exchange and build knowledge have been and will be important to achieve our shared aspirations for a connected and enhanced urban forest.

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Glossary

Biodiversity	<i>Living Melbourne</i> uses the definition of biodiversity given in <i>Protecting Victoria's Environment: Biodiversity 2037</i> : 'all components of the living world: the number and variety of plants, animals and other living things (including fungi and micro-organisms) across our land, rivers, coast, and ocean. It includes the diversity of their genetic information, the habitats and ecosystems within which they live, and their connections with other life forms and the natural world'.
Connectivity	The capacity of plants, animals and other living things to move between disjunct landscape elements such as habitat patches, lakes and streams.
Cool spot	Where the land surface temperature is < 0°C cooler than non-urban conditions based on an estimation of how different the temperature is in a location relative to the temperature that would be there in the absence of urban development (areas that are equal to or below their estimated non-urban baseline temperature). This may include areas such as larger parks, waterbodies and waterways.
Cooling intensity	The reduction in average air temperature under a tree canopy compared to the temperature outside the patch covered by the canopy, expressed in degrees Celsius.
Extinction debt	The future extinction of a species due to events in the past.
Green infrastructure	The green spaces and water systems that intersperse, connect and provide life support for humans and other species in urban environments. Green infrastructure ranges in scale from residential gardens to local parks and housing estates, streetscapes and highway verges, services and communications corridors, waterways and regional recreation areas. Green infrastructure has many benefits for society and the environment.
Habitat	All the physical and biological things that collectively make up the place where a plant or animal lives.
Grey infrastructure	Human-built physical structures and systems, such as buildings, water and electrical supply, sewers, stormwater drains, dams, reservoirs, fences, paths, roads and bridges.
Hot spot	Where the land surface temperature is > 10°C warmer than non-urban conditions based on an estimation of how different the temperature is in a location relative to the temperature that would be there in the absence of urban development. This may include areas of concentrated heat retention, such as major roads, commercial and industrial centres, and new residential subdivisions.
Integrated water management	Collaborative planning that brings together organisations that influence all elements of the water cycle, including waterways and bays, wastewater management, alternative and potable water supply, stormwater management and water treatment.

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Metropolitan Melbourne	<p>The geographical area that defines Melbourne as a city and the capital of the state of Victoria.</p> <p>Metropolitan Melbourne is made up of 32 local councils: Banyule, Bayside, Boroondara, Brimbank, Cardinia, Casey, Darebin, Frankston, Glen Eira, Greater Dandenong, Hobson's Bay, Hume, Kingston, Knox, Manningham, Maribymong, Maroondah, Melbourne, Melton, Mitchell, Monash, Moonee Valley, Moreland, Mornington Peninsula, Nillumbik, Port Phillip, Stonnington, Whitehorse, Whittlesea, Wyndham, Yarra, and Yarra Ranges.</p>
Natural infrastructure	<p>Strategically planned and managed network of natural lands, such as forests and wetlands, working landscapes, and other open spaces that conserves or enhances ecosystem values and functions and provides associated benefits to human populations.⁹⁰</p>
Permeability	<p>The readiness with which a surface, whether man-made (such as a paved road) or natural (such as soil or rock) allows water, air or plant roots to penetrate or pass through.</p>
Riparian	<p>The interface between land and a river or stream; land alongside creeks, streams, gullies, rivers and wetlands.</p>
Threatened species	<p>Species of plants, animals or other life forms that are considered either vulnerable, endangered, and critically endangered.</p>
Tree canopy	<p>The uppermost trees or branches of trees in a forest, forming an almost continuous layer of foliage. The topmost layer of bioactivity in a forest setting.</p>
Urban forest	<p>All of the trees and other vegetation – and the soil and water that support them – in a municipality. Urban forest incorporates vegetation in streets, parks, gardens, plazas, campuses, river and creek embankments, wetlands, railway corridors, community gardens, green walls, balconies and roofs.</p>
Urban green infrastructure	<p>An interconnected network of green spaces in an urban area that conserves natural ecosystem values and functions, and provides associated benefits to human populations.</p>
Urban heat island effect	<p>The phenomenon of dense urban areas having significantly warmer air and land surface temperatures than surrounding rural areas.</p>
Water-sensitive urban design	<p>Integrated design of the water cycle, incorporating water supply, wastewater, stormwater and groundwater management, urban design and environmental protection. It sees all water as a resource to be managed to improve the environment, the economy, and liveability.</p>

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9.2.1 – ATTACHMENT 2. Endorsement of Living Melbourne Form

Report to the: *Whitehorse Ordinary Council Meeting*

Agenda item:

Endorsement of Living Melbourne: Our metropolitan Urban Forest Strategy

Date: 15 April 2019

Purpose and background

- The purpose of this report is to seek Whitehorse City Council endorsement of *Living Melbourne: our metropolitan urban forest* strategy developed by The Nature Conservancy and Resilient Melbourne with input from metropolitan councils, the Victorian government, statutory authorities, academics and others (*Attachment 2*). Endorsement of *Living Melbourne* means support for *Living Melbourne's* Vision, Goals and Actions and a commitment to work in partnership with the other endorsing organisations towards its implementation.
- Resilient Melbourne was instigated by the 100 Resilient Cities (100RC) initiative, pioneered by The Rockefeller Foundation in 2015. This global initiative aims to help cities around the world become more resilient to the physical, social and economic challenges that are a growing part of the 21st century. Melbourne was selected from 372 applicant cities around the world to be in the first wave of 33 cities to join the network.
 1. Following significant engagement across metropolitan Melbourne, including all local councils, Victorian government, and many other stakeholders, the Resilient Melbourne strategy was released in May 2016 – the first ever metropolitan-wide strategy led by local government. While still part of the 100RC network, Resilient Melbourne is 100% locally owned and funded.
 2. 100 Resilient Cities – pioneered by the Rockefeller Foundation, has invested significantly in the development of *Living Melbourne* by facilitating pro-bono services to the project, including project partner The Nature Conservancy, satellite imagery from Digital Globe, and data analysis and software provided by Trimble.
- Urban forest initiatives have been established by several metropolitan Melbourne local governments, the Victorian government, non-governmental and community organisations, private land owners and others to protect and enhance Melbourne's metropolitan urban forest. What has been missing until now is a way for this work to be coordinated and supported at a metropolitan scale. The purpose of *Living Melbourne* is to galvanise support for a collaborative effort across sectors and organisations, jurisdictions and land tenures.
- *Living Melbourne: our metropolitan urban forest* strategy is supported by *Living Melbourne: Technical report*. The technical report (*Attachment 3*) provides technical evidence underpinning the strategy - both are intended to be read as stand alone documents.

Key issues

- As a flagship action of the Resilient Melbourne strategy, *Living Melbourne* provides a business case for nature as a driver of urban resilience and liveability. Its proposed framework aims to assist metropolitan Melbourne, and its communities, adapt, survive and thrive in the face of acute shocks and chronic stresses challenging our city, both now and in the future.
- The *Living Melbourne* strategic framework includes a vision; *our thriving communities are resilient and connected through nature*, three goals; *healthy people, abundant nature and natural infrastructure*, and six key actions; 1) *Protect, restore species habitat and enhance connectivity*, 2) *Set targets and track progress*, 3) *Scale up greening the private realm*, 4) *Collaborate across sectors and regions*, 5) *Build a toolkit of resources to underpin implementation* and 6) *Fund the protection and enhancement of the urban forest*.
- Endorsement of the strategy supports the *Whitehorse City Council* Vision "We aspire to be a healthy, vibrant, prosperous and sustainable community supported by strong leadership and community partnerships" and the Council Plan Objectives as follows:
 - Support a healthy, vibrant, inclusive and diverse community
 - Maintain and enhance our built environment to ensure a liveable and sustainable city
 - Protect and enhance our open spaces and natural environments

Attachments:

1. Supporting Attachment

1

9.2.1 – ATTACHMENT 2. Endorsement of Living Melbourne Form

- Benefits for endorsing organisations include the following: Licence to host mapping derivatives on website; use of satellite imagery for internal use; co-branding plus logo placement in final designed version of *Living Melbourne*, access to future financial investment for actions and aligned media opportunities, opportunity to demonstrate collective leadership regarding Melbourne's future liveability and opportunity to leverage collective metropolitan support to extend existing work.
- *Living Melbourne* has been developed with the assistance of a broad range of stakeholders, coupled with advice from a Senior Reference Group ([Attachment 1](#)) and a Technical Advisory Group. Extensive consultation on the document occurred from December 2018 to March 2019, with 36 organisations providing feedback in Round One and 18 providing feedback in Round Two. Further information regarding the stakeholder engagement process is provided in [Attachment 1](#).

Recommendation from management

4. That Whitehorse City Council:
 - 4.1. Endorses *Living Melbourne: our metropolitan urban forest* which means supporting *Living Melbourne's* Vision, Goals and Actions and committing to work in partnership with the other endorsing organisations towards its implementation; and
 - 4.2. Authorises the use of *Whitehorse City Council* logo to appear as an endorsing organisation in the designed version of *Living Melbourne* which will be launched in June 2019.

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Attachment 1
Agenda item

Supporting Attachment

Legal

1. *Living Melbourne* is not a legislative requirement nor does it diminish individual council's rights or ability to develop localised urban forest approaches. It is aligned with the Victorian Government's Action 91 in Plan Melbourne and aligned with existing visions and objectives, of endorsing organisations.

Finance

2. There is no requirement for endorsing organisations to commit funding alongside endorsement. Action 6 of *Living Melbourne* outlines work being undertaken to raise and leverage finance for its implementation.

Conflict of interest

3. No member of Council staff, or other person engaged under a contract, involved in advising on or preparing this report has declared a direct or indirect interest in relation to the matter of the report.

Occupational Health and Safety

4. In developing this proposal, the health benefits of our metropolitan urban forest have been identified.

Stakeholder consultation

1. *Living Melbourne* has been developed with a broad range of stakeholders, coupled with advice from a Senior Reference Group and a Technical Advisory Group.
 - 1.1. The Senior Reference Group included: Department Environment Land Water and Planning, City of Brimbank, The Nature Conservancy, Melbourne Water, City of Monash, City of Stonnington, Resilient Melbourne, City of Frankston, City of Melbourne, Parks Victoria, City of Hume.
2. Stakeholder involvement included a series of workshops to guide development of the strategy, incorporate stakeholder perspectives and review the strategy as it progressed and was finalised. The four major workshops focused on:
 1. Establishing the baseline and setting the initial vision;
 2. Developing the strategic foundation;
 3. Technical evidence to guide the strategy; and
 4. Draft strategy framing and development.
3. Stakeholders who contributed to the development of *Living Melbourne* include metropolitan Melbourne local government authorities, Victorian Government departments and statutory agencies, technical experts, land managers, policy makers, planners, academics developers and some community representatives (see the Acknowledgements section within *Living Melbourne* for a full list).
 - 3.1. Round 1 consultation on the early draft *Living Melbourne* strategy occurred December 2018 – January 2019. The draft *Living Melbourne* strategy was circulated to over 60 organisations, including all metropolitan councils, relevant Victorian Government departments and agencies, as well as a range of statutory authorities. Insightful, constructive feedback was received from 36 organisations, totalling 640 individual items of feedback demonstrating their commitment to *Living Melbourne* and involvement in its release and implementation.
 - 3.2. Melbourne Water circulated information inviting Healthy Waterways stakeholders (community organisations and community members) to respond to a questionnaire on *Living Melbourne*. 100% of respondents either strongly agreed or agreed with a metropolitan wide approach to improve greening efforts and better protect nature across Melbourne. 100% of respondents either strongly agreed or agreed with the vision and goals of the *Living Melbourne* strategy and 100% of respondents stated they would be likely to recommend that their local council endorses *Living Melbourne*.
 - 3.3. A stakeholder briefing session was held on 13 February 2019 to provide an update on *Living Melbourne* for endorsing organisations plus additional organisations involved in *Living Melbourne*'s development.
 - 3.4. Round 2 consultation on the draft strategy occurred from 22 February 2019 to 15 March 2019. Round 2 consultation asked organisations what needed to change in order for them to support or endorse the strategy. We received over 130 mostly positive comments from 18 organisations, with no submissions

9.2.1 – ATTACHMENT 2. Endorsement of Living Melbourne Form

indicating a reticence to endorse. Overall stakeholders have indicated their support for the collective approach that *Living Melbourne* is proposing.

- 3.5. *Living Melbourne* responded to feedback and updated the strategy to ensure the final version is representative of the needs of the diverse partnership.
4. Endorsement for *Living Melbourne* is being sought from the following organisations which have been involved in its development:
- 32 metropolitan Melbourne Local Government Authorities
 - Victorian Government – through DELWP)
 - Municipal Association Victoria
 - Melbourne Water
 - Yarra Valley Water
 - South East Water
 - City West Water
 - Parks Victoria
 - Vic Roads
 - Victorian Planning Authority
 - Australian Institute of Landscape Architects
 - Environment Protection Authority
 - Port Phillip and Westernport Catchment Management Authority

Relation to Council policy

5. The following Council policies are consistent with *Living Melbourne*:
- 4.1. The Whitehorse Planning Scheme
 - 4.2. The Whitehorse Health and Wellbeing Plan
 - 4.3. The Whitehorse Urban Forest Strategy 2018
 - 4.4. The Whitehorse Urban Biodiversity Strategy 2014

Environmental sustainability

5. In developing *Living Melbourne*, the following environmental sustainability matters have been considered:
- 5.1. *Living Melbourne* considers the current and future threats to Melbourne's liveability and proposes actions to extend and improve the metropolitan urban forest to both mitigate impacts and provide a long term strategic approach for its future sustainability.